

Service Developer's Guide for the Nokia 7110

November 1999

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Contents

1. Introduction.....	5
1.1 References.....	5
1.2 Contact information.....	5
1.3 Terminology.....	6
2. Wireless Application Protocol - WAP	7
2.1 Introduction.....	7
2.2 WAP Architecture.....	7
2.3 Developing Applications with WAP	8
2.4 Further Information.....	9
3. General Usability Issues	10
3.1 Mobile applications for mobile use.....	10
3.2 Big displays versus small displays.....	10
3.3 Length of the texts on small displays.....	10
3.4 Looping	10
3.5 Use of graphics	11
3.6 Utilization of display space	11
3.7 Navigation Principles.....	11
3.8 Use of header texts (card titles)	12
3.9 Use of links.....	12
3.10 Consistent terminology	12
3.11 Abbreviations and long words.....	13
3.12 HELP texts.....	13
3.13 Perform usability test.....	13
4. Introduction to the User Interface of the Nokia 7110	15
4.1 Keypad - detailed description	16
4.2 Display - detailed description.....	17
4.3 Basic Browser Display.....	18
4.4 Options on the left soft key.....	20
4.5 Selection Lists.....	20
4.6 Editors	22
4.7 Tables	24
4.8 Graphics	24
4.9 Bookmark handling.....	25
4.10 Use Number handling	27
5. Nokia 7110 user interface elements of WML.....	28

5.1 Hyperlink	28
5.2 Select Element	30
5.3 Input Element	31
5.4 Image Element.....	32
5.5 DO Element	33
5.6 TITLES and LABELS.....	34
5.7 LIMITATIONS.....	34

1. Introduction

The Wireless Application Protocol (WAP) will enhance the functionality of mobile phones through real-time interactive services. The protocol has been designed specially for small screens and low bandwidth, and it offers a wide variety of wireless services over the Internet using Mobile Phones.

This Service Developer's Guide for the Nokia 7110 provides information and practical examples for developers who want to develop WAP services for the Nokia 7110. It will highlight the possibilities, limitations and requirements of service development and provides a good introduction to the Nokia style of designing user interfaces.

This guide is not written for service developers only, but essentially for anyone involved in creating the wireless information society and who needs to know more about service creation on small mobile terminals. It can be used in conjunction with the Nokia WAP Toolkit.

The Toolkit offers developers an environment for creating, testing and demonstrating WAP applications. This allows service providers to evaluate the usability of wireless applications and services together with their end-user organization.

We at Nokia are very proud of our user interfaces and we have spent a lot of effort in constantly improving them. In this guide we have collected a lot of what we have learned to help developers improve their services. We believe that good usability will increase use and satisfaction and subsequently revenues for service providers.

This guide is not intended to be a detailed WAP document and it is not meant to replace any WAP specification.

1.1 References

User's guide for the Nokia 7110

The Nokia WAP Toolkit can be downloaded from <http://www.forum.nokia.com/>

Wireless Application Specifications <http://www.wapforum.org/>

Information about Nokia products can be obtained from <http://www.nokia.com/>

1.2 Contact information

Developer support can be obtained through Forum Nokia <http://www.forum.nokia.com.>

1.3 Terminology

Display

The word 'display' refers to the 4 lines of text (not including the Header text), which are visible at the same time in one view. You move from one display to another by rolling the roller down 4 times.

Card

A single WML unit of navigation and user interface.

Deck

A collection of WML cards that is the smallest download unit. You cannot download a single card in a deck, but must download the entire Deck. Service developers should be aware of this, and not do a giant application in one big Deck.

Hyperlink

A link within a document or card that allows quick navigation to another document (card).

Do element

A way of defining a binding between events (e.g. a user selection) and a task (e.g. to go somewhere).

Prev element

Lets the application developer define what happens, when the user selects **Back**. In some applications it might make more sense to jump to another card than the one that the user has just visited.

Input element

A mark-up element that allows for interaction with the user, i.e. letting the user input textual values. These can be used for inputs to locally stored scripts, or for parsing to origin servers.

Proportional fonts

A font, in which the letters don't necessarily take up the same amount of pixels in the width. 'W' and 'l' are good examples.

Options list

The Options list is the list of items shown when the user presses the **Options** soft key.

Navigation

The principle of moving between menu items, decks and cards.

2. Wireless Application Protocol - WAP

2.1 Introduction

The Wireless Application Protocol (WAP) is a set of protocols that allow the development of applications and services for use with Mobile Phones and other mobile devices. These protocols and their related standards and specifications are maintained by the WAP Forum.

The WAP Forum consists of a number of hi-tech companies from the Information Technology, Software and Telecommunications industries. The objectives of the WAP Forum are to:

- Bring Internet content and advanced data applications to digital cellular phones.
- Create a global wireless protocol specification that works across different wireless network technologies.
- Enable the creation of content and applications that scale across a wide range of bearer networks and device types.
- Embrace existing standards and technology wherever possible.

2.2 WAP Architecture

2.2.1 WAP and Internet Architecture

In order to leverage on the existing Internet standard as much as possible, the WAP stack closely follows the Internet model. This is illustrated in Figure 1.

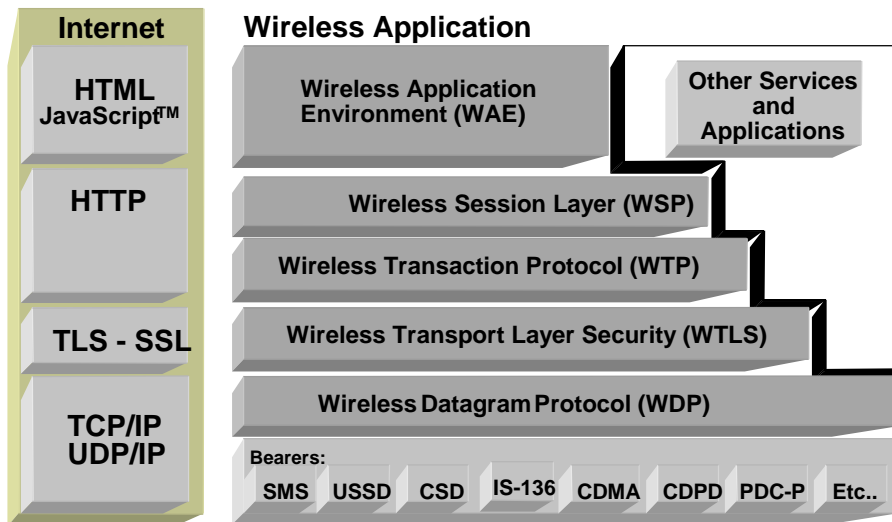


Figure 1 – Comparison of Internet and WAP Architecture

This layered architecture allows applications to utilize the features of the WAP stack through well-defined interfaces. This close link to the Internet architecture allows developers to utilize their existing knowledge and expertise when developing applications for Mobile Phones.

