

*NET*easyPhone Kit

Diagnostic user-test report

05/03/04



User-Lab: understanding the user experience

UCE

Birmingham

Executive Summary

This is the Final Report of the User-Lab evaluation of *NETeasyPhone*. The Project deliverables are this report and a review CD-ROM. The Project was conducted by User-Lab at The University of Central England and involved the lab's Usability Engineer and Research Fellow. The project focused on evaluating human-factors issues, by eliciting and analysing user feedback with the aim of assessing usability.

Group 3 Technology has developed *NETeasyPhone*. It is a new product that allows users to make private, secure and direct calls over the Internet. It has a number of related features, including a speed dial and contact book facilities. The Project involved four phases. The first phase, involved interviews with development team in order to understand the context of use, user profiles, task scenarios and areas of investigation. The second phase involved the production of data collection instruments, design of appropriate test conditions and experimental procedures for testing the product under laboratory conditions. The third phase, involved piloting and running user tests (n=11). Testing took place in two phases with results fed back to the development team and iterations made to the software and documentation Phase one (T1) investigated a beta version of the product and Phase two (T2) tested a iterated version of the software and documentation.. The final part of the project involved analysis of the results using inferential statistics, protocol analysis and observational coding.

“Pretty good [even] for a non-technical person to install!”

Three user profiles were used in testing. The first group (n=2) comprised of Innovators. In the tests, this user group had the highest use of mobile technology and used e-commerce the most. Technically savvy, they were the youngest group and were predominately male. The second group (n=3) comprised of Early Adopters. The third group were made up of the Late Majority (n=5). These make up 34% of the

population and in the tests this user group had the lowest use of mobile technology, used e-commerce the least and were the oldest.

Participants were recruited from The University of Central England. Each test involved participants completing three task scenarios and three Post-Test Questionnaires on completion of the tasks. The project involved two test sessions enabling iterations to be made between sessions. The two tests involved five test conditions:

- Sound off/on
- Firewall off/on
- Operating system XP/2000
- Platform Notebook/PC
- Handset Classic/Standard

Data from the tests were captured using questionnaires, interview notes and video recordings (See appendix). Analysis was carried out through reviewing the test data. Transcripts were coded to produce response matrices. Observational research software was used to analyse behavioural responses and basic statistical analysis was applied to questionnaire and interview data.

“It was a new experience using the net to make a call”

The focus of the research was to improve the user experience of the installation and initial use. Changes made to the software and documentation had the following results;

- 80% positive user protocols recorded
- 100% perceived usability responses recorded
- 100% workflow support responses recorded
- 100% task success rate
- 50% decrease in prompts after T1
- 85% increase in user checks during installation after T1

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Project Constants

- The Client
- The Product
- The Technology
- The Team
- The Resource
- The User profiles
- The Tasks

The Client

Group 3 Technology is a software development company which was established in 2000. Group 3 Technology has extensive telephony and computer knowledge including expertise in security encryption and bio-metrics. The company specialises in Voice over Internet Protocol (VoIP) software that has enabled the company's development of voice and data convergence over the Internet. The first outcome of the company's R and D is *NETeasyPhone*. This is one of many patented products and achieves high quality audio transmissions. Future developments are currently in production with video and networking capabilities to reach production in the next 12 months.

Gerry Leighton

Chief Executive Officer & Technical Director

Lee Squire

Commercial Director

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The Product

NETeasyPhone (The Kit) consists of a software application and Internet telephone handset. The software handles all call control, notification and presentation functionality and conforms to the international open H323 voice communication standard. Traditional ring-tone and engaged tones have been incorporated along with traditional telephone functionality including a Speed Dial facility. The Kit enables users to make voice calls over the Internet. The current version works on non-networked, direct access to the Internet via a dial-up 56kbps modem or ADSL/Broadband in conjunction with Microsoft Windows Operating Systems. Under these conditions operational performance is on a par with, or exceeding that of, traditional conversations on conventional PSTN telephone landlines. Calls are private and secure and use a direct connection that is not hosted on a public server. Users install the software and one of the two handsets;

- Standard – Portable handset with Base Stand:
- Classic – Two piece Internet Telephone with Keypad:

NETeasyPhone users purchase a *NETeasyPhone* ID, (Internet Telephone Contact Number) which they can then use to log-in to the *NETeasyPhone* software to make telephone calls to other *NETeasyPhone* ID users. Internet Telephone Contact Numbers (*NETeasyPhone* ID) comprises 13 characters (preferably 7 Letters & 6 digits). These numbers are stored in Telephone Contact Book. Users that have exchanged Internet numbers and added them to their own personal address book contacts can, at will, determine whether or not the person they wish to call is currently available to receive calls. Other user interface features include a Red or Green LED indicator. If the indicator is green the phone is operational and the User can dial a *NETeasyPhone* ID and will hear ringing, through the recipients' speakers and/or handset. Conversation can then take place through the handset. The call will be private, secure

and direct between the two parties regardless of their physical location in the world.

The Technology

Other VoIP systems are not secure and use either a central server or use other users (and their hardware) to channel calls, which makes these methods unreliable and potentially unsecure. Graphical Illustrations are available in Appendix iii.

Method 1: **Central Server Approach** – The two main commercial products of this type are provided by MSN & Yahoo. Both offer free software that is linked to e-mail accounts. These permit users to connect to a central server, which handles calls. The heavy usage levels are unknown and are likely to cause congestion and significant infrastructure investment. Currently this software is offered free with no guarantee or support for quality of service, and without Internet Telephone is provided.

