Nokia "*N-Gage*" Game Deck

Usability Evaluation

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Report Overview

This report hopes to assess the usability and design of the Nokia N-Gage game deck, and to highlight any problems that any potential user would face when first introduced to the system.

The study was conducted with 5 potential users, with one user being used for a pilot study and the other 4 being used in the main study. The pilot study was run first as a trial run of the evaluation procedure, in order to iron out any potential problems and to insure that when conducting the main evaluations the examination team would know what to do.

The evaluation used the thinking out loud method, where each user would describe verbally what they were doing at each stage of the study. This method provides the best indication of the thought process of the user and the mental mapping that takes place between what the user wishes to achieve and how they believe they can achieve it. Each user was asked to perform a number of tasks with the N-Gage, and the examiners observed the user. The users were give general goals to achieve rather than tasks that related directly to the N-Gage system.

Each evaluation was video tapes, allowing the examiners to have a record of exactly what each user did, and, thanks to the thinking out loud method, why they did it. These tapes were examined in detail to determine the areas that the user had trouble in.

A list of problem design and interface features was drawn up, and potential solutions to the problems were suggested.

The Nokia N-Gage

The "N-Gage" is Nokia's attempt to enter the hand held video console market. The market is currently dominated by Nintendo's Gameboy range. Since its release in 1989 Nintendo has sold 149 million original Gameboy machines. In 2001 Nintendo released a new hand held machine, the "Gameboy Advanced" which has gone on to sell nearly 50 million units. Despite the success of the Gameboy, it does have a number of weaknesses. The technology that the Gameboy (even the newer "Advanced" model) is based upon is quite old and out of date. It posses no 3D processing chips, and as such is limited to 2D flat games (or very simple 3D games). The Gameboy is also seen more as a toy for children, due to a long history of Nintendo marketing the device to under 16 year olds. Nintendo has tried to change this image this year with the release of the Gameboy Advanced "SP" version, which has a more adult orientated design, though it will be hard to change a 14 year established brand view. To take advantage of this Nokia has purposely marketed the N-Gage with emphasis on the up to date hardware features and 3D graphics processing capabilities of N-Gage. They have also gone for a more adult themed advertising campaign, using a more dark, urban style, of marketing, aimed at over 16 year olds and adults (Nokia Mobile Phones Communications 2003).

In its first 2 weeks Nokia managed to sell close to 400,000 N-Gage game decks, mostly through mobile phone operators (Squires 2003). Nokia has set a target to sell between 6 and 9 million units before the end of 2004. It remains to be seen though if Nokia can wrestle away a significant share of the market away from Nokia, especially considering that the hand held video game market has slowed down in the past few months.

While the Gameboy is designed specifically to play video games, Nokia is touting the N-Gage as a more advanced on line game system. The system has mobile phone capabilities, and must contain a valid mobile phone SIM card to be activated. It is not possible to use the N-Gage simply as a game system without having a mobile phone connection. The N-Gage has the ability to play MP3 audio files as well as acting as a radio and personal organiser, though Nokia is quick to market the N-Gage as a game system with mobile phone capabilities, rather than an advance mobile phone that can also play games. The Nokia has drawn some criticisms from industry observers for trying to put too many features into the N-Gage, making the primary role of the N-Gage rather vague.

The N-Gage contains a 104mHz ARM processors and runs version 6.1 of the Symbian mobile phone operating system. This operating system, including its user interface, is found in a number of newer mobile phones, which should make the N-Gage interface and menu system more familiar to anyone who has previously own one of these phones.

The N-Gage implements the Java 2 Micro Edition (J2ME) language and virtual machine, allowing it to run cross platform applications and games. Games and applications can either be written in Java and run using the N-Gage's Java Virtual Machine or written in C++ and compiled directly for the N-Gage ARM processor using development tools provided by Nokia.

The main screen of the N-Gage is a 176 x 208 LCD screen, set in a portrait orientation. The screen is 3.5cm by 4.15 cm. The screen is back-lit, allowing the N-Gage to be used in poor light conditions. The back light turns itself off automatically to save battery power when the device is not in use.

The N-Gage system comes with a hands free headset, which acts as both as a pair of headphones

and a microphone. The headset inserts into two plugs the bottom of the N-Gage, which are colour coded to the matching plug on the headset.

The device is designed to be opened at the back and the back cover to slide off. Once the back case is off a SIM card can be inserted and the MMC memory cards can be taken swapped around. To access the MMC card the battery must be removed, a feature of the N-Gage that has been heavily criticised.

The N-Gage comes with a 32MB MMC Memory Card that can be used to store small internet downloadable games, MP3 songs and "Real" video.

Study Subjects

One of the problems encountered when devising a usability study for the N-Gage was deciding who was is target audience for the system. Nokia is currently marketing the N-Gage as a video game system, rather than a phone, media player or a personal organiser. This would imply that Nokia is hoping to wrestle away some of the audience from the Nintendo Gameboy Advanced and other hand held video game systems, rather than competing against mobile phones that can also play games. At the same time the N-Gage cannot be used without a valid mobile phone operator SIM card. This means that there is little point purchasing the N-Gage unless it was to be used partly as a phone. Nokia have also included a number of multimedia applications as standard in the system, which seems to contradict the stance Nokia are taking that the N-Gage is a game system first. Based on early responses from the gaming community, Nokia also seem to have alienated a section of "hardcore" gamers, due to the N-Gages limited line up of launch games, lack of multi-player support for those games and an awkward game memory stick loading system. This would seem to be confirmed by the fact that Nokia have only sold a handful of N-Gage devices through video game stores.

It was decided that the main users of the N-Gage, certainly at the moment, would be phone users who would have an interest in games and portable entertainment, and who would like an all in one system for casual gaming. As such each subject chosen has had experience with various mobile phones, and have also had experience playing video games, though not necessarily on portable game systems.

Pilot User - Male.

Aged 18-30.

Experience with Nokia mobiles phones.

Experience with Symbian OS based phones.

Experience with video games, including mobile video games systems and owns a Gameboy advance.

User 1 - Male.

Aged 18-30.

Very limited experience with Nokia mobile phones.

No experience with Symbian OS based phones.

Experience with video games, but none with mobile video game systems.

User 2 - Male

Aged 18-30.

Experience with Nokia mobile phones.

No experience with Symbian OS based phones.

Experience with video games, limited experience and has used Gameboy.

User3 - Female

Aged 18-30

Experience with Nokia mobile phones.

No experience with Symbian OS based phones.

Experience with video games, but not much experience with mobile gaming.

User4 - Female

Aged 18-30.

Experience with Nokia mobile phones.

No experience with Symbian OS based phones.

Experience with video games, but not much experience with mobile gaming.

Task Selection

The goal of this study is to test the usability of the Nokia N-Gage game deck hardware and the application software that comes with the system. The N-Gage is designed to load and play video games that come on Multimedia Memory Cards (MMC) that can be inserted inside the game deck. It was decided not to test these games packages themselves, as each game would have a different set of interface and design issues. Each game would essentially be a usability study in itself.

Instead the study focused on the default applications that are stored on permanent memory in the system. This includes the phone applications, the media player and radio applications. Focusing on the default applications also allows for an evaluation of the hardware interface of the N-Gage as well, including the button system and hands free kit.

We wanted to evaluate the features a typical user would most commonly use day to day, rather than attempting to evaluate every feature and option. There would be little design information gained from studying the usability of a feature the user might use once or twice in the time they own the device.

The first area for study is the phone features of the N-Gage. Despite Nokia's current marketing campaign it is clear that one of the primary uses of the N-Gage is as a mobile phone. The Symbian operating system endows the N-Gage with a range of standard GSM mobile phone features. As well as making calls, the user can access a fully featured address book. The N-Gage can also send and receive SMS text messages. The Symbian system also allows the user to store a large number of contact entries. This can be used to access mobile numbers of contacts to call or send text messages to.

The second area for study is the media functions of the N-Gage. The N-Gage comes with a music player application that can play audio files in a range of formats. The default standard format is MP3, which allows high quality audio to be compressed to a small file size. This is ideal for a device such as the N-Gage, which has a limited storage memory (32MB on default model being evaluated). The N-Gage also comes with a built in radio tuner, allowing the user to pick up FM radio stations. The user can also record and save segments of the radio station onto storage memory.

The third area for study is the game functions of the N-Gage. The N-Gage does not come with any games as standard, they must be bought separately. The study also wanted to avoid assessing any of the larger full price video games for the N-Gage currently on sale. These games would have a large number of interface issues and as mentioned above, would require another full study to assess the interface issues presented by each game. A simple downloadable game *"FLO Boarding"* was chosen to test the N-Gage at playing video games. This game has a very simple

interface and control method, but it does use all the buttons on the N-Gage that are designed to be used to play video games. To control video games the user is supposed to us the D-Pad and two raised buttons on the keypad. This layout is similar to most other handheld video game systems on the market, including the Nintendo Gameboy. A quick assessment of the ergonomics of this system can be gauged from testing the system with the *"FLO Boarding"* game. Because a user has to swap around MMC memory cards if they wish to changed the video games they can access, it was felt important to test this process, as a typical user would probably have to do this on a regular basis.

The study is interested in finding out how easy it is for the user to mentally map what they wish to achieve to the functionality of the N-Gage interface. The study hoped to assess how intuitive the system is for the user, and how easy it is for the user to read from the interface the solution to a task. Because of this it was important to phrase the wording of the tasks asked of the user in a manner that reflected the desired out come rather than the procedure the user would have to complete. Each task is presented to the user as a *goal* they wish to achieve. For example "you wish to call your friend at this number" rather than "go to the phone application, enter this number then

call it". This gives the user a target that is based on real world situations that they would encounter in their day to day use of the system. This method also avoids presenting the user with too much information about the functionality of the system or about how the user is supposed to complete a task. The N-Gage system (like many of Nokia's products) presents the user with a number of ways to achieve a desired goal, and it would be unconstructive of the study to assume that the user would attempt one task a specific way.

The user was given 10 individual goals to achieve using what ever method they felt appropriate. To make the user fell that they were carrying out tasks they might find in the real world, the questions contain role play where the user is asked to respond to a specific simulated situation.

1. *Your friend Tracy is in hospital with a broken leg. This is the number of the hospital 087 98 48 609. Give her a call to see if she is okay.*

2. *Your friend Tracy is out of hospital. Give Tracy a call on her mobile to see how she is. Her number is in your contacts list.*

3. *It is your brother's birthday. Send him a "Happy Birthday" text message. His number is in your contacts list under "brother."*

4. *Your friend John has changed his mobile number to this new number 087 12 34 56). Update his number in your contacts list.*

5. *You are travelling on the bus home. You want to listen to the MP3 song "I Believe in a Thing Called Love" by the band The Darkness.*

6. *You like that song so much you want to set the ring tone of your Profile to "I Believe in a Thing Called Love."*

7. *Tune the radio to your favourite radio station.*

8. *Your sister loves the song playing on the station. Record one minute of the radio station for her.*

9. *You find your self on the bus again and bored. You want to play the "NokiaGame" snowboarding game.*

10. *You are bored with the current game. You want to swap the game card out to play another game.*

Test Set-up

The purpose of the study is to gauge the usability of the N-Gage in a real world setting. Because of this it was felt important to keep the study as informal and as natural for the user as possible. The usability study was conducted in an informal setting, in which the user would be comfortable. A video camera is used to film the user, but that is the only sign that the user and N-Gage is being examined. The user was read a consent form that explained the study and, most importantly, that the N-Gage is being examined not the user. It is also explained that if the user is not happy at any point they may chose to end the study.