2.2.2 Wireless Application Environment (WAE)

The Wireless Application Environment (WAE) is a general-purpose application environment that uses a combination of Internet and Mobile Phone technology. It provides a framework for the development of applications on a Mobile Phone.

The WAE contains support for the following functionality:

- Wireless Mark-up Language (WML) - a lightweight presentation language, similar to HyperText Mark-up Language (HTML) but optimized for use with mobile phones.
- Wireless Mark-up Language Script (WMLS) - a lightweight script language, similar to Java Script™.
- Wireless Telephony Application / Interface (WTA / WTAI) - telephony services and programming interfaces.
- Content Formats - defined data formats, such as vCard and vCalendar.

2.2.3 Wireless Session Protocol (WSP)

The Wireless Session Protocol (WSP) provides the application layer of WAP with an interface for two session services. The first is a connection-oriented service that operates above the transaction layer protocol. The second is a connectionless service that operates above a secure or non-secure datagram service.

The WSP is optimized for low bandwidth bearer networks with long latency.

2.2.4 Wireless Transport Protocol (WTP)

The Wireless Transport Protocol (WTP) runs on top of the datagram service and provides a lightweight transaction-oriented protocol suitable for use in Mobile Phones. WTP operates over secure or non-secure wireless datagram networks.

2.2.5 Wireless Transport Layer Security (WTLS)

The Wireless Transport Layer Security (WTLS) is based on the industry standard Transport Layer Security (TLS) and is optimized for used over narrow band communication channels. WTLS may be used for secure communication between terminals, and applications can selectively enable WTLS features.

2.3 Developing Applications with WAP

Application Developers can use the principles of WAP to develop new services or adapt existing Internet applications for use with Mobile Phones. Applications are written in the Wireless Mark-up Language (WML) and the WML Script, and stored on either a normal web server (origin server) or directly on the WAP Gateway. The content stored on the web server will be accessible from the Mobile Phone via the cellular network and a WAP gateway or proxy.

The Proxy Server acts as a gateway between the cellular network and the Inter/Intranet. The data sent between the origin server and the handset is binary encoded to optimize transmission over the narrow bandwidth of the cellular network. Note that the content stored on the web server might be in either textual or binary format. When the WAP gateway fetches textual content, it automatically compiles this to the encoded format to minimize network load.

Figure 2 shows the network-related elements required for developing and offering services to mobile users.

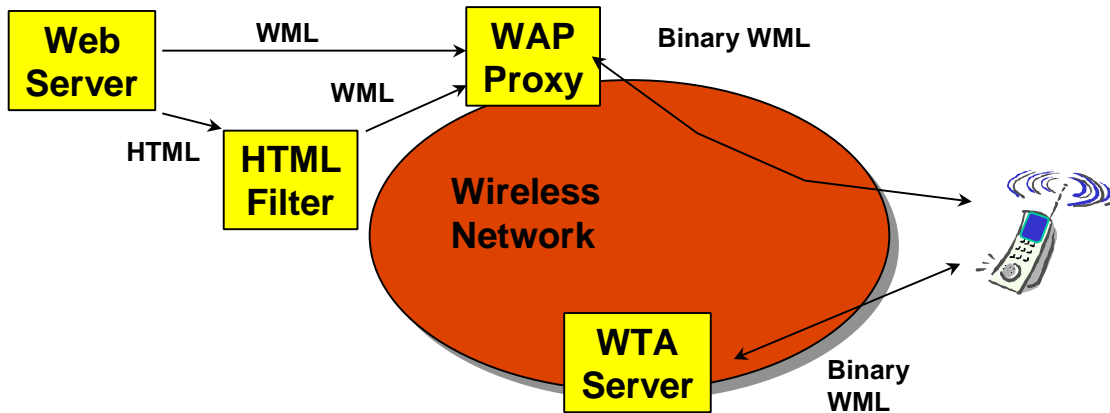


Figure 2 – Network-Related Elements for WAP Applications

Web Server:

The Web Server stores the applications written in WML. Alternatively, existing HTML applications can be used.

HTML Filter:

Any applications written in HTML will have to be converted to WML before they are sent to the Mobile Phone. This HTML Filter may form part of the Web Server or the WAP Proxy.

WAP Proxy:

The WAP Proxy acts as the gateway between the cellular network and the Inter/Intranet. It binary encodes the information which is to be sent to the Mobile Phone and decodes information sent from the Mobile Phone.

WTA Server:

The WTA server handles network-specific applications. These applications are not discussed in this document.

2.4 Further Information

Further information about WAP is available on the Internet at www.wapforum.org.

3. General Usability Issues

Nokia Mobile Phones are renowned for their simple to use and intuitive user interface. In order to create a service that will be perceived as usable and easy to understand, Nokia Mobile Phones provides some general guidelines to help service providers develop their applications.

3.1 Mobile applications for mobile use

When deciding what information to include in the different applications on a Mobile Phone, think about which information might be relevant in the situations where the Mobile Phone will be used. Because of the mobility of the small display, the user might primarily use the Mobile Phone when there is no access to the Internet on PC. We believe that users of the mobile applications will primarily be interested in brief and quick information. For instance, quick access to flight schedules from the Mobile Phone might be relevant for the user who is on his way to the airport and needs to check the departure time of the flight. Similarly, several short news flashes are more relevant than longer news articles. Quick access to weather information may also be of use in the mobile situation to quickly check out the temperatures of the destination of the traveller. However, it is less likely that users will surf on the application on the Mobile Phone but will prefer to surf the Internet on PC from the office or home.

