

This article was downloaded by: [Macdonald, Alastair]

On: 9 November 2009

Access details: Access Details: [subscription number 915328328]

Publisher Taylor & Francis

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Journal of Engineering Design

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title-content=t713429619>

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First Published on: 25 September 2009

To cite this Article Macdonald, Alastair S.(2009)'Embracing technophobes and technophiles: customer-centred product innovation in Japanese mobile phones 2003-2007',Journal of Engineering Design,99999:1,

To link to this Article: DOI: 10.1080/09544820903260250

URL: <http://dx.doi.org/10.1080/09544820903260250>

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Embracing technophobes and technophiles: customer-centred product innovation in Japanese mobile phones 2003–2007

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(Received 23 July 2009; final version received 14 August 2009)

Ageing populations may be regarded in some developed regions as problematic and burdensome, but in Japan, a rapidly expanding older market has been regarded by the manufacturing and service sectors as an opportunity for product innovation leading to benefits across diverse market sectors. Similarly, providing new products for a very young and technologically sophisticated generation has driven innovation aimed at reassuring parents of their children's safety. This paper discusses customer-centred approaches in Japan that have begun to address the needs of previously excluded or ill-considered market sectors through a field survey in Japan of recent product innovation in mobile phones in the older person's, children's, and mainstream markets from 2003 to 2007. These are discussed from a number of perspectives – technological innovation, interaction design, ergonomics, aesthetics and marketing.

Keywords: customer-centred design; manufacturing products; mobile phones; Japan

1. Introduction

The mobile phone is the epitome of the high-tech consumer product, with its compact multi-functionality, connectivity to services, and lifestyle connotations. Rapid technological change is exemplified in the paradigm-shift between the designs and technologies of analogue landline phones and their digital mobile successors. The marked differences between their respective interfaces, interaction styles, technologies, and functionalities very clearly illustrate the issues in design that can lead to exclusion of significant sectors of the population. Where once there were analogue interfaces with dials or push buttons, there are now multi-layered menu-driven interfaces with multi-function controls and diverse capabilities.

There has been a tendency in this evolution for a proliferation of diverse, and some would argue excessive, technical functions and features only readily usable by those already familiar with, or who are able to quickly adapt to, these forms of mobile technologies and interfaces. Those who tended to have difficulties were those who had had a lifetime experience of analogue technologies and interfaces and for whom a phone was only a phone, i.e. those from a generation more used to using landline phones in the home or office setting as distinct from on the move,

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and who were reluctant or unable to engage with complex digital technologies. With this sector, there are perhaps three significant issues to consider: (1) conditions associated with the ageing process itself, such as physical, sensory, or cognitive decline – the ‘ageing effect’, (2) those linked to prior knowledge, experience, and mental models of interaction with products – the ‘generation effect’, and (3) lifestyle needs and preferences. These factors, together with Japan now being a ‘super-ageing’ society, where over 21% of the population are over the age of 65 (MIAC 2008), have created a demand for new and appropriate customer-centred features on products.

However, an ageing population has the full spectrum of ages and abilities from the oldest to those very youngest just encountering products and technologies for the first time. A generation of technically sophisticated young children have emerged who use technological gizmos as a normal part of their lifestyle and everyday environment, but for whom the mobile phone had not previously been designed ergonomically, nor in terms of their intuitive and cognitive understanding of the product use. Japan’s low crime rate means that even young children are often unaccompanied on their way to and from school, but anxieties have been fuelled by recent – but still rare – incidents against children and, arguably, by manufacturers’ advertising material. However, while children still largely continue to travel unaccompanied, these new mobiles are designed as much for their parents’ reassurance as the child’s. As is discussed below, some of the concerns of anxious guardians of young customers mirror concerns for older customers, and catering for this type of secondary user has inspired innovative additions to mobile service technologies in both age groups. In discussing the old and the young with reference to the mainstream, the mobile phone (‘*keitai denwa*’ – commonly contracted to ‘*keitai*’) offers an interesting discussion of inclusive design issues.

2. Method

This field survey of *keitai* was conducted over a five year period of twice-yearly visits to Japan from 2003 to 2007 inclusive, by obtaining examples of marketing literature, handling phones at point-of-sale, attending exhibitions and presentations by carriers and designers, reviewing promotional literature available (in English), and corresponding with manufacturers. Material was translated from the Japanese as required. Academic literature and annual company reports provided context and insight, and the Japanese Good Design Awards archive (JIDPO 2008) was also consulted.

Selected for discussion from the many models launched in Japan over this period are nine mobile phones (Table 1), three specifically for older people, three specifically for children, and

Table 1. Mobile phone models, carriers, manufacturers, dimensions, and weights.