The evaluation method used in the study is the *thinking out-loud* method. With this method the user explains verbally what they are thinking and doing while using the N-Gage and the examiners record this information for study later. The idea of this method is to try and learn what the user is experiencing when faced with problem or choice and the mental processes they go through when attempting to solving the problem.

The first stage of the usability test was to informally evaluate the users experience with similar devices, such as mobile phones and hand-held media devices. It is important to keep this stage as informal as possible to keep the user at ease before the main examination. The user is asked a number of questions by the examiner, but it was decided not to do this in formal questionnaire manner. Instead the examiner just notes down the users responses. The questions were –

- *What experience have you had with Nokia phones?*
- *What experience have you had with Symbian based mobile phones?*
- *What experience have you had with video games?*
- *What experience have you had with portable video game systems?*

Despite Nokia's reputation for producing easy to use, intuitive mobile phones it was felt that it would still be necessary for the user to get acquainted with the hardware and with the user manual before the actual study started. The user is allowed about 5 minutes to familiarise themselves with the manual and about a minute to look at the different parts of the N-Gage system, without actually

accessing the individual applications. During the study the user will be allowed access to the manual if they become stuck at any point. Allowing the user to access the manual means that the test can also assess how easy and accessible the manual is with regards to the user trying to find the solution to specific problems.

The study was conducted in environments where a typical user would be found using the N-Gage. It was not desirable to conduct the study in any environment that had the appearance of a laboratory setting, as this might have made the user feel unnecessarily uncomfortable. It was also important that the user experience the effects of a real world when attempting each task as the user would be expected to use the N-Gage in these environments.

The N-Gage was placed in front of the user, with the headset and manual. The examiner sat to the side of the user, slightly behind him so that the user could not directly see the examiner but that the user could clearly hear the examiner and see him easily by a small turn of the head. A second examiner stood behind and to the side of the user with a video camera. The video camera was trained on the N-Gage and the users hands. The setup is shown below.
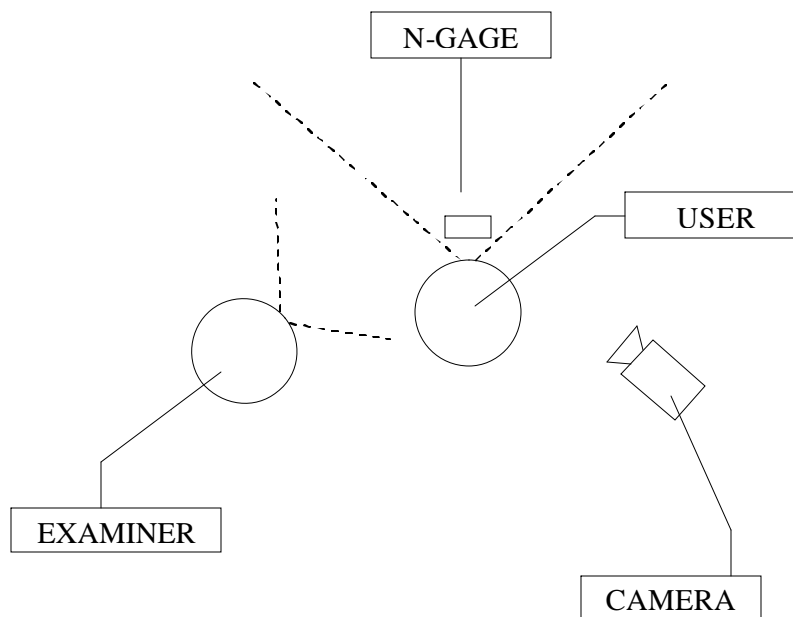
Pilot Study

It is important for the user to feel totally comfortable while doing the study. Because of this, it is important that the study is run in a professional manner and that all potential problems are anticipated and dealt with before hand. To achieve this, a pilot study was run before the main study.

The pilot study was run with just one user. As the point of the pilot is to gain experience with the testing method and to experience any problems before the main tests, the pilot was run as if it was part of the main study, with the full set up and the user been asked to perform all tests. The pilot was filmed using a camcorder so it could be studied afterwards. The user used in the pilot study was a male between the ages of 18 and 30, with a lot of experience playing computer games and the user is the owner of a Gameboy Advance mobile gaming system. The user has also a lot of experience dealing with phones especially Nokia phones and comes from an education in the computer sciences.

As well as observing the users use of the Nokia N-Gage, the testing method employed was examined. Many aspects of testing were examined including camera angle, amount of prompting and location. Colin Robson (1993) also suggests a list of aspects including space, actors, activities, objects, acts, events, goals and feelings. Initially it was thought that an over-the-shoulder camera angle would be the best angle considering the product under study. Users generally play the product face on, that is looking directly at it, so looking over the users shoulder allows for the screen and button presses to be observed clearly. This was confirmed in our pilot study, where other camera angles were also used. It was noted from the pilot study that some users may find the recording of their face very uncomfortable. As a result of this, the use of a second camcorder facing the user was discarded as it is an objective of the study to make sure that the users are comfortable at all times of the study.

One aspect of the testing that concerned the team before the studies related to the amount of prompting that should be used in an evaluation. In dealing with this concern, the group noted the suggestions of Judy Ramey (1998). In her paper, Ramey puts for forward a guideline as to how to interact with a user in an evaluation setting. The team decided to use the "Think-Aloud" method of evaluation, which involves the user describing what they are thinking when they are doing the tasks.

Preece, Rogers and Sharp (2002 p. 367) observe that the occurrences of silences is one of the biggest problems with the think-aloud technique. However, they also note that reminding the user to think can be intrusive and as such must be dealt with carefully so as not to make the user rely on the questioner. Rameys' (1998) paper outlines methods to deal with these problems such as prompting, echoing, "conversational disequilibrium" and summarizing at key junctions.

Location is another key aspect of the study. The team wanted to place the user in a setting similar to everyday life, where the user would normally use the product i.e. at home. The team tried to set up an environment with little or no background noise so that we could pick up the users comments and also so that the user would not get distracted. The team tried to ensure that there was ample light in the room for the user (even though the N-Gage is backlit). The team was also concerned that the position of the advisor might distract the user, so various positions were considered. Sitting the advisor directly in front of the user was found to be too formal and a little intimidating. As a result the team decided to locate the advisor to the side of the user and a little bit to the rear of the user.

As far as questions were concerned, the team found Rameys (1998) paper useful once again. Ramey provides an outline as to how questions should be phrased and recommends certain types of questions over others. Preece, Rogers and Sharp (2002 p. 443) suggested that it is a good idea to start the session with a familiar task and as a result the team decided that ringing a number on the phone would be a suitable first task as this is a very familiar task to phone users. The pilot study user was a little nervous beforehand, but this task managed to make the user more comfortable and at ease.

Think Out Loud Sessions

User 1

Task 1 - Phone the Hospital:

The mental mapping of the number keypad and dialling a number seems quite obvious. The user had no trouble in dialling a number, despite the fact he has not used a Nokia phone before, and recognise the green dial button as the natural button to press to dial the number.

The user did run into trouble when trying to decide how to hold the N-Gage to make a call. The user held the device flat against their head as one would do a normal mobile phone, with the screen facing their head. This was the natural mapping for the user on how to hold the N-Gage, but is actually not how the device is designed to be held. The user commented that he could see no clear marking on the N-Gage to indicate how the device is supposed to be held.

Task 2 – Phone Tracy using Number in Contacts

The user found getting into the Contacts application quite easy, but once in the Contacts application he found the navigation to be quite hard. The user instinctively hit the right menu button, expecting that to select and open the contact card for Tracy. Instead it dumped him back out to main menu, so he had to redo all the steps to get back into the Tracy contact card. The user commented repeatedly on the awkwardness of the system, and how the buttons were "where they should be."

Task 3 – Send your brother a "Happy Birthday" text message.

The user had the same problem with the right and left menu buttons as he had in the above task. The function of each button changed depending on what menu the user is currently in. Despite the fact that the function each menu button is supposed to perform is written on the bottom of the screen, in either the left of right corner, it is clear that this mapping is not immediately obvious to the user, and can be puzzling even after the user has looked at the N-Gage for a few minutes.

The text message application system jumps straight into asking the user to enter the telephone

number of the recipient, which surprised the user. It was expected that the message would be written first and then the user would choose the recipient, as is standard on most other mobile phones. The N-Gage seems to be taking the approach of email programs, where it is customary to enter the recipient first. This did confuse the user though who did not make the mental jump to realise this was the way the N-Gage was doing things.

When the user was in the "To:" field they tried to enter "brother" into the field but the N-Gage was expecting a number to be inputted. The user was very confused by this feature, and could not see an obvious way to open the address book to select a phone number. Again the user pressed the right menu button expecting it to open a menu system, but he was dropped back out to the main menu. It seems that despite having been shown a number of times how the buttons work, subconsciously the user has trouble breaking from his initial instinctive mapping system of what the buttons do. When the user did eventually get the address book to open, it was simply due to a trial and error approach of pressing a button to see what happens. Considering that some buttons will exit the application, this approach can lead to great frustration if the user presses the wrong button.

The user again experienced the problem of buttons changing function depending on the context in which they are pressed. The user accidentally selected the wrong recipient for the text message and went to open the address book again by pressing the green call function. But instead of opening the address book, this now sent the text message, which was not what the user expected. The user eventually got back to the "To:" field and managed to select the correct txt recipient.

Once the user got to the stage of typing in the text message, he found the "predictive text" feature of the N-Gage to be quite troublesome. Not having much experience with Nokia phones before, the user found it difficult to navigate the predictive text feature, and commented that it should be off by default.

When the user tried to exit the application to return to main menu, he found the "C" button, normally associated with cancel or back, did not return back through the menus, which is an example of a button doing one function in a particular context, but not performing the same function in another context.

Task 4 – Change your friend's mobile number

The user completed this task quite simply, but in a rather round-a-bout method. Still mentally mapping the green call button to the contacts list from the above task, the user pressed the green dial button which opened the Dialled Numbers list. The N-Gage did provide a way of changing the contacts list from inside the Dialled number screen, which allowed the user complete the task without having to go back out of the application.

Task 5 – Listen to MP3 Song.

The user took a while to find out how to do more than just select the "Contacts" or "Messaging." At first he did not realise that the 3 buttons under the D-Pad would be used to select more advanced options. But once he noticed the Music button, it was immediately obvious that that would be the button to select to open the music player. Once the Music Player was open the user had no problem locating the desired MP3 song, though it is interesting that he did choose to play the song using the options menu, rather than trying to select the "play" button.