3.2 Big displays versus small displays

The small displays of the Mobile Phones limit the amount of information that can be shown on each display, compared to the PC. The PC provides more excess space for animations and extra information. On the Mobile Phone, special attention should be paid to prioritizing the information shown on the display. As stated above, think about which information is relevant for the mobile situation of use.

3.3 Length of the texts on small displays

Pay attention to the length of the texts in the applications on Mobile Phones. While reading the text, only four lines can be viewed at a time. When scrolling the text, there is always a risk that the user loses track on the text page, if the page is too long. The roller makes scrolling the text easy, but the smaller display limits the amount of text that the user will feel comfortable with. We recommend that text should be limited to an approximate maximum of the length of 4-5 displays (= 16 – 20 lines).

3.4 Looping

Looping refers to the way in which the last item in a list is automatically followed by the first item in the same list. If the user scrolls down when the last item is shown at the bottom of the display, the next one will automatically be the first item.

The following displays loop:

- Options list.

The following displays do not loop:

- Cards with text only, or cards with text and one or more links.
- Single selection lists.
- Multiple selection lists with mark/unmark.
- Cards containing only links.

3.5 Use of graphics

The Nokia 7110 will display graphics in service. Refer to section 4.8 Graphics.

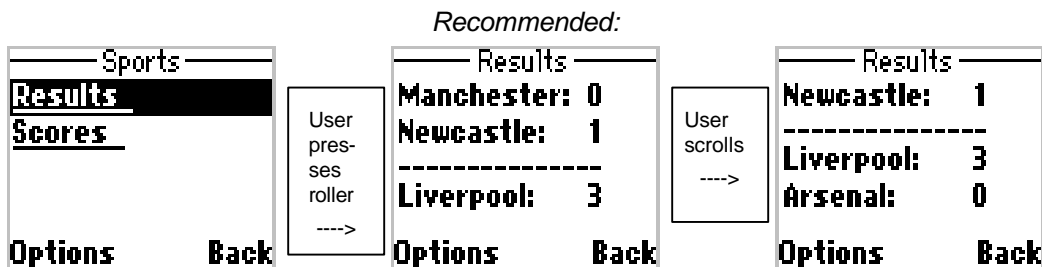
3.6 Utilization of display space

Avoid too much space between items, since it decreases the user's sense of easy navigation, and does not enhance the usage of an application. It is recommended that items are placed on a card, so that there will always be visible items when the user enters the card.

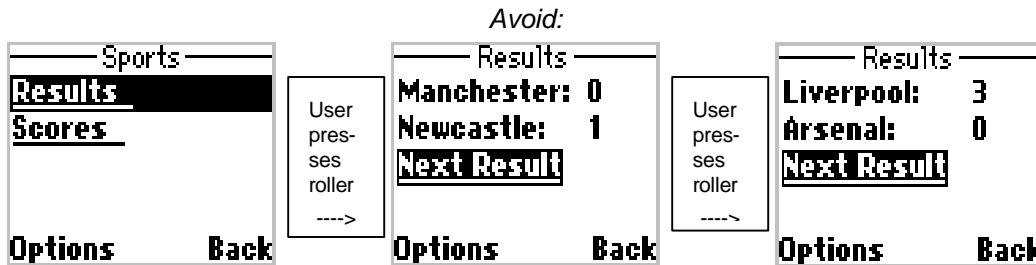
3.7 Navigation Principles

- The left soft key is used to enter the menu structure and execute commands. The right soft key is used to exit the menu structure and cancel commands as well as navigating back in history.
- It is a general rule of navigation that users should always have an easy way to step back in the application. The user should always be able to cancel commands – i.e. be able to 'regret' the chosen commands. This is particularly relevant in situations where the user is merely curious to explore the application, and where s/he needs an easy escape route. Overall satisfaction with the application depends on the user's sense of ease when navigating. This is why an easy 'escape route' increases the user's sense of control of the navigation.
- Another important navigation principle is always to give the user more than one way of performing important actions. In other words, the user can either select an item on a page by highlighting a link and pressing the roller or the same action can be performed by highlighting the item *Select* in the Options list and then pressing the soft key *Select*.
- The hierarchy of an application determines the structure of the navigation within an application. The more layers added or perceived by the user, the more complex the navigation becomes. There is the risk that the user loses track of the starting point and experiences a loss of control. Most users like to have a 'safe haven' - a place that they are familiar with and that they recognize when navigating through cards. The further down in the hierarchy and away from the 'safe haven', the more the user will worry about how to get back to his 'safe haven'.

In the following example, a deep hierarchy has been avoided by letting the user scroll down on the 'Results' page instead of navigating via links.



In the following example, the user might get lost because many extra layers are added to the hierarchy due to navigation between displays by selecting links.



3.8 Use of header texts (card titles)

Header texts are titles that describes the content of the display and their use is recommended. They help the user to navigate in the application because they function as a reminder of where the user is in the application. The header text should be determined by the item previously selected by the user. For instance, the header text 'Bookmarks' tells the user that the display contains a list of bookmarks in the application and that the Options item previously selected was *Bookmarks*.

Proportional fonts are used in header texts, and if the header text is too long it is automatically truncated. Truncation is usually better than abbreviations, because the user might be confused by unfamiliar abbreviations that can be difficult to understand.

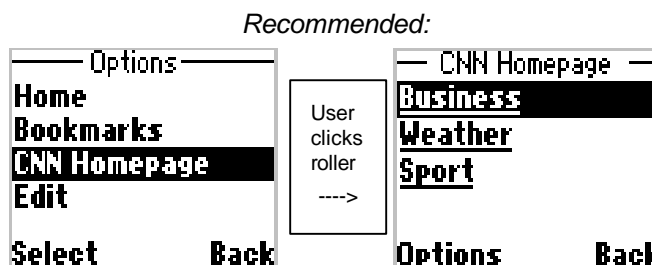
3.9 Use of links

Because the link feature is well known from the Internet, users intuitively know that clicking a link gives access to more information. On the Nokia 7110 roller clicking performs the same task as clicking on a link on the Internet on the PC. Links are a powerful tool for linking different information items and preventing long pages of text. We recommend the use of links, keeping in mind that unnecessarily deep hierarchies should be avoided. Links are described in Section 5 of this document.