Year	Model	Carrier	Manufacturer	Dimensions (mm)			Weight (g)
				w	h	d	
2003	Raku-Raku 111 F672i	NTT DoCoMo	Fujitsu	51	99	22	105
2004	TU-KA S	TU-KA for KDDI	Kyocera	48	121	18	87
2005	Raku-Raku Simple	NTT DoCoMo	Mitsubishi	50	127	19	90
2005	A101K	au for KDDI	Kyocera	46	125	15	78
2006	SA800i Kids Keitai	NTT DoCoMo	Sanyo	50	97	27	122
2006	Junior Phone A55255A	au for KDDI	Sanyo	53	102	26	140
2007	FOMA F801i Kids Keitai	TT DoCoMo	Fujitsu	48	105	18	120
2007	D800iDS	NTT DoCoMo	Mitsubishi	49	106	21	122
2007	Raku-Raku Basic F883i	NTT DoCoMo	Fujitsu	51	102	20	103

three which are more mainstream, i.e. they may be regarded as possessing ‘universal design’ (UD) qualities suitable for a range of users. The criteria for their choice were as follows: (1) innovative or ‘breakthrough’ products with features designed specifically for a market sector (children or older people) which had been previously excluded or ill-considered; (2) products which included innovative services that would assist either of the above two market sectors, either through niche products or adaptable features and which represented a particularly customer-centred approach to innovation; (3) products which exploited new technologies that addressed the needs, capabilities, and anxieties of each of these two market sectors; and (4) products which were launched during the five year period (2003–2007). Some additional models are referenced for context.

3. The internal market: technological drive

In Japan, there is a large internal market – there are no overseas handsets, and fierce competition between carriers drives innovation. Out of a Japanese population of 127.7 million, 103 million (81%) are phone subscribers, and the company NTT DoCoMo has 53.4 million of these, i.e. c. 52% of the total market (NTT DoCoMo 2008). NTT DoCoMo is a Japanese equivalent of British Telecom (BT); it was founded in 1953 as the state-owned public monopoly NTT (Nippon Telephone and Telegraph), and at the time of its privatisation in 2000 controlled more than 90% of local telephone lines in Japan. The other two major carriers are KDDI (formed in 2000 from the merger of state-owned Kokusai Denshin Denwa with two other companies) (c. 30%) and Softbank (c. 18%). NTT DoCoMo and KDDI have tended to innovate in handset design for older and younger users.

As befitting a highly technological society, the Japanese are avid consumers of new technology and create a significant demand for innovative features. The third generation (G3) of mobile phone standards and technologies permit high-speed internet access, video telephony, and high sound quality similar to landline phones. With the significant investment required for such a technology, carriers have been desperate to find the next mass-revenue data service to follow on from text messaging. Building on its ‘i-mode’ mobile email internet service launched in 1999, NTT DoCoMo launched FOMA™ (Freedom of Mobile Multimedia Access) in 2001 as its brand for the first G3 cellular network in the world, and many of its early FOMA™ handsets were quite experimental and initially aimed at early adopters. From initial coverage around the largest cities it achieved almost national coverage by 2004, proving significant for breaking through into mass sales, and retaining a competitive advantage. The proportion of 3G mobiles in use overtook that of 2G at the end of March 2006 and about 40 million users subscribed to FOMA™ G3 in 2008, i.e. 82% of NTT DoCoMo’s subscribers (NTT DoCoMo 2008).

4. Reaching out to the older customer

4.1. Issues of ageing

With the convergence of two phenomena, firstly, Japan’s ‘super-ageing’ population and secondly, rapid advances in mobile telecoms technology, there was a danger that the significant older market sector would be disenfranchised from the innovations and opportunities brought about by advanced telecoms because service providers and manufacturers of products and interfaces did not fully take into account their particular needs and capabilities. Although technological advances were being made rapidly, not everyone could keep up with these.

It is now well understood that how the effects of ageing, with their impact on one’s physical, sensory, and cognitive functions, can impact on the use of products, specifically with regard to

mobile phones. For example, Tomioka (2004) discusses accessibility issues and product specifications for mobile phones in relation to UD. Kawahara (2005) considers the physical function characteristics across the range of older people's senses in relation to mobile phone design, revealing the extent of the inadequacy of current designs in addressing e.g. a range of sight conditions. Pattison and Stedmon (2006) describe changing capabilities in individuals as a result of the ageing process with reference to the senses, motor function, and cognition together with the corresponding design specifications required for mobile phones to meet these conditions. Additionally, Lim (2008) describes the importance of also considering the 'generation effect' (as distinct from the physical effects of ageing). This effect results from the way that people have learned to interact with and use technology, their familiarity with certain types of products, and the mental models they have developed, most commonly during an earlier, formative period in their lives, which affect their comprehension, speed, and ease-of-use of products.

