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***Deliverable 13 – Final User Interface Report:  
The Evaluation Plan***

Authors: Colette Nicolle, David Poulson,  
(Loughborough University)  
Katharine Black, Mike Clarke, Andrew Lysley  
(ACE Centre),  
Tina Magnuson (KTH)

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## Executive Summary

This document provides an overview of the entire evaluation strategy for the project. Although a Workpackage 4 activity (User Interface: design and models for evaluation), this work has been accomplished in close collaboration, in fact virtual integration, with the activities and team members of Workpackage 1, User Involvement and Evaluation. It includes all of the detailed evaluation methods and tools, which were instrumental in developing the final user interface of the WWAAC software. The Evaluation Plan has been developed and regularly refined over the course of the project to cover the following phases:

- Simulation Study Set-up (documented as i3)
- User Evaluation Set-up, Alpha version (documented as i10)
- User Evaluation Set-up, Beta version (documented as i14)
- Detailed plans for the User Consultations and Longitudinal Studies (documented for the first time in this deliverable).

The primary target population is described as end-users aged between 12 and 25 years (revised from the original range of 10-21 years), who use graphic symbol-based augmentative and alternative communication (AAC) systems to support their face-to-face interaction. Such individuals are likely to also use symbols in written message construction.

The Overall Assessment Criteria are discussed in relation to the accessibility and usability of the software by these target users, and it is stressed that traditional evaluation models may not always be appropriate for people with complex communication needs. The population of AAC users is a heterogeneous one and variation is common in both performance in the use of technology, as well as in an individual's performance over time. This makes traditional quantitative approaches to data capture, for example time to complete a task, difficult to apply in this sector, and suggests that a productive approach to evaluation in the AAC field is one based on more individualistic and qualitative evaluation.

It is also important to emphasise that risk assessment and contingency plans to overcome any risks form an important part of the evaluation planning. Potential pitfalls can be due to human, technical or environmental reasons, as well as conflicting agendas of the needs of the technical team and the evaluators. On the one hand, rapid prototyping and informal iterative feedback loops are required to advance the software, but in contrast, evaluators need stable, frozen software which can be rigorously evaluated with end-users. Finding solutions to such potential pitfalls or contradictory agendas are only possible when the technical and evaluation teams are able to communicate effectively and work in harmony, as is the case in the WWAAC project. This has meant that the evaluation methods and tools have had to be applied with a great deal of flexibility.

The evaluation methods and techniques chosen to be used in the WWAAC project are described. Individual and workshop settings are recommended, but allowing a certain degree of flexibility depending on a user's needs and circumstances. All the associated tools are contained within the Appendices. Essentially the evaluation consists of 8 main phases:

- Simulation Study
- Evaluation of the WWAAC Web Browser, Alpha Version
- Evaluation of the WWAAC Email program, Alpha Version

- Pilot Evaluation of the Linguistic Support module
- Evaluation of the Browser and Email software, Beta Version
- Longitudinal Case Study of the Browser (WWB) and the Email (WEM)
- Longitudinal Case Study of the Supportive Writing software (WSW)
- Additional Investigations, or User Consultations

The results of each phase of these evaluation activities will be fed back to the WWAAC consortium as a basis for discussion and further refinement of the WWAAC software. The results are presented as a Workpackage 1 activity in a separate deliverable, D11, the Final User Evaluation Report.

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## 1. INTRODUCTION

The aim of Workpackage 4, *User Interface: Design and models for evaluation*, is to develop sound and effective approaches to ensure effective user involvement at each stage of the design and evaluation of the WWAAC software. This work has been accomplished in close collaboration, in fact virtual integration, with the activities and team members of Workpackage 1, User Involvement and Evaluation.

The first phase of user involvement was the identification of the users' requirements (Workpackage 1, Task 1.1), documented in Deliverable 2, User Requirements Document, which also contained the required methods and tools developed in its closely related Workpackage 4. This document now provides an overview of the entire evaluation strategy for the project. It includes all of the detailed user evaluation methods and tools used over the course of the project, which were instrumental in developing the final user interface of the WWAAC software. The Evaluation Plan has been developed and regularly refined over the course of the project to cover the following phases:

- Simulation Study Set-up (documented as i3)
- User Evaluation Set-up, Alpha version (documented as i10)
- User Evaluation Set-up, Beta version (documented as i14)
- Detailed plans for the User Consultations and Longitudinal Studies (documented for the first time in this deliverable).

Section 2 describes the target user population of the project and the specific criteria for inclusion in the evaluation process.

Section 3 provides an overview of the overall assessment criteria used in the project

Section 4 provides an overview and discussion of the overall evaluation methods and techniques used in each phase of the evaluation.

Section 5 covers the set-up of the Simulator Study (originally documented as i3), with tools found in Appendix 3.

Section 6 covers the user evaluation set-up of the Alpha version of the WWAAC Web Browser (WWB) and WWAAC Email software (WEM), with tools found in Appendix 4.

Section 7 describes the pilot evaluation set-up for the linguistic support module, with tools found in Appendix 5.

Section 8 covers the user evaluation set-up of the Beta version of the WWB and WEM, with tools found in Appendix 4 (updated and refined over the course of the alpha and beta trials).

Section 9 describes the methods and tools for the longitudinal case studies of the WWB and WEM, with tools found in Appendix 6.

Section 10 describes the specific methods and tools for the longitudinal trials of the WWAAC Supportive Writing software (WSW), with tools found in Appendix 7.

Finally Section 11 describes the methods used for the user consultation phase of the project, with tools found in Appendix 8.

The results of each phase of these evaluation activities will be fed back to the WWAAC consortium as a basis for discussion and further refinement of the WWAAC software. The results are presented as a Workpackage 1 activity in a separate deliverable, D11, the Final User Evaluation Report.

## 2. TARGET USER GROUPS

A central aim of the WWAAC project is the development of applications that will support the manipulation of symbols in a web-based environment. The key applications that will be evaluated are an adapted web browser, an adapted email application, and a supportive tool for symbol-to-correct-text production. It is hypothesised that developing these applications towards efficient and functional usability will be served best by evaluation practices involving individuals with complex communication needs who rely upon symbol systems in communication. Such applications must also satisfy the accessibility requirements of those with significant physical disabilities, and so we will seek to involve individuals who have a variety of access needs.

The primary target population of end users identified as participants in detailed evaluation practices are: people who use graphic symbol-based augmentative and alternative communication (AAC) systems to support their face-to-face interaction. Such individuals are likely to also use symbols in written message construction. We had initially decided to focus upon young people aged between 10 and 21 years who are professionally supported in their use of AAC and the Internet within school / college or receiving non-professional support at home. This age group was considered highly likely to be motivated in the use of Internet technology, in line with their non-disabled peers. In the UK, for example, the National Curriculum introduces the Internet to children by age 10-11.

In November 2003 a decision was taken by the evaluation team to shift the age range slightly from young people aged between 10 and 21 years to young people aged between 12 and 25 years. All other definitions of our primary target group remain unchanged. This decision was taken for largely practical reasons. Recruitment of users who have just left college was sometimes found to be easier than recruitment of users who are within the education system. In addition, no evaluators had managed to identify users below the age of 13 for inclusion in the alpha and beta evaluation process.

The population of adults using graphic symbol based AAC is likely to meet inclusion criteria. However, the question of motivation in Internet use was considered less predictable than for younger people, particularly those in education. Consequently, this older group has been identified as a secondary group for inclusion in this study and will be investigated during the user consultation phase.

In addition, evaluation will seek to involve a broad spectrum of potential end users who may benefit from easier access to the Internet, including: people who use other forms of AAC, people with learning disabilities who may use symbols to support their literacy, people with aphasia, 'naturally speaking' young children, and the general aging population.

### 2.1 Specific Criteria For Inclusion In Detailed Evaluation Practices

In adopting a social model of disability, inclusion criteria are described according to the demands of the tasks involved rather than person centred measures of

impairment. Consequently, the study will identify people using graphic symbol based AAC who have:

### ***Cognition and language understanding***

- receptive language abilities sufficient to understand discussion concerning strengths and weaknesses of technology
- cognitive abilities such that they are able to think about, and understand, abstract concepts such as email
- language / cognitive abilities such that they understand basic sentence / phrase structure

### ***Expressive communication***

- There are no strict criteria concerning prerequisite abilities in the context of face-to-face conversation. However, to be part of the primary target group, some form of symbol based AAC will be being used to support face-to-face interaction.

### ***Literacy***

- When testing the symbol-to-text support systems, we aim to recruit end users who have experience in using symbol combinations in writing activities, in particular for the evaluation of the email application.

### ***Sensory abilities***

- adequate visual acuity and visual processing abilities to work with pictures, symbols and/or simple text on a computer screen.
- functionally useful hearing (included aided hearing)

### ***Access methods***

We aim to recruit end users who use a variety of access methods, including:

- direct (including those using head pointing methods)
- switch access (1 and 2 switches)

A pro-forma for documenting individual end user's capability is included in Appendix 1.

### 3. OVERALL ASSESSMENT CRITERIA

The scope of this document focuses on user related assessment criteria and therefore does not include technical quality assurance activities designed to ensure that the software is operating reliably and to specification. These activities are the remit of quality assurance testing within the technical development phase of the project. Rather, this document describes the user-based evaluation activities, providing users and experts in the AAC sector with exposure to the software being developed by the project, and providing an opportunity for further refinement of design.

It is also important to emphasise that risk assessment and contingency plans to overcome any risks form a crucial part of evaluation planning. The ideal trial is not always possible, and compromises may have to be made for reasons related to human, technical or environmental conditions. Furthermore, in software development projects there can be conflicting agendas between the needs of the technical team and the evaluators. On the one hand, rapid prototyping and informal iterative feedback loops are required to advance the software, but in contrast, evaluators need stable, frozen software which can be rigorously evaluated with end-users. In developing the formal evaluation protocols, methods and tools found in this deliverable, the *caveat* has always been that the approach must be very flexible in order to accommodate the users and their requirements. In addition, the approach has to be flexible so that it can easily be adapted to the current version of the software if, for example, there are any technical difficulties over the course of the user trials. Finding solutions to such contradictory agendas and potential pitfalls are only possible when the technical and evaluation teams are able to communicate effectively and work in harmony, as is the case in the WWAAC project.

Many methods of evaluating software have been developed, and the method chosen will depend on a number of factors: the stage of development of the software, the extent of user involvement, expertise and resources available, and the desired outcome. The use of more than one method is also recommended, and in the case of the WWAAC project, the methods will vary across the different aspects of the evaluation—the linguistic support before and after integration with the email will need to be evaluated differently from the browser and email software.

The appropriate number of users is an issue which needs to be resolved in the planning phase. Often these decisions must be based upon the practical constraints of project time scales and resources, but having at least 4-6 participants is always advisable (Poulson et al., 1996). Landauer (1988) points out that the number of observations depends on the degree of precision that is required for the kinds of conclusions to be drawn and the variability of the behaviour being measured. If the responses of the different participants differ considerably, then this would be an indication that there is likely to be a large variation in the way that the population will respond to the software, and the trials may have to be extended to include more subjects. If, however, all the subjects tend to respond in the same way, then it is likely that the results of the trial are fairly representative, and that a greater number is not needed.

Preece, et al (2002) and Nielsen (1997) both emphasise the importance of involving appropriate users and that they are representative of the intended users of the system. Preece et al also recognise that there is never enough time to do evaluations as you would ideally like, so you may have to compromise with the resources and the time available. However, a precise number of users is not recommended. Nielsen (1997) discusses the payoff ratio between the benefits and the costs for user tests, and suggests that, in principle, one should keep testing as long as the benefit from one additional test user is greater than the cost of running that user. However, Nielsen also accepts a 'discount usability' approach which would allow very few test users. For example, he illustrates that after a usability test with perhaps 3-4 users, many of the observations will be the same, either because several observers made the same comment or because several users are encountering the same usability problems. Thus, the 'law of diminishing returns' may mean that no new issues will appear simply by increasing the number of users.

Ensuring that a representative sample of users is obtained can, however, be particularly problematic when conducting trials with elderly and disabled people, as they represent a very heterogeneous group. In performing extensive user trials with people with disabilities, it is suggested that a combination of different assessment measures are used. Also, a less than perfect design for studies may sometimes have to be used, the argument being that users' endurance may be limited and that such a compromise is therefore acceptable (Shaw, 1993). In the WWAAC evaluation, it is envisaged that those users who present the greatest challenge to the software will be selected by identifying those with the perceived greatest and most complex needs. Naturally it is better to oversample, but it will be possible, even with low numbers of users, to understand this subset of AAC users with reasonable certainty.

One of the main distinctions between categories of users is between novice and expert (Nielsen, 1997). The longitudinal trials will be an attempt to replicate 'natural' usage with the novice user moving to intermediate and then expert stage, and from dependent to independent usage. It is expected that as the user becomes more competent, new difficulties may be revealed.

The length of an ideal longitudinal study is debatable, but the word 'substantial' is usually used in its definition. According to the Center for Research on Information Technology and Organizations, University of California, the length of a longitudinal study is determined by the expected behaviour of the unit or units being studied . . . and the length and number of data collection periods will vary across designs (Venkatesh and Vitalari, 1991).

Venkatesh and Vitalari (1991) also point out that the data used in longitudinal studies may be quantitative or qualitative, and that small samples are acceptable for a given information technology due to rarity in population, e.g. strategic information systems, cooperative work systems, etc. They also emphasise that 'the ideal sample is almost never possible due to constraints and environmental factors beyond the researcher's control.' It is suggested that researchers should always plan to oversample in order to deal with non-responses in setting up the study and also the decisions on the part of some users to discontinue participation in the study. This is

known as attrition and can be due to factors such as mobility, mortality, system malfunctions, or just a loss of interest in the study. Moreover, Venkatesh and Vitalari argue that the combination of oversampling and a rare population may argue for the use of an availability sample with the usual caveats that one must be careful when generalising the results. All these issues must be recognised when designing the trials.

During the WWAAC evaluation activities, emphasis will be placed on subjective assessment, as traditional performance measures in human-computer interaction will be less significant given the nature of the target group for the project and the levels of disability being supported. Therefore, in many cases the criteria of success for the project will be the degree to which the software supports some degree of improved independence/ease of use in task performance, rather than an over-concern with measures of time to perform activities. However, where feasible, comparisons between a person's ability to perform tasks using the WWAAC software and available alternatives will be made.

The following broad assessment criteria will be used based loosely on the ISO 9241 Part 11 concept of utility and its definition of *usability*:

Usability is the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.

ISO TS 16071 (Guidance on Accessibility of Human Computer Interfaces) defines *accessibility* in relation to usability as:

The usability of a product, service, environment or facility by people with the widest range of capabilities.

This difference between accessibility of the system and usability of the software is an important distinction to make, especially when our target users are likely to be using alternative input methods. Accessing information is not enough. In fact, although a Web site is accessible to users, it still may not be sufficiently usable to such users, and therefore, guidelines need to be followed by Web developers to achieve this (See WWAAC Deliverable 12a: Guidelines for developing an AAC-enabled World Wide Web). The goal of usability is to make users' experience with the Internet more efficient and satisfying.

Since more prolonged use will be necessary to assess the following usability aspects adequately, they are expected to assume greater importance during the longitudinal case studies during the final stages of the project:

- **Utility** – It is essential to assess whether the software is of value for the target group. It will therefore be critical to assess to what extent the software promotes the user's ability to use the Internet-based services independently, or at least with less support (for basic accessibility and use) from facilitators than prior to its introduction. Recording which components of usage can be performed by the user independently and which tasks can be performed only with support from a facilitator before and after using the WWAAC software will give some good

indication of the utility of the software. To this end the following questions also need to be answered.