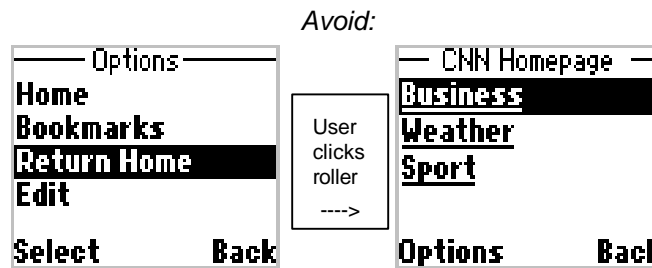
3.10 Consistent terminology

It is important to keep terminology consistent. Inconsistent terminology often confuses the user unnecessarily, and makes navigation complex. Consistent terminology makes it possible to think in terms of displays, and to recognize each display when navigating through them.

In the following example the text *CNN Homepage* is consistent with the header text of the second display 'CNN Homepage'.



In the following example the text *Return Home* is inconsistent with the text 'CNN Homepage'



3.11 Abbreviations and long words

The length of words might cause problems on small displays. Therefore, we recommend that special attention be paid to the choice of short words on the display. Try to avoid abbreviations if possible, because the meaning of unfamiliar abbreviations might be difficult for the user to understand.

In order to avoid splitting of words, the Mobile Phone will use word wrapping.

Moreover, localization issues should be taken into consideration. Words, which are short in English, might be very long in some languages, for instance Finnish or Hungarian.

3.12 HELP texts

The content of the help texts should be considered carefully. Add Help texts only if the content of the text is relevant to the particular situation of use. The text should be relevant to the page which it is intended to explain.

It is recommended not to have any *Help* items in the Options list, because the content of this help would be too general for the application and would not help the user. For instance, one should avoid having Help texts explaining the way the roller is used, because it can be assumed that the user already knows this by the time he connects to the application. However, it might be good to explain something relevant to the particular page visible to the user in a *Help* item placed on the actual page as a link.



3.13 Perform usability test

It is always good to perform a usability test of new applications. People who have not been involved in the design or development of the applications tend to notice potential usability problems often not obvious to those who know the design by heart. Usability tests should always be performed as early as possible in the development process. Any necessary changes resulting from the tests can then be implemented within the development timescale. Try to recruit users who are representative of the

end users of the application, and try to conduct the usability test on a smaller scale, if the timescale does not allow for extensive testing.

4. Introduction to the User Interface of the Nokia 7110

This section gives a short overview of the user interface of the Nokia 7110 phone. The Nokia 7110 phone is a Mobile Phone supporting many features, like Calendar, Advanced Messaging, Phone Book, etc.

The Services (Browser) part of the phone is designed to comply with the user interaction handling known from other applications in the phone.

This section provides a basic understanding of how the product behaves when using different kinds of Browser/WML elements.

Figure 3 shows the User Interface of the Nokia 7110.

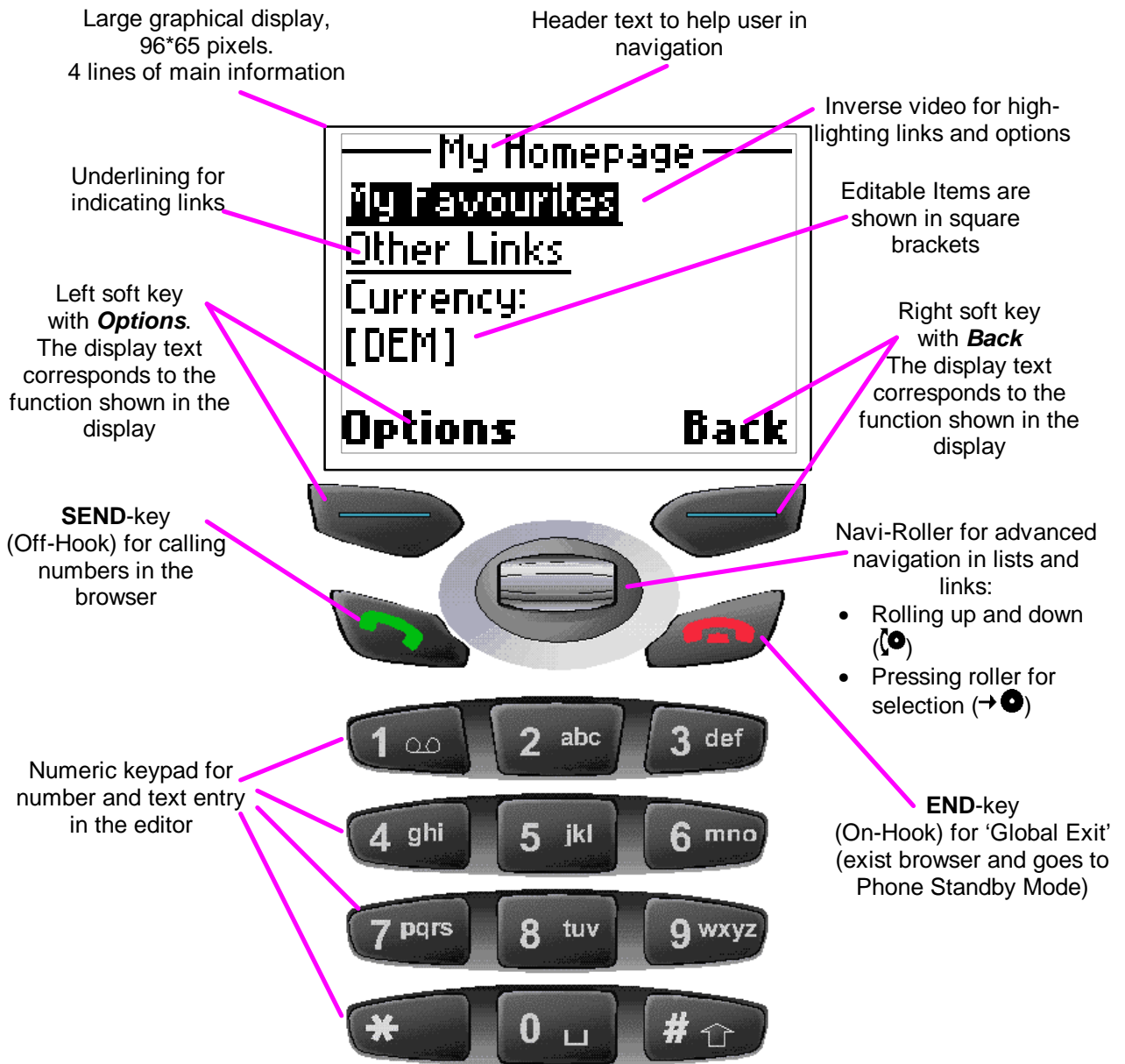








Figure 3 – The User Interface of the Nokia 7110.