The user found the headset system to be quite easy and obvious to use.

Task 6 – Set the ring tone.

While the Radio and Music buttons seem clear to the user (see below), the function of the Menu button does not seem that clear from the printed symbol. It is clear from observing and listening to the user that he did not have an idea how to change the ring tone, and did not understand the way that Nokia place the ring tone in Profiles.

Task 7 – Tune Radio

This task demonstrated that when a button has a clear single function, with a recognisable symbol, the user can quickly and easily achieve his goal. The Radio button was quickly found by the user, and because of its clear function and symbol the user had hesitation no selecting it.

This task again demonstrated the problems with the D-Pad, especially when the user was trying to select a function. It seems far too easy to accidentally press down or up instead of select, which is this case caused annoyance for the user as he had to start over again.

Task 8 – Record the Station

Like in the above task, the user found the record function quick and simply, due to the clear symbol on the record icon, and by the fact that the icon had only one function.

The significant delay noticed by the user when pressing the record button caused the user some distraction, as he was confused as to whether the N-Gage system was actually executing the desired function. With no visual feed back from the system, the user could not tell if anything was happening. When faced with this situation the user choose to continue pressing the select button, rather than waiting for a moment.

When trying to save the recording the user encountered a number of problems. Firstly, once the user had entered a file name for the recording he went to save the file by pressing down the D-Pad. All the time the user had used the Radio application he had selected tasks by pressing the D-Pad, but when he did it to finish the file name the D-pad performed the function of exiting the file name screen and moving back to the main radio screen, and continued to record the radio station. Secondly the screen also became corrupted when the user was put back into the main radio screen. The user's first response to this was that he must have done something wrong, even though it was probably due to a bug in the system.

To complete the saving of the file the user had to return to the file name screen, enter the file name again and press the left menu button.

Task 9 – Playing NokiaGame.

The user found selecting and playing the game quite simple. The user did not notice the two raised buttons on the N-Gage's keypad until well into the game, which suggests that they are not as distinguishable from the other keypad keys as needed.

The user found it quite easy to navigate the game's menus, but again had a problem with the function of the left and right menu buttons swapping around. At first the "exit" function was assigned to the left menu button, but then changed to the right menu button and back again. This slightly confused the user, though after experiencing the same problem in previous areas of the N-Gage the user seemed to manage better and read the descriptions at the bottom of the screen before pressing a button. This did make his navigation slower though, as he had to read the descriptions and decide which button to press.

Task 10 – Open and take out MMC card.

The user did not have much experience with Nokia phones before and at first did not realise that on Nokia phones the convention is to place a round power button at the side of their phones. The user believed that to turn the machine off he should hold down the red call button, which he said was the convention with all the mobile phones he had used. The user had experience the Nokia convention of the individual power button before so when he remembered the phone was a Nokia phone the user went looking for the power button.

The back of the N-Gage caused the user some problem. It was not clear to the user which way he was supposed to slide the back cover off, and at first the user tried to slide the cover off in the wrong direction. It was not clear to the user if the case wasn't coming off because the user was not opening it properly or because he was pulling in the wrong direction. Eventually after some fiddling the user managed to get the case off. Once the case came off, the user had no trouble removing the battery to get at the MMC memory card, though the user did comment that it was "stupid" to have to remove the back case and the battery just to change the game cards.

User 2

Task 1 - Phone the Hospital:

The user had no trouble dialling the number and, from his previous experience with Nokia mobile phones, knew intuitively that the green call button dials the mobile number.

The user did have trouble when trying to figure out how to hold the N-Gage when making a phone call. The user held it to his face with the screen facing down, which is the way a typical mobile phone is designed to be held. This is contrary to Nokia's design, which was to hold the N-Gage horizontal with the top facing the user. The user found it quite confusing and could not figure out from the marking on the N-Gage how to hold the device.

Task 2 – Phone Tracy using Address Book:

The user first believes that the screen might be touch sensitive, which implies at first the user did not map the left and right menu buttons to the text at the bottom of the screen. After the user realised that the screen was not touch sensitive he needed time to study the N-Gage layout before he realised that he was supposed to use the bottom left and right menu buttons.

The user felt that the application was quite slow, after he experienced a delay of a few seconds on opening the Contacts application. Even though the delay was quite small, it still was enough to make the user doubt that he had opened the application properly.

Task 3 – Send your brother a "Happy Birthday" txt message.

At first the user had some trouble trying to get to the Text messaging application. It is possible to send a text message from the Contacts list by selecting "Create Message", but the user completely missed this option, instead going to the "Send" menu option. It was not until the user had selected this option and created a message containing the contact details of the contact entry that the user realised that he was accidentally sending the contact details rather than a message to the recipient. The user believed that the "Send" menu option referred to sending the contact entry recipient a

message rather than sending the actual contact details.

Instead of retrying the Contact application options, the user decided that it was better to try a different approach by trying the Messaging Application. The user was annoyed by the way the functions of the bottom left and right menu buttons swapped around as the user descended into the application menus. It aggravated the user as he could not predict which button would be assigned to which function, and he had to read the function description at the bottom of the screen for each button.

When faced with the "TO:" field the user was slightly puzzled about how to enter the phone number of the desired recipient. The user realised that he needed to pull up the contacts list, and went to the option menu to achieve this. After the user made a mistake in the contacts menu he expected that the right menu button would correct the error but instead exited to the main messaging screen. This is the second time the users misunderstanding of the function of the bottom menu buttons had aggravated the user with this task.

The user had experience with Nokia's predictive text system, but he did not expect it to be on by default, and was surprised by this fact, which caused the user to enter the wrong text. When the user attempted to clear the text he pressed the wrong menu button and again exited the application. This aggravated the user again.

The user had great trouble with the bottom menu buttons, which quite often didn't seem to perform the functions the user expected. The user was quite frustrated with the N-Gage system at the end of the task and commented that the "hated" using the messaging application.

Task 4 – Change your friend's mobile number

Again the user commented on the delay he faced when opening the Contacts application. This seemed to distract the user, or make him doubt the (correct) actions he had just performed to open the application.

The user selected by mistake the wrong menu option to edit a contact entry, but quickly realised

this. He did have trouble when trying to exit the application without saving the new entry. It was not clear to the user what options to choose to exit without saving the new entry, whether to pick "Done" or "Exit" or press the red hangup button. Also when the user exited using the red hangup button, the user did not expect the state of the application to be stored when he reopened the application.

Once the user got to editing the correct contact entry he had no problems and realised that the "C" button clear the mobile number digits allowing the user to enter a new number on the keypad.

Task 5 – Listen to MP3 Song.

The user had no trouble recognising the Music button and mapping this button to the task of opening the music player application. The user also found connecting the headset straightforward as the connection plugs were colour coded.

The user selected to play the song using the options menu, rather than the icons on the main screen. He did not notice these icons as having the function of playing or stopping the music.

Task 6 – Set the Ring tone.

The user was not sure of the function of the Menu button, but because he could not figure out a way to open more applications and options, he assumed that it must provide access to further options.

For the first time the user realised that the D-Pad can be used to select options by pressing it down.

The user knew from his previous experience with Nokia phones that he wanted to edit the profiles to change the ring tone, and had little trouble finding and changing the N-Gage ring tone. The user once again experienced a delay from the system, which annoyed him somemore. The user wished that the N-Gage provided some form of indicator that would display that the N-Gage was processing the users request.

Task 7 – Tune Radio

The user had little trouble with this task, though he did expect that he could type in the radio frequency using the keypad. But once he realised that this was not an option the user had no trouble highlighting the cycle station button, and selecting it with the D-Pad.

Task 8 – Record the Station

The user did assume that the option to record a segment of the radio station must be in the options menu. The user was puzzled when he could not find the desired option and had to study the Radio screen for a moment. Eventually the user found the record icon. The user did comment that the icon should be "red," which it is supposed to be. This suggests that the contrast of the colours on the screen was not high enough for the user to distinguish clearly the colours of the icons.

Task 9 – Playing NokiaGame.

The user recommended a different symbol be used for the main menu button, as he felt the current symbol did not make clear the functionality of the button.

The user had no trouble playing the game, and knew to use the raised keypad buttons to control the game.

Task 10 – Open and take out MMC card.

The user had no trouble turning off the N-Gage or opening the back of the machine. In fact the user commented that the back of the N-Gage was too flimsy and should be harder to remove. He recognised that the battery must be removed to access the MMC card, which he felt was a bad design.

User 3

Task 1 - Phone the Hospital:

Phoning the hospital was not a problem for this user as the user was a previous mobile phone user. The mapping of the buttons uses the same convention as used by other mobile phones and provides consistency i.e. that the green button is used to make a call.

When it came to actually talking within the context of the phone call, the user found it quite confusing. The reason lies in the fact that mobile phone users usually hold the phone in a certain way i.e. with the side containing the keypad pointing to their face. However, with the Nokia N-Gage the user has to hold the phone side-on with the keypad at a right angle to the users face. This was considered by the user to be foolish as the user would look "silly" walking down the street holding the phone like that.

Task 2 – Phone Tracy using Address Book

Entering the contacts and finding the desired contact was no problem to the user. The user has performed a similar task on her own phone numerous times. Actually making the call was not a problem to the user. Problems with the system occurred when the user tried to end the call. The user pressed the 'c' button instead of the red button. The user wasn't aware that she hadn't ended the call and so if that happened on a regular basis could be paying a large phone bill.

Task 3 – Send your brother a "Happy Birthday" txt message.

The user navigated her way to the 'Text Message' screen easy enough and didn't find that particularly difficult. However, when the user had to enter the recipients' number, the user got quite distressed when she found that she couldn't put in 'Brother' directly. As a result the user started to hit numerous buttons in a panic trying to solve the problem.

The user admitted to being very confused as she didn't know whether to enter the number first or write the text message first. This is unlike the normal Nokia convention, where the user types the

text message first and then enters the number. With the normal Nokia convention there is a clear distinction between the two aspects. It wasn't obvious to the user how to access her contacts. She found the text message screen very confusing and so exited the screen attempting to approach the task from a different angle.

The user proceeded to 'Contacts', but entered into the wrong contact. The user became slightly distressed at all the screens she had to go through to exit out of the persons details. The mapping of the buttons to the onscreen commands was not obvious to the user.

After returning to the 'text message' screen, the user admitted to not knowing what she was doing and resorted to the manual. However, the user misunderstands the manual and believes that she has already done what it said to do. The user was looking at a wrong section.

After writing the message the user decides to enter the menu to look at the options but enters a wrong section. When the user tries to exit this section, she finds it rather difficult and gets distressed. Once again the user has a problem with the mapping of the buttons.

When the user discovers how to add a recipient, the user uses the button mapped to the middle of the navigation pad to select, but accidentally goes to the next contact.

Task 4 – Change your friend's mobile number

The user found great difficulty with this task and didn't accomplish the task properly. This is a very bad reflection on the system as the user might later on try to ring John, but she would be ringing the wrong number. The user wouldn't know that she was calling the wrong number and would have a lot of trouble trying to find his proper number.