Method 2: **File-sharing Node Approach** - The main commercial products of this type if called ‘Skype’. This is in beta version and is free to download. Users access the Internet from the PC and become part of the Web network (either as a Node or Super Node). Search facilities permit users to look for other users that are currently logged-on. This means that users may find their computer is being used to route calls. This affects performance and has potential security risks. The Skype principle is similar to the Kazaa file-sharing method for downloading free music and film files from other Users over the Internet.

The Team

The team comprised a Usability Engineer and Senior Research Fellow from User-Lab. User-Lab is based at Birmingham Institute of Art and Design. The lab is part of the Institutes Research Department and is staffed by a multidisciplinary team with expertise in digital media design, human-computer interaction, psychology and software engineering. The lab consists of three purpose built testing and design

labs, that are equipped with the behavioural, physiological and psychological research tools. The lab has two related functions: to carry out research into the digital experience, and based on the results of this work, to develop an innovative commercial service. In the two years, since its inception, the lab has been involved in a number of collaborative projects with Regional Development Agencies, Further Education bodies, charities and the public and private sector. The labs research agenda pertains to understanding the user experience in terms of accessibility, usability and engagability

“It’s easy to follow the instructions”

Senior Research Fellow. Marie Jefsoutine Senior Research Fellow in Digital Media, Birmingham Institute of Art and Design, University of Central England, where she is involved in usability research, e-learning and digital media development. Marie has worked in multimedia design for over ten years, previously at the BBC Open University and Goldsmiths College Design Department. Marie studied Experimental Psychology (BSc Hons) at Sussex University, after which she worked in Speech technology at Logica Cambridge Plc, and Psycholinguistics at Cambridge University. She completed an MSc in Computing, Cognition and Psychology at Warwick University, and later took a PgDip in Communications and Electronic Graphics at Goldsmiths College, University of London. She has produced a number of CDROMs and web sites, including The Virtual Gallery of Contemporary, now on display in the Victoria and Albert Museum. Marie is a member of The BCS HCI group and The Design Research Society and publishes regularly in the fields of design and usability.

Usability Engineer. John Knight is Usability Engineer, at Birmingham Institute of Art and Design, University of Central England. John studied Fine Art at University College, Wales (then Gwent College) under Roy Ascott, the visionary telematicist. He specialised in mixed media that included film and video, performance and painting and printmaking. Over the next 12 years he worked in

commercial design and print production, within a variety of design projects, ranging from Touring British Council Exhibitions to Consumer Magazine production. John completed an MSc in User-Interface Design at London Guildhall University in 2000. Since then he has worked on design and research projects for a range of organisations. These include user-interface design for the British Library and user-centred design for digital media. He contributes regularly to a number of publications and conferences in the field of design, usability and engagability. In addition, he has worked as a visiting lecturer and external examiner (London Guildhall University) on BSc and MSc computing and business courses. John has been a member of The Usability Professionals Association of four years and is a member of The BCS HCI group, WMITA and Society of Public Information Networks.

The Resource

The User-Lab is a non-profit making organisation and was developed through Higher Education Funding Council for England capital funding. The lab was founded in 2000 and undertakes academic and commercial research. The lab is a purpose built user-centred design centre that designs and tests products and services. The lab is part of Birmingham Institute of Art and Design's Research Department and provides commercial services and research outcomes. The User-Lab has contributed to improving communication between designers, researchers and businesses in understanding the user experience.

Birmingham Institute of Art and Design (BIAD) is one of the United Kingdom's foremost centres in art, design and media education. BIAD has a tradition of arts education dating back to the founding of the School of Design in 1843. The Faculty comprises The School of Jewellery, School of Art, The Bournville Centre for Visual Arts as well as the main campus at Gosta Green. BIAD offers a portfolio of preparatory certificates and a well-established range of vocationally relevant postgraduate courses that regularly attracts a learning community of over 450 students. The are underpinned by strong industry links, including a comprehensive research and development

programme. BIAD is one of 9 faculty's of The University of Central England.

‘3 things you like about NETeasyPhone Kit?’

1. “Free Calls
2. The address book
3. Different to the norm”

The User Profiles

Recruitment was based on three user profiles developed from Everett Rogers (1995) Diffusion of Innovations categorisation.

Profile 1.

Innovators make up 2.5% of a population. Innovators use their peer networks and cosmopolitan social relationships to maintain their interest in enterprise and new ideas. Being an innovator has several prerequisites; Disposable income, technical knowledge and the ability to cope with a high degree of uncertainty. Innovators play an important role in the diffusion of new ideas. In the tests this user group had the highest use of mobile technology and used e-commerce the most. Technically savvy they were the youngest group and were predominately male.

Profile 2.

Early adopters make up 13.5% of a population. Early adopters are a more integrated within groups than innovators. Early adopters focus on their locality and have the greatest degree of opinion leadership in most systems. Potential adopters look to early adopters for advice and information and are effective in speeding up the diffusion process. The early adopter decreases uncertainty about a new idea by adopting it, and then conveying a subjective evaluation of the innovation to near-peers through interpersonal networks.

Profile 3.

The Late Majority make up 34% of a population. The late majority adopt new ideas after the average as a result of peer pressure. Innovations are not adopted until most others in their population have done so and are approached in a sceptical and cautious manner. In the tests this user group had the lowest use of mobile technology, used e-commerce the least and were the oldest.

Profile 1.

Gender Ratio (M-F):2:0

Mean Age:27.5

Mean E-commerce use: 3.5

Mean Mobile use:5

Subject 1. (Navin)

Subject 4. (Tom)

Profile 2.