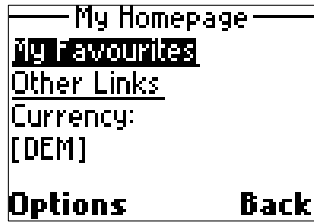
4.1 Keypad - detailed description

<p>Left soft key</p> 	<p>The left soft key is used for 'positive' actions, and will always be Options when browsing. When entering values in input fields the left soft key will be used for confirming the input.</p>
<p>Right soft key</p> 	<p>The right soft key is used for 'negative' actions, and will be Back in normal browsing.</p>
<p>Rolling</p> 	<p>Rolling the roller will in general allow the user to scroll in the options or text in the current display.</p>
<p>Pressing roller</p> 	<p>Pressing the roller will always work as 'selection'.</p>
	<p>Used to terminate ongoing calls, and in the Browser it will Exit everything, i.e. it will go to Phone Standby Mode if pressed once (twice) when using SMS (Data) as bearer. Also called 'Global Exit key'.</p>
<p>Close Slide</p>	<p>Closing the slide works like pressing the END-key.</p>
<p>Numeric keys:</p> 	<p>The numeric keys basically have no function when viewing cards and in Options lists. The Numeric keys are used in the editor, as follows:</p> <p>When a number input has been requested via the WML, the numeric keys will insert the corresponding digit (and */#)</p> <p>When a text string has been requested, the numeric keys will work for multi-tapping characters (the *-key will work for inserting special characters, the #-key for switching between upper- and lower-case.)</p> <p>The editor handling is further described in the editor section (section 4.6 Editors).</p> <p>In the normal browser situation, the numeric keys have no function.</p>

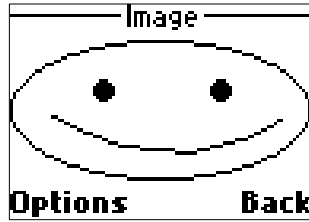
4.2 Display - detailed description

The Nokia 7110 display contains 65 rows of 96 pixels. The physical dimensions of the so-called 'active area' (where there are actually pixels available) are 34.3 mm * 29.0 mm (W*H). This gives up to 4 lines of main text, plus a header text and the area used for the two soft keys. The main text area can also be used for showing graphics. The graphics area is at maximum 44 pixels high and 96 pixels wide.

Display with 4 lines of text:



Display with an image:



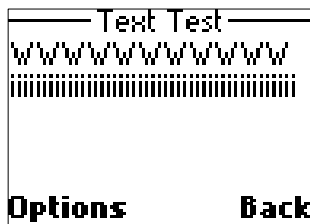
4.2.1 Display Fonts

All fonts used in the Nokia 7110 are proportional fonts. Proportional fonts give a dynamic and minimized width for each character, give improved readability of the display texts, and generally allow more characters to be displayed per line.

Two fonts are used in the Browser part of the phone:

- 8 pixel normal (used for header texts)
- 8 pixel bold (used for main text and soft-key texts).

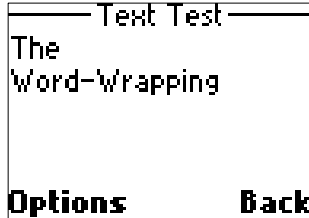
Having proportional fonts means that it is difficult to tell how many characters there can be in each line. This depends on which characters are used, as shown in the following example:



This example shows that it is possible to fit many more lower-case 'i'-characters than upper-case 'W'-characters into one line of the display. This needs to be kept in mind when selecting texts to be used in different services.

4.2.2 Word Wrapping

Word wrapping is also important when designing services. If the first two words of text do not both fit into the first line, the second word will automatically be moved to the second line (the phone does not support word hyphenation). This may result in the following:



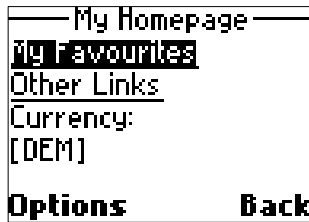
Using the Toolkit is one method of checking how the text will be shown on the display.

4.2.3 The Header Text in the Nokia 7110

The Header text will contain the `title` attribute in the WML card. This header text can help the user in knowing where they are in the service, and ease navigation in the browser.

4.3 Basic Browser Display

A typical browser display is shown below:



Note: The right soft key will in this situation 'Back-step' to the previously selected card. Pressing the right soft key will 'send' a `prev` event, which can be mapped, to a `prev` task (which will go backwards in the history).

The different elements of the Browser Display and the detailed handling are described further below.

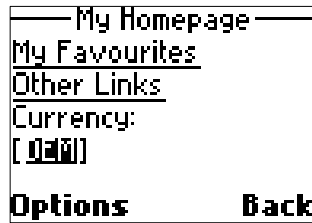
4.3.1 Scrolling selectable elements

Whenever there are selectable elements in the display, the roller (🌀) will allow the user to scroll between the selectable items.

Scrolling down in the above example will give:



And scrolling down again gives:



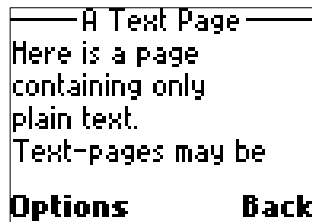
There is no wrapping when the user has scrolled to the end of the Card.

