

# Approach to Commercialization of Raku-Raku SMART PHONE

● Kenetsu Furuki ● Yoshiaki Kikuchi

The Fujitsu Raku-Raku PHONE, which we developed jointly with NTT DOCOMO, INC. (hereinafter, DOCOMO) is a long-selling line of products with 16 models commercialized from 2001 up to the present, and over 20 million units have been sold. As the mobile phone market is rapidly shifting toward smartphones, senior citizens are also increasingly becoming interested in them. In view of this market environment, Fujitsu has worked in cooperation with DOCOMO to commercialize Raku-Raku SMART PHONE as a new model of the Raku-Raku PHONE line and started to offer the product in August 2012. Based on thorough research and analysis, we have identified the values of and challenges faced by senior citizens, who are the main target customers. We have re-examined all of the hardware and software to develop a smartphone that can be used without the users being made aware of their age or physical ability. This paper presents our approach to commercialization with the focus on the development of a touchscreen-type user interface, to which we have paid the most attention in the development of the Raku-Raku SMART PHONE.

## 1. Introduction

As the mobile phone market is rapidly shifting from feature phones to smartphones, it has been found that as many as 42.6% of senior citizens are eager to purchase smartphones. In particular, they are known to be attracted to the intuitive and fun-looking touchscreen-type user interfaces (UIs) and the convenience and enjoyment provided by various types of information made available in the palm of their hand. However, when senior citizens actually try using smartphones at smartphone hands-on conferences or focus groups, touchscreens, which are supposed to be user-friendly, prove to be too difficult for them to operate as they wish. It has also been found that the existing smartphones fail to meet their needs. Based on repeated research, Fujitsu went back to square one and started developing a smartphone desired by senior citizens and launched it in 2012.

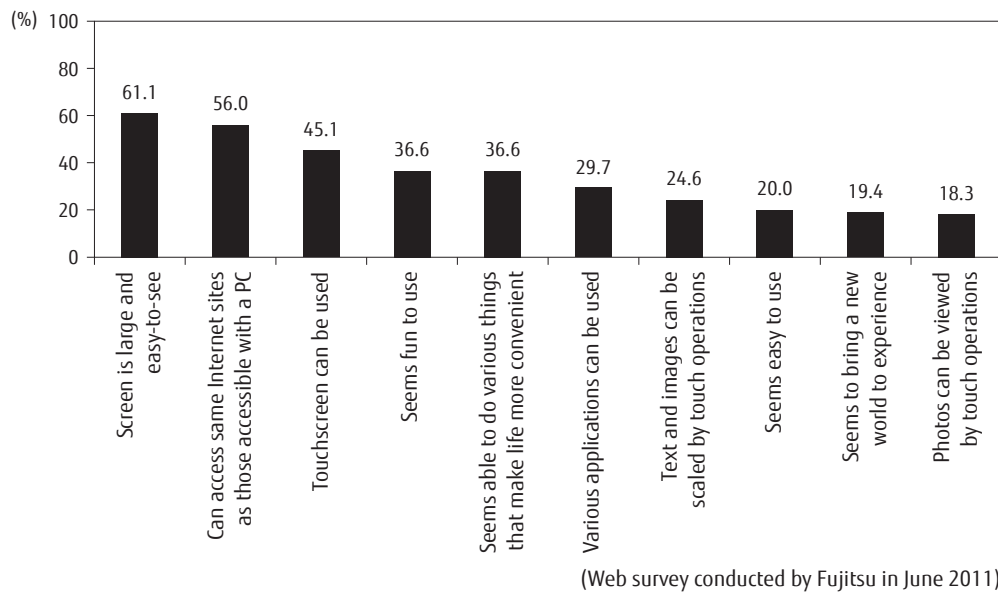
This paper presents our approach to the development of the Raku-Raku SMART PHONE, which has been developed to realize a smartphone that can be used without the users being made aware of their age or physical ability, and its unique features.

## 2. Senior citizens' expectations for smartphones

We conducted a survey to find out what senior citizens expect of smartphones and what specific features and services they desire.

The result has shown that there are higher demands for basic functions and operations of smartphones as indicated by responses such as "Screen is large and easy-to-see," "Can access same Internet sites as those accessible with a PC" and "Touchscreen can be used." They are followed by responses such as "Seems fun to use" and "Seems able to do various things that make life more convenient," showing that the next highest percentage of respondents hope that smartphones will make life more convenient (**Figure 1**).

Senior citizens know how to use a touchscreen more than we had expected. The reason for this is apparently that smartphones are covered by the media including commercials and news shows because of the smartphone boom. The media shows moving visual images of maps and photos being scaled by simple operations. In fact, at smartphone hands-on conferences hosted by Fujitsu, people were observed having



**Figure 1**  
Why senior citizens want to buy smartphones.

fun trying out photo scaling operations by pinching in and out. In addition, as with operations, the influence of commercials and news shows containing images of people freely using various applications and services appears to raise expectations for an “ability to do various things,” for example.