When the user accessed 'Contacts', the user was presented with the contact 'Tracy'. The user at this point became very confused at this point as the user could not see the rest of the address book. She thought that when she went into 'Contacts', she would see all the contacts in a list.

Task 5 – Listen to MP3 Song.

The user initially was a little wary of the task as the option to have an mp3 player on a phone was not one she had encountered before.

When the user initially went into the 'Music' section, the user exited after a few seconds as nothing appeared. It appeared to the user that there was no data in this section. There was no loading screen to indicate that the section was loading.

When the user finally returned to the 'Music' section, she became confused and distressed as the only song she could see was 'REC0000'. There was no indication that there were any other songs in the section.

The user admits that the headset is a good idea as it shows consideration for other people when the user is in public on a bus or train.

The user almost found the track list at one stage, but instead chose the 'List View' option from the menu. The naming convention used in that section was very confusing as can be seen from this user. The user thought that she was getting a list of songs, which is understandable considering the manner in which the option was phrased.

User gets very confused by the new layout, and admits to not liking the menu system in general as it is not obvious what to do.

The user also observes that the button on the bottom left corner of the deck is much easier to use to select items than the button on the navigation pad as the arrows get in the way quite a lot, when using the navigation button.

On numerous occasions throughout the task the user admits to being stuck and confused. The menu system coupled with the poor loading times and bad naming conventions lead to confusion when

using the system. On one occasion the advisor had to give the user a hint so as to help the user.

At the end of the task the user was delighted to hear the song, but claims that the process in accomplishing the task was confusing.

Task 6 – Set the Ring tone.

Initially the user admits to being "daunted" by the task.

As the user tries to select 'Profile', she misunderstands the options in the menu and selects the 'Move To Folder' option, resulting in the 'Profile' folder being moved to 'Media'. This command 'Move To Folder' doesn't specify to the user that it is moving the present folder to another folder. The user in this case thought that it was a command which would bring her to the folder she wanted to go to, much like a search system. The whole process confused the user and eventually the results were that it provided great difficulty, even for the Advisor, to find the 'Profile' section again.

The user proceeds back to the main menu and admits that she doesn't know which approach to take – go to the song and try to set it as ringtone there or try and find the 'Profile' section and complete the task that way.

Once the user decides to try and complete the task by going directly to the song, the user once again runs into trouble with the music player. Once again the fact that the music player takes a long time to load causes a problem for the user. The user doesn't know once again whether there is any data in the music player.

Many times throughout the task the user admits to not knowing what she is doing, that the menu system is not very good and that she often gets lost. She also admits in a moment of frustration that she doesn't like the N-Gage, that it is a confusing and frustrating experience.

The Advisor was in some difficulty to try and find the 'Profile' section once again. The Advisor had

previously had some experience with the N-Gage, which is a testament to how confusing the system can be. Even though it was only in another section, there are so many sections and options to look through that it could take quite sometime to search through them all.

Task 7 – Tune Radio

This task highlighted in respect of this user that the N-Gages' mapping of buttons to onscreen instructions are not satisfactory. This user found that associating onscreen instructions to buttons very confusing and pressed the wrong button on numerous occasions.

While there is no doubt that there is a lot of functionality packed into the N-Gage, this doesn't work to its advantage in this case. The organisation of the functionality caused great confusion to this user and she seemed overwhelmed with the amount of actions a user could take. The mini-menu used in all sections as 'Option' caused this user great distress and confusion. It resulted in great frustration on the users part as they naming conventions used could be taken up in many different ways.

When asked whether she would buy a Nokia N-Gage, the user said that she wouldn't unless she got "a lot of time to look at the manual". Even when the user did consult the manual during this task, she found that the manual didn't deal satisfactorily with the radio.

Task 8 – Record the Station

While the user eventually thought that the record button on the radio made sense i.e. that the icon on the button and placement of the button were "sensible" options, it took the user a considerable amount of time to realise this. The user almost mistook the 'Save Channel' option as the record option. Once the user read the manual, there was no confusion as to what to do.

It was interesting to observe at the start of this task that when asked to do a task within a section, the user went straight to the 'Options' menu within the section. It is interesting to contrast this with the earlier tasks where the user didn't have any idea as to where to go.

Some difficulty was found however, when recording from the radio as there is a lag to the recording. Much like with the music player, the phone takes a little while in executing. This may be down to the complexity of recording from radio to memory, but some form of waiting screen should be shown to the user to notify the user of this fact.

Task 9 – Playing NokiaGame.

The user found selecting and playing the game quite simple. The user initial screens regarding the internet and profiles were slightly confusing, but the user had no problem bypassing these screens. In game the user discovered quickly that the raised buttons were to be used as controls as well as the navigation arrows. The user quite enjoyed the game even though she doesn't usually play the game.

The user found exiting the game to be an awkward task. When the user tried to follow the on screen instructions she found herself returning to the game time and time again. Eventually she discovered that the main menu button could return her to the phone from the game.

Task 10 – Open and take out MMC card.

The user did not have much problem turning off the phone as the user has experience with Nokia phones. However, difficulty arose when the user attempted to open the rear of the phone. The user found that the button that had to be pushed was too thin and very hard to press, especially if the user has to slide the cover in a direction at the same time.

Unlike other Nokia phones whose covers' slide away from the user, the Nokia N-Gages' cover slides towards the user causing much confusion for the subject.

The user found it silly that the battery has to be removed first before the game card can be removed. The user did not initially notice that the card couldn't be removed without removing the battery.

User 4

Task 1 - Phone the Hospital:

The user is a regular phone user and found the mapping of buttons for this task quite good. The user is used to pressing a green button to ring a number and a red button to cancel a call. The user did find it ridiculous that the user has to hold the phone side-on for a call as opposed to holding the keypad next to your face. The user felt that she would feel silly to walk around holding the phone like it is supposed to.

Task 2 – Phone Tracy using Address Book

The user ran into difficulty in getting into the 'Contacts' section. Although the user could identify that the 'Contacts' option at the bottom of the screen was the target, she could not initially associate it with any button. As a result, the user went through some confusing steps before eventually reaching the required stage. Once the user reached the 'Contacts' section the user had no problem in finding a contact or calling the contact.

Task 3 – Send your brother a "Happy Birthday" txt message.

The user had no problems getting to the text message screen as the user is a regular phone user, however, the user did have two main problems with the task.

The first problem concerns entering a contact form 'Contacts'. The user tried numerous approaches to solving the problem without success. The user felt that the options at the bottom of the screen couldn't be assigned to any button. When the user finally associated the buttons with the options, the user commented that the buttons were too far away from the screen to be associated with the options. The user commented that the options could be associated to any number of buttons on the phone.

The second main problem that the user encountered was deleting characters from the text message. The user used the red button, which the user used to end a call, as well as trying the 'Delete' option from the pop-up menu in the text message screen, before she finally discovered that the 'c' button

erased characters from the message. The user later commented that the 'c' button was "hidden" to her by the surrounding buttons and she found it difficult to associate it with any function. She commented that it didn't seem to her to look like a clear button.

Task 4 – Change your friend's mobile number

The user found this task pretty straightforward except for the fact that she selected a wrong contact once. Once she got her bearings the user found the task quite easy. The user is used to doing such a task on her own phone.

Task 5 – Listen to MP3 Song.

The user associated the designated buttons for the radio and music player very quickly. Although the user was not shown an initial list of tracks, the user was able to navigate her way to the desired track quickly through the submenus. However, when it came to playing the song she found that she had to activate the loudspeaker or put on a headset. Once she chose the loudspeaker option, the user thought of activating the loudspeaker in a settings menu, but found that to be unsuccessful. Whilst he did find where to activate the loudspeaker there was no indication as to where the user would activate it. The user later commented that the fancy icons for the radio, music player and especially the main menu do not make it obvious what they represent.

Task 6 – Set the Ring tone.

The user had difficulty in determining where to assign the ringtone. Initially she thought that it might be assignable from the song itself, but when this was unsuccessful the user attempted to look in settings. The user didn't initially look to set the ringtone in 'Profiles' suggesting that this is possibly not the best location for the ringtone.

Task 7 – Tune Radio

The user identifies the radio symbol as referring to the radio in the phone. The user was annoyed that she could not listen to the radio over the loudspeaker. Allowing a loudspeaker for one and not the other can become annoying for the user.

Task 8 – Record the Station

It is interesting to note that the users first reaction when told the task was to enter 'options' and see if there was an operation there that would record from the radio. The user is now getting used to looking in the 'options' menu to solve tasks.

The user did, however, find it difficult to discover how to record from the radio. The user could not map the function to any key on the pad. The option on the screen was not near any button and could have been associated to any of the keys.

The significant delay noticed by the user when pressing the record button caused the user some distraction, as he was confused as to whether the N-Gage system was actually executing the desired function. With no visual feed back from the system, the user could not tell if anything was happening. When faced with this situation the user choose to continue pressing the select button, rather than waiting for a moment.

Task 9 – Playing NokiaGame.

The user found selecting and playing the game quite simple. The initial internet and profiles section caused a little confusion, but the user bypassed these quickly enough. As the user is used to playing mobile games on a Nokia phone the user assumes that the board is controlled the keypad and the user is confused when this doesn't work.

When the user attempts to exit the application he comments that there is no obvious button to press

to exit the application. The user just pressed various buttons and was lucky that the red button returned the user to the main screen.

Task 10 – Open and take out MMC card.

The user found that removing the rear cover was very difficult and the push button very narrow and inaccessible. The user thought that the lid was "very plasticy". She found it annoying that the battery has to be removed before the game cartridge could be changed.

Overall, the user thought that the N-Gage was "very fiddly", and stated that none of the options and menu were "terribly obvious". She was very adamant that the clear button did not look like a clear button. She found that the fancy icons on the buttons didn't make her particularly associate the buttons with any particular function. She thought that the buttons were too far from the screen to associate them with any on screen functions. She stated that she would not buy a Nokia N-Gage.

Usability Problems and Possible Solutions

- The rear cover was considerably difficult to remove for most of the users. The push button at the bottom was too narrow and hard to press down. Users instinctively pulled the back case in the wrong direction (up). The N-Gage requires a removal of the back case in a seemingly less than natural manner which is contrary to the design on other Nokia mobile phone which opened upwards in the opposite direction. A more accessible button is recommended, and the back case opening direction should open in a manner more constant with Nokia phones.

- The rear case and battery must be removed to access the MMC memory card. This was considered clumsy design and awkward by all users, who only had to remove the card once. It is conceivable that this design would cause a typical user serious aggravation as they would have to repeat the operation numerous times. A solution to this problem would be to place a MMC card slot on the side of the device that would be more easily accessible.

- Users were confused by the fact that the Radio application required that the headset be plugged in during the entire duration of use, while it was possible to use the Music player with the inbuilt loud speaker system. One user would this "silly" as they did not understand why they were not able to listen to the radio over the loud speakers if they would listen to music in that manner. A solution would be to place an internal aerial in the device to allow the system to pick up radio stations without the headset acting as an aerial. Another solution would be to clearly explain that the headset is needed as an aerial for the radio application to operate.