Does the software promote improved access to internet-based services for AAC users?

Does the software promote improved interaction with web-based media?

How does the software alter the profile of support required?

Does the software do what it is supposed to do?

Does the software provide all the functionality needed to assist such users?

- **Effectiveness** – It will be important to assess how well the software supports users in carrying out activities, and to this end the following questions need to be answered.

Does the software allow the user to operate at an improved level of performance?

Is the software easy to use?

Is the software easy to learn?

Is the user able to remember how to use the software after an interval of non usage?

- **Efficiency** – Efficiency is related to the effort required to perform activities, and can be assessed in part by the amount of time that it takes to perform given activities using the software and the number of keystrokes needed for system operation. Whilst such performance measures are of value in HCI assessment, it is considered that in itself time needed to perform a task is of limited value in the context of the AAC user, and a more relevant question is whether the software provides advantages over alternative (current) ways of performing the same task. Another measure of efficiency that is likely to be of particular relevance to the WWAAC investigations relates to whether the software requires unnecessary activity on the part of the users, i.e. number of keystrokes needed to reach completion of a task. The following questions therefore need to be answered:

Can the user perform the tasks with less effort using the software compared to available alternatives (prior use)?

Are the number of keystrokes minimised?

Is the quality of the output improved?

Can quantitative gains in efficiency (e.g., fewer errors) outweigh qualitative gains in effectiveness (e.g., easy to use).

- **Satisfaction** – This involves an assessment whether the user enjoys using the software and is also related to motivation to continue using it in the future. Given that WWAAC users are likely to have considerable discretion over usage, motivation is likely to be a critical factor. As well as subjective opinion, this can also be indirectly measured by monitoring whether the software continues to be used over a period of time, in particular during the longitudinal case studies (for example, continued use of internet services but using alternative software). The following questions therefore need to be answered.

What elements of the software does the user enjoy or find frustrating, and why?

Will the user continue using the software over an extended period of time?

Has the software improved the user's quality of life (e.g., by measuring user's attainment of personal goals with respect to internet use)?

Subjective opinion of ease of use is also likely to be especially critical during the longitudinal case studies, as users and their facilitators will have significant discretion whether to use the WWAAC software or return to the system they were using before WWAAC. If the system is perceived to be difficult to use this is also likely to de-motivate users from continuing to use the system.

## 4. OVERALL EVALUATION METHODS AND TECHNIQUES

The population of AAC users is a heterogeneous one. Variation in performance in the use of technology is common between users, and variation in individual's performance over time is also common. This makes traditional quantitative approaches to data capture, for example, time to complete a task, difficult to apply in this sector; and suggests that a productive approach to evaluation in the AAC field is one based on more individualistic and qualitative evaluation work (McConachie et al 1999, Clarke and Kirton 2003). Within this context an individual case study approach is particularly relevant for use with these user groups.

It is also recognised that an objective view of honest and accurate information rests on ascertaining the validity and reliability of the data captured. This presents particular methodological difficulties when seeking the views of people with communication and learning difficulties. For example, for many people using AAC an act of communication involves explicit collaborative co-construction with the communication partner. In this way the contribution of a person using AAC is often realised as an accomplishment of both participants in the conversation. Such negotiation of meaning between interviewer and interviewee may be considered a confounding influence for the validity of findings, particularly if the interviewer is conceived of as an advocate for a particular point of view. However, failing to engage in a negotiation of meaning also raises questions about the interpretation of interviewees' actions and the credibility and authenticity of reported views. To try to overcome such failings, certain methods, such as 'thinking aloud' whereby the users verbalise their thoughts as they test the system (Nielsen 1997), are also very difficult or impossible with users with complex communication needs, whose switches may be in use with the browser rather than their communication aid.

It is noted, also, that exploring the validity of users' views through proxy report (from a care assistant for example) does not necessarily equate with robust methodological practice in this population. It is also true that AAC users may be seen to have a propensity to positive views and that they will say what they expect the interviewer wants to hear. Therefore agreements or conflicts in reported opinions between people using AAC, as perceived by professionals/family members, and the reported opinion of people using AAC themselves cannot be assumed to equate with improved/reduced validity of findings. Rather, in developing an interview strategy for non-speaking AAC users it is necessary, where possible, to incorporate some checks for the validity of decision making and reliability in response within the interview procedure in order to approach an understanding of the authenticity and credibility of the views. The authors, then, recognise the limitations of an interview strategy adopted for seeking the views of people using AAC, and will include techniques to ensure that users realise that it is acceptable to be negative and critical of the software.

The authors also suggest that a methodology using Talking Mats, as employed during the user requirements phase of the project, be used where appropriate for interviewing end-users with complex communication needs (Murphy, 1998; Clarke et al, 2001). This framework for data collection was developed by the AAC Research

Unit at University of Stirling to discuss abstract concepts or issues that the end-users do not often address in their everyday conversations. Sets of pictures are produced to illustrate issues which researchers wish to include in the interview. Different emotions can then be depicted to allow the end-users to indicate their feelings towards each of these issues (e.g., whether he or she feels very happy, content, bored, confused, worried or angry). Each picture chosen by the user can be arranged on a textured mat and attached by Velcro™ so that a visual representation can be built up about the user's feelings on a particular topic.

In order to make optimal use of finite project resources, users will be consulted both in individual and in workshop settings. However, given the considerable variation in abilities of our primary target users, it has been important to accept that a certain degree of flexibility will also be needed in how these techniques are applied in a particular case. The evaluation methodology should therefore be considered as a framework from which to operate rather than being a definitive statement of what should be done in each case.

Essentially the evaluation consists of 8 main phases. These are:

- Simulation Study
- Evaluation of the WWAAC Web Browser, Alpha Version
- Evaluation of the WWAAC Email program, Alpha Version
- Pilot Evaluation of the Linguistic Support module
- Evaluation of the Browser and Email software, Beta Version
- Longitudinal Case Study of the Browser (WWB) and the Email (WEM)
- Longitudinal Case Study of the Supportive Writing software (WSW)
- Additional Investigations, or User Consultations

The results of each phase of these evaluation activities will be fed back to the WWAAC consortium as a basis for discussion and further refinement of the WWAAC software. The results are presented in a separate deliverable, D11, the Final User Evaluation Report.

#### **4.1 Planning for Simulation Study**

As the evaluation of the simulator (Workpackage 1, task 1.2) is the first formal stage in the development of the prototype, the data captured during this early phase of the project will be mainly qualitative in nature and is intended to be used to further refine the specification for the prototype. The evaluations of the Simulated Web Browser would be conducted when the simulator is ready for evaluation with users, over a period of 6 months from April 2002, and would consist of 3 components, consisting of:

- Expert evaluations
- Preliminary user evaluations
- User workshops

A combination of techniques will be used, including discussions with experts inside and outside the Consortium, as well as the early exposure of the prototype to a sample of AAC users. Such feedback will ensure that the software development remains user focused and that users requirements are still being considered throughout the development of the prototype system.

## **4.2 Planning and Pilot for Alpha Evaluations**

It is proposed that there will be a pilot during the Consortium meeting in May 2003 (Task ID 3 – Pilot for alpha evaluation). The meeting will have three objectives:

- Final refinement of evaluation plans
- Piloting of alpha evaluation framework with experts within the consortium
- Familiarisation of relevant partners with the evaluation procedures

The first objective will be performed by a sub group consisting of the Evaluation Team of ACE, ESRI, DART, KTH and Modemo. In addition to testing the procedures, the internal pilot would also be used as a training workshop to ensure commonality in procedures between different countries. This is important as all those involved in the evaluation activities need to understand (and translate) materials for use in each country.

### **4.2.1 Evaluation of the WWAAC Web Browser, Alpha Version**

Final planning will take place following the pilot workshop, and the alpha evaluation workshops for the Web Browser will then take place during May/June (Task ID 4 - Alpha Tests, Browser). These workshops will be planned for the UK, Holland, and Sweden involving 4-6 users in each country. It is anticipated that AAC users selected for these studies would be already using computers, and would have used or seen e-mail/web services in action.

Alpha evaluation will require workshops in each country, which may be over 1 or 2 days duration—the approach must, however, be very flexible in order to accommodate the users and their requirements. The first session would be an introduction to the project, setting up of software, and obtaining initial reactions. The second session would involve an opportunity for the users to operate the software in a more comprehensive manner, followed by individual interviews with users and discussion with facilitators about its value. These workshops will be conducted in the users' national language.

It is anticipated that these workshops will be carried out in the UK, Sweden and NL in May/June 2003. Regular, ongoing feedback will be provided to the technical developers to ensure rapid take-up. A more formal report documenting all the data will be delivered to the technical partners on 21 June (Task ID 6 – Alpha browser report), followed by agreed changes to the specification towards the Beta version. Continued technical development of the Web Browser would then take place until 19 October 2003 (Task ID 12 – Completion of Beta Browser and Email).

#### ***4.2.2 Evaluation of the WWAAC Email program, Alpha Version***

The evaluation of the Email program will consist of a comparative study with Widgit's Inter\_Comm software and AbleLink's Web Trek Connect. Inter\_Comm was chosen as it is the only other viable EU-based email client. Web Trek Connect was chosen as, while not designed to meet the needs of people who use symbols to support their face-to-face communication, it is intended to assist people with learning disabilities to send and receive emails. This was seen to be of some potential interest to our primary target group, and we felt we could only benefit from including an additional item of software in our comparison. The first phase will be through expert evaluations within the consortium, followed by evaluation with 1 or 2 expert users and/or their facilitators. Good and less attractive features will be compared and contrasted with the WWAAC Email program in order to determine its relative utility, effectiveness, efficiency and satisfaction in use. This phase of the evaluation will begin mid June and will be completed in the 3<sup>rd</sup> week in July, 2003, and a report will be delivered to the technical partners at the end of July, followed by agreed changes to the specification towards the Beta version. Continued technical development of the Email program would then take place until 19 October 2003, when the programming will be completed which is required for the linguistic support elements (Task ID 12 – Completion of Beta Browser and Email software).

#### ***4.2.3 Pilot Evaluation of the Linguistic Support module***

From June to September 2003 the linguistic support module will be developed (Task ID 14 – Develop linguistic support program). The users for the pilot phase of the evaluation will be Bliss users with high receptive skills and poor literacy, i.e. those who could particularly benefit from such language support and who have the potential to succeed in its use. A workshop will be held with each user to demonstrate, explore and make use of some of the functions of the linguistic support module. Appropriate users (2 or 3 in each country) will be identified in Sweden, the Netherlands, Finland, and possibly the U.K. (where Bliss users are quite scarce). Copies will be made of the vocabulary being used in the AAC systems of each user, and this will be used to personalise the linguistic support module that each will evaluate. Sweden will first pilot the procedures in early October (Task ID 15 – Pilot linguistic support) with one or two users before pilots take place in the other countries. Protocols will then be consolidated through a telephone or video conference with the other evaluators before further workshops take place from late October, to be completed by mid-December. The support module will be revised and improved during January according to the users' comments and requirements.

### **4.3 Beta Evaluation Planning**

Detailed planning for the beta evaluation work and longitudinal studies will be carried out during September 2003, with a beta planning workshop being planned for early September to be held with a consortium meeting planned in conjunction with the AAATE Conference. (Task ID18 – Planning for Beta evaluation).

Participants will be the same consortium members as were involved in the earlier evaluation planning. Some translation of evaluation materials will also be needed after this meeting.

#### **4.3.1 Evaluation of the Browser (WWB) and Email (WEM) software, Beta Version**

The beta evaluation work will begin at end October 2003 (Task ID 19 - Beta Evaluation) continuing until Christmas. A two-tier evaluation process will be undertaken, that is, the UK and Sweden will each first conduct one workshop in order to consolidate procedures and protocols. The results of these first 2 workshops will be discussed with the evaluation team on 14 November during the next consortium meeting. Workshops will then be conducted from mid-November in the UK, Sweden, Holland, Finland and Denmark (evaluations in Spain will be conducted later during the user consultation phase.) Feedback will be provided to the technical team on a continuous basis, but formal results will be prepared for the evaluation report by 9 January. A project technical workshop is arranged for 16 January, at which time planning for the Longitudinal Studies (for browser, email and supportive writing) will take place. Any changes to the software will be agreed with the technical team before this date (Milestone Task ID 23 - Agreed Changes to Beta Software).

Workshops will be conducted along the same lines as the alpha evaluations, but based on our experiences during the alpha phase, improvements and refinements have been made (See Section 8). These workshops may include both new users and also earlier users from the alpha trials, as this would engender ownership in the project, as well as allowing the improvements in the software to be assessed against the earlier findings. It is also anticipated that a sub group of these users could be involved in the longitudinal trials.

It is anticipated that some further refinement of the product will be needed after Beta evaluation and this will need to be completed by the end of January in order that the longitudinal field trials can begin on schedule.

### **4.4 Longitudinal Case Study of the Browser (WWB) and the Email (WEM)**

There will be longitudinal trials in the UK, Holland, and Sweden with both the Web Browser and the Email program. These will involve a total of 3-4 people in each country (including the 3-4 from the longitudinal studies of WSW described below, all of whom will be Bliss users) and using materials translated into national languages (Task ID 28 - Longitudinal Study, Browser/Email). Users should also be selected on the basis of the project's primary target users and should all be symbol users. The

Longitudinal trials will also include integration with the concept coding aspects of the project.

The trials will continue for an extended period of 3 months between end-January/early February to mid to end April 2004. A project technical workshop is arranged for 20 January, at which time detailed planning for the Longitudinal Studies (for browser, email and supportive writing) will take place.

#### **4.5 Longitudinal Case Study of the Supportive Writing (WSW)**

Following the pilot evaluation of the linguistic support module, a total of 4-5 Bliss users will be asked to participate in the longitudinal case studies of the WSW, where training and longer term use of the language support will be factors to determine success (Task ID 26 - Supportive Writing Longitudinal). Trials will take place from mid-March to mid-May 2004, alongside the longitudinal studies of the browser and email. For only this sub-group of Bliss users, the linguistic structures will be embedded in the browser and email applications, and these users will therefore need more contact time than other participants in the longitudinal trials. Specific evaluation methods and tools will be developed during the earlier pilot evaluation phase and during the planning workshop arranged for 20 January.

#### **4.6 Additional Investigations**

In parallel with the longitudinal case studies there will also be further consultation with other user groups in the UK and other countries, including Spain (Task ID 27 – Further user consultations). This will allow further expert and user feedback to be obtained. This will be useful to supplement information obtained from the longitudinal studies and to also identify other markets for the browsing and e-mail software. It is anticipated that about 20 additional users will be consulted. Because people with aphasia have been identified as an important target group, these users will be included in the additional investigations.

An analysis of the results of these studies (Task ID 29 – Analysis of longitudinal + further studies) will be discussed as a consortium at the end of April 2004, leaving the remaining weeks for a final refinement of the product (Task ID 30). During this latter period a synthesis of results for D11 - Final User Evaluation Report will also take place, and this deliverable will be completed for the end of the project (Task ID 32).