Selecting a highlighted element is done by pressing the roller, → ●.

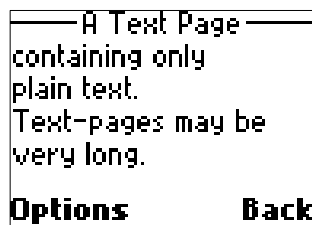
Note: Links will always be displayed on a separate line in the browser. This should be considered when designing displays that look good.

4.3.2 Scrolling plain text

If the user scrolls through plain text in the Browser display, the text is scrolled line by line. Example:



Scrolling down (↓ ●) gives one extra line of the text:



Please note, that the word-wrapping rules (see 4.2.1 Display Fonts) also apply to plain text.

4.4 Options on the left soft key

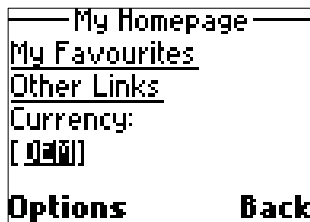
The left soft key will, in all normal browsing situations, contain **Options**. The options list is a mixed list, containing both context-sensitive options (like all the Do-elements), and also 'fixed' browser options (Bookmark handling, etc). The contents and ordering of the options are:

- *Home* (short-cut to the Home page)
- *Bookmarks* (see the section 4.9 Bookmark handling).
- *Select* or *Edit* (works as go -element for links and Select for selection lists or links), works as 'Edit' for input -element.
- do Element number 1 (provided by the WML Card - if available)
- do Element number 2 (provided by the WML Card - if available)
- do Element number X (provided by the WML Card - if available)
- *Use Number* (will allow the user to call (or edit) any of the numbers in the current Card). Only available if there are numbers in the Card. See also section 4.10 Use Number handling).
- *Empty Cache* (Removes all cached WML Decks in the phone).
- *Exit* (Exits the browser, ending up in the main menu with the Browser item highlighted. With confirmation)

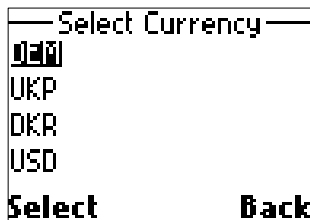
4.5 Selection Lists

If the user selects an entry in a Card that refers to a selection list, they will be allowed to select an item from the list of items.

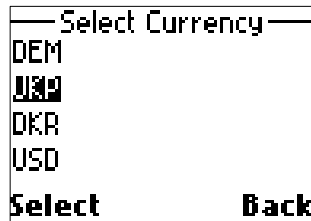
Let us assume that the user has scrolled down to the [DEM] option:



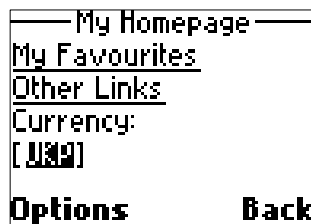
Selecting this item can be done either by pressing the roller (→ ●), or by selecting the *Select* item from the **Options** on the left soft key. In both situations, the result would be:



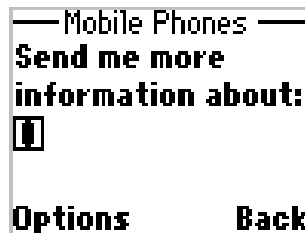
The user can scroll in this list using the roller (↻); scrolling down will give:



The user can select an item either by pressing the roller (→●) or the **Select** soft key. When an item is selected from this list (in this example the 'UKP'), the Browser display is re-entered and will show the new selection:



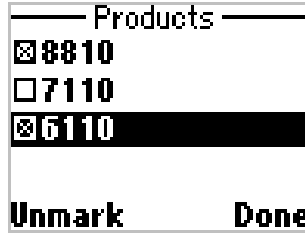
The Nokia 7110 also supports multi-selection lists, which are invoked using the `option` element with the `multiple` attributes, set to true WML command. This is shown below:



When the user selects two brackets, they will get a list of items to select from:



The user can select and deselect items from this list either by pressing the roller (→●), or by pressing the **Mark/Unmark** soft key:



The user can mark none, one, or several of the items in this list.

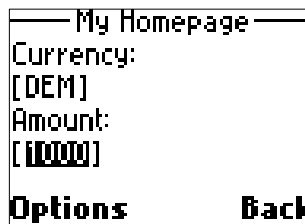
When finalized, the user presses the right soft key, **Done**, and the previous Browser display returns with the new selections:



4.6 Editors

The Nokia 7110 has three editors, one used for typing phone numbers, one for typing text (and numbers), and one for typing a Password (number entry, but where the typing is displayed to the user using asterisks).

The editors can be used in a specific application to define a variable. Let us assume the following situation:



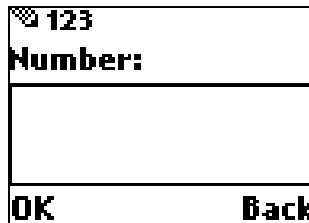
The user can now select the *Amount* item either by simply pressing the roller (→●) or via the *Select* item from the **Options** on the left soft key. Selecting such an item will bring up either the Number Editor or the Text Editor (in the example above, probably the Number Editor should be used).

Which editor is invoked depends on the `format` attribute of the `input` element

The three editors are described further below.

4.6.1 The Number Editor

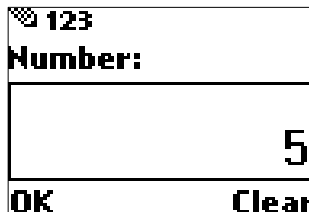
The Number Editor is a simple number typing editor, which looks like this:



The user can type any number, * or #, here and also the '+' sign can be entered (pressing the *-key twice).

The number editor also supports a title (Label) which should be defined in the WML. The Title can be one line long; if the title is longer it is truncated.

Note also that the Right soft key is **Clear** when the user has typed one or more digits (allowing clearing of the last entered digit):

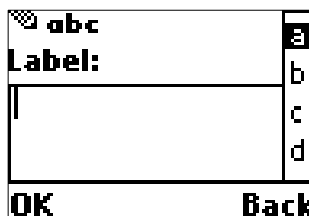


4.6.2 The Text Editor

The Text Editor in the Nokia 7110 allows a user-friendly way to enter and edit text.