Gender Ratio (M-F): 2:1

Mean Age: 30.67

Mean E-commerce use: 3.33

Mean Mobile use:5

Subject 6. (Chicone)

Subject 8. (Panch)

Subject 10. (Mukti)

Profile 3.

Gender Ratio (M-F): 1:4

Mean Age:38.8

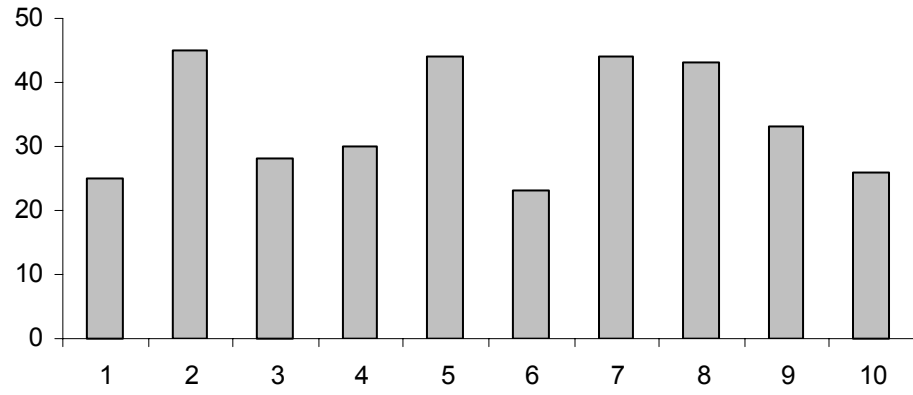
Mean E-commerce use:2

Mean Mobile use:4

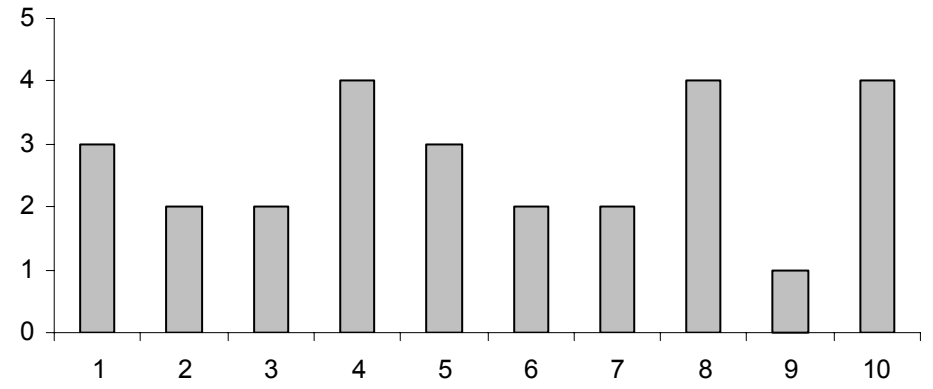
- Subject 2. (Adrian)
- Subject 3. (Claire)
- Subject 5. (Kathryn)
- Subject 7. (Sue)
- Subject 9. (Louise)

Demographics

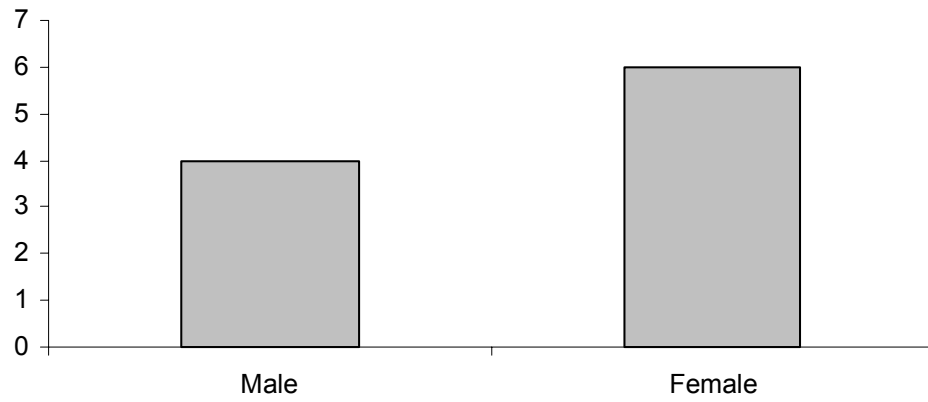
Age



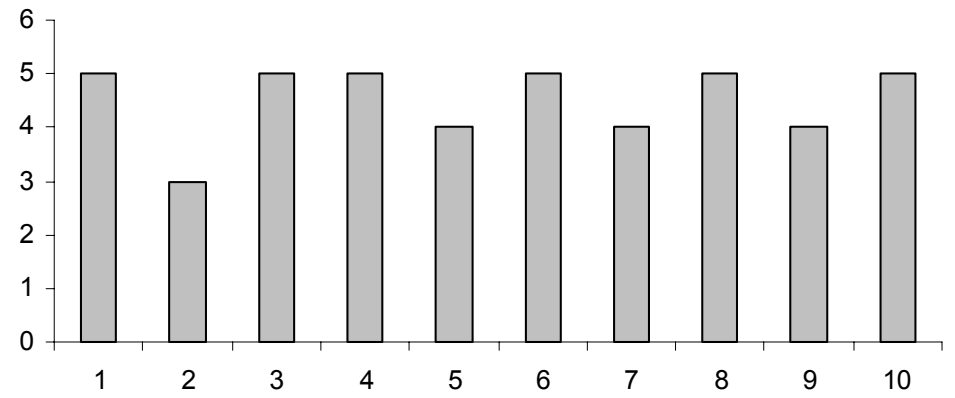
Ecommerce frequency



Gender



Mobile frequency



Evaluation planning

- Evaluation Criteria
- Equipment
- Task Scenarios
- General Methodology
- Test Materials