- The Power button was considered to small by a number of users, who had trouble activating it. It was also confusing for users who have little experience with Nokia phones, as other phones follow a more standard system of powering off using the red hang up button held down for a period. A larger more clearly identified button would be recommended as this would provide more control for users and highlight the functionality of the button more clearly.

- Users had trouble figuring out how the N-Gage system should be held when making a call. All users held the device with the screen facing towards the head, so one would hold a standard mobile phone. This was not the way the device was designed to be held, and as such the users had trouble picking up the output from the speaker. None of the user could make out where the speaker or microphone slots were on the system. The speaker and

microphone slots should be repositioned to fit the more

- The functionality of the option menus at the bottom of the screen continued to swap around from the left and right bottom menu buttons. For example in a number of applications the "Exit" function would be assigned to the right menu button when the user entered another screen in the same application the "Exit" function would have moved to the left menu button. This confused the users and slowed down their navigation, as they could not anticipate where each function would be in the next screen. A standard system should be devised, possibly with the inclusion of a dedicated button for more standard functions such as "Exit."

- Users had trouble with the icon system used in the main menu. The users did not feel the icons were clear and they felt they were too small to distinguish the detail of the icon necessary to understand its function. A solution would be to user large icons with more distinct shapes and colours.

- Users found it difficult to move back a stage when navigating through an application without accidentally exiting the entire application. Users would often press a button they believe would simply move them back a step, only to find themselves back at the main menu. This led to create frustration if the user had already completed a number of steps in the application. The navigation system of the N-Gage system needs to be more consistent and the functions of each buttons, especially buttons that will exit or undone the work a user had spent time on.

- The loading times of a number of the N-Gage applications caused confusing with the users, who could not tell if they had actually selected the application or not. As recommended by a number of the users a loading progress bar would be helpful in these situations, to inform the user that the system is processing their request and that it is not necessary to retry selecting the application.

- Many of the users found difficulty associating the buttons to their relevant on screen commands. This was especially noticeable concerning the two selection buttons mapped to the two options at the bottom of the screen. It was considered by many users that the buttons were too far away for the buttons to be associated with the tasks. A solution could be to place the buttons beside the screen where the user can more readily associate the buttons with the tasks.

- One user found great difficulty in erasing some text in a text message. The user did not notice the 'C' erase or cancel button, claiming that the button was "hidden" from her by the

buttons surrounding it. Indeed if the user is using the D-pad (navigation pad), it is noticeable that the users thumb covers the 'C' button on occasions. A solution for this problem could be found in clearing the space covered by the users thumb and placing the buttons in more recognizable locations.

- As regards the D-Pad, the users were continually frustrated by the button associated with it. The users often found that they pressed the arrows by mistake. This meant that the users had to scroll back up the menu to the desired location and then attempt to press the button again. Leaving the D-Pad as just a navigation pad would be an ideal solution. The selection buttons at the bottom operate in much the same way and work to do the exact same job. At the moment it is a very frustrating feature which could easily have been avoided.

- One user commented how the icon representing the main menu button was misleading. The user didn't know what to associate with the button. The icon does not in any way look like representing a menu and a more obvious icon would be appropriate, for example just text saying menu or an icon representing a drop-down menu for example. If the user doesn't know which button brings them to the main menu, they would lose out on many of the features of the N-Gage.

- When writing a text message, users entered into the text message screen with little bother, however the 'To' field at the top of the text message caused a lot of trouble. Users thought initially that they could enter in a contacts name in the field and continue. However, the keypad only entered numbers not characters and the users could not see how to enter a contact. The users didn't think it obvious to select the 'Options' command and enter the contact from 'Add Recipient'. Users thought that the process was complicated and could have been achieved by simpler means. Indeed, a solution could be found by looking at other Nokia phones. With these the user enters the text message first and then once they have completed writing the message are transported to another screen associated with entering a contact. By separating the tasks, the user can focus on one task at a time and the menu options become less complicated. Putting both together results in a rise in the number of options available to the user, resulting in a more complicated menu system.

- When entering into the music player it was found that the previously viewed track was displayed to the user. Often, users thought that there were only one song in the music player and exited the application. This eventually led to confusion and distress for the user. This misleading display could be rectified by showing the list of songs available on entry to the music player.

Conclusion

In conclusion, the team found the Nokia N-Gage was overly complicated and tries to implement too many features without success.

It was found that the mapping of the buttons to their respective functions led to much confusion due both to the layout of the buttons as well as the fact that there were too many functions for too few buttons. Many screen icons were hidden from the user and the icons on the buttons were often unclear – in particular the main menu button. As well as this, one user commented that the menus were not very obvious, while another user had great difficulty after accidentally moving a vital folder. She couldn't find the folder again, and required assistance in finding it.

Nokia try to implement a phone, mobile games console, radio and music player into one package which has resulted in a very complex system, which often confuses and frustrates users. Loading times for some applications are frustrating for the users, not just because of the time required, but also because the system gives no indication that it is loading an application.

Given that Nokia designed the system primarily as a mobile games console, one would be forgiven for thinking that Nokia would have focused on making the system as easy as possible for gamers. However, the fact is that inserting new game cards is a very frustrating process. Many users commented on how ludicrous it is to have to remove the battery so that the game card could be removed. This, however, is not the only problem. Users often found it very difficult to open the rear of the phone.

Holding the device when making a phone call also caused much confusion. One of the only positive aspects found with the N-Gage was the screen. Users found the lighting from the screen very acceptable and the screen itself was pleasantly large. It is a pity, however, that Nokia didn't design clearer menu icons give the screen is well capable of displaying them.

Appendix A – User 1

Task 1 - Phone the Hospital:

- User starts by saying he is going to do what he normally does, which is key in the number.

- User dials number on keypad

- To dial the number the user then presses the green dail button.

- User had no idea which way he was supposed to hold the N-Gage when the call had gone through. Commented that there were no clear markings on device to indicate a speaker to talk into, or an area to listen to.

- The user naturally held it flat to his head, which is actually the incorrect way to hold the device.

Task 2 – Phone Tracy using Number in Contacts

- User's first notion was to opened "Contacts"

- Once in contacts the user found scrolling through the names quite time consuming. He assumed that pressing a letter would skip down to that set of names, which is a feature the N-Gage does support.

- The user assumed that the right function button was "Select" which was incorrect. It was "Exit" so he was put back out to main menu.

- Commented that "this is awkward." The user a number of times hit the wrong button and was put into an irrelevant menu or exited back to the main menu.

- Once the user was back to selecting "Tracy" in the address book, they assumed that they could dial the number by just pressing the green dail button, which was correct.

Task 3 – Send your brother a "Happy Birthday" text message.

- User noticed the "Message" menu option on main screen, so they went into it.

- In the Message menu the user wanted to select "New Message", and pressed the right menu

button, but instead of it opening a new message it exited message application.

- User when back into Message application and tried a number of buttons to open a New Message, but none of the buttons he tried worked.

- User then pressed the left menu button, which opened the options menu. User commented that he believed the right menu button would be the "select" button as that was the one that opened the messaging application. He was puzzled that the "function" switched between the right menu button to open the application to the left menu button to select options in the message application.

- The user selected new message by pressing the left arrow key, which was indicated by the arrow sign on the Create Message menu option. The user then when to start typing in the message but he realised that the N-Gage was asking him instead to enter the recipient into the "To:" field.

- The user tried to type in "brother" into the field but only numbers came up.

- The user pressed the right menu button with the option "close" in an attempt to close down the "To:" field to get to the text entering window below. This was not successful and caused the application to save the txt message and return to the main messaging menu.

- When the user tried it again he pressed the green call button which pulled up the address book. The user did admit that he did this by accident and did not expect that the green call button would open up the address book.

- The user accidentally selected "Tracy" as the recipient so he tried to reopen the address book by pressing the green call button again, but instead of re-opening the address book it send the txt message. The user commented that the function of the green button had changed once a recipient had been entered, which was confusing.

- The user returned to the main messaging menu and created a txt message again. He opened the address book and selected "brother" by pressing "b" on the keypad to jump to the b section of the address book.

- The user after a bit of thought realised that to move from the "To:" field to the main text section he needed to press down on the D-pad.

- The messaging system was set by default to use "predictive text" which the user found annoying. He also did not know which key to press to insert a space, which he commented was because he had never used a Nokia phone before.

- Once he had written the message, the user sent the message by instinctively pressing the green dail button.

Task 4 – Change your friend's mobile number

- When in the main screen the user pressed the green dial button in an attempt to open the contacts application. This put the user into "Dialled Numbers" but the user did not seem to realise he was in the wrong application.

- In "Dialled Number" the user managed to get to the Contacts list by selecting "Add to Contacts - Update Existing" which put the user into the contacts list.

- The user selected the record for John and selected it to edit the 'mobile number' number field.

- The user entered a new number for the record, using the 'C' (cancel) button to erase the old number.

- The user then went back to the main screen and into the Contacts application to check that the number had been updated which it had.

Task 5 – Listen to MP3 Song.

- At first the user was confused about how to get to the other options, though he assumed that there must be more options than just "Contacts" and "Messages"

- The user tried to get to the other options by going through Contacts, and onto the Contacts applications options menu. It was only then that the user realised that those were just options for the Contacts application.

- After the user had realised that the answer would not be found in the 2 bottom options (Contacts and Messages) he scanned the rest of the N-Gage buttons and saw the row of 3 function buttons below the D-Pad. The user noticed that on had a musical note printed on one of the buttons and assumed that that button would have something to do with the music player.

- Once in the Music Player application the user selected options after scanning the screen for a moment. Once in options the user selected Track List.

- In Track list the user selected the MP3 song, and in options again he selected 'Play'.

- The N-Gage asked the user to connect head set, which the user instantly recognised as being the headphones that come with the N-Gage package. The user had no problem matching up the

correct plugs to connect the headset and commented that it was easy to do as they were colour coded.

Task 6 – Set the ring tone.

- To get into the profile section the user decided to try some of the other "weird" looking buttons. The user clicked on the main menu button, but admitted that the button's function was not clear so he did not know what response to expect from doing so. This put the user into the main menu.

- To change the "ring tone" the user initially thought that he would have to go into the "Phone" application, but realised that the option to change ring tone would not be found there.

- Again the user selected the right menu button expect to select a menu option, but to the users surprise, ended up exiting to the main screen.

- The user accidentally pressed a keypad button in an attempt to select the highlighted menu option. Unbeknownst to the user when in the main menu the keypad acts as a shortcut method of selecting a menu option. The user was placed into the "Tools" menu, but did not realise. The user commented that he was "lost" and pressed the "Back" button to return all the way out to the main screen and started again.

- In the main menu the user pressed a number of the N-Gage buttons in an attempt to open one of the menu options. He eventually consulted the quick start guide in the manual.

- From the manual the user realised that the D-Pad can also be pressed down as a button. The user commented that that was "not normal for mobile phones."