The overall evaluation framework is shown below. This framework gives an overview of the different phases of evaluation along with their timescales, starting from the date of the revised project, 1 March 2003. That is, the evaluation of the simulator does not form part of this framework, and those proposed dates can be found in the Simulator Study Setup (Section 5). The evaluations in the framework are staggered to reflect the completion and technical testing of the various software components and the available timescales in the project. A summary of the evaluation tasks and Milestones is provided below:

**Milestones:**

Alpha Browser report, 21 June 2003

Alpha Email report, 1 August 2003

Completion of Beta software, 19 October 2003

Agreed changes to Beta software, by mid January 2004

End of project, 31 May 2004

<b>Task ID</b>	<b>Timescales</b>
1 – Start of revised project	1 March 2003
2 – Browser development (alpha)	March-May 2003
3 – Pilot for alpha browser evaluation	Consortium Meeting, 9 May
4 – Alpha Tests Browser	May-June 2003
5 – Analysis of results	June 2003
6 – Alpha browser report	21 June 2003
7 – Email development (alpha)	March-May 2003
8 – Alpha tests Email	16 June-18 July 2003
9 – Analysis of Email results	July 2003
10 – Alpha Email report	1 August 2003
11 – Beta development	August-mid October
12 – Completion of Beta Browser and Email software	19 October 2003
13 – Completion of Beta Browser and Email software with concept coding	End December
14 – Develop Linguistic Support program	June-September 2003
15 – Pilot linguistic support – SE	Early October
16 – Linguistic support Workshops- FI, SE, NL, and possibly UK	Late October-mid December
17 – Email + Language module development	January 2004
18 – Planning for Beta Evaluation	September-October 2003
19 – Beta Evaluation – SE and UK	End October-mid November
20 – Feedback on protocols	14 November 2003
21 – Beta Evaluation – SE, UK, NL, FI, DK (with continuous feedback)	mid November- end December
22 – Analysis of Beta results and Beta Evaluation Report	mid January 2004
23 – Agree changes to Beta software	By mid-January 2004
24 – Planning for Longitudinal Studies	20 January 2004
25 – Refinement of technical development	Mid-end January 2004
26 – Supportive Writing Longitudinal	Mid-March to mid-May 2004
27 – Further user consultations (incl. ES)	End January/early February to end

	March 2004
28 – Longitudinal study: Browser/Email	End January/early February to mid-end April 2004
29 – Analysis of longitud. + further studies	March-early May 2004
30 – Final refinement of product	mid April to end May 2004
31 – Synthesis of results and final report	April-May 2004
32 – End of project	31 May 2004

## 5. SIMULATION STUDY SET-UP

Throughout the development of the simulated web browser, a range of evaluation activities will ensure that the interface being developed is appropriate for our target population to use, and that in addition the software will contain all of the functionality needed to promote independent usage. During this phase a combination of techniques will be used, including discussions with experts inside and outside the Consortium, as well as the early exposure of the prototype to a sample of AAC users (Workpackage 1, tasks 1.2 and 1.4). Such feedback will ensure that the software development remains user focused and that users requirements are still being considered throughout the development of the prototype system. Later in the project, evaluation activities will be used to assess how well the technical developments satisfy user requirements, and promote independent internet access.

As the evaluation of the simulator (Workpackage 1, task 1.2) is the first formal stage in the development of the prototype, the data captured during this early phase of the project will be mainly qualitative in nature and is intended to be used to further refine the specification for the prototype. The evaluations of the Simulated Web Browser would be conducted when the simulator is ready for evaluation with users, over a period of 6 months from April 2002, and would consist of 3 components, consisting of:

- Expert evaluations
- Preliminary user evaluations
- User workshops

The software will be evaluated in the form of user workshops to be held at the ISAAC and Communication Matters Conference Workshops (month 20-22). The results of these evaluation activities will feed directly into the development of the Alpha version software. These results will in turn inform the development of the Beta software versions, to be evaluated formally in further workshops and in the longitudinal case studies (task 1.3 - longitudinal multiple single case study).

### 5.1 Expert Evaluations

Many potential problems with the design of the user interface can be identified by expert opinion before the system is tested by users. During Task 1.2 (Simulation Study) informal evaluations will be regularly taking place during the development of the simulator. This will include an assessment of the functionality being designed into the simulator, as well as the various forms of input (e.g., the design alternatives) that will make up the final prototype. In this part of the evaluation, the WWAAC project defines an expert as someone who has experience in working with people with communication impairments, e.g. teachers, professional facilitators, or developers of AAC systems.

Expert evaluations will use a combination of techniques (e.g. discussions with experts and regular evaluation of interface design ideas). For example, high-level

interface design ideas should be presented to both the partners within the Consortium, as well as experts and facilitators outside the Consortium, in order to ensure that the user requirements are always being considered. Once the main difficulties are corrected, then the simulator is ready to be evaluated with users during the first phase of workshops.

## **5.2 User Evaluations**

The following notes, in addition to Section 2, Target User Groups, are provided to partners to guide them in the evaluation of the simulated software:

### **5.2.1 General Notes**

The following methods are for guidance only, and specific steps may need to be adapted to the needs of individual users. We assume that a default configuration of the simulator will be used, in a similar way to that demonstrated to the experts in the first stage of our evaluation work. Adjustments may need to be made for each user, with the help of their facilitator, e.g.

- Reading at word or sentence level.
- Use of function keys.
- Location of icons (top/bottom as opposed to top/left side)

The evaluation will consist of the following steps:

- Introduction to the User
- Demonstration of the basic browser functions
- Usage scenarios
- User Interview

### **5.2.2 Introduction to the User**

The software you are about to use is the first version of a new Internet browser, which we hope will make surfing the Internet easier for you. We're going to show you how to use it and then ask you to have a go for yourself.

### **5.2.3 Demonstration of the Basic Browser Functions**

The evaluator should initially demonstrate the following basic browser functions to the user:

- Concept of favourites page for users, with demonstration of setting up and using favourites
- Selecting a favourites page
- Browsing a page's content
- Reading text selection
- Scrolling/moving through a page
- Finding and selecting links
- Using the back function
- Adding page to favourites
- Deleting new item from favourites
- Going back to home page
- Entering a new URL
- Setting up presentation options, e.g. display type, etc.

#### **5.2.4 Usage Scenarios**

Users should attempt the following set-tasks either on their own, or with their facilitator if support is needed. A checklist is provided for the evaluator to record problems observed and specific comments for each task (See Appendix 4B for checklist which was updated over the course of the project).

1. Choose a favourite web site and to go it.
2. Scroll/move through the page.
3. Start at the top of the page and read some text.
4. Read the same paragraph again.  
Now read some more text.
5. Read the previous paragraph again.
6. Read through just the links and then choose one of them, so that it will take you to another web site.
7. Start at the top of the new page and read some text.

8. Go back to the previous web site.
9. Get a summary of the web page.
10. Read the summary of the web page.

## 6. USER EVALUATION SET-UP, ALPHA VERSION BROWSER AND EMAIL

The following section represents plans for conducting the user evaluations of the alpha version prototype software. The general procedure outlined below (Section 6.1 and 6.1.1) relates to the evaluation of both the Web Browser and the Email software; however, a separate more specific workshop procedure is provided for the evaluation of the Browser (Section 6.1.2) and for evaluation of the Email (Section 6.1.3). Plans will be refined, if necessary, based on the results of the pilot study and the functional specifications for the software products to be evaluated.

It is anticipated that the Beta evaluation will be conducted in a similar fashion to the Alpha evaluation activities. However, the Beta methods and tools will be refined as necessary following experience in their use and will also include further functionality as agreed within the project.

### 6.1 User Workshops

Alpha version evaluation of the adapted Web Browser will be conducted between May and June 2003. The evaluation of the alpha version of the Email program will begin with expert evaluations within the consortium in May and June. This will be followed by evaluation with 1 or 2 expert users and/or their facilitators of Widgit's Inter\_Comm software so that a comparison can be made with the WWAAC email software.

#### 6.1.1 Participants

The primary focus group for evaluation has been identified as people using graphic symbol based augmentative and alternative communication systems. The evaluation will therefore involve people with physical disabilities using graphic symbol based AAC who have:

- (1) receptive language abilities sufficient to understand discussion concerning the strengths and weaknesses of technology
- (2) cognitive abilities such that they are able to think about, and understand, abstract concepts such as email, and
- (3) adequate visual acuity and visual processing abilities to work with pictures, symbols and/or simple text on a computer screen.

There are no criteria specified for expressive communication skills, although the primary target population are people who use graphic symbol based AAC as their primary channel of communication in face-to-face conversation. Professionals who have long term, knowledgeable relationships with the individual target users will make judgments concerning these abilities. Based on these criteria the group is likely to include people with physical disabilities, some learning difficulties and limited literacy skills. Facilitators will be asked to complete the pro forma for

assessing individual user's capability (Appendix 1), and this pro-forma need not be completed again if the same user is included in the beta evaluation and longitudinal single case studies.

The group will also be selected on the basis of their current, and reliable, access to a Multimedia PC (Windows '98 or above) using Internet Explorer version 6.0, as well as an understanding of language such that they understand the concepts of the Internet and the World Wide Web.

Workshops will be planned for England, The Netherlands, and Sweden, involving 4-6 users in each country. These can be implemented through either individual evaluations, or in a workshop setting where more than one user is present at one time, if this can be arranged in the timescales.

Once users have been identified, their interests will be explored in order to identify suitable Web sites to include in the evaluation which will be accessible and usable by the alpha version of the prototype. These sites will be tested in advance by the evaluation team to ensure that the evaluation will be conducted with minimum disappointment on the part of the users.

### **6.1.2 Workshop Procedure – Alpha Browser**

Symbol-based information documents will be produced to support understanding of the project and the provision of informed consent. For children, consent to participate will be sought from parents/guardians in addition to children's assent to participation. A consent form will need to be prepared and presented to the users and their facilitator well before the event.

A suggested procedure for the user workshops is outlined below. The approach must, however, be very flexible in order to accommodate the users and their requirements, and the timing of each activity will also depend on the total time for the workshop. It is proposed that, if time permits, the workshop be split over two days (with a half-day session on each day). The first day would allow ample time for familiarisation with the software by the end user and their care staff/facilitator, carrying out various usage scenarios and conducting initial individual interviews, all of which can take considerable time for this user group.

The Workshop would begin with user(s), their facilitator(s) and project representative(s) in a small group for an explanation of the activities about to take place. The evaluation of the software, however, will be on a one-to-one basis with 2 evaluators, one with the task of working with the user, and the other observing. The end user's facilitator may also be present, depending on the needs and preferences of each particular user.

Activity	Time
<b>Session 1</b>	
a) Introduction to WWAAC and explanation of the purpose of the activity	10 minutes
b) Demonstration of the prototype and introduction to use.	20 minutes
c) 1 to1 familiarisation with the prototype, with individual users and facilitators	30 minutes for each person
d) 1 to1 provisional evaluation of the prototype with users and facilitators	90 minutes for each person
<b>Session 2</b>	
e) Continued 1 to1 evaluation of the prototype with users and facilitators	90 minutes for each person
f) Individual interview and user discussion	60 minutes for each person
g) Discussions with local facilitators/experts	60 minutes
h) Analysis of findings and discussion	Post Workshop
<b>Total workshop time (over 2 sessions)</b>	<b>Approx 5 hours for each user + 1 hour with experts</b>

**a) Introduction to the Workshop and WWAAC**

The group would be given a short introduction to the workshop and the WWAAC project, e.g.

“Thank you for coming along today to take part in our workshop. The idea is for us to get some idea of how we can improve the software that we are developing in our

project so that it will do the things that you want it to do. The project is called WWAAC which stands for World Wide Augmentative and Alternative Communication. What the project is trying to do is to improve the access to Internet and e-mail for AAC users by developing software that makes it easier to access these features. The software you are about to use is the first version of a new Internet browser, which we hope will make surfing the Internet easier for you.

“This morning we will demonstrate the software to you, but we don’t want to spend too much time on that as we want to set up computers so that you can try the software out for yourselves and tell us what you think. Later this morning we will ensure that each of you are set up with using the software, and then this afternoon (or, for example, tomorrow morning) you can try using it for yourselves. We would then like to come back (tomorrow) and let you use the software some more. We would then like to spend some time talking about your experiences with the software so that we can improve it if necessary in the future.

“In a few months time we would also like to come back and show you how we have taken your advice into account, and also ask if any of you would like to take part in a more extended trial of the software.

“Does anyone have any questions?”

### ***b) Demonstration***

The range of functionality supported by the software would then be demonstrated, i.e. web browsing. For example, the following basic browser functions could be demonstrated to the users:

- Browsing a page’s content
- Reading text selection
- Reading a summary of a page
- Scrolling/moving through a page
- Moving between frames
- Finding and selecting links
- Using the back function
- Going back to home page
- Entering a new URL
- Concept of favourites page for users

### **c) 1 to 1 Familiarisation with software**

A default configuration of the software will be used where possible, but adjustments will be necessary with the help of the user's facilitator to configure it to a user's individual needs. The user's particular input device, e.g. scanning versus direct access, will clearly be essential to support, and sufficient time will be required to ensure that input methods work and that preferences for output have been fully explored, e.g.,

#### **Input needs**

- Switch access supported
- Mouse and keyboard accessibility features – relevant to direct access users
- Setting up and use of function keys – relevant to direct access users

#### **GUI**

- Text size and contrast – relevant to all users
- Location of icons (top-bottom as opposed to top/left side) – relevant to all

#### **Output**

- Word, sentence or paragraph level feedback for text output – relevant to all

Users will also be encouraged to explore usage of the system, and be able to ask further questions.

**Note:** In the Beta evaluation, the basic functionality would be clearly explained again, but in addition, further advanced functionality of the browser should be demonstrated to each user once they have a basic understanding, e.g.,

- Adding page to favourites
- Deleting new item from favourites
- Setting up presentation options, e.g. display type, etc.

### **d) Provisional 1 to 1 Evaluation**

Users will have an extended opportunity to explore usage of the system and will also be encouraged to attempt the following set-tasks either on their own, or with their facilitator, and, where necessary, WWAAC staff if support is needed. A checklist is also provided for the evaluator to record problems observed and specific comments

for each task (See Appendix 4B for the final version of that checklist extended for the Beta trials).

1. Choose a favourite web site and to go it.
2. Scroll/move through the page.
3. Start at the top of the page and read some text.
4. Read the same paragraph again.

Now read some more text.

5. Read the previous paragraph again.
6. Read through just the links and then choose one of them, so that it will take you to another web site.
7. Start at the top of the new page and read some text.
8. Go to another part (frame) of the page (where Next Paragraph button won't work)
9. Go back to the previous web site.
10. Get a summary of the web page.
11. Read the summary of the web page.
12. Enter a new URL
13. Add that site to the list of favourites.
14. Delete the URL from the list of favourites

During this period users will be observed and any difficulties in using the software noted. See Appendix 4B for the final version of that checklist extended for the Beta trials).

### ***e) Continued 1 to 1 Usage***

As section d)

### ***f) Individual User Interview and Discussion***

Each participant will be interviewed following a short pro forma established for the project. (See Appendix 3B). The feasibility of translating such a document into different symbol systems will also be considered.

### ***g) Discussions with Local Experts***

In addition to user discussions, there will also be detailed discussions with local facilitators and experts. A pro forma for this is included in Appendix 4F, and care will be taken to ensure that translation into local languages does not lose the essence of the issues being explored. This is based on the high level assessment criteria established for the project, and a consideration of the more detailed evaluation planning criteria included in Section 3.