### 3. Issues with use of smartphones

As described above, we have found that senior citizens have high expectations for and a desire to purchase smartphones. In these circumstances, we have focused most on ensuring stress-free and comfortable touchscreen operations, which is the biggest appeal. We have hosted smartphone hands-on conferences, seminars and usability surveys to delve into and analyze the issues with the smartphones currently in the market.

#### 1) Touch operations turning to long taps

With smartphones, there is no feeling of pressing a real button and the users often keep the button pressed for a long time because they do not know whether or not the button has been pressed. As a result, the intended tap operation may end up turning to a long tap.

#### 2) Inability to flick or pinch in/out

A button may be tapped by mistake when a flick, pinch-in or pinch-out operation is intended, resulting

in starting an application or moving to the next link destination.

#### 3) Pressing of wrong buttons

It may be difficult to accurately touch the spot aimed at and an adjacent button may be tapped by mistake or the finger may accidentally touch the screen to start an application.

#### 4) Slow operations

Senior citizens tend to operate the screen slowly while checking each operation. This may cause the finger to stay in contact with the screen for a long time, possibly resulting in a long tap where a tap is intended. The handset itself may enter power saving mode to turn off the screen.

#### 5) Inability to learn operations

The screen organizations are layered and the correlations between screens may be too difficult to understand. For that reason, it is not easy to learn the operations. In addition, the existing smartphones do not offer much explanation (guidance). Furthermore, touchable buttons are difficult to identify by the graphics perhaps because of the focus on design aesthetics. This makes it difficult for the users to distinguish between touchable buttons and “display only” sections, making it difficult to see where to press.

In this way, user analysis by smartphone hands-on conferences, seminars and usability studies have

made it clear that touch operations, which are supposed to be intuitive and user-friendly, are actually awkward for senior citizens to use.

#### 4. Technology to facilitate comfortable touch operations

In order to solve issues specific to senior citizens resulting from a deterioration in their physical ability due to aging and allow them to use smartphones in a stress-free way, the Raku-Raku SMART PHONE has incorporated technological solutions in both hardware and software aspects.

Fujitsu has equipped all smartphone models with a Human Centric Engine (HCE), which makes them easy to use in ways that are suited to the age, behavior and location of the user, and the Raku-Raku SMART PHONE integrates HCE2.0 Advance, the latest engine of all HCEs. HCE2.0 Advance has incorporated HCE technology especially to make it easier to use a touchscreen, which allows senior citizens to carry out touch operations in a stress-free way.

The biggest feature of HCE2.0 Advance is that the touchscreen and software developed exclusively for the

Raku-Raku SMART PHONE are used to solve issues with senior citizens' touch operations, which has enabled them to use the smartphone comfortably without feeling any stress.

##### 4.1 Raku-Raku Touchscreen

Of the issues with touch operations mentioned earlier, 1) to 3) cannot be resolved by software alone. Accordingly, we have fundamentally reconsidered both the hardware structure of the touchscreen, which is the key device, and the conventional touch interface (behavior), in which an operation is confirmed by tapping.

To deal with this situation, we have developed the Raku-Raku Touchscreen.

The Raku-Raku Touchscreen is composed of the following two major technologies (Figure 2).

- 1) Detection of pressure of touching finger

With existing smartphones, applications are launched by tapping the touchscreen. With the Raku-Raku Touchscreen, just touching the touchscreen does not launch any function but pressing buttons further down activates functions. While the conventional touchscreen only detects the point on the plane that