4.2. *Towards broader accessibility*

There had been little evidence of overt marketing of 'accessible' mobile phones until NTT DoCoMo introduced the Raku-Raku (translated as 'Easy-Easy') phone series from 2001 onwards. Innovations included 'simple, user-friendly interfaces designed for easy use even by persons unfamiliar with mobile phones' for those 'who cannot manipulate the devices intuitively' and with 'various features to assist users with visual disability'. These have 'features to support visual functions along with audio features, as well as an easily viewable display' (Irie *et al.* 2005). The Raku-Raku Phone 111 F672i (Figure 1) by Fujitsu had 'a relatively large LCD display with large letters, three one-touch dials on its upper half, it is easy to dial in a single operation', and was 'a hit seller that has been sold over 1,000,000 units with one model' (Kawahara 2005), and was still proving to be one of the best sellers over five years after being launched (NTT DoCoMo 2007a). More recent innovations introduced in this family of *raku-raku* phones include variable text size (now standard across a whole range of mobiles in Japan), and cameras on some phones that can be used as a 'magnifying' device for reading text, useful for those with reading difficulties or eye conditions such as macular degeneration, a medical condition predominantly found in elderly people.

4.3. *Radical redesign for older users*

In 2004, the TU-KA S mobile phone (Figure 2), designed by Kyocera for carrier KDDI's subsidiary TU-KA which targeted non-G3 users, was a radical departure from existing mobile phone designs. A user could only carry out four operations on this phone: turn it on, turn it off, dial a number, and accept a call. To dial a number, the largest, green button (top left on Figure 2) was pressed and then the number entered. From an ergonomic perspective, the TU-KA S was large (121 mm high), slim (18 mm deep), lightweight (87 grams – the weight of a 2008 Nokia 3110C, but the Nokia is smaller in all dimensions) and had large, easy-to-see buttons, and a loud volume speaker. It was simple because it mimicked an analogue landline telephone and had none of the extra features found in mobile phones. It was light because all the non-essential technologies (for this market) had been stripped out. It had a long battery life – one month between charges. The manufacturer stated that the phone was so simple to use that it did not really require a manual (the copy on the packaging made a virtue of this) and the manual that was provided comprised only a few pages. The marketing literature literally and visually spelled out the operational analogy between the TU-KA S phone and the more familiar (to these particular customers) analogue landline-based phone interfaces. Its design was promoted as 'friendly' as was its back-up service: 'you can talk to the [technical back-up] person who responds kindly and politely'. It was clearly marketed at



Figure 1. Raku-Raku Phone 111 (F672i) had a relatively large LCD display and three one-touch dials, NTT DoCoMo 2003 (© NTT DoCoMo INC).

the older user and marketing material employed a well-known actor familiar to his generation from a long-running TV soap. In his grandfatherly role, he complains to his young relatives that all the so-called simple phones are anything but, until he is handed a TU-KA S and has to admit it is foolproof (Figure 3). The TU-KA S won a Japanese ‘G-mark’ Good Design Award for UD in 2004, but more significantly it helped KDDI displace UK’s Vodaphone ranking by securing 17 times the number of its new customer subscriptions in the month after the phone was launched (Lewis 2005).

NTT DoCoMo’s ‘Raku-Raku Phone Simple’ (Figure 4) by Mitsubishi from 2005, and au-for-KDDI’s (au is a brand of KDDI) A101K (Figure 5) by Kyocera from 2006, followed a broadly similar type of design to the 2004 TU-KA S. Both of these were also long, slim, and lightweight (see Table 1 for data), with the A101K at 78 grams being the lightest model of all *keitai* included here. The marketing literature for all three models was exceptionally clear and easy to understand. It addressed the needs of this sector, and showed, through typical scenarios, how



Figure 2. TU-KA S mobile displaying a simplified interface with enlarged buttons and characters, au-for-KDDI 2004 (photo © Alastair S. Macdonald).