Evaluation criteria

In the context of the project, usability was defined, as per ISO 9241-11: Guidance on Usability (1998). This states that usability as “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”. Efficiency was measured in terms of task completion and satisfaction in terms of attitudes. More generally the evaluation drew on a wide range of quality standards including;

ISO 6385 : 1981, Ergonomic principles in the design of work systems

ISO /DIS 9241-11 : Guidance on Usability

ISO 10075-1 : 1994 Ergonomic principles related to mental work-load

ISO/IEC CD 14598-1 :Evaluation of Software Products

ISO 9241-3: 1993 Visual display requirements

ISO DIS 9241-8 Requirements for displayed colours

ISO DIS 9241-9 Requirements for non-keyboard input devices

ISO 9241-10: 1996 Dialogue principles

ISO/CD 9241-12: Presentation of information

ISO/DIS 9241-13: User guidance

ISO/DIS 9241-14: Menu dialogues

ISO/DIS 9241-17: Form-filling dialogues

ISO/IEC 10741-1 Dialogue interaction

ISO/IEC DIS 11581-1 & 2 : Icon symbols and functions

“It’s very fast to install”

“It was easy to understand”

Equipment

The Equipment used in the evaluation is housed in Lab 2 at User-Lab. This is a 3x6 Metre room with natural (2x2 Metre screened window) and fluorescent lighting (6x2 500mm 80 watt tubes). Broadband Internet connection is provided to a test platform running Internet Explorer 6.06. This is a Windows (NT) enabled PC with 1000MHZ processing speed, 256 Random Access Memory, 80 gigabyte hard drive storage. The 17” CRT screen is set at 1024 x 768 resolution screen displaying 16bit High Colour. The screen is sited on a desktop at a height of 715mm. The test platform uses a standard qwerty keyboard and mouse. Participants are provided with an adjustable typists chair at a distance of 320mm from the screen. A WATEC ccd 230 camera is mounted to the top of the screen (directed at subjects” head and shoulders) sound is captured by a powered 20mm long clip microphone. Screen capture is by a 24-bit sampling scan converter. Signal compression uses MPEG 2, which is recorded on digital videotape and electronically as MPEG files.

Tests were viewed on a 24” Colour monitor and Window Media Player on the analysis platform. Analysis employed Observer software. Tests were reviewed and behaviours identified and scored from media files. The software was used to derive four analytical measures (see appendix):

Time-event tables

This is a chronological listing of all recorded events, sorted in columns for the various subjects and classes of behaviour and three analyses made;

Time-Event Plots

This is a graph in which observational data are plotted against time.

Elementary Statistics

This provides descriptive statistics on the frequency and duration of events or states.

Lag Sequential Analyses

This examines how often certain events are preceded or followed by other events.

Task Scenarios

- Install the Software and Hardware
- Make a call
- Receive a call

General Methodology. User testing is a structured investigation of product, involving observation of real users interacting with it. Before the test, a representative sample of participants is selected. Areas of investigation are identified. Task scenarios are designed from analysis of these issues and a means of measuring them derived. A task scenario might involve navigating to and from a predetermined location. The means of measuring usability includes using quantitative variables and qualitative data. Examples of quantitative variables are the time taken to complete a task, the number of errors or deviations from the critical path. Qualitative data relates to more subjective issues including satisfaction and self reports. Test materials are prepared, including producing the necessary documentation, such as consent forms and a pilot test conducted to provide benchmark results and to refine and evaluate the methodology. Participants begin the test by completing the documentation and are briefed on the nature of their participation. The test itself involves the participants undertaking task scenarios while being observed by a test administrator. Comments are recorded and where possible the think aloud protocols employed. Data is recorded either by note taking, using data logging devices or with video capture. The results from the various participants' tests are tabulated and statistically analysed on the basis of their scope and severity. This information is then communicated to the development team for their use in developing and marketing the product.

Specific Procedures

Participants were recruited from staff and students at the University of Central England (UCE). Participants began the tests by completing a non-disclosure form, Screening Questionnaire and were then briefed on the test during a pre-test introduction and interview. Participants were informed of their right to leave the test at anytime and that the test administrator was not involved in the development of The Kit. Each test involved participants completing three task scenarios and three Post-Test Questionnaires on completion of the tasks. The test administrator remained silent during the test except when prompting or answering a participant's queries. The project involved two test phases (T1 and T2) enabling iterations to be made between sessions.

T1.

Participants 1-5, notebook computer with Window XP

T2.

Participants 6-10, PC with Windows 2000

Independent Variables

Sound off/on
Firewall off/on
Operating system XP/2000
Platform Notebook/PC
Handset Classic/Standard

Test Materials

Non-disclosure agreement
Screening Questionnaire
Post-test questionnaire: Installation
Post-test questionnaire: Operation
Post-test questionnaire: Website(n=4)

Results

Demographics (Source: Screening Questionnaire)

- Gender: Ratio (M: F) 4:6
- Mean age: 34.1
- Mean e-commerce frequency Mean: 2.7 (90% of highest achievable score)
- Mean technical knowledge: 1.8 (60% of highest achievable score)
- Mean mobile use: 4.5 (90% of highest achievable score)

Installation (Source: Post-Test Questionnaire: Installation from Test 2)