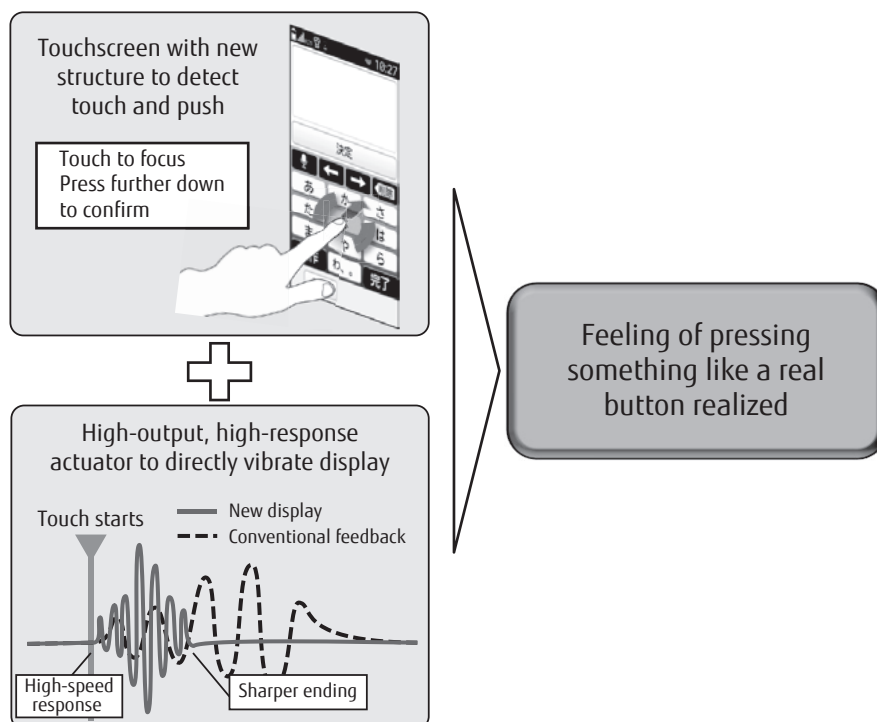


Figure 2  
Overview of features of Raku-Raku Touchscreen.

has been touched, the Raku-Raku Touchscreen is additionally equipped with features to detect presses and the touched point.

Furthermore, we have taken measures in terms of graphic design to focus on the touched button so that the users can confirm that they have touched it.

Because touching alone does not confirm any operation, wrong operations such as accidental launching by touching the screen with the finger and inadvertent selection of links by flicking, pinching in and out or other gesture operations can be avoided. Senior citizens were able to confidently master gestures for comfortable touch operations. In addition, the focus indication allows the users to confirm the touched button before it is fully pressed down, which prevents them from pressing the wrong buttons.

#### 2) Haptics feature to return vibration to fingertip

A vibration element capable of high-speed response and a structure to generate LCD screen surface vibration are combined to give high-speed force feedback to the fingertip. This returns a response resembling a click of a real button to the fingertip at the same time as the users press down on the touchscreen, which makes them recognize that the button has been correctly selected.

This feature has been implemented as a means to resolve issues such as "there is no feeling of pressing a button unlike real buttons and whether or not the button has been pressed cannot be confirmed."

By combining these two features, the Raku-Raku Touchscreen realizes "reliable operations like those of real buttons" and intuitive operations of touchscreens.

## 4.2 Auto display

With ordinary smartphones, the display automatically turns off (the handset itself enters standby mode) after a certain period of time in order to prevent the phone from unnecessarily consuming power. Senior citizens tend to operate slowly while they are remembering how to perform the next operation. And this may cause the display to turn off before the next operation is carried out, possibly obliging them to repeatedly turn on the handsets so that they can carry out their intended operations. To address this expected issue, we have provided a function to sense the tilt and shake information of the smartphone to detect the state of the smartphone being held in the users' hand so that

the display (handset) is kept turned on while the users are holding it in their hand.

## 5. Touch UI

The Raku-Raku SMART PHONE integrates a new touch UI that we have exclusively developed. In addition to the home application, the individual applications are also created with consistent interaction and graphic design. We started preliminary research in June 2011 and surveyed senior citizens in Europe, the U.S. and Japan to realize a UI accepted by a wide range of senior citizens, with the aim of developing a UI that is easy to use for all senior citizens. To allow users to more easily experience more things by using smartphones, rather than simplifying what can be done at present, the new touch UI has been developed with the following points in mind.

- Ease of finding desired applications
- No wondering what to do next
- Operations achievable by tapping alone (customers not good at gesture operations such as flicking and pinching in and out can operate the handset simply by tapping)

Specifically, the new touch UI has three features:

#### 1) Screen organization based on flat, layered structure and vertical scroll

The new touch UI is organized into a flat structure with all of the application icons laid out on one portrait screen. This has provided the characteristic ease of grasping the entire screen and finding out what is where.

The direction of screen scroll is made vertical to make it easier to grasp the entire organization and allow smooth operation. As shown in **Figure 3**, a horizontal scroll system causes the users' line of sight to change in the vertical direction for each screen after the line of sight has moved horizontally. In contrast, the vertical scroll system only requires the line of sight to move in one vertical direction, which allows users to recognize the icon layout during a movement in one direction to makes it easier for them to learn the icon layout.

#### 2) Icon colors, sizes and layout according to degree of importance and urgency (**Figure 4**)

Icons have a layout that uses different colors and sizes according to their degree of importance and urgency to make it easier for users to identify the desired button.