Figure 3. Selection of marketing material for the TU-KA S (photo © Alastair S. Macdonald).

typical anxieties between user and guardian or relative could be allayed. The A101K was promoted as a ‘talk-only’ mobile, while the Raku-Raku’s marketing literature headline was ‘real easy – what everyone has been waiting for’, with NTT DoCoMo promoting its concept of ‘kantan’ i.e. ‘easy-to-use’. All phones had large and clearly contrasting numbered buttons and simple colour-coding for start-call and end-call function buttons. At the top of the A101K front face were three buttons which one could allocate to e.g. one’s home number and two other personal phone numbers of one’s choice to facilitate one-button dialling. The A101K also had a handy little ‘drawer’ in its base that could be slid out and on which one could write phone numbers, including the phone’s own, corresponding to the one-button dialling facility, as an *aide-memoire*, acknowledging issues of old-age forgetfulness or cognitive decline. The A101K even came with a wrist-strap on which



Figure 4. Raku-Raku Phone Simple mobile by Mitsubishi showing the large 'talk' (blue) and 'end' (orange) buttons and small screen, NTT DoCoMo 2005 (© NTT DoCoMo INC).



Figure 5. A101K reintroducing a small screen, au-for-KDDI 2006 (© KDDI Corporation).

the mobile's number was printed. Neither the TU-KA S nor the A101K had a screen; however, the Raku-Raku Phone Simple reintroduced a small screen allowing dialled numbers to be seen as well as total call-time, and every time it was docked into its charger, a text message was sent to a nominated relative or friend. On the Raku-Raku Phone Simple, buttons also lit up showing which were required to perform certain actions. It was also a lightweight phone at only 90g. Other features in this generation of phones were very clear on/off buttons labelled 'talking' (the larger of the two buttons in both models, green on the A101K and green/blue on the Raku-Raku Simple), and 'finish' (the smaller button in both cases, red on the A101K and orange on the Raku-Raku Simple), as well as technically considerate sound quality and manual volume adjustment for a range of hearing capabilities.

5. The next generation: *keitai* for children

'Inclusive' design philosophy is about 'design for the whole population', and is not only for older users or those with disabilities: other types of users may require or prefer simple-to-use features. A TU-KA S type model, for example, might also be appropriate for those less comfortable with advanced technology, or those who need or indeed prefer very simple interfaces. Conversely multi-layered, menu-driven interfaces with multi-function controls can appeal to technophiles and at the other end of the age spectrum, a number of mobiles have recently been designed specifically for children whose use of 'sophisticated' technology can appear second nature. In the discussion of inclusive design, or UD as is the preferred term in Japan, although case studies of mobiles for older people have been presented in UD forums and conferences following the formation in 2003 of the International Association of Universal Design (IAUD) (see Section 8), the discussion of children's phones as 'universal' designs is conspicuously absent, perhaps due to a limiting cultural view that UD need only address the needs of older or disabled people.

5.1. *Three keitai for children*

The 2006 NTT DoCoMo SA800i 'Kids-Keitai' (kid's mobile) (Figure 6), manufactured by Sanyo, had a distinctly rounded pebble-shaped clamshell design and clear simplified buttons suited to small hands. The bright primary colours of its casing were offered in a variety of colourways as is common with many mobile models in Japan, due to the demands of a highly fashion-conscious market: blue, red and yellow; midnight blue and black; and two tones of either pale grey, 'cute' pink or green were the casing colour options. The other large carrier, KDDI, launched the Junior Phone A5525SA in the same year, manufactured by Sanyo (Figure 7). Again, this was a rounded clamshell design with two-tone blue (pale and dark), red, green, and pink options. In December 2007, a new model was launched by NTT DoCoMo, the FOMA F801i Kids Keitai (Figure 8) manufactured by Fujitsu, containing a number of 'peace of mind' (*anshin*) features. To differentiate itself from the by-now-familiar rounded pebble-clamshell look, this folding *keitai* has a more rectangular shape, again with colourway options (orange, light blue, black, and white). The prominent graphic feature on the face is a large circular ring of LEDs enclosing the alarm loudspeaker, a two-tone 100-decibel alarm. From an ergonomic perspective, it is designed for small hands, and being waterproof it is robust enough for the playground. As befits a nation which invented computer game consoles, these came with the usual paraphernalia of screen-based amusements which, in the SA800i 'Kids-Keitai', were accessed through its 'Kid's mode' setting, as well as the ubiquitous built-in camera and internet services, including storybooks (downloadable novels to read on the mobile have been a huge success with adults), thereby providing the 'hook' or attraction of this product from the child's perspective. The Japanese language



Figure 6. Kid's-Keitai SA800i with rounded clam-shell design, NTT DoCoMo 2006 (© NTT DoCoMo INC).

has three alphabets, the Chinese-derived '*kanji*' characters being the most difficult for children; so, in menus and on screens, these were replaced in the SA800 by the simple Japanese '*hiragana*' script.