- 16% increase in user satisfaction between Test 1 and Test 2
- Satisfactory completion: 40% of highest achievable score
- Perceived usability: 100% of highest achievable score
- Workflow support: 100% of highest achievable score
- Instructions and documentation: 80% of highest achievable score
- Dialogue and feedback: 80% of highest achievable score
- Perceived system performance: 100% of highest achievable score

Operation (Source: Post-Test Questionnaire: Operation from Test 2)

- Interface design: 20% of highest achievable score
- No change (between Test 1 and Test 2)
- Task 1 (make a call) completion: 100% of highest achievable score
- 40% improvement (between Test 1 and Test 2)
- Task 2 (receive a call) completion: 40% of highest achievable score
- 20% decrease
- Effort and workload: - 20% of highest achievable score
- 40% improvement
- User support: 60% of highest achievable score
- No change
- Speed of response: 100% of highest achievable score
- No change
- Timeliness of feedback: 80% of highest achievable score

- 60% improvement
- Pleasure in use: 80% of highest achievable score
- 40% improvement
- Quality of outputs: 60% of highest achievable score
- 20% improvement Visibility and readability: 20% of highest achievable score
- No change

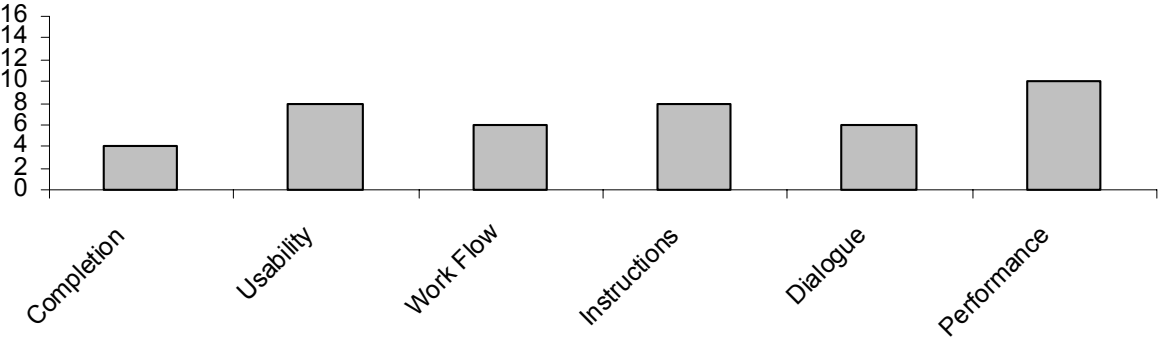
Protocol Analysis Source: Coded Transcripts from Test 2

- Overall positive score 80% of highest achievable score
- Positive action statements: 74% of highest achievable score
- 282% improvement
- Negative action statements: 47% of highest achievable score
- 11% improvement
- Positive interface statements: 14% of highest achievable score
- 17% decrease
- Negative interface statements: 67% of highest achievable score
- 50% decrease Effort and workload: - 20% of highest achievable score
- 40% improvement
- User support: 60% of highest achievable score
- No change
- Speed of response: 100% of highest achievable score
- No change
- Timeliness of feedback: 80% of highest achievable score
- 60% improvement
- Pleasure in use: 80% of highest achievable score
- 40% improvement
- Quality of outputs: 60% of highest achievable score
- 20% improvement Visibility and readability: 20% of highest achievable score
- No change