### ***h) Analysis and Discussion***

Information obtained from the workshops will be used as the basis for further discussion within the project. The reporting should follow a common format based on the overall assessment criteria, and be a composite of both expert and user opinion. The pro forma used for discussions with experts will also act as this report template, ensuring that the information from different trials is consistently reported (see Appendix 4F). An additional discussion document will also be generated for use within the consortium highlighting any mismatches between user requirements and agreed functional specification and the emerging software. A possible sample pro forma for this reporting is included in Appendix 9.

#### ***6.1.3 Workshop Procedure – Alpha Email***

The evaluation of the Email program will begin with a comparative study with Widgit's Inter\_Comm software. This first phase will be through expert evaluations within the consortium. Good and less attractive features of Inter\_Comm will be compared and contrasted with the WWAAC Email program in order to determine its relative utility, effectiveness, efficiency and satisfaction in use (See Appendix 4A for a possible format).

This will be followed by evaluation with 1 or 2 expert users and/or their facilitators of the Inter\_Comm software, and a suggested procedure for the user workshops is outlined below. The approach must, however, be very flexible in order to accommodate the users and their requirements, and the timing of each activity would also depend on the total time for the workshop. It is proposed that, if time permits, the workshop be split over two days (with a half-day session on each day). The first session would allow ample time for familiarisation with the software by the end user and their care staff/facilitator, carrying out various usage scenarios and conducting initial individual interviews, all of which can take considerable time for this user group.

Symbol-based information documents will be produced to support understanding of the project and the provision of informed consent. For children, consent to participate will be sought from parents/guardians in addition to children's assent to participation. A consent form will be prepared and presented to the users and their facilitator well before the event. (See Appendix 2).

The Workshop will begin with user(s), their facilitator(s) and project representative(s) in a small group for an explanation of the activities about to take place. The evaluation of the software and comparison with Inter\_Comm will, however, be on a one-to-one basis with 2 evaluators, one with the task of working with the user, and the other observing. The end user's facilitator may also be present, depending on the needs and preferences of each particular user.

Activity	Maximum Time
<b>Session 1</b>	
a) Introduction to WWAAC and explanation of the purpose of the activity	10 minutes
b) Demonstration of the prototype and introduction to use.	20 minutes
c) 1 to1 familiarisation with the prototype, with individual users and facilitators	30 minutes for each person
d) 1 to1 provisional evaluation of the prototype with users and facilitators	90 minutes for each person
<b>Session 2</b>	
e) Continued 1 to1 evaluation of the prototype with users and facilitators	90 minutes for each person
f) Individual interview and user discussion	60 minutes for each person
g) Discussions with local facilitators/experts	60 minutes
h) Analysis of findings and discussion	Post Workshop

<b>Total workshop time (over 2 sessions)</b>	<b>Maximum 5 hours for each user + 1 hour with experts</b>
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### **a) Introduction to the Workshop and WWAAC**

The group would be given a short introduction to the workshop and the WWAAC project, e.g.

“Thank you for coming along today to take part in our workshop. The idea is for us to get some idea of how we can improve the software that we are developing in our project so that it will do the things that you want it to do. The project is called WWAAC which stands for World Wide Augmentative and Alternative Communication. What the project is trying to do is to improve the access to Internet and e-mail for AAC users by developing software that makes it easier to access these features. The software you are about to use is the first version of a new email facility, which we hope will make using e-mail services easier for AAC users. We would like you to see how it compares to Inter\_Comm, which we understand you are now using.

“This morning we will demonstrate the software to you, but we don’t want to spend too much time on that as we want to set up computers so that you can try the software out for yourselves and tell us what you think. Later this morning we will ensure that each of you are set up with using the software, and then this afternoon (or, for example, tomorrow morning) you can try using it for yourselves. We would then like to come back (tomorrow) and let you use the software some more. We would then like to spend some time talking about your experiences with the software so that we can improve it if necessary in the future.

“In a few months time we would also like to come back and show you how we have taken your advice into account, and also ask if any of you would like to take part in an a more extended trial of the software.

“Does anyone have any questions?”

### **b) Demonstration**

The range of functionality supported by the software would then be demonstrated, i.e. using email facilities. For example, the following e-mail functions could be demonstrated to the users:

- Composing an email message
- Sending an email message

### **c) 1 to 1 Familiarisation with software**

A default configuration of the software will be used where possible, but adjustments will be necessary with the help of the user’s facilitator to configure it to a user’s individual needs. The user’s particular input device, e.g. scanning versus direct access, will clearly be essential to support, and sufficient time will be required to

ensure that input methods work and that preferences for output have been fully explored, e.g.,

### ***Input needs***

- Switch access supported
- Mouse and keyboard accessibility features – relevant to direct access users
- Setting up and use of function keys – relevant to direct access users

### ***GUI***

- Text size and contrast – relevant to all users
- Location of icons (top-bottom as opposed to top/left side) – relevant to all

### ***Output***

- Word, sentence or paragraph level feedback for text output – relevant to all

Users will also be encouraged to explore usage of the system, and be able to ask further questions.

### ***d) Provisional 1 to 1 Evaluation***

Users will have an extended opportunity to explore usage of the system and will also be encouraged to attempt the following set-tasks either on their own, or with their facilitator, and, where necessary, WWAAC staff if support is needed. A checklist is also provided for the evaluator to record problems observed and specific comments for each task (See Appendix 4C for the final version of that checklist extended for the Beta trials).

1. Compose a short e-mail message
2. Send an e-mail message
3. Read an incoming e-mail message.

(This list will be expanded during the expert evaluation phase.)

During this period users will be observed and any difficulties in using the software noted. (See Appendix 4C for the final version of that checklist extended for the Beta trials).

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**e) Continued 1 to 1 Usage**

As section d)

**f) Individual User Interview and Discussion**

Each participant will be interviewed following a short pro forma established for the project (See Appendix 3B). The feasibility of translating such a document into different symbol systems will also be considered.

**g) Discussions with Local Experts**

In addition to user discussions, there will also be detailed discussions with local facilitators and experts. A pro forma for this is included in Appendix 4F, and care will be taken to ensure that translation into local languages does not lose the essence of the issues being explored. This is based on the high level assessment criteria established for the project, and a consideration of the more detailed evaluation planning criteria included in Section 3.

**h) Analysis and Discussion**

Information obtained from the workshops will be used as the basis for further discussion within the project. The reporting should follow a common format based on the overall assessment criteria, and be a composite of both expert and user opinion. The pro forma used for discussions with experts will also act as this report template, ensuring that the information from different trials is consistently reported (see Appendix 4F). An additional discussion document will be also be generated for use within the consortium highlighting any mismatches between user requirements and agreed functional specification, and the emerging software. A possible sample pro forma for this reporting is included in Appendix 9.

## **7. PILOT EVALUATION SET-UP, LINGUISTIC SUPPORT**

### **7.1 Introduction**

The evaluation of the alpha version of the linguistic support module will take place between mid October and end December 2003. There will be a two tier evaluation process. First a pilot workshop will take place in Sweden. Then, after information about the procedures is fed back to the evaluation group and some refinements are made, alpha workshops will take place in the Netherlands, Finland, and possibly the UK.

### **7.2 Specific procedures relating to the evaluation of the Linguistic Support Module**

The methods and tools for the evaluation of the alpha and beta versions of the browser and email software, provided in Sections 6 and 8, have been adapted for evaluating the linguistic support module. The overall evaluation procedures have been kept but some changes have been made to reflect the functionality of the linguistic support module. The detailed Workshop procedures are documented in Section 7.4. In addition, the questionnaires for the user interviews have been adjusted to include the functionality of the linguistic support module (see Appendix 5A). However, it must be emphasised that flexibility is still required in order to ensure that users' individual needs are accommodated.

#### **7.2.1 End Users**

The users for this phase of the evaluation will be Bliss symbol users with high receptive language skills and less developed literacy, i.e. those who could particularly benefit from such language support and who have the potential to succeed in its use. They should have an interest in written communication. Users need to be familiar with the Symbol for Windows software since it is not possible to integrate the linguistic support module with other communication software at the current time. Bliss users who meet these criteria (2 or 3 in each country) will be identified in Sweden, the Netherlands, Finland, and possibly the U.K. (where Bliss users are quite scarce). Copies will be made of the vocabulary being used in the AAC systems of each user, and this will be used by KTH to personalise the linguistic support module that each will evaluate. Two individual workshops will then be held with each user from mid October to end December to demonstrate, explore and evaluate some of the functions of the linguistic support module.

#### **7.2.2 Non-verbal communication**

Although it is not possible to capture every gesture or analyse videos of every expressive response during the evaluation, a great deal of non-verbal information could be lost unless specific steps are taken in the planning stage. Evaluators are, therefore, advised to ensure that non-verbal communication is captured, and the

interview template (Appendix 5A) provides a reminder to record this. Where possible, evaluators should verify any interpretation of the non-verbal communication with the user by asking a yes/no question. Evaluators should indicate whether or not any interpretation has been verified.

### **7.2.3 User profile forms**

For users who have not participated in other WWAAC workshops we recommend that, if at all possible, the user profile forms be completed before the workshop takes place. This would enable the researchers to be aware of user characteristics, e.g. visual or cognitive impairments that could have an impact on the procedure of the evaluation.

If an end user has been recruited for the evaluation of the browser or the e-mail program, there is no need to ask for the user profile forms to be completed a second time.

### **7.2.4 Insight into Grammatical Competence**

Since the main idea of the linguistic support is to have preset grammatical structures in which the writers can change the symbols for content, insight into the user's basic grammatical competence is necessary. Therefore, an ad hoc set of six judgment tasks to distinguish grammatical form from content should be undertaken (see Appendix 5B). In addition, to gain a broader insight into the user's receptive grammatical awareness, the TROG (Test for reception of grammar) or a language-specific equivalent, measuring basic grammatical competence, should be used as well. TROG is not standardised for the adult population. However, in this project the reason for performing grammatical testing is to focus on the individual and gain an insight into their grammatical competence rather than consideration of comparative measures or normality aspects. This information will be used to relate grammatical competence to performance with the linguistic support module and possible personal development. One test item of TROG is shown as an example in Appendix 5C.

### **7.2.5 Translation of materials**

Materials that are to be presented to the user should be translated into the user's first language. These materials include the ad hoc task protocol (Appendix 5B), the word localising protocol (Appendix 5D), and the script protocols (Appendix 5E). Since we want to obtain information about the user's grammatical competence, it is important to retain the same sentence structures (or their equivalents, e.g., an Adv(erb) S(ubject) V(erb) structure in one language may correspond to an Adv(erb) V(erb) S(ubject) structure in another language. It is of less importance if that results in a changed semantic content. Thus, the target word/sentence should have the

same *form* as the correct answer and a different form from the distractor, with the exception of script sentences marked “preset phrase” since they are already translated in the application. Material that is to be discussed does not need to be translated.

### **7.2.6 Session Timescales**

The workshops with each individual should be split over two days, with a half-day session on each day. To allow for the possibility of making some adjustments between the first and second sessions, a few days should elapse between the two sessions. However, in order to maximize retention of information between sessions, the two half-day sessions should take place within a week of each other.

If a user is unable to attend a scheduled second session, perhaps because they are ill, the second session should be rearranged, as soon as possible. At the second session, there should then be an additional period of 1 to 1 familiarisation before conducting the documented workshop procedures for session 2.

The evaluation of the software will be on a one-to-one basis with 2 evaluators. One evaluator will work with the end user, and the other will observe and take notes. It may also be useful to make a video recording of the session. An end user’s facilitator may also be present, depending on the needs and preferences of each individual.

### **7.2.7 Expenses**

In recognition of the end user’s time, end users should be given an ‘expenses’ payment equivalent to €20 for each half day session. It will be up to individual evaluators to decide whether to write a cheque to the end user, or to make the payment in the form of a voucher. If other expenses such as travel or phone use are incurred, these should be paid in addition to the above payment. If a user opts out at any point during a workshop, they will still receive the ‘expenses’ payment for that session.

## **7.3 ‘To Do’ checklist**

The following checklist will provide a reminder to the evaluators of tasks needing to be completed before, during and after the user evaluations.

<b>Before the user evaluation:</b>	
Identify 2 end users who: a. use bliss symbols in 'spoken' face-to-face interaction and have high receptive language skills with less developed literacy b. are aged between 12 and 25 years (if possible). c. are professionally supported in their use of AAC and the Internet within schools and colleges, or receive non-professional support at home. d. have an interest in written communication	
Send copies of users' AAC vocabularies to Tina at KTH so these can be incorporated into the linguistic support module	
Arrange for the completion of user profile forms (if new users) or review forms already completed for earlier browser or e-mail evaluations	
Arrange 2 half-day sessions within a week for each user to evaluate the linguistic support module	
Identify source of technical support for the workshops	
Explore users' input needs and ensure that appropriate interfaces/other hardware/technical support will be available	
Arrange consent forms for signature, if not already completed at another stage in the project.	
Identify a suitable (standardised, if possible) test of grammatical competence, TROG or a language specific equivalent.	
Encourage the user to bring their AAC system to the workshop, especially any low tech system.	
Check interview materials and symbol chart supplied to make it appropriate for the specific user. Customise, if necessary, to meet the needs of the user, e.g., by adding personal symbols or names.	
Ensure that the linguistic support software operates correctly on your computer	
Translate all materials (except script sentences marked "preset phrase" since they are already translated in the application) to be presented to the user into the appropriate language.	

<b>During the user evaluation:</b>	
Go through consent form with user to ensure informed consent	
Follow workshop procedure (7.4 )	
Appendix 5A: User Interview (Linguistic Support)	
Appendix 5B: Ad Hoc Task Protocol	
Appendix 5C: Sample page from TROG	
Appendix 5D: Word Localising Protocol	
Appendix 5E: Script Protocols – Linguistic Support Module	
Complete expense claim form with user (if required)	
<b>After the user evaluation:</b>	
Appendix 4F: Pro Forma for Discussion with Experts/Facilitators (adapting where appropriate)	
Send the complete test forms from the judgment task and the test for grammatical competence to Tina	
Send comments/errors encountered/changes needed to programmers on a regular basis, copied to Tina	
Send final (translated into English) results of user evaluations for the linguistic support software to Tina (by 9 January)	
Data on completion of usage scenarios: State the task, problems observed and any other comments (from Appendix 5E)	
Send raw data from User interviews (Appendix 5A) to Tina at KTH electronically.	
Arrange payment to users	
Consider possible users for longitudinal studies	

#### 7.4 Workshop Procedure – The Linguistic Support Module

Consent to participate will be sought well in advance of the workshops, and a form will be completed. For children, consent to participate will be sought from parents/guardians but the child's assent to participate will also be gained. The

consent form will be revisited on the first day of all workshops to remind users of what they have agreed to, and to confirm that they are still happy with this. Users will also be told that they may opt out of the workshop at any point.

A suggested procedure for the user workshops with timings is outlined below. The approach must, however, be very flexible in order to accommodate the users and their requirements. Breaks should be taken whenever they are required.

The Workshop should begin with the user, his or her facilitator(s) and project representative(s) in a small group to discuss the workshop procedures and to foster openness. There will then be a period of familiarisation with the software before the evaluation commences. The evaluation of the software will be on a one-to-one basis with 2 evaluators, one with the task of working with the user, and the other observing (vide recordings). An end user's facilitator may also be present, depending on the needs and preferences of each particular user.