- Once he realised how to select the user select the telephone option in the main menu, but all this did jump back to the main screen. This is the correct function, as the main screen acts as the telephone application, but the user was puzzled why "that didn't work."

- The user tried a number of options in the main menu such as "Media" and "Tools" but did not find anything that he took to be used to change the ring tone. The user had visible trouble navigating the menus with the D-Pad and continuously was moved up or down when he wanted to instead select an option. The user commented that the selection method was "really annoying."

- The user gave up and had to be hinted that he wanted to edit his "profile" by the evaluation team.

- With this knowledge the user quickly proceeded to the "Profile" option in the main menu, having

seen that option before but not made a connection that it would be where a ring tone is selected.

- The user had to press the D-Pad down twice to get a response and there was a significant delay from the time the option was selected to when the Profile application opened up. This annoyed the user as he commented "it is way to slow."

- Once in Profiles the user selected the General profile and choose to Personalise it. The user was still have noticeable problems selecting options with the D-Pad.

Task 7 – Tune Radio

- The user at first went into the main menu but then noticed the "Radio" button under the D-Pad and selected that instead.

- The user selected the "Station Up" button and cycled through the radio stations.

- He then opened the options button and selected manual tuning. The user typed in a value in to the manual tuning field with little trouble, though when pressing the D-Pad button to select this station again the D-Pad responded by moving down rather than selecting. The user had to reset and do it over.

Task 8 – Record the Station

- The user immediately noticed that there was a "record" button on the main Radio screen, as marked by a round red icon, which he selected to record the radio station.

- There was a significant delay from when the user pressed the record button and something happening on screen, which puzzled the user as he believe the button "was not working."

- The user stopped the recording after a few seconds and entered a file name to save the recording under. Once he had typed in the file name he pressed the D-Pad button in an effort to continue which caused the N-Gage screen to become slightly corrupted. The Radio application when back to recording.

- The user had to stop recording and enter a file name again. This time the user pressed the left menu button (highlighted as "OK") which saved the file.

Task 9 – Playing NokiaGame.

- The user had no trouble selecting "NokiaGame" from the main menu.

- The user selected "Flo Boarding" from the games menu option and started the game.

- When playing the game the user did not notice the raise keypad buttons that act as action buttons until a while into the game.

- Pressing the left menu button called up the menu and the user exited out of the game easily. The user did comment that "Exit" swapped around from left to right menu buttons as the user went back up through the game menus.

Task 10 – Open and take out MMC card.

- To turn off the N-Gage the user believe he need to hold down the red hang up button until the system powered off as he has done before on "normal mobile phones."

- When that didn't work he went into the main menu looking for a power off function.

- When he realised there was no power off function, the user looked for another button on the side of the N-Gage.

- Finding the Power button the user held that down until the system powered off.

- The user unplugged the headset

- The user had some trouble deciding on which way the back of the N-Gage was supposed to slide to open

Appendix B – User 2

Task 1 - Phone the Hospital:

- The user started by just dialling the number.

- The user pressed the wrong button for one of the numbers, but recognised that the "C" button would clear the mistake.

- The user pressed the green dail button to dial the number and commented that that was what one generally does with Nokia phones.

- The user could not figure out how he was meant to hold the phone to his ears. The user held the N-Gage flat to his head with the screen facing down. He commented that it was very confusing trying to figure out how to hold the device.

Task 2 – Phone Tracy using Address Book:

- The user first pressed the screen over the text "Contacts" in an effort to select that application. When nothing happened the user realised that the screen is not touch sensitive.

- After studying the N-Gage layout for a moment the user pressed the left menu button which corresponded to opening the Contacts application. The user comments that the N-Gage was "extremely slow" opening the contacts page.

- The user used the keypad to move quickly to the 'T' section of the address book.

- Once the correct contact entry was selected the user opened the options menu by pressing the left menu button and selected to call the number.

Task 3 – Send your brother a "Happy Birthday" txt message.

- From the main screen the user went into Contacts and jumped to the 'B' section by pressing the keypad.

- When the desired recipient was selected the user brought up the options menu but pressing the

left menu button. The user wanted to send a txt message to the recipient, but was not sure how to go about it. The user missed the "Create Message" option the first time cycling through the options menu, and instead choose "Send->Send as text message" which, instead of sending a text message to the recipient, sends the recipient's contact details to a mobile number as a txt message.

- When the user realised the mistake, he exited out to the main menu to start again.

- The user decided to go into the Messaging application this time, rather than Contacts.

- The user opened the Messaging application by pressing the right menu button. Once in the messaging application the right menu button's function was to exit the application. The user commented that it was "really stupid" that the "select button" switched over from the right menu button to the left menu button when in the application.

- The user opened the options menu and selected Create Message. When faced with the "To:" field the user paused for a moment to consider what to do next. The user then entered the options menu again looking for a way to put the mobile number of the desired recipient of the message, in the "To:" field. The user selected "Add Recipient" from the options menu.

- When in the contact list the user used the keypad to jump down the contact list to the desired entry. But the user pressed the wrong button and was taken to the wrong section of the address book. The user pressed the right menu button which was labelled "Back" on this screen, hoping to return to the start of the address book but this returned him to the previous screen. This was not what the user expected and he expressed annoyance that he had been taken back a stage and had to repeat what he had already done.

- The user opened the options menu, selected Add Recipient again and this time selected the correct contact list entry. Once the recipient had been select the user was automatically brought back to the new message screen.

- The user wanted to move from the To: field to the main text entering area of the screen. He expected that pressing down on the D-Pad would move the cursor down to that area of the screen, which it did.

- When typing the text message the user expressed annoyance at the predictive text feature of the N-Gage, which the user did not expect to be on.

- Because of the predictive text system the text the user entered and the text that appeared on the screen did not match, so the user attempted to delete the text by pressing the right menu button. On the particular screen the right menu button had the function of "Close" which exited back to the main messaging menu, much to the user's annoyance. He commented that he mistook

"Close" for "Clear" and that he "didn't like the menu's in this [the N-Gage]."

- The user followed the above method again to get back to the stage he was at before he accidentally exited. The user typed in the text message using the predictive text system, which he had experienced on other Nokia mobile phones.

- To send the text message the user opened the options menu and selected "Send" to send the message.

- After he was finished the user commented that he "hated that [the message application]" and that it was "stupid."

Task 4 – Change your friend's mobile number

- From the main screen the user selected to enter contacts. The user commented that "they really need to sort out that delay" with reference to the time it took for the Contacts application to open up.

- The user used the keypad short cuts to jump to the 'J' section of the contact list, and with the desired contact highlight opened the option menu.

- The user wanted to select "Edit Contact" to edit the contact entry, but by mistake selected "New Contact" which opened a new contact entry to edit. The user did not realise this and was rather confused when presented a blank contact entry.

- Realising that it was not the correct screen to be at, the user wanted to return back to the main contact list, but could not figure out how to exit the New Contact screen without saving the new contact, which he did not want to do.

- The user pressed the red hang up button, knowing that that would exit him all the way back to the main screen, but he did not see any other way of exiting without saving the new contact entry.

- The user then went back into the Contacts application by pressing the left menu button, but the N-Gage had stored the state of the application and the user found the system was still editing the new contact entry rather than at the contact list.

- The user opened the option menu and selected Exit to return to the main screen.

- The user went back into the Contacts application expect the same thing to happen, but found that he was presented with the normal contact list.

- The user selected the desired contact entry, opened the options menu and selected "Edit" this

time rather than "New Contact." It was only at this point the user realised the mistake he had made before.

- The user scrolled down to the mobile phone field of the contact list using the D-Pad. He then deleted the number using the "C" button, which he rightly guessed as having the function of clearing the digits.

- The user selected "Done" to store the changed entry which it did.

Task 5 – Listen to MP3 Song.

- The user immediately recognised the Music button from its symbol of a musical note, and pressed the button to open the Music player.

- When the application opened the N-Gage instructed the user to attach the headset to the deck. The user attached the headset, commenting that it was straight forward as the connection plugs were colour coded.

- The user opened the options menu by pressing the left menu button. He then selected "Track List" which pulled up the list of available tracks. The user selected the desired track and opened the options menu again and selected "Play" which started playing the MP3 file.

- The user noticed by accident that the volume of the music player could be controlled by pressing left or right on the D-Pad, and commented that that was a "cool" feature.

Task 6 – Set the Ring tone.

- The user wanted to get into "settings" but did not know how to go about it. He first tried to scroll down the main screen by pressing the down arrow on the D-Pad, but this had no effect.

- The user then pressed the Main Menu button which opened the main menu. The user acknowledged that this was what he wanted.

- The user highlighted "Profiles" with the D-Pad and realised that pressing the D-Pad button down he could open the menu entries. The user commented that knowing that the D-Pad can be used to selected options makes the system "a lot easier."

- The user selected "General Profile" using the D-Pad to select, and selected to Personalise. In the

Profile setting the user selected ring tone (again with the D-Pad) and selected the desired MP3 song. There was a significant delay from when the user selected the MP3 to when the screen returned to the main profiles screen. While the delay was happening the user commented that he wasn't sure if he had correctly selected the MP3 song, and when the screen did changed that user commented that there should be some form of indicator telling the user that the N-Gage is processing this request, rather than the machine just freezing up.

Task 7 – Tune Radio

- The user opened the Radio application by pressing the radio button.

- The user tried to tune the radio by keying in a frequency but the N-Gage did not respond.

- The user then highlighted the Cycle station buttons and cycled through the stations until he came to the desired radio station.

Task 8 – Record the Station

- The user stated that it must be in the options menu, and opened the options menu. The user cycled through the different option menus but when he did not find a record option he returned to the main radio screen.

- The user studied the screen layout, looking for a "record function." Eventually the user noticed the record icon on the main screen. The user commented that the record icon "should be red."

- The user selected that record option.

- To stop the recording the user pressed the right menu button. When asked for a file name the user typed in a file name and pressed the right menu button again to save the file

Task 9 – Playing NokiaGame.

- The user went back to main screen and then into main menu. The user commented that the symbol for the main menu button was not clear that it activated the main menu.

- The user selected NokiaGame to start the game.

- The user tried to use the two raised buttons on the keypad to control the game, which was successful. The user commented that because the buttons were raised it drew attention to them.

- To exit the user pressed the red hang up button.

Task 10 – Open and take out MMC card.

- The user knew to turn off the system using a side button, as he stated that this was standard on Nokia phones.

- The user had no trouble pulling of the back of the case, though he commented that the back case came off too easily and should be more "stable."

- The user recognised the MMC card immediately and that it was necessary to remove the battery to access the card.

Appendix C – User 3

Task 1 - Phone the Hospital:

- User starts by typing the number in on the number pad.

- User then tells us that she is looking for the call button, which is usually green on phones.

- User has no problem finding the button.

- The call is then made by pressing the green dial button.

- User is confused as to how to hold the N-Gage.

Task 2 – Phone Tracy using Address Book

- User recognises that 'contacts' could be associated with 'Address Book'.