Questionnaire Results

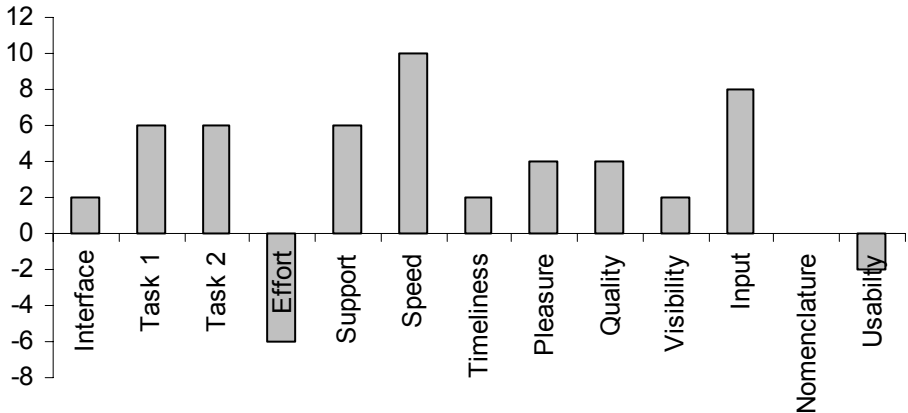
Installation

Test 1

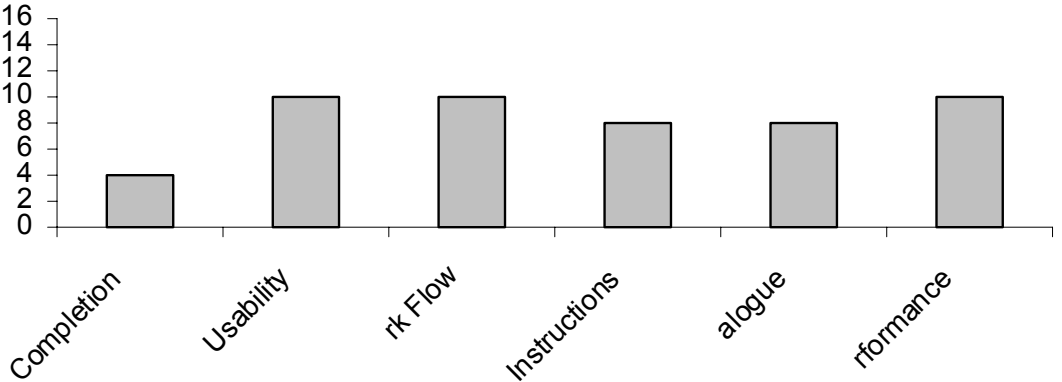


Operation

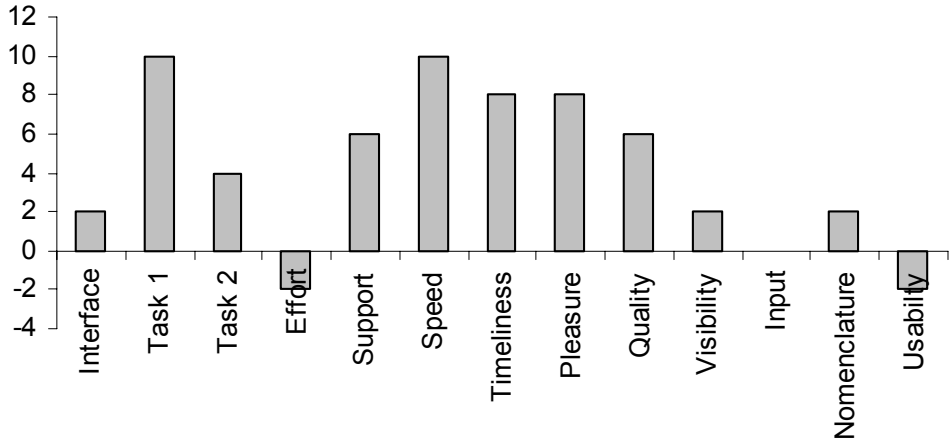
Test 1

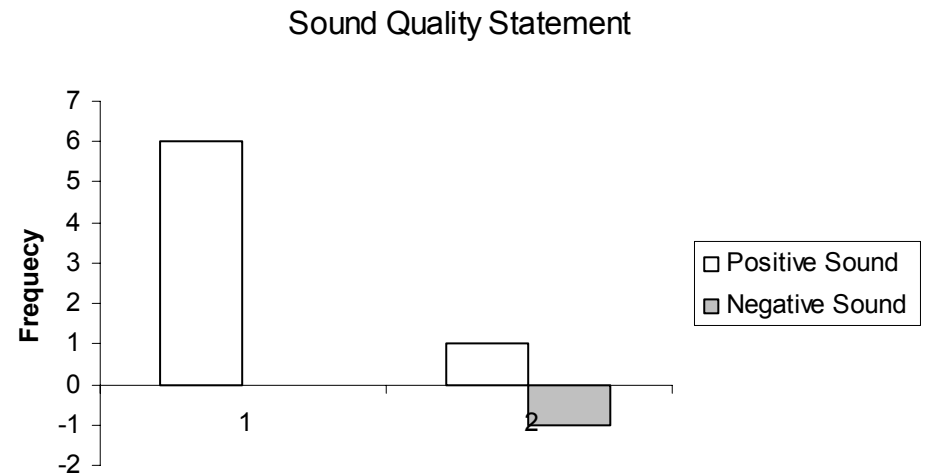
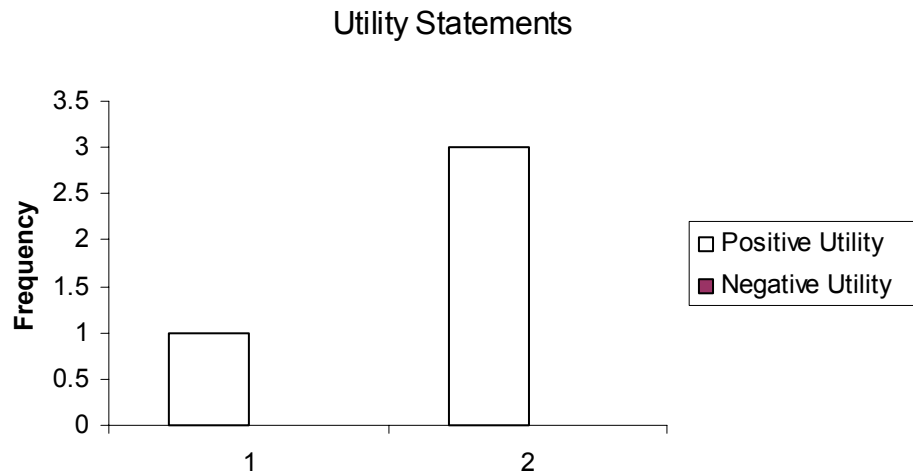
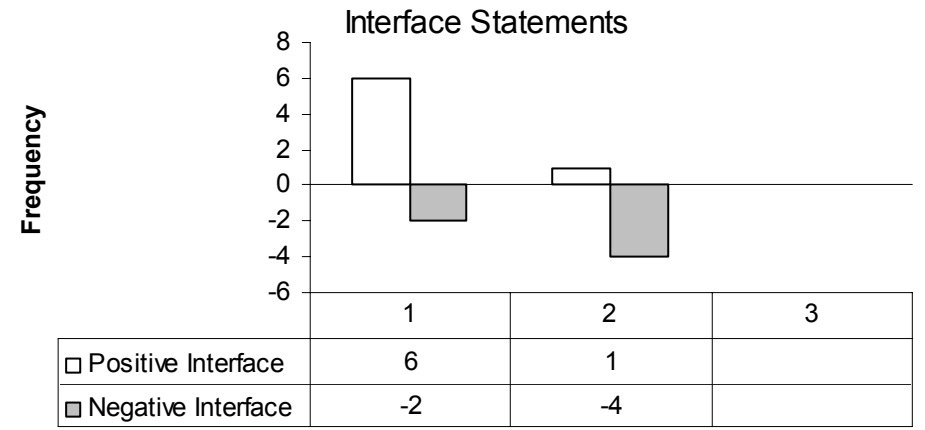
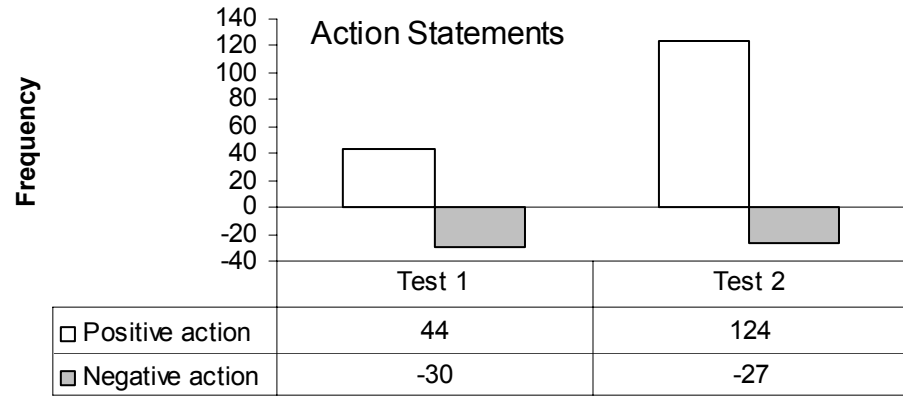