Activity	Time
<b>Session 1</b>	Approx 2 hours 35 min
a) (Re-)introduction to WWAAC and explanation of the purpose of the activity	10 minutes
b) Getting to know the user and fostering openness	10 minutes
c) Administration of ad hoc task and TROG	40 minutes
d) Demonstration of the prototype and introduction to use, 1 to1 familiarisation with the prototype, with individual user and facilitator.	20 minutes
e) One-to-one evaluation of the prototype with the user, script 1	45 minutes
f) Comments, discussion, and rounding off	30 minutes
<b>Session 2</b>	Approx 2 hours
g) Continued evaluation of the prototype with the user, script 2	1 hour
h) Interview and discussion with user (Appendix 5A)	30 minutes
i) Explanation of the final integrated software	5 minutes

j) Interview with facilitator and/or professional if appropriate (see Appendix 4F)	25 minutes
k) Analysis of findings and discussion	Post Workshop
<b>Total workshop time (over 2 sessions)</b>	<b>Approx 4 hours and 35 minutes (plus time for breaks) with each user</b>

**a) Introduction to the Workshop and WWAAC**

The user and their facilitator should be given a short introduction to the workshop and the WWAAC project. The following areas should be covered:

- A brief overview of the WWAAC project
- The fact that this version of the writing support is incomplete, that we need their participation and feedback in order to continue the development of the software
- A description of the idea of the final software, with the linguistic structures, grammatical rules, and concept coding integrated in the e-mail software

An overview of the workshop timetable

Revisit the consent form signed earlier, and confirm that the user is still happy to proceed. In particular, confirm whether or not they have given consent for photographs and / or videos to be taken of them, and for what purpose these may be used (research within the project, training and / or publicising WWAAC). Emphasise that the user can opt out at any point during the workshop. They would still receive their ‘expenses’ payment for that session.

Finally, ensure that you have given the user the opportunity to ask any questions, and stress that they can ask questions at any point during the workshop.

**b) Getting to know the user and fostering openness**

A short discussion should now take place. If appropriate, use the Bliss charts or their own communication devices to discuss an unrelated topic such as film stars or sports. The evaluator should bring forward the use of the negative symbols for giving the appropriate feedback. Discuss the fact that honest feedback on the

linguistic support is sought, and that both positive and negative comments are welcome.

### ***c) Administration of ad hoc task and TROG***

Before the ad hoc task a conversation should take place about the fact that words have both a form and grammatical function as well as a semantic content. Reference should be made to the colour coding used on bliss symbol charts to illustrate this further.

The user should be presented six sets of cards, each set containing one target word/sentence, one correct answer of the same word class/sentence structure but with different semantic content and one distractor, i.e., a different word class/semantic structure but belonging to the same semantic field. One example of a card set is “fly” (V) (target word) – “laugh” (V) (the same word class, correct answer) – “bird” (N) (distractor). The answers should be recorded before any comments or explanations are made. When all six tasks are completed there should be a discussion about the erroneous and/or correct answers. The tasks should be administered once again and an explanation given after each item.

- Encourage the user to think about words as belonging to different categories
- Encourage the user to think about the colour coding of the Bliss card and different word types having different colours

The new answers should be registered again and, if possible, with comments about how the user deals with the information. For the entire task protocol, see Appendix 5E. In the protocol, the words in italics refer to the cards that are needed.

TROG is a standardised test measuring grammatical competence. The user is presented with a spoken sentence and given four pictures, one of which represents the spoken sentence. An example of a test item in TROG is given in Appendix 5C.

### ***d) Demonstration of the prototype and introduction to use, 1 to1 familiarisation with the prototype, with individual user and facilitator.***

It should be explained that this writing support module is a stand-alone module for the moment. The version that is to be evaluated from January is e-mail software in which this linguistic module is to be integrated together with other support functions (grammatical rules and concept coding).

The basic functionality should be clearly explained and demonstrated. A standard set-up of Blissymbols will be used at this stage of the evaluation, although this may be adjusted in advance by the evaluator to make it more personal. The user should be accessing this in whatever manner is most familiar to them. Encourage the user to make use of the basic functionality demonstrated. Gradually introduce further functionality. This includes:

- Browse through the different fields on the start page (called “message page”)

- Listen to the spoken content in each field
- Show and explain the different word *types*
- Demonstrate that the different word types initiate different sentence types, e.g., the “question word” will initiate a question starting with a question word such as “Who will come?”
- Show that the symbols “hiding” behind each field are seen in the grey fields on the lower line
- Show that, when clicking on a specific field, the former grey fields appear on the main line and can be chosen
- Show the difference between a final choice and a link (links are fields with a folded corner on)
- Show that a chosen symbol appears on the message line above
- Show that after a symbol is chosen, the program jumps back to choices with possible ways to continue the sentence
- Show that after a punctuation mark is entered, the program goes back to the start page

#### ***e) One-to-one Evaluation of the prototype with the user***

i) Ask the user to identify and localise a number of fields containing words belonging to different word classes (for protocol, see Appendix 5D)

ii) Ask the user to follow script 1, using the linguistic support functions (for protocol, see Appendix 5E). In Symbol for Windows, Personal Communicator, set the Start page to “messages”. When following the script in the Writing Support, go back to the Start page between every sentence.

My name is xxxx. (NP V Proper name)

What is your name? (QW V NP)

I write with Blissymbols. (NP V prep NP)

Later I will write a mail. (Adv NP VP NP) (Swedish Adv V(Aux) NP V NP)

When will we finish? (QW V(Aux) NP V)

#### ***f) Comments, discussion and rounding off***

After each set of tasks, questions relating to these should be asked from the User Interview (Appendix 5A). However, dialogue throughout the evaluation session is to be encouraged. After all the tasks have been completed, there will then be a short interview about more general issues concerning the linguistic support module. Important points arising from this discussion /interview should be sent to KTH as soon as possible so that (minor) adjustments can be made prior to the second workshop.



**g) Continued evaluation of the prototype with the user, session 2**

i) Demonstrate, by using a different start page (called “start page” under “page manager” in Personal Communicator) how an e-mail message can be constructed, e.g., a greeting, an introductory line, the main message, rounding off, and a farewell

ii) Demonstrate the different pre-set phrases for composing a mail message

iii) Ask the user to follow script 2, using the preset phrases and linguistic support functions (for protocol, see Appendix 5E for Scripts 1 and 2). In Symbol for Windows, Personal Communicator, set the Start page to “messages”. When following the script in the Writing Support, go back to the Start page between every sentence.

Hi, (preset phrase)

How are you? (pre-set phrase)

It has been a long time since I heard from you. (pre-set phrase)

Yesterday I got a letter. (Adv NP V NP)

It was from a friend. (NP V prep NP)

Tonight I’m going to the cinema. (Adv NP VP prep NP)

Take care!(pre-set phrase)

Best wishes xxxx. (preset phrase)

Users will be encouraged to attempt the set of tasks on their own with the assistance of WWAAC staff if required. After each task, the user should be asked the relevant questions from the User Interview questionnaire (see Appendix 5A). If possible, access to the user’s own form of AAC would be advisable, especially any low tech system.

A proforma is provided for the evaluator to use whilst each task is being completed. This contains space for observations including problems observed by the evaluator, and comments (including non-verbal ones) from the user and/or facilitator (See Appendix 5E).

**h) Individual User Interview and Discussion**

After all the tasks have been completed, there will then be a short interview about more general issues concerning the linguistic support module. The evaluator should use the pro-forma to record the user's responses (Appendix 5A).

***i) Explanation of the final functionalities of the integrated software***

The linguistic support module by itself might seem abstract and difficult to understand. It should clearly be explained that the module should be an integrated part of the e-mail software, together with other functionalities that could assist in producing good messages. It should be explained that grammatically well-formed sentences are necessary to obtain automatic symbol-to-text translation, which is necessary in order to send e-mail to persons with other symbol systems or to persons communicating with text.

***j) Interview and Discussion with Facilitators and/or Professionals***

In addition to user discussions, and, if users think it is appropriate, there will also be detailed discussions with local facilitators and experts. The same pro forma will be used as for the browser and email evaluations (Appendix 4F), but questions may be slightly adapted where suitable.

***k) Analysis and Discussion***

Information obtained from the workshops will be used as the basis for further discussion within the project. The reporting should follow a common format based on the overall assessment criteria, and be a composite of both expert and user opinion. The pro forma used for discussions with experts will also act as this report template, ensuring that the information from different trials is consistently reported (see Appendix 4F). An additional discussion document will also be generated for use within the consortium, highlighting any mismatches between user requirements together with agreed functional specification and the emerging software. A possible sample pro forma for this reporting is included in Appendix 9.

## **7.5 Follow-up**

Following this pilot evaluation, some of these users (possibly 3-4) will be asked to participate in the Longitudinal Case Study of the Linguistic Support (January 2003-March 2004), where training and long term use will be factors to determine success. The pilot will also point towards modifications and improvements in the support module, based on the users' comments and requirements.

## **8. USER EVALUATION SET-UP, BETA VERSION**

### **8.1 Introduction**

The Beta evaluation will be conducted in a similar fashion to the Alpha evaluation activities. However, following our experiences it is possible to make certain refinements to procedures and tools, which are detailed below.

Workshops will take place between end October and end December 2003. They will be conducted in the UK, Sweden, the Netherlands, Finland, and Denmark.

This phase will also compare and document how the WWAAC software differs from other browsers and email applications.

### **8.2 Changes to procedures from Alpha to Beta trials**

Although the methods and tools for evaluating the Alpha version of the browser and email are still applicable to the Beta evaluation, some lessons have been learnt and refinements to the procedures can now be recommended. The methods and tools provided in Section 6 have now been adapted for the Beta phase, and the main changes are described below. The Workshop procedures are repeated in Sections 8.4 and 8.5 below, in order to reflect these changes and the functionality of the beta software. Specific user tasks for the browser and email applications are included in Appendices 4B and 4C (Evaluation checklist with Usage Scenarios). In addition, the questionnaires for the user interviews have been extended to include the added functionality of both the browser and the email, as well as other evaluation issues such as those discussed in 8.2.2 below (See Appendix 4D and 4E). However, it must be emphasised that flexibility is still required in order to ensure that the users' individual needs are accommodated.

#### **8.2.1 Participants**

The beta evaluations will be conducted with participants from the primary target population of end users as defined in Section 2. In November 2003 a decision was taken by the evaluation team to shift the age range of this group slightly from young people aged between 10 and 21 years to young people aged between 12 and 25 years. All other definitions of the primary target population remain unchanged.

#### **8.2.2 Non-verbal communication**

Although it is not possible to capture every gesture or analyse videos of every expressive response during the evaluation, a great deal of non-verbal information could be lost unless specific steps are taken in the planning stage. Evaluators are, therefore, advised to ensure that non-verbal communication is captured, and the interview templates (Appendices 4D and 4E) provide a reminder to record this. The evaluator responsible for recording the information should take care to position

themselves so that they have a clear view of the user, as well as the computer screen. Where possible, evaluators should verify any interpretation of the non-verbal communication with the user by asking a yes/no question. Evaluators should indicate whether or not any interpretation has been verified, and the checklists in Appendices 4B and 4C) provide a prompt to do this.

### **8.2.3 User profile forms**

We recommend that if at all possible, the user profile forms be completed before the workshop takes place. This would enable the researchers to be aware of user characteristics, e.g. visual or cognitive impairments, that could impact on the procedure of the evaluation.

Please also note that minor improvements have been made to the User Profile form following the alpha trials. These are mainly to clarify the wording to one of the questions, and also to distinguish between independence in computer use and independence in using the Internet. If an end user is recruited for the Beta phase who has been involved in the Alpha phase, there is no need to ask for the user profile forms to be completed a second time.

### **8.2.4 Session Timescales**

The workshops with each individual should be split over three days, with a half-day session on each day. This is to ensure that end users do not become too tired during the evaluation process. To try and maximize retention of information between sessions, the two half-day sessions that relate to the browser should be as close as possible to each other. Ideally, these two half-day sessions should be held on two consecutive days. However, evaluation of the browser and the email do not need to occur in close proximity to each other, as there is no need to retain information about one application when evaluating the other. Indeed, there is no requirement for an individual to evaluate both the browser and the email applications. Separate end users can be recruited to evaluate these applications if desired.

If a user is unable to attend a scheduled second session on the browser, perhaps because they are ill, the second session should be rearranged, if possible. At the second session, there should then be an additional period of 1 to 1 familiarisation before conducting the documented workshop procedures for session 2.

The workshops should be conducted in a quiet room, with distractions minimised.

The evaluation of the software will be on a one-to-one basis with 2 evaluators. One evaluator will work with the end user, and the other will observe and take notes. As mentioned above, to maximize the quality of the observations, the observer should endeavour to position themselves so that they have a clear view of both the user and the computer screen. An end user's facilitator may also be present, depending

on the needs and preferences of each individual. Most importantly, though, a person who supports them in using the Internet should also be present (if different from the facilitator).

**8.2.5 Expenses**

In recognition of the end user’s time, end users should be given an ‘expenses’ payment equivalent to €20 for each half day session. It will be up to individual evaluators to decide whether to write a cheque to the end user, or to make the payment in the form of a voucher. If other expenses such as travel or phone use are incurred, these should be paid in addition to the above payment. If a user opts out at any point during a workshop, they will still receive the ‘expenses’ payment for that session.

**8.3 ‘To Do’ checklist**

The following checklist will provide a reminder to the evaluators of tasks needing to be completed before, during and after the user evaluations.

<b>Before the user evaluation:</b>	
Spend time becoming familiar with the browser and email software.	
Identify end users who: a. use symbols in ‘spoken’ face-to-face interaction b. are aged between 12 and 25 years (if possible) c. are professionally supported in their use of AAC and the Internet within schools and colleges, or receive non-professional support at home. d. use a variety of access methods (as much as possible)	
Arrange for the completion of user profile forms (if new users) or review forms already completed during alpha phase	
Arrange 2 half-day sessions for each of 4 users for browser evaluation	
Arrange 1 half-day session for each of 4 users for email evaluation	
Investigate Internet and Email access from workshop venue and liaise with Network Administrator if appropriate. For the email application to work, need port open for pop3 (number 110) and port open for SMTP (number 25). If internet explorer and outlook express work on a machine, then the email application should work on that machine.	