- User associates 'contacts' on screen with the appropriate button and enters 'contacts'.

- Friend's phone number was easily found by typing in the appropriate initial number in the search field and scrolling through the list until the appropriate contact was found.

- User selects the appropriate contact and makes the call by entering the 'options' menu and selecting the 'call' option.

- When ending the call the user found it confusing.

- The button that the user thought would cancel the call didn't and was as a result still connected to the answering machine of the contact.

- Instead of pressing the red button she kept pressing the 'c' button in the bottom left corner of the phone.

Task 3 – Send your brother a "Happy Birthday" txt message.

- User had no problem getting to the 'Text Message' screen. The user went from the initial

screen to messages by means of the on screen prompt.

- The user then created a new text message.

- Once in the 'Text Message' screen the user was prompted to enter the recipients' phone number.

- The user presumed that this 'To' section was connected to the 'contacts' section directly.

- User tried to enter 'b' for brother, but instead received '22'.

- The user presses numerous buttons on the number pad, trying to change the 'To' section to characters instead of numbers.

- The user exited to the main menu and proceeded to the 'Contacts' section.

- User enters an incorrect contact and exits to the main menu once again.

- User goes back into the 'Text Message' screen.

- User looks at manual to find out how to enter 'Brother'.

- User misunderstands manual.

- User decides to write the text message first. No problem was encountered in writing the text message.

- When the message is written the user enters the text message menu but enters wrong sections.

- The user exits back to the message and enters the 'options' menu selecting the 'Add Recipient' section in the menu.

- The user is then brought to the 'Contacts' section.

- The user has no problem finding the 'Brother' contact.

- User tries to use the button located on the navigation pad to select the contact, but instead goes down a contact as she hit the down arrow by mistake.

- User recovers and selects the contact.

- Once the contact is selected the user is returned to the text message screen and selects the 'Options' option and then the 'send' option to send the message.

Task 4 – Change your friend's mobile number

- The user has no problem entering 'Contacts', has now done this numerous times.

- The user only sees the contact 'Tracy' as it was the last contact opened.

- The user goes into 'Options' and selects 'Edit Label' thinking that that might be what she needs to do.

- The user admits that she doesn't know what she is doing.

- After selecting 'Edit Label', the user changes the label 'Mobile' in Tracy's details to 'John'.

- The user then proceeds to change the number to the number given.

Task 5 – Listen to MP3 Song.

- First of all the user decides that to play the mp3 player that she should go into the Main Menu.

- After looking at all the options in the main menu, the user speculates that the mp3 player would probably be in the 'Media' option and enters this section.

- The user immediately notices the 'Music' option in the 'media' screen.

- User attempts to enter the 'Music' section, but exits after a few seconds as nothing has loaded on the screen. It appears to the user that there is nothing in the 'music' section.

- The user returns to the main menu and then goes back into the 'Media' section.

- The user is confused but speculates that if the song is not in music then it is possibly in the 'RealOne' section in 'Media'.

- The user selects this option and enters the 'Real One Player'.

- However, the user discovers that there are no clips in 'RealOne'.

- User exits from this application and returns to 'Media'.

- The user looks at the other options in the 'Media' section and tries the 'Radio' section.

- User concludes that the song is not in 'Radio' and exits back to 'Media'.

- User tries 'Music' once more, but thinks that she might have to connect the headset for the player to work.

- 'Music' opens showing the last viewed track which was 'REC0000'.

- As the user doesn't immediately see the desired song so she goes back to the 'Media' menu.

- User is confused at this point and decides to consult the manual.

- The user navigates to the desired section in the manual easy enough and determines that she has to attach the headset.

- Finished with the manual, the user decides to try 'Music' once again.

- As the desired song is not immediately visible, the user decides to open the 'Options' menu and look at the options the music player has.

- After looking at through the list of options, the user decides to select the 'List View' option.

- The user has difficulty selecting 'List View' as she keeps hitting the down arrow instead of the button on the navigation pad.

- The users identifies that it is too easy to hit the arrows, when using the navigation pad for selection.

- Finally the user selects the 'List View' option, which just changes the users' view of the menus.

- Subject is very confused at this point and goes into 'RealOne' once again, but again discovers that there are no clips.

- User tries the 'Radio' once again and listens to the radio for a short period of time as a "break".

- User finds that the radio is too loud and wonders whether there is a volume control. The volume control is software based and the user was unable to identify the volume control at the top of the screen.

- User tries to exit the radio and get back to the 'Media' section, however the user hits a wrong button and is returned to the main screen.

- The user returns with no difficulty to the 'Media' section.

- In her confusion, the user opens the 'Services' section.

- The user resorts to the manual for a solution.

- The user goes to the wrong section. The user goes to the "How to play Media" section as opposed to the "How to play mp3" section.

- User returns to the N-Gage and returns to 'Media'.

- User observes that the selection button in the bottom left corner of the N-Gage is much easier to use than the button situated on the navigation pad.

- After entering 'Media', the user proceeds to the 'RealOne' section.

- The user briefly returns to the manual and then exits 'RealOne' and return to the 'Media' section.

- Because the user changed the users' view of the menu, the user doesn't recognise that there are arrows to go down to other items on the menu.

- User claims "to be stuck"

- At this point the user is getting distressed and the advisor has to give the user a hint.

- The user contemplates the hint and returns to the 'Music' section.

- The same song, 'REC0000', appears once again.

- The user decides to see what options are available in the music player.

- User enters the 'Settings' section and quickly exits.

- After going back into 'Options', the user chooses 'Track List' and the list of all the songs in the music player appears on the screen.

- The user wonders if that option had been there the whole time.

- User selects the correct song and plays the song.

Task 6 – Set the Ring tone.

- When asked whether the user had previously used profiles on a Nokia phone before, the user confirmed that she had.

- User speculates that 'Profiles' is in the main menu somewhere, so the user goes into the main menu by pressing the menu specific button.

- From there the user tries to open 'Profiles'.

- However, when the menu to open the section appears the user sees the option 'Move To Folder' and presses this instead of 'Open'.

- The user thinks that this will allow her to move to the folder she wants i.e. 'Profiles'.

- Instead, this selection causes the 'Profiles' folder to be moved to the 'Media' folder.

- The user at this stage is very confused as the operation didn't do what she thought it would, so the user returns to the main menu by means of the menu specific button on the keypad.

- User is confused about whether she should go to 'Profiles' or to 'Song'.

- User decides to go to the 'Music' section by using the music player specific button she learned in the last section.

- Once again the music player is slow loading and so the user exits out of the 'Music' section.

- The user starts to hop between the main menu and the music player.

- Once the music player loads up, the song 'REC0000' starts playing once again, so the user exits.

- User admits that she doesn't know what she is doing.

- User thinks for a minute and concludes that she should try and find 'Profiles', but is distressed when she realised that it is not positioned where she originally found it saying " I just saw it too", and asking "did it just disappear?". She still doesn't realise that she has moved the section to 'Media'.

- User admits to being lost and says that she doesn't like the N-Gage.

- User is desperate so she resorts to the manual and looks for the 'Profiles' section.

- Manual says that 'Profiles' section should be in main menu, but user gets distressed when it isn't there. Advisor has to step in and help user find 'Profiles'.

- Advisor looks for the 'Profiles' section for minutes and finally resorts to turning off the phone and then turning it back on . Advisor eventually finds the 'Profiles' section.

- The user is now presented with the opportunity to open the 'Profiles' section but she thinks that she is already in the 'Profiles' section.

- She selects 'Options' and chooses 'List View' as the user thinks that this option will show her the list of profiles available to her.

- Unfortunately, as before this just changes the users view of the menu system.

- Although confused the user enters 'Profile' and selects the 'Generalise' profile.

- To personalise this profile the user chose 'Options' from the bottom right hand corner of the screen and chose 'Personalise' from the popup list that appeared.

- The user selects the 'Ringtone' option and from the menu that appears chooses the 'change' option.

- The user then cycles through the list, finding the desired song and sets the song as ringtone by selecting the 'Select' command in the bottom right hand corner of the screen.

Task 7 – Tune Radio

- The user has previously selected the radio player so she knows that the 'Radio' is in the 'Media' section within the main menu.

- The user goes into the main menu using the main menu specific button.

- The user wanted to go into the 'Media' section but presses the button on the bottom right hand side of the phone and exits to the initial screen.

- User returns to the main menu and again recognises that she wants to enter the 'Media' section, but once again hits the wrong button and returns to the initial main screen.

- User looks at the main screen and wonders whether the background picture is there as a "waiting picture", while the N-Gage does some work.

- On realising that this is not the case, the user returns to the main menu.

- User starts to press buttons hoping that one of the buttons will do something.

- User presses the music player button on the phone and is transported to the music player.

- The user exits back to the main menu.

- The user accidentally goes back into the music player.

- Confused, the user goes back to the main menu and cycles through the items trying to find something that could possibly activate the radio.

- By pressing the button mapped to the exit button, the user returns to the main screen.

- After looking at the phone pad for a while the user notices that there is an icon on one of the buttons that resembles a radio and proceeds to press said button.

- User is transported to the radio section.

- User is perplexed by the screen and stares at the screen for a few seconds and admits she doesn't know what to do from this point.

- User once again hits the exit button by mistake while pressing various buttons to see if they did anything within the radio.

- User decides to consult the manual.

- User returns to phone and enters the options menu displayed in the bottom left corner of the screen.

- User selects 'Channels' from menu, but decides it is not what she wants so returns to radio.

- User enters the options for the radio once again and chooses 'Auto Tune Up' which tunes the radio to her desired radio station.

Task 8 – Record the Station

- The user remains in the radio from the previous task and chooses the 'Options' instruction in the bottom left corner of the screen.

- The user then proceeds to scroll through the list, claiming that there is no recording option in the list.

- User goes to the 'Help' selection in the 'Options' menu and reads the help given about the radio.

- Once the subject finishes reading the in phone help to do with the radio, the user goes back into the 'Options' menu.

- The user wonders whether the 'Save Channel' will record from the radio will complete the task.

- Unsure of whether it will, the user resorts once again to the manual for instruction.

- From the manual, user discovers what has to be done to record from the radio.

- Once user knows how to do the task i.e. by selecting the button with the red dot in the

middle of it on the radio, she thinks "it makes sense".

- User identifies the record button as the button at the bottom of the radio with the red dot in its middle, and selects it to record.

- User records some music and the selects the stop button represented at the bottom left corner of the screen and names the track in the space provided.

Task 9 – Playing NokiaGame.

- The user returns to the main screen from the radio by selecting the 'Exit' option located in the bottom right corner of the screen.

- User reckons that game must be situated in the main menu somewhere and proceeds to the main menu through use of the main menu specific button.

- User searches through the list of sections in the main menu to discover the game.

- Once the user discovers the game, the user selects it and selects 'Open' to open the game.

- After deciding against connecting to the internet or using an existing profile, the user is shown a screen showing various options.

- The user immediately recognises 'Floboarding' as the game, selects the game and selects 'Open' to open the game proper.

