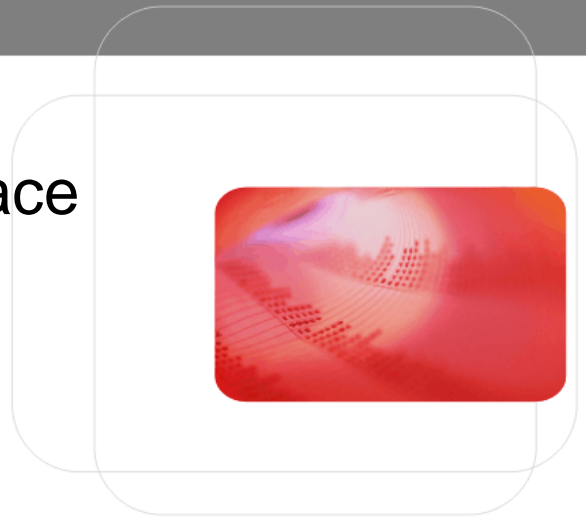**VODAFONE GROUP**
_RESEARCH AND DEVELOPMENT

Multimodal Interaction in the Mobile Space

W3C Workshop on Multimodal Interaction
18, 19 July 2004

Dr Maria Farrugia
Vodafone Group R&D

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Technology Trends

Processor

Increased processing power resulting in increased functionality

Size of Device

Getting increasingly smaller

Carried everywhere

Display

Higher resolutions (VGA)

Lower power consumption

Storage

Increased capacity

Access to data services

Through 2.5G and 3G networks

Portable entertainment device

Battery Life

Increased talk time from minutes to hours

Camera

Resolutions have increased 30x over past 2 years (CIF → 3MP)

Mobile phone is becoming ubiquitous.

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Impacts of Technology Trends on Human-Terminal Interaction

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- User has difficulties accessing and interacting with mobile services anywhere, anytime:

  - Large hierarchical menu systems which are complex to navigate
    - Where can I find train timetable information on Vodafone *live!*?

  - As terminals get smaller, key entry via keypad becomes slow and tedious
    - How many key presses does it take to enter a calendar appointment on a handset?

  - Viewing capabilities and information navigation is restricted by the small display

  - Poor user interface which does not adapt to the user environment and preferences

  - Legislation on in-car phone usage restricts terminal usability whilst driving

  - Service accessibility is difficult for some people with special needs

Multimodal technologies provide an approach for overcoming these difficulties, through human-terminal interaction solutions that enhance terminal usability, as well as data entry and presentation of information in the mobile space.

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Benefits to the User

Multimodal user interfaces provide human-terminal interaction solutions that will provide:

- Ease of use of the device

- Intuitive way of interacting with mobile services through the device

- Faster data entry

- Terminal usability in "hands busy, eyes busy" environments, such as while driving

- Enhance existing services; enable new compelling services

- Optimal adaptation of the user interface to the user environment and preferences

- Interchange seamlessly between input and output modes

- Service accessibility for people with special needs, through inclusive design

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- Voice recognition solutions could enable:

  - Faster menu navigation

  - Control of the terminal with generic voice commands, for e.g., "zoom, "next", "back"

  - Interaction with applications using application specific voice commands
    - Fast forward or rewind a music/video clip
    - View and update contact details, appointments, etc

- Text-to-Speech for reading out information displayed on screen

- 3D graphics could revolutionalise the look and feel of mobile phones through enabling avatars, 3D menus, screensavers, etc

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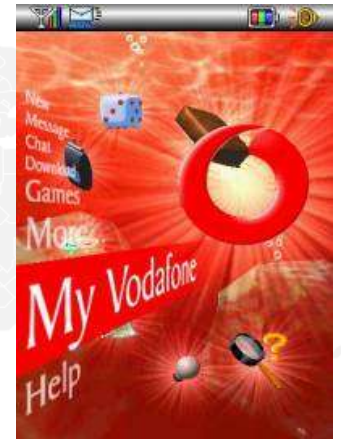
Managing the terminal through multimodal technologies (2/2)

- **"Vibra-tactile" feedback** - haptic sensations that enhance menu navigation

- **Motion-based terminal control**:

  - Navigate around web pages (flip pages, zoom, etc) and change display orientation by tilting the device

- Overcoming barriers to data entry through:

  - **Handwriting recognition technology**

    - Siemens AG prototype Penphone allows the user to write on any surface

  - **Projected and virtual keyboards** that register hand motion

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Multimodal messaging services

_ Key messaging services that could be enhanced by a multimodal interface:

- Text messaging through:
  - Template-based SMS generation using voice
  - Text-to-speech to render the message by voice
  - Use of avatars (2D- or 3D-graphics) for reading out the text message

- Voicemail service:
  - Speech commands for deleting, skipping and repeating messages
  - Display message-related information (for e g., caller, time of message, etc.)
  - Display a talking head while rendering the voice message

_ Access to emails, diary, etc., while driving in to work

_ Enable sharing of emotions through virtual sensations

Do you want to go for something to eat?

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Information accessibility using multimodal user interfaces

_ Enhancing form-filling applications, such as route-finding, business finder, etc., by using a combination of speech, keypad entry and stylus. The information is displayed visually and rendered audibly

_ Sensors collect information on the user location, environment and activities to deliver data in a timely manner, at the right place and in the most appropriate format

_ GPS and camera input for location and object/landscape recognition:
  - Where am I? type of applications
 - Augmented reality services, such as virtual guided tours for tourists

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Use of multimodal technologies in mobile gaming

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- Voice commands for:
  - Game configuration, for e.g., weapon selection
  - Turn-based games, for eg. Chess and scrabble

- Multimodal technologies enable new, immersive mobile gaming applications:
  - Use of camera, for eg. Virtual mosquito hunt game
  - 3D audio and haptic sensations could compensate for the small display
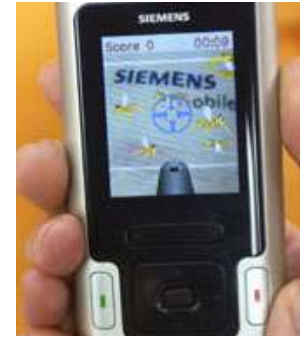
  - Sensor-based input can track 3D motion (acceleration and direction) and enable augmented versions of real ball games. The motions are translated into actions, such as hitting a ball in a game like tennis

  - Location and map based adventure games use the reality as a playground. The real map is "spiced up" with virtual objects

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Speech Enabled Services – Demonstration Applications

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Client-based Speech Recognition

_ **Speaker independent**, language dependent

_ **Terminal usability and service accessibility in "hands busy, eyes busy" environments**

_ Make a call

- **DIAL** a number
- **CALL** a contact from addressbook

_ Access to **Vodafone** *live!*

- **GAMES**, **RINGTONES**, **FOOTBALL SCORES**, **NEWS**

_ Direct activation of **phone functionality**

- **MISSED CALLS**, **REDIAL**
- **FIND CONTACT** from addressbook
- **VOICEMAIL**
- **INBOX**
- **BLUETOOTH**, **INFRARED**

_ Symbian Series 60 phones, smartphones

_ Footprint: approx 500kB

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Question and Answer Time

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Benefits to Vodafone

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How can Vodafone benefit from multimodal user interfaces?

- Improved accessibility and ease of use, result in higher service usage and an associated increase in ARPU

- Achieve a competitive edge through differentiated service offerings compared to our competitors

- Fulfil our Corporate Social Responsibility and enlarge customer base by meeting the requirements of people with special needs

- Generate cost savings in customer call centres through a greater degree of automation

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List of 100 Contact Names

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