Identify source of technical support for the workshops	
Explore users' input needs and ensure appropriate switches/scanning interfaces/other hardware/technical support will be available	
Arrange consent forms for signature, if not already completed at Alpha stage.	
Encourage the user to bring their AAC system to the workshop, especially any low tech system.	
<b><i>For the Browser evaluation:</i></b>	
Identify interests/preferences of end user	
Prepare a selection set containing up to four symbol supported words that reflect these interests (for use with a search engine).	
Prepare Favourites Page of up to six web sites that reflect these interests. Ensure that the browser is compatible with these sites. If possible, ensure that at least one of these sites contains frames	
Prepare Talking Mats™ materials and symbol chart supplied. Customise, if necessary, to meet the needs of the user.	
Review User Profile form and choose a suitable default layout. The Evaluator may want to consider using the Layout Editor to adjust this if they have sufficient time and technical support. Record the default layout used or take a screen shot of the layout prepared using the Layout Editor. Try and ensure that the browser contains sufficient functionality to complete as many tasks as possible in section 8.4 d & e.	
In Finland, Sweden and Denmark, use the Layout Editor to translate the buttons if auditory support is required.	
<b><i>For the Email evaluation:</i></b>	
Prepare Talking Mats™ materials and symbol chart supplied. Customise, if necessary, to meet the needs of the user.	
Identify if user has writing grids that would be suitable for composing emails. Ask for copy to be sent to you, and import them into the WWAAC email application. Otherwise, use / adapt the default email grid supplied [recommended option].	
Identify a colleague who will receive and respond to an email from the user during the workshop. Add a photograph of them to the	

address book.	
Prepare 3 emails to the user. These should be waiting for the user in the Inbox by the start of the workshop.	
In Finland, Sweden and Denmark, use the Layout Editor to translate the buttons if auditory support is required.	
<b>During the user evaluation:</b>	
Review consent form with user to ensure informed consent	
Follow workshop procedure (8.4 for browser and 8.5 for email)	
Appendix 4: Evaluator's checklists with usage scenarios: 4B – Browser 4C - Email	
Appendix 4D: User Interview (Beta Browser)	
Appendix 4E: User Interview (Beta Email)	
Complete expense claim form with user (if required)	
Demonstrate Layout Editor and Interview Facilitator and/or person who supports the end user in accessing the Internet	
<b>After the user evaluation:</b>	
Send comments/errors encountered/changes needed to programmers on a regular basis, copied to Colette and Katharine	
Send final (translated into English) results of user evaluations for Browser and Email to Colette and Katharine (by 9 January):	
Data on completion of usage scenarios: State the task, problems observed and any other comments (from Appendices 4B and 4C)	
Raw data from User interviews for both Browser and Email (Appendices 4D and 4E) – this ought to be sent electronically so that there are no problems with reading your handwriting!	
Transcript of comments from facilitator interview	
Arrange payment to users for expenses	
Consider possible users for longitudinal studies	

#### 8.4 Workshop Procedure – Beta Browser

Consent to participate will be sought well in advance of the workshops, and a form will be completed. For children, consent to participate will be sought from parents/guardians but the child's assent to participate will also be gained. The consent form will be revisited on the first day of all workshops to remind users of what they have agreed to, and to confirm that they are still happy with this. Users will also be told that they may opt out of the workshop at any point.

A suggested procedure for the user workshops with timings is outlined below. The approach must, however, be very flexible in order to accommodate the users and their requirements. Breaks should be taken whenever they are required.

The Workshop should begin with the user, his or her facilitator(s) and project representative(s) in a small group to discuss the workshop procedures and to foster openness. There will then be a period of familiarisation with the software before the evaluation commences. The evaluation of the software will be on a one-to-one basis with 2 evaluators, one with the task of working with the user, and the other observing. An end user's facilitator may also be present, depending on the needs and preferences of each particular user. Most importantly, though, a person who supports them in using the Internet should also be present (if different from the facilitator). At the end of the workshop, the Layout Editor will be demonstrated to the person who supports the end user in using the Internet and / or the facilitator, and they will be interviewed.

Activity	Time
<b>Session 1</b>	
a) (Re-)introduction to WWAAC and explanation of the purpose of the activity	5 minutes
b) Getting to know the user and fostering openness	15 minutes
c) Demonstration of the prototype and introduction to use.	10 minutes
d) 1 to1 familiarisation with the prototype, with individual user and facilitator	1 hour
e) 1 to 1 evaluation of the prototype with the user	1 hour
<b>Session 2</b>	
f) Continued 1 to1 evaluation of the prototype with the user	2 hours 10 minutes
g) Interview and discussion with user	20 minutes

h) Demonstration of Layout Editor, then interview and discussion with local facilitators/experts	30 minutes
i) Analysis of findings and discussion	Post Workshop
<b>Total workshop time (over 2 sessions)</b>	<b>Approx 5 hours (plus time for breaks) with each user + 1/2 hour with experts</b>

**a) Introduction to the Workshop and WWAAC**

The user and their facilitator should be thanked for their participation and given a short introduction to the workshop and the WWAAC project. The following areas should be covered:

- A brief overview of the WWAAC project
- The fact that the new version of the browser incorporates many of the suggestions made by end users during the earlier evaluation phase, and that suggestions from the beta phase will be used to refine the software.
- An overview of the workshop timetable

Revisit the consent form signed earlier, and confirm that the user is still happy to proceed. In particular, confirm whether or not they have given consent for photographs and / or videos to be taken of them, and for what purpose these may be used (research within the project, training and / or publicising WWAAC). Emphasise that the user can opt out at any point during the workshop. They would still receive their ‘expenses’ payment for that session.

Finally, ensure that you have given the user the opportunity to ask any questions, and stress that they can ask questions at any point during the workshop.

**b) Getting to know the user and fostering openness**

A short discussion should now take place. If appropriate, use Talking Mats™ to discuss an unrelated topic such as film stars or sports. The evaluator should make some use of the negative side of the scale when they use the Talking Mats™, and should encourage the user to do the same. If it is not felt appropriate to use Talking

Mats™ in this way with an individual, discuss the fact that honest feedback on the browser is sought, and that both positive and negative comments are welcome.

This exercise will be explored and rehearsed during the user evaluation workshop in November.

### ***c) Demonstration and Introduction to Use***

The basic functionality should be clearly explained and demonstrated. This includes:

- Favourites page
- Selecting a site from the favourites page
- Using the 'next word/sentence/paragraph' button
- Using the 'next link' and 'go to link' buttons

### ***d) 1 to 1 familiarisation***

A default configuration of the software will be used, although this may have been adjusted in advance by the evaluator. The user should be accessing this in whatever manner is most familiar to them, e.g. two switch scanning, headmouse etc. Encourage the user to make use of the basic functionality demonstrated. Gradually introduce as much of the further functionality as time allows, including:

- Reading text, including repeating selections
- Moving between links, including skip 5 function
- Returning to the favourites page
- Using the selection set with a search engine
- Adding page to favourites
- Getting a summary of a page
- Using the back function
- Moving between frames and entering a selected frame
- Scrolling/moving through a page

- Moving between reading word-by-word, sentence-by-sentence and paragraph-by-paragraph
- Adjusting the volume and speed of the speech synthesiser

### **e) 1 to 1 Evaluation of the software**

Users will be encouraged to attempt the following set-tasks either on their own, or with their facilitator and /or WWAAC staff. It should be made clear to the user that this process is in no way 'a test' of their ability to use the software. It is about trying out different aspects of the software and seeking their feedback.

After each set of tasks, the user should be asked a question (see Appendix 4D). There are also some suggestions for additional questions. This process can be supported by Talking Mats™ and / or the pre-prepared symbol chart. If possible, access to the user's own form of AAC would be advisable, especially any low tech system.

Where Evaluators have used the Layout Editor to prepare a customised layout to meet the needs of the user, they may have had to remove functionality from the browser that is required to complete a task. If that is the case, omit the task from the evaluation and note this on Appendix 4D.

Evaluators should try and complete as many tasks as possible in the time available. However, all users are different, and it may not be possible to complete all tasks in the allotted time with every user. If it is not possible to complete any task due to time constraints, simply record this in Appendix 4D.

A proforma is provided for the evaluator to use whilst each task is being completed. This contains space for observations including problems observed by the evaluator, and comments (including non-verbal) from the user and / or facilitator (See Appendix 4B).

#### **1. Speech Synthesiser:**

1.1 Read some text. Use next and previous buttons.

1.2 Change the reading settings. Try out word-by-word, sentence-by-sentence and paragraph-by-paragraph. Set the browser to the preferred option.

1.3 Alter the speed of the speech. Read some text. Set the browser to the preferred speech rate.

1.4 Alter the volume of the speech. Read some text. Set the browser to the preferred volume.

## **2. Using Links:**

2.1 Read some text and then follow an embedded link.

2.2 WWAAC staff to point out a link in the bottom right area of the screen. Use 'skip 5 links' to get to the link and then select it.

## **3. Favourites Page:**

3.1 Choose a site from the favourites page and go to it.

3.2 Follow a link to a new site. Add this to the favourites page. Return to the favourites page and find it on there.

## **4. Summary:**

4.1 Go to two or more web pages and get a summary of each. Read any information provided about the content of the page.

4.2 Get a summary of a web page. Select one of the links from the list generated and go to it. Return to the summary page and select another.

## **5. Entering Information Online:**

5.1 Search for a new site on a search engine using a search term from the pre-prepared selection set.

## **6. Exploring a Long Page:**

6.1 Scroll down a page and then up.

6.2 Scroll to the bottom of a page and then to the top.

## **7. Frame Navigation:**

7.1 Move around a page using 'next frame' and then enter a frame. Move to another area on the page using 'next frame' and enter that.

## **8. Free Browsing (if time permits):**

Handover to user and their facilitator to explore sites of their choice.

### ***f) Individual User Interview***

After each set of tasks, questions relating to these should be asked. After all the tasks have been completed, there will then be a short interview about the browser

following a short pro forma (see Appendix 4D). Although the evaluator will use this pro-forma to record the user's responses, Talking Mats™ and / or the pre-prepared symbol chart will be used where appropriate to elicit information from the user.

### ***g) Demonstration of the Layout Editor and Interview with Facilitator and/or Person Who Supports the Internet Use of the User***

The Layout Editor should be demonstrated before the interview, so that the facilitator/person who supports the Internet use of the user can comment on it in relation to the browser application. Other new features will also be discussed, for example jumping over a number of links. A pro forma for the interview is included in Appendix 4F, and care should be taken to ensure that translation into local languages does not lose the essence of the issues being explored. Evaluators may want to use the pro forma to form the basis of a discussion, rather than delivering the questions formally. Evaluators may also choose either to ask the questions about 'AAC users' more generally or to ask the questions about the user who has participated in the evaluation. This choice will depend upon the experience of the facilitator/person who supports the Internet use of the user. Evaluators should document their choice. This pro forma is based on the high level assessment criteria established for the project, and a consideration of the more detailed evaluation planning criteria included in Section 3).

### ***h) Analysis and Discussion***

Information obtained from the workshops will be used as the basis for further discussion within the project. The reporting should follow a common format based on the overall assessment criteria, and be a composite of both expert and user opinion. The pro forma used for discussions with experts will also act as this report template, ensuring that the information from different trials is consistently reported (see Appendix 4F). An additional discussion document will be also be generated for use within the consortium highlighting any mismatches between user requirements and agreed functional specification and the emerging software. A possible sample pro forma for this reporting is included in Appendix 9.

## **8.5 Workshop Procedure – Beta Email**

The alpha phase of the email (expert) evaluation consisted of an comparative study with Widgit's Inter\_Comm software and AbleLink's Web Trek Connect (Alpha Email Evaluation Report, July 2003). This was conducted by expert members of the Consortium, and resulted in a number of improvements to the software's utility and usability. The Beta phase of the email evaluation will now evaluate the software with end users.

Consent to participate will be sought well in advance of the workshops, and a form will be completed. For children, consent to participate will be sought from

parents/guardians but the child's assent to participate will also be gained. The consent form will be revisited on the first day of all workshops to remind users of what they have agreed to, and to confirm that they are still happy with this. Users will also be told that they may opt out of the workshop at any point.

A suggested procedure for the user workshops with timings is outlined below. The approach must however, be very flexible in order to accommodate the users and their requirements. Breaks should be taken whenever they are required.

It is proposed that the email workshop be held in one half-day session. It is anticipated that a half-day will allow sufficient time for familiarisation with the software by the end user and their facilitator, carrying out various usage scenarios and conducting individual interviews. However, the pilot evaluations in the UK and Sweden will confirm these timescales, and if not appropriate, then these procedures may need to be revised. If the workshops are too rushed, the format may be changed to two half-day sessions. The timing of each activity would then be adjusted.

The Workshop should begin with the user, his or her facilitator(s) and project representative(s) in a small group to discuss the workshop procedures and to foster openness. There will then be a period of familiarisation with the software before the evaluation commences. The evaluation of the software will be on a one-to-one basis with 2 evaluators, one with the task of working with the user, and the other observing. An end user's facilitator may also be present, depending on the needs and preferences of each particular user. Most importantly, though, a person who supports them in using the Internet should also be present (if different from the facilitator). At the end of the workshop, the person who supports the end user in using the Internet and / or the facilitator will be interviewed.

Activity	Time
<b>Session 1</b>	
a) (Re-)Introduction to WWAAC and explanation of the purpose of the activity	5 minutes
b) Getting to know the user and fostering openness (if not already taken place during a beta browser evaluation)	15 minutes
c) Demonstration of the prototype and introduction to use.	10 minutes
d) 1 to1 familiarisation with the prototype, with individual user and facilitator	30 minutes

e) 1 to 1 evaluation of the prototype with the user	1 hour 10 minutes
f) Interview and discussion with user	20 minutes
g) Demonstration of Layout Editor, then interview and discussion with local facilitators/experts	30 minutes
h) Analysis of findings and discussion	Post Workshop
<b>Total workshop time (over 1 session)</b>	<b>Approx 2.5 hours for each user (plus time for breaks) + 1/2 hour with experts</b>

**a) Introduction to the Workshop and WWAAC**

The user and their facilitator should be thanked for their participation and given a short introduction to the workshop and the WWAAC project. The following areas should be covered:

- A brief overview of the WWAAC project
- The fact that input from end users is valued, and that suggestions from the beta phase will be used to refine the software.
- An overview of the workshop timetable

Revisit the consent form signed earlier, and confirm that the user is still happy to proceed. In particular, confirm whether or not they have given consent for photographs and / or videos to be taken of them, and for what purpose these may be used (research within the project, training and / or publicising WWAAC). Emphasise that the user can opt out at any point during the workshop. They would still receive their ‘expenses’ payment for that session.

**b) Getting to know the user and fostering openness**

If this user has not previously participated in a beta browser evaluation workshop, a short discussion should now take place. If they have, remind them that honest feedback is valued, and go straight to the demonstration.

If appropriate, use Talking Mats™ to discuss an unrelated topic such as film stars or sports. The evaluator should make some use of the negative side of the scale when they use the Talking Mats™, and should encourage the user to do the same. If it is not felt appropriate to use Talking Mats™ in this way with an individual, discuss the fact that honest feedback on the email application is sought, and that both positive and negative comments are welcome.

This exercise will be explored and rehearsed during the user evaluation workshop in November.

### ***c) Demonstration and introduction to use***

The basic functionality should be clearly explained and demonstrated. This includes:

- Reading an email message in the Inbox

### ***d) 1 to 1 familiarisation***

A default configuration of the software will be used, although this may have been adjusted in advance by the evaluator. The user should be accessing this in whatever manner is most familiar to them, e.g. two switch scanning, headmouse, etc. Encourage the user to make use of the basic functionality demonstrated. Gradually introduce as much of the further functionality as time allows, including:

- Using the address book
- Composing an email message
- Sending the email message, including 'exchange' / 'send & receive'
- Viewing sent message in Sent Mailbox
- Identifying 'new mail', including use of 'exchange' / 'send & receive'

### ***e) 1 to 1 Evaluation of the software***

Users will be encouraged to attempt the following set-tasks either on their own, or with their facilitator and /or WWAAC staff. After each task, the user should be asked a number of questions (see Appendix 4E). This process can be supported by Talking Mats™ and / or the pre-prepared symbol chart. If possible, access to the user's own form of AAC would be advisable, especially any low tech system.

A proforma is provided for the evaluator to use whilst each task is being completed. This contains space for observations including problems observed by the evaluator,

and comments (including non-verbal) from the user and / or facilitator (See Appendix 4C).