Test 2

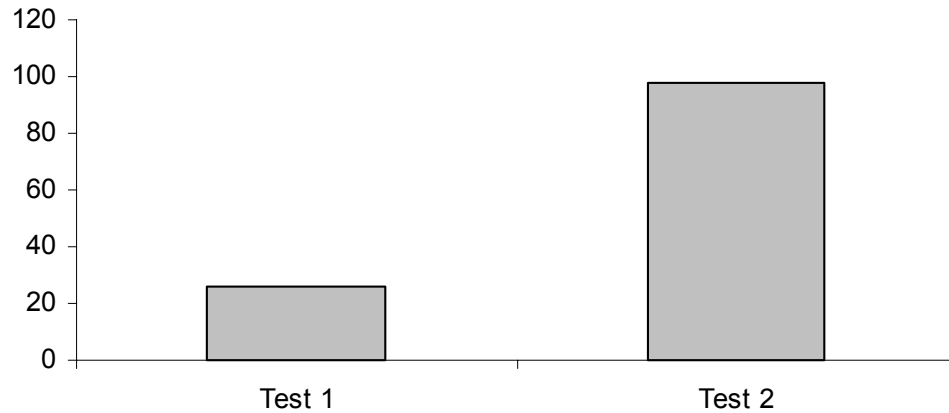


Test 2





Aggregate results



‘Pretty good for a non-technical person to install!’

‘Three things you like best about NETeasy Phone’

1. Free Calls
2. Address book
3. Different to the norm

‘It was easy to understand’

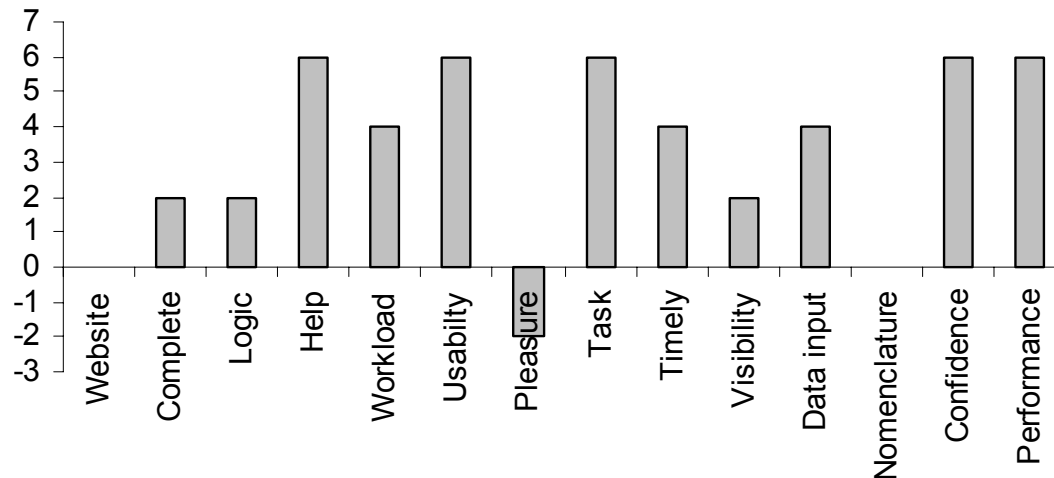
‘It’s fun to use’

‘It’s very easy to install’

‘Its easy to follow the instructions’

‘Very fast to install’

Website



Discussion

Individual Differences

There were noticeable differences among the different user profiles. However, none of the participants were unable to navigate, or understand and use the main functions of The Product. The Innovators had no problems in either installation or operation; such is their level of ability that when faced with problems they had the solution at hand. Generally positive about the product they tended to rely on their own methods of installation. They were, however negative on the look and feel of the interface and of the handset. The early adopters interaction patterns were solving problems by their own ingenuity. These users were involved at the T2 stage and the improved installation process was demonstrated in increased satisfaction levels and quicker installation times. While they did have difficulties they were unanimously favourable about the user experience and product benefits. The final group (Late Majority) made up the largest group (n=5) in testing and theoretically posed the greatest challenge. There was some differentiation in responses to the product and task completion. These users tended to operate 'by the book' fastidiously reading the instructions and carrying out the checks. This meant that despite their lack of confidence they were all able to complete the tasks and in a timely fashion with high levels of user satisfaction.