- Of the various open to the user, the user chooses to play a 'Quick Race' as opposed to play a season. The user chose this by highlighting the option with the arrow keys and selecting the option with the selection button in the bottom right of the phone.

- User uses the same button to select the default location and board for the game.

- Game commences and the user starts to play the game admitting that she doesn't know what controls are required to play the game.

- User manages to navigate the onscreen player around various bends.

- On exiting the game the user presses various buttons to return to the game menu system – there are no obvious solutions.

- User selects end game, but is confused when she is returned to the game menu once again and ends up choosing the location for the game once again.

- User presses buttons in haste and eventually resorts to the main menu button to the right of the screen. This returns the user to the main screen.

Task 10 – Open and take out MMC card.

- To turn off the N-Gage the user turned off the Nokia N-Gage by pressing the small on/off button to the side of the N-Gage.

- The user proceeds to unplug the headset from the phone before attempting to open the rear of the N-Gage.

- The user tries many times to remove the rear cover without success. At one point the phone falls from her grip as the user tries to open the rear of the phone.

- The user even attempts to use the headset to open the rear by using it to press in the button at the back of the phone.

- The user finds it difficult to press in the button and open the rear at the same time.

- User has to resort to manual to discover how to open the back of the phone.

- After succeeding in opening the rear of the phone the user attempts to take out the cartridge by getting her nails under the cartridge and trying to lift it up.

- User is forced to resort to the manual again.

- User has trouble in identifying the required section; she thinks it should be called "game card" and not "memory card".

- User is confused as to why she has to remove the battery first, but takes out the battery and then the card and puts everything back together.

Appendix D – User 4

Task 1 - Phone the Hospital:

- User is initially in the main screen and just types in the phone number.

- User presses the green button at the top left of the phone to ring the number.

- User presses red button in top right corner to cancel the call.

Task 2 – Phone Tracy using Address Book

- User initially tries the navigation arrows to try and get into the address book.

- After looking around the phone for a minute, the user sees the 'Contacts' menu at the bottom left of the screen. However, the user doesn't know how to access that option. The user can't associate the option with any button.

- The user finds the main menu button to the left of the screen and presses it.

- The user is brought to the main menu. However, the user presses the navigation arrows and is returned to the main screen.

- User goes back into the main menu again and highlights the 'Telephone' option.

- User presses the green button as she thinks that this might select 'Telephone', however, this only returns the user to the main screen.

- At this point the user admits to not knowing what any of the buttons do.

- User goes back into the main menu and scrolls to 'Contacts'.

- User now discovers that the button in the bottom left corner of the phone, with a line as an icon, is in fact a selection button and selects 'Contacts'.

- The user is then presented with a submenu from which the user selects 'Open' to open 'Contacts'.

- The user then presses 'T' to skip to all the contacts starting with 'T'.

- User scrolls to Tracy and selects Tracy.

- From the pop-up menu the user selects the 'call' option.

- Once the user is finished with the call, the user once again presses the red button to end the call.

Task 3 – Send your brother a "Happy Birthday" txt message.

- User reckons that the 'Messaging' section would be placed in the main menu so she navigates to the main menu through its' designated button.

- Once in the main menu, the user scrolls through the options until she identifies the 'Messaging' section. The user proceeds to select 'Messaging' and select the 'Open' option in the pop-up menu.

- User selects 'New Message'.

- User selects 'Create Message'.

- User selects 'as Text Message'.

- When the user tries to enter "Brother" into the 'To' field using the keypad, the user finds that this field reads the input from the keypad as numbers and therefore the number '22' appears instead.

- User attempts to erase the number. For this task the user presses the red button she pressed to end a call. However, this resulted in the user exiting to the main screen.

- Using the process the user returns to the text message screen.

- In the same 'To' field, the user attempts to use the arrow keys to enter 'Contacts', but they have no effect.

- User presses the button at the bottom right of the phone associated with the option at the bottom right of the screen and exits to the 'Messaging' screen.

- After creating another new message, she tries the arrows again.

- The user can identify the options at the bottom of the screen, but is unhappy as she can't find anyway of accessing them.

- Once again she presses a few buttons including the button in the bottom right, which brings her back to the 'Messaging' screen.

- The user becomes frustrated as she has to create another new message. She admits that she has "no clue" how to access her phonebook from this screen.

- User presses the main menu specific button and is brought back to the main menu.

- Once again the user creates a new message.

- This time the user tries the button in the bottom left which opens a pop-up menu.

- User browses the menu and selects the 'insert' option from the menu.

- The user is confused when the 'insert' option doesn't allow the user to enter a contact or name.

- User goes back to the pop-up menu and selects the 'Add Recipient' option.

- User type in 'b' and scrolls to find "Brother".

- User selects "Brother" and returns to the text message screen to find the contact number included in the 'To' field.

- When typing the message the user makes a mistake and decides to erase the mistake. However, the user selects 'Close' option instead of the 'c' button in the bottom left corner of the phone.

- User creates a new message, includes the contact and tries to delete using the arrow keys. However, didn't erase the mistake.

- Confused, the user selects 'Options' and selects the 'Delete' option.

- However, this option deletes the whole message, so the user doesn't select that option.

- User decides to resort to the manual. However, just as she leaves down the phone the user notices the 'C' button located in the bottom left of the phone. This button allows the user to delete characters from the message.

- User fixes message, selects 'Options' and uses the 'Send' option to send the text message.

Task 4 – Change your friend's mobile number

- Now that the user knows how to associate the options at the bottom of the screen with their relevant buttons, she uses the facility to go directly to 'Contacts'.

- Selecting the 'Options' option, the user navigates the pop-up menu to select the 'edit' option.

- However, the user is presented with a screen whereby the last contact entered is shown and the user is editing the contacts e-mail. Therefore, the user exits back to 'Contacts' and selects John by pressing 'j' and scrolling to John.

- The user selects edit once more, but edits the telephone number instead.

- Once the user has edited the number, she selects 'Done' to show that she is finished editing.

Task 5 – Listen to MP3 Song.

- At the start the user notices the radio button (button with radio icon).

- User selects this icon thinking that mp3 might be in there as the user associates the radio with music.

- User is told that a headset is required.

- User is not happy with this but sees the button beside the radio button with an icon of musical notes.

- User presses this button and enters the music player.

- Once the music player loads up the user selects the 'Options' function at the bottom of the screen and then selects 'Track List'.

- The user finds the desired track easily.

- The user enters the 'Options' option once again and selects the 'Play' operation, at which point the user is told that a headset is required or told to activate the loudspeaker.

- The user thinks that in order to activate the loudspeaker she has to exit the music player.

- The user exits the music player by selecting the 'Exit' option and returns to the main screen.

- The user enters the main menu and opens the 'Tools' section.

- The user then enters the 'Settings' section.

- Finally the user enters the 'Device' section.

- The user fails to see anything of immediate relevance and decides to go back into the music

player.

- In the music player the user attempts to play the song once again, but receives the same message.

- The user enters the 'Options' section and discovers that she can activate the loudspeaker through this menu.

- The user activates the loudspeaker and plays the song using the play function in the pop-up menu.

Task 6 – Set the Ring tone.

- The user started the task from inside the music player and on hearing the task chooses the 'Options' function at the bottom of the screen to see what her options were when it comes to assigning ring tones.

- The user selects the 'Settings' option from the menu, buts find nothing of relevance.

- The user presses the main menu button situated to the left of the screen to return to the main menu.

- The user selects 'Tools' followed by 'settings' within the 'Tools' section.

- From there the user enters 'call', but exits to 'Tools' when she finds nothing of relevance.

- Next the user enters 'Application Manager', but when she finds nothing she returns to 'Tools'.

- The user selects 'Call' once again.

- Frustrated the user resorts to the manual looking for 'Profiles'.

- User discovers that the Profiles section is located in the main menu.

- The user, however, thinks that she is in the main menu when she is in fact in 'Tools'. (Tools is written at the top of the screen).

- Once the user discovers that she is in fact in 'Tools' she returns to the main menu.

- Once in the main menu the user scrolls through the list of options to discover the 'Profiles' section.

- Once the user opens the section she selects the 'general' profile and decides that she wants to 'personalise' that profile.

- The user is presented with a screen with ring tones as its first option. The user selects this option and chooses the 'change' option.

- The user scrolls to the appropriate song and selects 'Done'.

Task 7 – Tune Radio

- As the user has previously entered the radio through its' designated button, the user has no problem assessing the radio.

- When a screen appears telling the user that she has to connect a headset she becomes a little annoyed that she can't use the loudspeaker.

- The user finds the headset and attaches it to the phone.

- Once the user is allowed to enter the radio, the user goes to the 'Options' function at the bottom of the screen to see if there is an option to tune the radio as there is no visible tuner on the radio.

- The user discovers the 'Manual Tuning' option and selects this option.

- The user types in the desired frequency and selects 'OK' to accept the tuning.

Task 8 – Record the Station

- The users first reaction when told the task was to enter the 'options' function at the bottom screen.

- The user scrolls through the menu and selects the help option.

- After reading the help, the user goes back to the radio and scrolls to the record button situated in the bottom of the radio.

- The user is unsure of how to select the record button and her initial reaction is to press the radio button to the side of the screen. This returns the user to the main screen.

- The user returns to the radio and tries various combinations of buttons but selects 'exit' by mistake and exits to the main screen.

- After returning to the radio, the user presses the red button thinking that since the record

button is red and so is the red button that they are mapped. Unfortunately they are not and the user exits to the main screen once again.

- Frustrated the user returns to the radio and this time discovers that the button is assigned to the bottom left selection button.

- The user waits for the application to record from the radio and then stops recording by selecting the 'Stop' option at the bottom of the screen.

- The user is required to name the track. The user does so by typing on the keypad and then selecting 'OK'.

Task 9 – Playing NokiaGame.

- The user figures that the game is located in the main menu and presses the main menu button to enter the main menu.

- The user scrolls to 'Nokia Game' and selects the game.

- After deciding against connecting to the internet or using an existing profile, the user is shown a screen showing various options.

- A screen with a variety of options, but the user finds no difficulty in finding the game 'Floboarding'.

- Once inside the game, the user is shown another set of options – different ways in which the game could be played. The user scrolls to the 'Quick Race' option and selects it.

- The user selects the default location and board for the race.

- At the start of the game the user tries to navigate the board with the keypad as is usual in Nokia games.

- However, after a few seconds the user realises that the arrows control the board.

- On exiting the game, the user presses many buttons to see which would work. The user presses the red button and is returned to the main screen.

Task 10 – Open and take out MMC card.

- The user turns off the phone by pressing the on/off button at the side of the Nokia.

- User removes the headset for easier access to the rear of the phone.

- The user finds it difficult to remove the rear of the phone as the push button at the rear is difficult to press at the same time as the user tries to slide the rear cover off.

- Eventually the user manages to remove the rear cover.

- The user had previously heard that the battery had to be removed in order to change the game cartridge. However, she has a little difficulty in removing the battery.

- The user replaces the game with no difficulty.

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