1. Choose a message from the inbox, open it and read it
2. Choose a recipient for an email message from the address book
3. Compose a short email message to that person. Send the email message. Make sure it goes by using the 'exchange' / 'send & receive' button.  
[*The recipient should be contacted by the evaluator and asked to respond ASAP*]
4. View sent message in Sent Mailbox
5. Use 'exchange' / 'send & receive' button to receive reply. Open reply and read it.

#### ***f) Individual User Interview and Discussion***

After each set of tasks, questions relating to these should be asked. After all the tasks have been completed, there will then be a short interview about more general issues concerning the email application. Each participant will be interviewed following a short pro forma established for the project (see Appendix 4E). Although the evaluator will use this pro-forma to record the user's responses, Talking Mats™ and / or the pre-prepared symbol chart will be used where appropriate to elicit information from the user.

#### ***g) Demonstration of the Layout Editor and Interview with Facilitator and/or Person Who Supports the Internet Use of the User***

The Layout Editor should be demonstrated before the interview, so that the facilitator/person who supports the Internet use of the user can comment on it in relation to the email application. A pro forma for the interview is included in Appendix 4F, and care should be taken to ensure that translation into local languages does not lose the essence of the issues being explored. Evaluators may want to use the pro forma to form the basis of a discussion, rather than delivering the questions formally. Evaluators may also choose either to ask the questions about 'AAC users' more generally or to ask the questions about the user who has participated in the evaluation. This choice will depend upon the experience of the facilitator/person who supports the Internet use of the user. Evaluators should document their choice. This pro forma is based on the high level assessment criteria established for the project, and a consideration of the more detailed evaluation planning criteria included in Section 3.

### ***h) Analysis and Discussion***

Information obtained from the workshops will be used as the basis for further discussion within the project. The reporting should follow a common format based on the overall assessment criteria, and be a composite of both expert and user opinion. The pro forma used for discussions with experts will also act as this report template, ensuring that the information from different trials is consistently reported (see Appendix 4F). An additional discussion document will also be generated for use within the consortium highlighting any mismatches between user requirements and agreed functional specification and the emerging software. A possible sample pro forma for this reporting is included in Appendix 9.

## **9. LONGITUDINAL MULTIPLE CASE STUDIES: BROWSER (WWB) AND EMAIL (WEM)**

### **9.1 Introduction**

This plan reflects the need to ensure that the Longitudinal Study is iteratively completed and documented in order to provide quality feedback to the developers. It also uses the amended description of the longitudinal single case studies found in the revised Technical Annex (February 2003), which defines these trials as being 'medium-term evaluation of the WWAAC system.' This phase will include evaluation of elements of symbol support for web browsing and email and will include some integration with the concept coding aspects of the project.

A project technical workshop was conducted on 20 January, at which time more detailed planning for the Longitudinal Studies took place for the Web Browser (WWB), Email (WEM) and WWAAC Supportive Writing (WSW). The draft of the methods and techniques was discussed before this meeting (by email and telephone conference) to ensure that procedures are well in place to begin the Longitudinal Studies on schedule.

Given the unique nature of this part of the evaluation, the plans for the WSW evaluation are described in more detail in Section 10.

### **9.2 Procedure – Longitudinal Case Study of the Browser (WWB) and the Email (WEM)**

There will be longitudinal trials in the UK, Holland and Sweden with both the Web Browser and the Email program.

The trials will continue for an extended period of 3 months between end-January/early February to mid-end April 2004. These will involve 3-4 people in the UK, Holland and Sweden. These numbers include the users from the above-mentioned longitudinal studies of the supportive writing, all of whom will be Bliss users. Materials used will be translated into national languages. Users should also be selected on the basis of the project's primary target users (young people aged between 12 and 25 years) and should all be symbol users. It is expected that participants will be chosen from the end-users who have taken part in the alpha and/or beta evaluations. However, choice of participants will be determined by their availability and other practical issues, such as their current school or college, and available IT support.

It should also be investigated whether, in addition to the individual case studies, it might be feasible to arrange a 'site' longitudinal study. This would mean that a computer or computers would be made available in an IT classroom at one of the schools or colleges, whereby students could drop in and out of the study, recording their experiences either in a logging file or on an Activity Diary (described below and see Appendix 6B for paper-based templates). This would only work with the support and enthusiasm of the IT technical and teaching staff of the college, which has already been suggested by one college in particular in the UK.

Usage of the software during the Longitudinal Case Studies will be assessed in a number of ways, covering the following key aspects:

### **Utility**

Recording which components of usage can be performed by the end-user independently and which tasks can be performed only with support from a facilitator will give some good indication of the utility of the software, e.g.

- The ability of the end-users to perform tasks without assistance, or with less assistance than previously (through the user and/or facilitator interviews)
- Whether the software provides all the functionality needed by the users and their facilitators

### **Effectiveness**

It is important to assess how well the software supports end users in using the Internet, e.g.,

- Does the software do what it is supposed to do
- Whether the end user is able to use the Internet at an improved level of performance
- The ability of the end users to learn how to use the software in a reasonable period of time
- The ability of the end users to remember how to use the software after a period of time, and from day to day
- The ability of end users to understand the information received (either through the browser or email), i.e., the concept coding aspects of the project.

### **Efficiency**

This is related to the effort required to perform activities. It is considered that in itself time needed to perform a task is of limited value in the context of the AAC user, and a more relevant question is whether the software provides advantages over alternative (current) ways of performing the same task, i.e., a comparative measure, e.g.,

- The number and types of errors made, documented either in an Activity Diary, or through the user interviews, or through interviews with facilitators
- Whether the software requires any unnecessary activity on the part of the end-users, i.e., the number of keystrokes needed to reach completion of a task.

## Satisfaction

This involves assessing whether the user enjoys using the software and whether or not the user is motivated to continue using it in the future. As well as subjective opinion, this can also be indirectly measured by monitoring whether the software continues to be used over the course of the longitudinal studies, or if the user continues to use Internet services but using alternative software with assistance. Aspects which will be assessed include, e.g.,

- End users' perceptions of ease of use
- End users' and facilitators' perceptions as to how the software could be improved
- Motivation to continue using the WWAAC software
- Whether or not the software has had any impact on the quality of the user's interaction with Internet services

### 9.3 User Expectations

In recruiting end-users to the longitudinal study, care must be taken to ensure that the users know what they are agreeing to do and the time and commitment it will take. The expectation is that each user should plan to use the browser and send an email at least twice a week, but preferably more often if this is possible. Note that a greater degree of time and commitment is required to participate in the supportive writing evaluation.

It is suggested that an evaluator visit each end-user every 2 to 3 weeks (depending on distance to travel). During the intervening weeks when a visit is not taking place, the evaluator will send an email to the end-user to ask about general issues or if there are any particular problems. It is suggested that each user be 'matched' with a specific evaluator in order to facilitate this process and also to build a good working relationship with each user.

### 9.4 Expenses

In recognition of the end user's time, they should be given an 'expenses' payment equivalent to €50 for participation in the study. If other expenses such as travel or phone use are incurred, these should be paid in addition to the above payment. If a user opts out at any point, payment will be still be made, as was the procedure during the Beta trials.

## 9.5 'To Do' checklist

The following checklist will provide a reminder to the evaluators of tasks needing to be completed before, during and after the longitudinal case studies.

<b>Before the longitudinal studies:</b>	
Identify end users for longitudinal case studies who: <ul style="list-style-type: none"> <li>a. use symbols in 'spoken' face-to-face interaction</li> <li>b. are aged between 12 and 25 years (if possible)</li> <li>c. are professionally supported in their use of AAC and the Internet within schools and colleges, or receive non-professional support at home.</li> <li>d. use a variety of access methods (as much as possible)</li> </ul>	
Arrange for the completion of user profile forms (if new users) or review forms already completed during the alpha or beta phase	
Conduct additional pre-trial interview with end user and facilitator to document baseline and Internet usage expectations (Appendix 6A)	
Investigate Internet and Email access from user's school and/or home and liaise with Network Administrator if appropriate. Ensure that the following are available: Windows 98 or above, Internet Explorer 6.0 or above, and a sound card.	
For the email application to work, must have port open for pop3 (number 110) and port open for SMTP (number 25). As a general rule, if Internet Explorer and Outlook Express work on a computer, then the email application should work on that computer.	
It is suggested that a visit is made to the school and/or home early in the planning stages, for the purpose of installing the software and investigating any potential access issues.	
Identify source of technical support over the course of the longitudinal study, both in-house and also from the WWAAC project.	
Explore users' input needs and ensure appropriate switches/scanning interfaces/other hardware/technical support will be available	

<p>Arrange consent forms for signature. There are 2 new consent forms:                  A consent form for users evaluating the browser and email. This will also ask their permission for us to log their emails and web sites visited.                  A consent form for users who are also evaluating the supportive writing. This will also ask permission for us to record and analyse the contents of their emails.</p>	
<p>Demonstrate to both the end user and facilitator how to use the Activity Diary in the form of an on-line questionnaire (Appendix 6B for paper-based formats)</p>	
<p>Train the facilitator and/or person who supports the end user in accessing the Internet in the use of the Layout Editor</p>	
<p><b>For the Browser evaluation:</b></p>	
<p>Identify interests/preferences of end user.</p>	
<p>A project Web site will be developed containing 4-6 world news items that will demonstrate the symbol support that concept coding provides. Users will be encouraged to visit this site on a weekly basis, as it will be updated regularly. (Supply any relevant news items, including fun/gossipy items, to the ACE Centre, who will collate/write them and request translation into each language).</p>	
<p>Provide the user with a link to their existing vocabulary pages if suitable/ possible, or prepare a selection set containing a comprehensive list of symbol supported words that reflect their interests (for use with a search engine).</p>	
<p>To get the user started, prepare Favourites Page of about 6 web sites that reflect these interests. Ensure that the browser is compatible with these sites. If possible, ensure that at least one of these sites contains frames.</p>	
<p>Review User Profile form and choose a suitable default layout. The Evaluator may want to consider using the Layout Editor to adjust this if they have sufficient time and technical support. Record the default layout used or take a screen shot of the layout prepared using the Layout Editor.</p>	
<p>Prepare Talking Mats™ materials if to be used in fortnightly and final interviews. Customise, if necessary, to meet the needs of the user.</p>	

In the Netherlands and Sweden, use the Layout Editor to translate the buttons if auditory support is required.	
<b>For the Email evaluation:</b>	
Arrange for a new email account to be created for each end user. Try and make use of the sfw server, as this will allow emails to be tracked.	
Prepare Talking Mats™ materials if to be used in fortnightly and final interviews. Customise, if necessary, to meet the needs of the user	
Identify if user has writing grids that would be suitable for composing emails. Ask for copy to be sent to you, and import them into the WWAAC email application. Otherwise, create grids in consultation with the user. [Record if new grids are created as the user will have to spend additional time becoming familiar with these]	
In the Netherlands and Sweden, use the Layout Editor to translate the buttons if auditory support is required.	
<b>During the longitudinal studies:</b>	
Collect log file for each user, which will also include the results of the user's Activity Diary, on each fortnightly visit. Open these files in Excel and look for trends in usage (with further analysis to be completed later).	
Appendix 6C: Fortnightly user interviews (Browser and Email) – As this is geography dependent, possibly every 3 weeks.	
Send an email to the user the weeks a visit is not held, asking questions about the Browser and Email.	
Appendix 6D: Final Interview with end user	
Appendix 6E: Final Interview with facilitator and/or other professional expert	
Complete expense claim form with user (if required)	
<b>After the longitudinal studies:</b>	
Send comments/errors encountered/changes needed to programmers on a regular basis, copied to Colette and Katharine	
Summarise key trends from logged files on a regular basis but	

analyse overall when study is completed.	
Summarise data from the Activity Diaries and User Interviews (Use Activity Diary and questionnaires as a template)	
Summarise any additional comments from facilitator interview every 2 weeks	
Send final (translated into English) results of longitudinal case studies for Browser and Email to Colette and Katharine	
Arrange payment to users for expenses	
Send thank you letter to user and facilitator for their contributions to the project	

## 9.6 Detailed Methods and Tools

It is suggested that methods and tools for the longitudinal trials will include:

- User Profile form (if this was already completed in the alpha or beta phase, there is no need to complete it again).
- New consent form for each user:  
A consent form for users evaluating the browser and email. This will also ask their permission for us to log their emails and web sites visited.  
A consent form for users who are also evaluating the linguistic module. This will also ask permission for us to record and analyse the contents of their emails.
- Pre-trial interviews with end-user and facilitator: These will describe the user's previous experience in using the Internet, as well as their past exposure to the WWAAC software. It will also document their expected usage of the Internet (whether at school or at home), what sort of technical support is available on site, etc.
- (Re-)Demonstration and (re-)training in the use of the browser and the email software for both the end-user, his or her facilitator and any person who is available to provide technical support.
- Depending on the needs of each end-user, it may be appropriate to introduce only basic features at the beginning of the trial and to provide training on the more advanced features at future visits. In any event, keep track of features being used, using the table of functions which will be provided.
- On-line Activity Diary, in the form of an on-line questionnaire, recording whether the software does what the user wants it to do, whether there are any

technical problems, and overall impression, as well as additional space for the facilitator to add more information if necessary.

- Automatic data logging which will record all actions and time spent using the browser and email. The log file will also record the URL of the website on which the action takes place. The user name on log-in will be recorded automatically. If there is no logging on procedure, discuss the best option, which could be to create separate shortcuts for each student.
- Regular e-mail and telephone contact (with users and facilitators) in order to monitor that there are no specific problems in usage that need resolving. This will also provide regular, assessable activities using the email software. In addition, it could also be interesting for different end users to email each other as the longitudinal trial progresses.
- Interviews every two weeks with end-users, which will cover the following issues (similar issues may be covered by email exchange in the intervening weeks):
  - Usage over that period
  - Subjective satisfaction
  - Problems in use
  - Ability to recover from error
  - Need for support
  - How well end-users remember how to use the system over time
  - Motivation to continue using the software
- Making contact with facilitators, through a brief interview every two weeks
- Final Interview with end-users, which will sum up their opinion of the software over the entire duration of the study.
- Final Interview with facilitators or other experts who have been involved in the study.

## 9.7 Activity Diary

Activity Diaries are useful to provide a general understanding of the activities the users are engaged in, i.e., how long the software is used for, what aspects of using the browser are particularly enjoyable and which are causing problems (Poulson et al, 1996). In this way, feelings and opinions can be captured 'as they happen', and changes over time in usage and attitude towards the software can be documented.

A Diary can be kept either by the end-user or by the facilitator or teacher, depending on the ability and preferences of the user. The format needs to be short and succinct, since if they are too complicated or time-consuming, this is likely to lead to non-completion. This diary is expected to be an important component of the data collection over the course of the longitudinal case studies. Even though it is not suggested that statistical analysis be necessary of the data, it should give a clear indication of whether the software does what the user wants it to do, the problems

that occurred whilst using the software, and the attitude of the user to the activity at that point in time.

In order that the Activity Diary can be completed independently and immediately after using the browser and/or email software, an on-line Diary is programmed to appear as soon as the user selects 'exit' from either the browser or the email. For reference, the format is provided in Appendix 6B. The Activity Diary has been designed so that users will be able to independently record, using a 3 point scale, whether they could do what they wanted to do, whether there were any technical problems, and their overall impression that day. On exiting the third and final question, a dialogue box will appear for additional comments by the facilitator if necessary. As automatic logging will capture the start and finish times of Browser and Email usage, this information is not required to be recorded on the Activity Diary. In addition to this on-line questionnaire, there will also be an opportunity for facilitators to record activities on a paper-based form, copies of which will be left beside the computer (also see Appendix 6B).