The editor supports Uni-code format and will default to allow typing text in the language selected in the phone's menu system.


The initial Text Editor looks like this:



In the Text Editor, the right soft key first allows back stepping, but when the user starts typing it allows the user to clear the last entered character.

The text editor also has a dynamic input window, like the Number Editor.

The left soft key in the Text Editor is **OK**. Text entry is done in either of these ways:

- The user can use the roller (↻) to highlight a character to insert from the list on the right side of the display. Pressing the roller (→) will insert the selected character.
- The user can press the digit keys to enter characters; to select the required character the user may have to multi-tap the key. For example, to select the E character, the user must press the  key twice in quick succession.

When the user is finished typing/editing a text, they choose the **OK** option (left soft key).

4.6.3 The Password editor

The Nokia 7110 also supports password entry; this is invoked when the `password` attribute is used for the `input` field.

This brings up a password entry editor where the user can type a password. In this editor, the typed number will be shown as asterisks (*) to the user.

4.7 Tables

The Nokia 7110 displays Tables as one long row of cell information, e.g. the 2x2 table

```
1 2
3 4
```

Is shown like



Due to the restricted capacity of a small display, we don't recommend using tables.

4.8 Graphics

The Nokia 7110 supports Wireless Bitmap graphics. The maximum size of the graphics area is 96x44 pixels.

Images can be used e.g. for showing a corporate logo when entering the service.

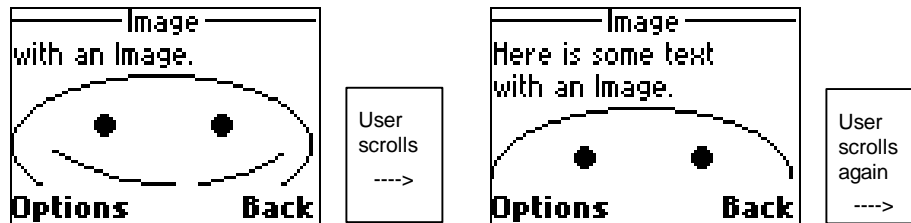
Images fitting in the graphics area are centred. Images that are larger than the display are left-aligned and truncated from the right-hand part. Images which are taller than the display are top-aligned, and the bottom part of the display is truncated.

If the image is maximum one line (11 pixels) tall, three lines of text can be displayed on the same display above and/or below the image. Similarly, with an image of maximum 22 pixels there can be two lines of text (see the example below), and one line of text with an image of maximum 33 pixels.

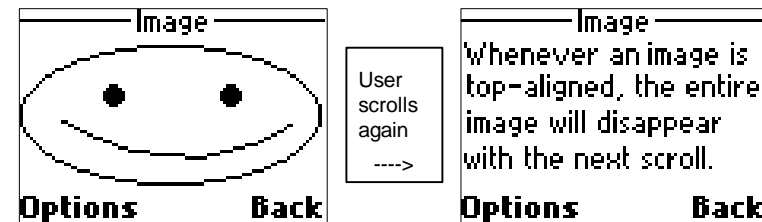
There cannot be text next to an image; the image will always start its own line as shown in the following example:



The user can scroll an image line-by-line, but when the image is scrolled to the top of the display, the entire image will disappear with the next scroll:



7110 doesn't support bitmaps used as links. If an image is defined as a hotlink, the text defined in the ALT attribute will be used as the link text, i.e. the ALT attribute will be shown instead of the bitmap. We don't recommend defining images as hotlinks. If a requested image does not exist, a small default picture will be shown. We

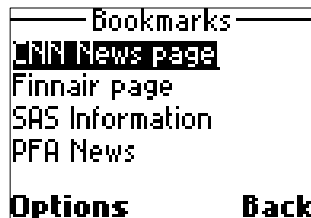


recommend using the image ALT attribute value.

4.9 Bookmark handling

The Bookmark handling of the Nokia 7110 is entered using the *Bookmarks* item contained under the options on the left soft key, **Options**.

When entering the *Bookmarks* option, the user will get access to the currently defined bookmarks. This could look like:



The user can scroll the Bookmarks using the roller (↻) and select a Bookmark by pressing the roller (→●).

The Options on the left soft key in the Bookmarks list will contain:

- *Save as bookmark*. Allows the user to add the current Card to the bookmarks list.
- *Add Bookmark*. Type in and add a bookmark to the bookmarks list.

When there is at least one bookmark in the bookmarks list, the following will also be shown:

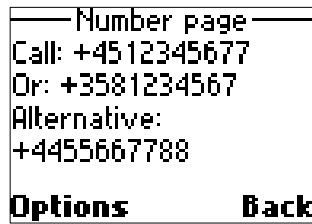
- *Go to.* An alternative way of selecting the highlighted bookmark.
- *Edit.* Allows the user to edit the highlighted bookmark, changing url and title.
- *Erase.* Allows the user to erase the highlighted bookmark.

4.10 Use Number handling

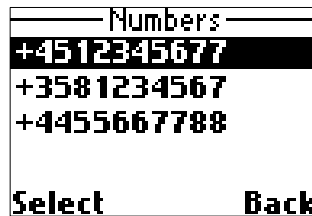
The *Use Number* option is available via the **Options** soft key in the normal Browser display (when viewing a specific card).

A note "No numbers found" is displayed if the item is used and no numbers exist on the active card.

This could be a card like this:



The *Use Number* option will allow the user to select any of the numbers in the card. This could look like:



The user can scroll the list using the roller (↻), and select a number by pressing the roller (→●) or the **Select** soft key.

Selecting a number will exit the browser and paste the number into the normal phone Standby Mode. From the Phone Standby Mode, the user can call the number, save it and even send a short message directly to it.

5. Nokia 7110 user interface elements of WML

5.1 Hyperlink

Use the `<anchor>` element to create a hyperlink, similar to a HTML link. A hyperlink is a mechanism that lets the user navigate to a new location. It provides easy navigation through an application.

The `<a>` element is a short form of the `<anchor>` element, and is bound to a go task without variables. WML specifications recommend the use of the `<a>` element instead of `<anchor>` where possible, to allow more efficient tokenisation.