Interaction Patterns

The user profiles split into two interaction patterns that in part related to experience. On the one hand the savvy tended to freely explore the product and have their own particular ways of interacting. They regularly installed software, use new products and will find work arounds. In this respect the product was competent in behaving in a familiar mode of installation. The second group were more proscriptive and methodically went through routines derived from prompts and documentation. The revised on screen dialogue, quick installation guide with checklist and trouble shooting guide will please this type of users

and (the trouble shooting guide) will facilitate the more technical group.

Attitudes to the product

All participants were positive about the product, whatever set backs they had faced during the tests. Novelty and cost were noted as positive features and what negative interaction occurred were minor, improved through iteration and did not impede task flow.

Future Developments

The tests focused on installation. The results show the scale of improvements made on this part of the product lifecycle that built on the quality of the beta version. T2 suggested future areas of work that, while not impacting on first use could impinge on sales and user satisfaction over time. These include issues of interface design, handset functionality and user help and support. Overall the team concluded that testing had greatly improved the user experience of an innovative product. The *NETeasyPhone*. installation is easy to use, the documentation written from the users perspective and supports an efficient workflow from opening the box to making and receiving the first call.

Testing rigour

The test involved a wide range of users , covering the key profiles of the product. The iterative nature of the testing meant that most data was fed back to make improvements as opposed to a benchmarking summative evaluation. The test team are confident that should this take place with the final version of the product the results would be unanimously positive. Testing procedures proved robust with Observer providing detailed and useful data. Given more resources a greater detail of statistical analysis could be carried out although this would be more for research purposes than gleaning new results.

Appendix i (Data)

Data Available in hard copy Only

Appendix ii (Project Documentation)

Data Available in hard copy Only

Appendix iii (Graphical Comparison of NETeasyPhone and other VoIP Methods)

1. NETeasyPhone™ - The New 'Private, Secure & Direct' Method [3rd Generation/3G]

Carlton 772655

Martins 698223

INTERNET

William 285679

LSquire 472931

Internet Telephone Contact No. comprise 13 characters - 7 letters and 6 numbers =

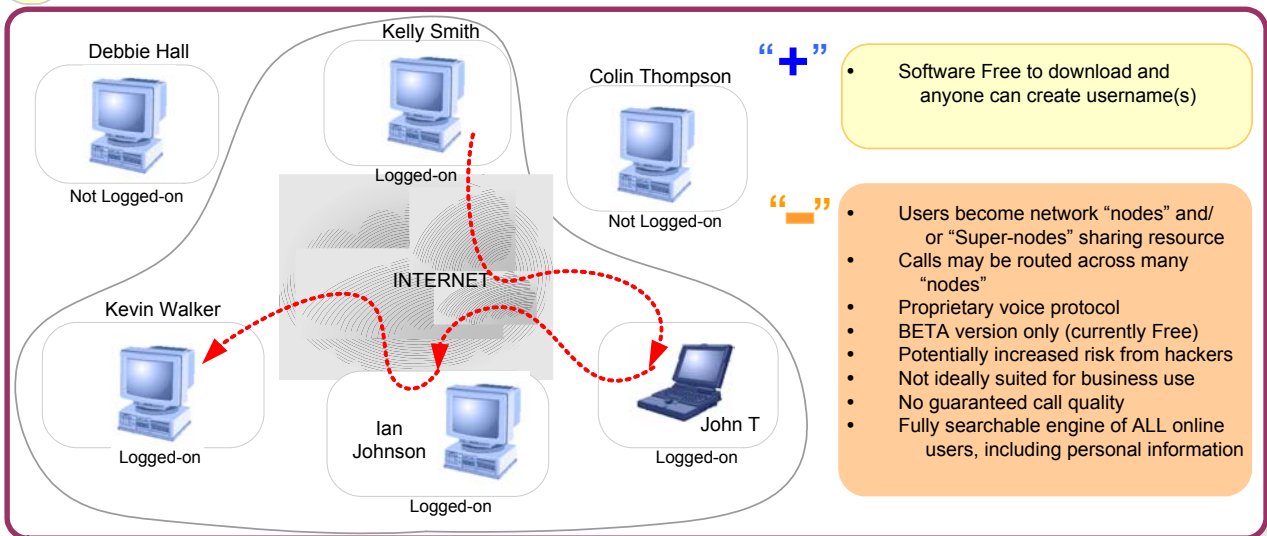
“NETeasyPhone ID”

- Voice Calls are **Private, Secure & Direct** between 2 parties
- ‘Lifetime’ Personal Internet Telephone No. [NETeasyPhone ID] - 21 day Trial Available
- High Call **Quality** using open **H.323** and **Secure** encryption in Free Software
- 56k or ADSL/Cable Broadband with no bandwidth-related issues
- Internet **Telephone** included & Adaptor for using ordinary Telephone /DECT on sale
- ‘Live’ **Video** and **Network** Version due 2nd half 2004
- One-off payment to buy
- Non-networked version on-sale now

continued /...

Appendix iii (Continued)

2. Skype - Internet 'Node' Computer Resource Sharing Method [2nd Generation/2G]



3. Yahoo / MSN Messenger - Hosted Public Server Method [1st Generation/1G]