The on-line version resulted from discussions within the project and through exploring the use of an on-line switch accessible questionnaire (such as the one at <http://www.madhousesoftware.freeserve.co.uk/freedownloads.htm>) in order to enable end-users to complete some or all of their replies more independently.

Users will have discretion in using the diary, but every effort will be made to encourage usage. Completing an activity diary demands a degree of commitment on the part of both the end-user and his or her facilitator. Therefore, it is important to motivate the user and make sure that they understand exactly what to do. If, however, a facilitator is completing the diary on behalf of the user, it would be advisable to go through the completed diary with the user at the end of the session to ensure that their views have been accurately represented.

## **10. LONGITUDINAL MULTIPLE CASE STUDIES: SUPPORTIVE WRITING (WSW)**

### **10.1 Introduction**

The evaluation plan for the WSW has here been given a separate section since the methods and tools for the evaluation differ somewhat from those developed for the Browser and the Email.

The WSW application is a new kind of support and offers assistance for structured writing which requires a different writing strategy. Questions we need to ask when evaluating this module is whether it will improve the quality of the written output and the possibilities of translating symbol messages into interpretable text for the receiver, and subsequently, increase the independence of the user. A side question would be how much and what type of linguistic competence is needed to be able to use a support of this kind and to what extent the support can affect the writer's linguistic competence. To approach these questions we need descriptive case studies containing interviews and observations. Further, we need experimental studies including comparisons between output with and without the support module, comparison over time and an investigation of linguistic competence before and after usage/training. It is important in this evaluation to show how the WSW acts at a direct, technical level (effectiveness) and how the support affects the writer's performance and the writer's interactions via written communication (efficiency).

### **10.2 Procedure – Longitudinal Case Study of the Supportive Writing (WSW)**

Following the pilot evaluation of the stand-alone linguistic support module, a total of 4-5 Bliss users (two in Sweden, and one to two in the Netherlands) will be asked to participate in the longitudinal case studies of the WWAAC Supportive Writing software (WSW) when it has been integrated with the email software, together with other support functions (grammatical rules and concept coding).

Trials will take place from mid March to mid May 2004, alongside the longitudinal studies of the browser and email. For only this sub-group of Bliss users, the linguistic structures will be embedded in the Email application, and these users will therefore need more contact time than other participants in the longitudinal trials. The questionnaires used for the Browser and the Email evaluations will be used, with added sections covering the supportive writing issues (See Appendices 6A-6E).

### **10.3 Linguistic competence**

In order to assess the writer's linguistic competence and possible development an ad hoc task and a grammatical test (TROG or equivalent) should be administered before and after the evaluation (Appendix 5C).

## 10.4 Composing emails with and without the WSW

In order to see if the WSW will make email and text composition easier for the user we need to compare usage and output from writing both with and without the WSW. Thus, to keep all other conditions equal the test texts will be written with the WSW integrated in the WEM and the comparison texts will be written with the WEM containing their ordinary symbol charts without the grammatical support. Both conditions can then be automatically logged.

Usage of the WSW during the Longitudinal Case Studies will be assessed in a number of ways, covering the following key aspects:

### Effectiveness

It is important to assess how well the software supports end users in using the WSW by doing what it is supposed to do, i.e., making email correspondence easier. We need to investigate

- The ability of the end users to remember how to use the software after a period of time, and from day to day. (Tool: Observations and possible improvement of output.)
- Whether it is possible for the user to write what he intends, i.e., whether the writer will be affected by the given alternatives. (Tool: Before-hand report of what he intends to write, Appendix 7)
- Whether the module does what is expected given the writer follows the instructions.. (Tool: Comparison of what the software is supposed to produce and the actual output, logging)

### Efficiency

This is related to the effort required to perform activities and to improved result by usage. It is considered that the time needed to perform a task is of limited value in the context of the AAC user, and a more relevant question is whether the software provides advantages over alternative (current) ways of performing the same task, i.e., if and how the software/method affects the output/result. This will be done by comparative measures as described below.

- The number and types of errors made, documented either in the Activity Diary, through the user and facilitator interviews, and through logging analyses. A scheme of how errors will be counted and classified will be developed. (Tool: Interviews and logging)
- Whether the software requires any unnecessary activity on the part of the end-users, i.e., the number of keyboard events needed to reach completion of a task. (Tool: Logging)
- The adequacy with which the result (output message) will be interpreted. (Tool: Automatic symbol-to-text translation)

- The grammatical correctness of the output messages. (Tool: Grammatical analysis of output)
- Possible performance changes over time. (Continuous logging measures)
- Possible output changes over time. (Continuous output analysis measures)
- The possibility for the receiver of the message to tell any differences between messages composed with and without grammatical support. (Tool: Reader judgement to occur after the evaluation period)
- Whether there will be an overall difference when the writer uses this software compared to when he uses his ordinary equipment, i.e., with or without WSW. (Tool: A composite result of the above mentioned measures)

### **Satisfaction**

This involves assessing whether the user enjoys using the software and whether or not the user is motivated to continue using it in the future. As well as subjective opinion, this can also be indirectly measured by monitoring whether the software continues to be used over the course of the longitudinal studies, or if the user continues to correspond by email through their current way. Aspects which will be assessed include, e.g.,

- End-users' perceptions on ease of use (Tool: fortnightly interview)
- End users perceptions as to how the software could be improved (Tool: fortnightly interview)
- Motivation to continue using the WWAAC software
- Whether or not the software has had any impact on the quality of the user's interaction by use of the WSW (Tool: analysis of email correspondence)
- Will the user be more comfortable with written communication? (Interviews)
- Will the user be more independent? (Interviews with both the user and people around. Observations)

### **10.5 Probe session procedures**

At every session the evaluator sees the user there will be a fixed set of tasks that have to be administered.

The user needs to write an email both with WEM without any grammatical support and with the WEM – WSW (WWAAC Email software and WWAAC Supportive Writing) application. To avoid the effect of slow starts or fatigue the order of condition, i.e., whether the user should start by writing with his ordinary way of writing or with the WSW, will alternate (Appendix 7).

The user has to write a minimum length of time AND a minimum number of content messages (pieces of information). Before the first trial session a discussion must occur about the time and text length that is reasonable for the particular user. When a minimal time and text length is decided upon, both requirements must be achieved during each trial. The active writing time and output length should be set to a reasonable extent for the user (Appendix 7). These content messages could consist of anything from, e.g., a two symbol message such as “daddy” + “car” to a complete sentence “My dad drove me here this morning”. In order to know that the short message may contain the same amount of information, the user needs to orally (or by using the easiest way) inform the evaluator in advance what he intends to write (Appendix 7).

The user will be given the task of writing an email to a familiar person, such as friend, parent, teacher. To make it easier for the user to get started with his task, he/she should each trial be given a topic to write about. All topics should be decided before the first trial session and then randomly given to the user. An example: If the user is going to evaluate the WSW on seven occasions x two conditions = 14 topics. The topics could be anything the user would want to write about. The topic could also be what has happened during the last week or the plans for the coming week. So the topic could be chosen from a set of freely chosen topics, a sort of diary or a combination of both. At one day’s session the type of email topic has to be the same but can vary between sessions. (Appendix 7).

**10.6 ‘To Do’ checklist**

The following checklist will provide a reminder to the evaluators of tasks needing to be completed before, during and after the longitudinal case studies. The items marked with an asterisk indicate general issues that probably have been taken care of since they are included in the checklist for the evaluation of the Browser and the Email application.

<b>Before the longitudinal studies:</b>	
* Identify end users for longitudinal case studies, which should be the same users as those who participated in the pilot study.	
* For the email application to work, need port open for pop3 (number 110) and port open for SMTP (number 25). If internet explorer and Outlook Express work on a computer, then the email application should work on that computer.	
* Identify source of technical support over the course of the longitudinal study, (both in-house and also from the WWAAC project)	
Administer ad hoc task and grammatical test if not done at the pilot evaluation.	

Make sure that the pre-trial interview form is filled out properly (Appendix 6A).	
Check the Logging function	
(Re-)Demonstration and (re-)training in the use of the the email software combined with the WSW for both the end-user, his or her facilitator and any person who is available to provide technical support.	
* Appendix 6B: demonstrate to both the end user and facilitator how to use the Activity Diary, and prepare talking mats stickers if appropriate	
Decide together with the user what the content of the message should be and how it will be structured Appendix 7.	
<b>At the beginning of each session:</b>	
Check that the Logging function is switched on	
Administer the first task from the Topics List (Appendix 7).	
Check whether the message should be written with the WSW module or the current writing system (Appendix 7).	
* Identify if user has writing grids that would be suitable for composing emails. Ask for copy to be sent to you, and import them into the WWAAC email application. Otherwise, create grids in consultation with the user. [Record if new grids are created as the user will have to spend additional time becoming familiar with these.].	
<b>During the longitudinal studies:</b>	
*Collect log file for each user, which will also include the results of the user's Activity Diary, on each fortnightly visit. Open these files in Excel and look for trends in usage (with further analysis to be completed later).	
*Appendix 6C: Fortnightly user interviews	
*Send an email to the user the weeks a visit is not held, asking questions about the email with supportive writing.	
*Appendix 6D: Final User Interview with end user	
*Appendix 6E: Final Interview with facilitator and/or other professional expert	

* Complete expense claim form with user (if required)	
<b>After each session:</b>	
Send comments/errors encountered/changes needed to programmers on a regular basis, copied to Tina	
Send before-hand report of what the user intends to write	
Send the log file to Tina	
Send message transferred into text in both the original language and English	
Collect data from Activity Diaries every two weeks when visiting the end user, if appropriate	
<b>After the longitudinal studies:</b>	
Administer a second run of the ad hoc task and grammatical test and send the raw data to Tina	
Send final (translated into English) results of longitudinal case studies for WSW to Tina	
Summarise raw data from both the Activity Diary and User interviews every two weeks (Use Activity Diary and Interview questionnaires as a template).	
Summarise any additional comments from facilitator interview every 2 weeks	
*Arrange payment to users for expenses	
*Send thank you letter to user and facilitator for their contributions to the project	

### 10.7 Detailed Methods and Tools

It is suggested that methods and tools for the longitudinal trials will include:

- User Profile form (if this was already completed in the alpha or beta phase, there is no need to complete it again).
- New consent form for each user: A consent form for users who are also evaluating the linguistic module. This will also ask permission for us to record and analyse the contents of their emails.

- Pre-trial interviews with end-user and facilitator: These will describe the user's previous experience in using email for correspondence with friends and other persons. It will also comment on possible thoughts and discussions since the first pilot trial.
- (Re-)Demonstration and (re-)training in the use of the email software combined with the WSW for both the end-user, his or her facilitator and any person who is available to provide technical support.
- On-line Activity Diary, in the form of an on-line questionnaire, recording whether the software does what the user wants it to do, whether there are any technical problems, and overall impression, as well as additional space for the facilitator to add more information if necessary.
- Automatic data logging, which can be used to show the time users spend using various functions of the software, and also revealing those functions accessed most frequently. The logging may also track what errors are being made, the type of errors detected by the user and the type of errors that will remain undetected.
- Regular email and telephone contact (with users and facilitators) in order to monitor that there are no specific problems in usage that need resolving. This will also provide regular, assessable activities using the email software.
- Trial sessions with the supportive writing approximately every two weeks.
- Interviews every two weeks with end-users, which will cover the following issues (these are planned to be face-to-face, but email interviews could also be explored):
  - Usage over that period
  - Subjective satisfaction
  - Problems in use
  - Ability to recover from error
  - Need for support
  - How well end-users remember how to use the system over time
  - Motivation to continue using the software
- Making contact with facilitators, through a brief interview every two weeks.
- Final Interview with end-users, which will sum up the end-users opinion about the software over the entire duration of the study.
- Final Interview with facilitators or other experts who have been involved in the study.
- A follow-up grammatical task that covers the same area as the pre-trial grammatical task.

## 11. USER CONSULTATIONS

In parallel with the longitudinal case studies there will also be further consultation with other user groups in the UK and other countries, including Spain, which will allow further expert and user feedback to be obtained. This will be useful to supplement information obtained from the longitudinal studies and to also identify other markets for the browsing and e-mail software. It is anticipated that about 20 additional users will be consulted. Because people with aphasia have been identified as an important target group, these users will be included in the additional investigations. Therefore, the additional user groups which are expected to be included in the study are

- People with aphasia
- People with learning disabilities, including people with dyslexia
- Elderly users

These investigations are meant to be more informal than the alpha or beta trials, collecting qualitative information from different user groups to assess to what extent the software meets their needs. Separate questionnaires for users and professionals, covering the browser and the email, with or without WWAAC Supportive Writing, can be found in Appendix 8. Evaluators should use these questions as a guide only, and questions may have to be adapted to the specific needs of each user group. For all questions, there should be scope for additional comments, to be recorded either under the relevant question, or at the end of the questionnaire.

## **12. NEXT STEPS**

An analysis of the results of these studies will be discussed within the consortium in the final stages of the evaluation, leaving the remaining weeks for a final refinement of the WWAAC software. During this latter period, a synthesis of the evaluation results will form D11, the Final User Evaluation Report.

### 13. REFERENCES

- Clarke M.T. and Kirton, A. (2003). Patterns of interaction between children with physical disabilities using augmentative and alternative communication and their peers, *Child Language Teaching and Therapy*.
- Clarke, M. et al (2001). User Requirements Document, WWAAC project Deliverable 2.
- ISO 9241, (1998). Ergonomic Requirements for Office Work with Visual Display Terminals, Geneva
- Landauer, T. K. (1988). In Helander, M., (ed.), *Handbook of Human-Computer Interaction*, North-Holland, pp. 905-928.
- McConachie, H., Clarke, M.T., Wood, P., Price, K. and Grove, N. (1999). Evaluation of Speech and Language Therapy for Children using Communication Aids: Final report to the NHS Executive R&D Programme for People with Physical and Complex Needs.
- Murphy, J. (1998). Helping People with Severe Communication Difficulties to express their Views: A low-tech tool, *Communication Matters*, **12** 9.
- Nielsen, J. (1997). In Salvendy, G. (ed.), *Handbook of Human Factors and Ergonomics*, 2<sup>nd</sup> ed., Wiley, pp. 1543-1568.
- Poulson, D., Ashby, M. and Richardson, S. (eds.) (1996). *USERfit—A Practical Handbook on User-Centred Design for Assistive Technology* (Brussels, Luxemburg: ECSC–EC–EAEC).
- Preece, J., Rogers, Y., Sharp, H. (2002). *Interaction design. Beyond human-computer interaction*, Wiley, pp. 350-351.
- Shaw, C. G. (1993). Seat cushion comparison for nursing home wheelchair users. *Assistive Technology* 5, cited in Poulson, D., Ashby, M. and Richardson, S. (eds.) (1996). *USERfit—A Practical Handbook on User-Centred Design for Assistive Technology* (Brussels, Luxemburg: ECSC–EC–EAEC), p. 112.
- Todman, J. and Dugard, P. (2001). *Single-case and small-n experimental designs. A practical guide to randomization tests*. London: Lawrence Erlbaum Associates.
- Venkatesh, A. and Vitalari, N. (1991). Longitudinal Surveys in Information Systems Research: An Examination of Issues, Methods and Applications. In Kramer, K. (ed.), *The Information Systems Challenge: Survey Research Methods*, Harvard University Press, pp. 115-144.