Here the word "Products" or "Nokia Group" is a link to another card in the deck (the "products" or "group" card). The user activates the link by pressing the roller key (→ ●).

The second card ("products") also has links ("Mobile Phones", "Wireless Data, and "Nokiahome"). "Nokiahome" links back to the first card.

```
<wml>
  <card name="nokiahome" title="Nokiahome">
    <p>
      NOKIA - connecting people
      <a href="#products">Products</a>
      <a href="#group">Nokia Group</a>
    </p>
    <do type="prev">
      <prev/>
    </do>
  </card>
  <card name="products" title="Products">
    <p>
      <a href="phones.wmlc">
        Mobile Phones</a>
      <a href="data.wmlc">Wireless Data</a>
      <br/>
      <a href="#nokiahome">Nokiahome</a>
    </p>
    <do type="prev">
      <prev/>
    </do>
  </card>
  <card name="group" title="Nokia Group">
    <p>
      <a href="nmp.wmlc">NMP</a>
      <a href="nmp.wmlc">NTC</a>
      <br/>
      <a href="#nokiahome">Nokiahome</a>
    </p>
    <do type="prev">
      <prev/>
    </do>
  </card>
</wml>
```

#products points to another card in the same deck.

phones.wmlc points to another deck in the same directory.

At this point
 makes an extra line break.

If there is no text inside the <anchor> element, the title of the <anchor> element is used as a link. So either one of these has to be supported.

Every <anchor> or <a> element appears on a separate row in the display of the Nokia 7110.

5.2 Select Element

Use the `<select>` element to create a selection list. A selection list is a tool that lets the user respond to a question with a predefined set of options. Single and multiple selection lists are supported. The various options in the list are created using the `<option>` tag.

```
<wml>
  <card name="phones" title="Mobile phones">
    <p>
      Send me more information about:
      <select key="models" multiple="true"
title="Products">
        <option value="eighty">8810</option>
        <option value ="seventy">7110</option>
        <option value ="sixty">6110</option>
      </select>
    </p>
    <do type="prev">
      <prev/>
    </do>
  </card>
</wml>
```

If there is no text inside the `<option>` element, the `title` of the `<option>` element is used as an item of a selection list. So either one of these has to be supported.

The square brackets [] represent the selection list. Pressing the roller (→ ●) when the brackets [] are highlighted, enters into the selection list. The chosen option will appear between the brackets [7110, 6110].

5.3 Input Element

Use the `<input>` element to allow the user to add input to an application.

The following example illustrates how an input element can be used to request information from the user and display it.

```

<wml>
  <card name="phones" title=Phones>
    <p>
      Send me more information about:
      <select key="models" multiple="true" title="Products">
        <option value="eighty">8810</option>
        <option value="seventy">7110</option>
        <option value="sixty">6110</option>
      </select>
      Please, provide your:
      <br/>
      Name:
      <input key="name" title="Name"/>
      Address:
      <input key="address" title="Address"/>
    </p>
    <do type="accept" label="Confirm">
      <go href="#confirm"/>
    </do>
    <do type="prev">
      <prev/>
    </do>
  </card>
  <card name = "confirm" title=Confirmation>
    <p>
      $(name) we are happy to send you more information.
    </p>
    <do type="prev">
      <prev/>
    </do>
  </card>
</wml>

```

The user selects the highlighted Name Input element by pressing the roller (→ ●).

An editor is evoked and the user can enter his/her name.

In the editor the left soft key text is **OK**. By pressing the **OK** soft key, the user returns to the previous card.

The user can send the information request by selecting *Options – Send*.

A 'Confirmation' page is displayed and shows that the variable 'name' has received the entered value.

5.4 Image Element

Use the `` element to show an image within the card.

The following example illustrates how an image element can be used to display graphics.

```
<wml>
  <card name="nokiahome" title="Nokiahome">
    <p>
      
      Nokia - Connecting people
    </p>
    <do type="prev">
      <prev/>
    </do>
  </card>
</wml>
```

When entering this card, the browser will show the Nokia-logo on the top of the display, and the text below it.

5.5 DO Element

Use the <do> element when you want to add action-like behaviour or general information links which concern the whole service.

When you add a <do> element to your design, it will be stored in the browser's options list together with the preloaded options like home, bookmarks, use number, etc. The actual place of <do> elements in the options list is as follows:

Home
Bookmarks
Select (or Edit)
do element 1
do element 2
do element x
Use number
Empty cache
Exit

The options list will be displayed when the user presses the **Options** soft key.

```
<card name="nokiahome" title="Nokiahome">
  <p>
    NOKIA - connecting people
    <a href="#products">Products</a>
    <a href="#group">Nokia Group</a>
  </p>
  <do type="options" label="Nokia Help">
    <go href="http://localhost/wml/nokia/help.wml"/>
  </do>
  <do type="options" label="Contact">
    <go href="http://localhost/wml/nokia/contact.wml"/>
  </do>
  <do type="prev">
    <prev/>
  </do>
</card>
```

A default text will be displayed, if no label is provided, but it is important to provide the user with a label to give the <do> element a meaningful interface.

PREV element

The <prev> element is a special element which allows the user to return to a previous selected card. This element is placed on the right soft key of the browser interface and is called **Back**. By pressing the **Back** soft key, the user is able to navigate to the previous card in the history. The use of the <prev> element is recommended.

5.6 TITLES and LABELS

Please provide the user with the following titles and labels:

- The `title` of a card to help him/her to navigate in your service.
- The `title` of a `select` element is used in the header of the selection list.
- The `title` of an `input` element is used in the editor title.
- The `label` of a <do> element is used in the Options list.

5.7 LIMITATIONS

The Nokia 7110 does not support the following tags:

TAB	Tabulators are replaced with a space character
FIELDSET	Fieldset grouping may not always be possible on the small display. If the items cannot be displayed on the same display, the user is not given any notification.

The Nokia 7110 ignores emphasis tags. Nokia type fonts are used instead:

EM	Emphasis
STRONG	Strong emphasis
I	Italic font
B	Bold font
U	Underline
BIG	Large font
SMALL	Small font