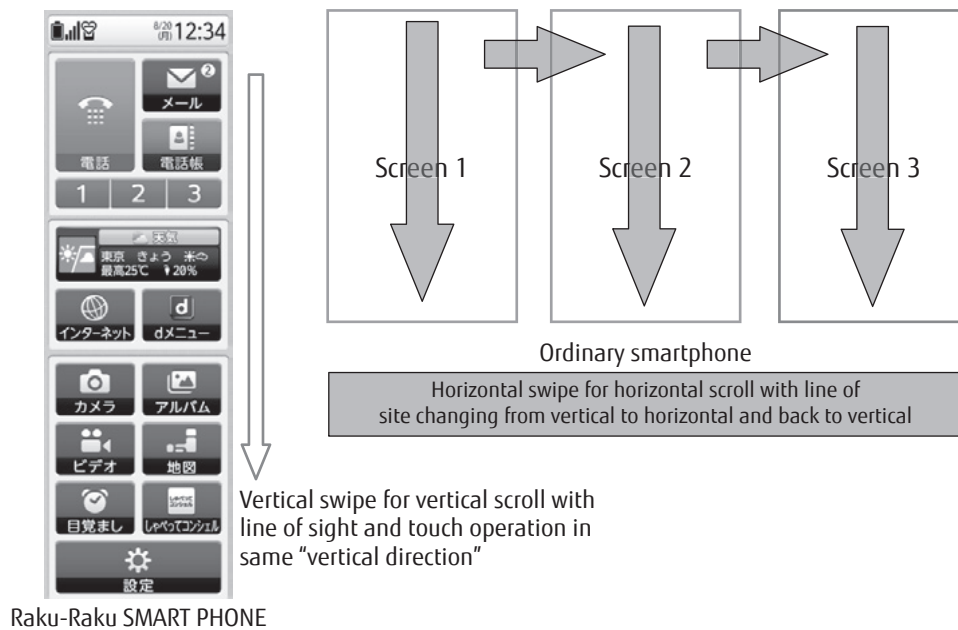


Figure 3  
Flat, layered structure.



Figure 4  
Sizes and colors according to degree of importance or urgency.

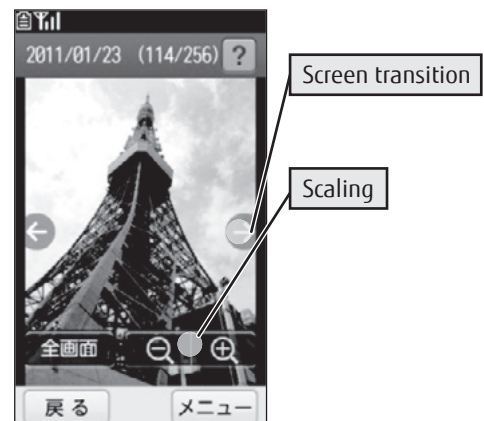


Figure 5  
Operation system that avoids operations difficult for senior citizens.

For example, the most eye-catching color is given to the new arrival notification bar to announce the arrival of a new message quickly and reliably. Icons for phone, one-touch speed dial, e-mail and phonebook have different sizes and colors to allow quick access.

3) Operation system to avoid operations difficult for senior citizens (Figure 5)

We have taken measures so that users can switch between functions, and scroll the screen and scale simply by using buttons without gesture operations that

senior citizens find hard, such as pinch-in and -out, long tap and double tap.

In addition, the Raku-Raku SMART PHONE is equipped with another UI. It provides exactly the same menu with colloquial expressions as that of the existing Raku-Raku PHONE (feature phone) models. It is intended for customers who are eager to use a new touch-based UI but feel uneasy about a new operation system. The purpose of this is to eliminate their anxiety about switching to a smartphone by offering a sense of



Figure 6  
Unchanged operation system.

ease that allows them to go back to the familiar existing UI anytime (Figure 6).

## 6. Conclusion

Smartphones provide a communication tool to make life convenient and enjoyable. For them to serve their purpose, we think services that can be enjoyed by senior citizens are necessary, in addition to offering handsets that senior citizens can enjoy using without being aware of their age or physical ability. As a form of new communication for senior citizens, Fujitsu has provided Raku-Raku Community, a site where users can

fully enjoy connecting to other people, along with the release of the product. This allows users to casually interact with people they normally would never meet and discuss their hobbies, travel, food, health and other themes. Raku-Raku Community is monitored 24 hours a day by Fujitsu staff and senior citizens can enjoy the service with peace of mind.

We intend to continue offering “new values, inspiration and delight” by providing services as well as handsets in a form that senior citizens can easily enjoy by making use of our universal design technology and ICT.



**Kenetsu Furuki**  
Fujitsu Ltd.  
Mr. Furuki is currently engaged in product planning for Raku-Raku PHONE.



**Yoshiaki Kikuchi**  
Fujitsu Ltd.  
Mr. Kikuchi is currently engaged in user interface planning for smartphones and tablets.