5.2. Security

Apart from the child, these children's *keitai* have another significant user, in that they are also designed for their parents' peace of mind and embody a number of security features. The SA800i incorporated a GPS function (GPS is now standard in G3 phones in Japan) to allow parents to track their children's location, whether at 'cram' school, playing with friends, or while returning home. It does this through its '*imadoco*'TM (where [am I] now?) feature by sending information from the child's handset through the service provider to the parent. Restrictions on who is called from the



Figure 7. Junior Phone A5525SA, KDDI 2006 (© KDDI Corporation).

mobile, limits to call time, a protection alarm, and providing parents with an automated email at preset times are other features of this particular phone. As a result, and with all the games options and packed with features, these phones are significantly heavier than the mobiles discussed above for older people, with the SA800i weighing in at 122 grams, more akin to the weight of an average *keitai*, and with the KDDI Junior Phone the heaviest in this survey at 140 grams. The Junior Phone A5525SA features included a security buzzer operated by a pull-string (in this model the phone would automatically take a photo), a location tracking facility updating on location through GPS to a parent's mobile or PC approximately every five minutes, and a cover lock which prevented removal of the battery so that the phone could not be forcibly turned off. Parents could also lock the phone using a 'C-mail'TM service from their PC or mobile when they knew the child had lost it so that no one else could use it. The FOMA F801i Kids Keitai contains a number of security features, apart from the loudspeaker alarm mentioned above, which simultaneously alerts parents of the alarm's use through '*i-mode*'TM, a mobile email internet service currently (2008) used by 48 million subscribers in Japan (NTT DoCoMo 2008). It also allows a discreet message to be sent, by the child, of its location by simply pressing a button on its side, and similarly with the KDDI Junior Phone, one can go online on one's PC to locate the phone through its GPS '*keitai osagashi*' (mobile searching) service. The coloured skin of the phone is thin enough to allow hidden characters to shine through when lit to indicate 'call' or 'help'. It has an amulet-style



Figure 8. FOMA F801i, NTT DoCoMo 2007 (© NTT DoCoMo INC).

remote controller worn by the child to allow it to activate the phone to beep if it is misplaced within a range of up to ten metres, and a number of other features concerned with locating the phone.

6. Adaptable and enhancing

6.1. Adaptable interfaces

Mitsubishi's 2007 D800iDS mobile (Figure 9) for NTT DoCoMo was the world's first 'clam-shell' design with two screens, one of which (the lower) is a touch-screen, and is visually and functionally analogous to Nintendo's hand-held DS gaming machine. This won a 'G' Mark Japanese Good Design Award in its 2007 Universal Design category. The interface can be customised to suit the user's preferences and most frequently used functions. Its 55 mm touch screen permits, for those with no previous mobile phone experience, a setting providing three large buttons 30 mm wide



Figure 9. D800iDS twin-screen. The lower screen is a touch-screen and the interface can be customised to the user's needs and preferences, NTT DoCoMo 2007 (© NTT DoCoMo INC).

by 13 mm high. This allows access to three operational modes to suit different user preferences: a phone function, a mail function, and a camera function, each of which is accessed by simple and clear menus and navigation. For those familiar with mobile interfaces and menus, the phone can be set up with conventional-looking or, if preferred, even more complex interfaces. Although the TU-KA S and the various kid's *keitai* are niche market products, this begins to approach the concept of 'universal' design, or at least, of excluding fewer types of capabilities. The touch panel has three different modes of text input including handwritten (thereby mimicking a PDA's ability to learn an individual's handwriting and the phone also allows one to do quick sketches of, say, a location map), and input relating to Japanese syllabary. A subtle force-vibration sensation is provided for the feedback reassurance one would normally expect from physical buttons.

6.2. Enhancing technologies

A number of user-considerate technological innovations and applications can be found in recent mobiles that enhance interaction through the senses of touch, sight, and sound. Hearing difficulties



Figure 10. Raku Raku Phone Basic F883i, NTT DoCoMo 2007 (© NTT DoCoMo INC).

may be caused by age-related or hearing conditions, or by a noisy ambient environment. Plug-in bone conduction receivers, such as NTT DoCoMo's (2006a) Sound Leaf can be used both by those in noisy environments and those with hearing impairments as the sound is conducted through skull bones directly into the inner ear. NTT DoCoMo's 'clear (*hakkiri*) voice' feature found in the Raku-Raku Phone Basic F883i from 2007 (Figure 10) adjusts for different conditions, automatically launching in noisy situations to adjust voice and ring tone volume based on the ambient noise level. The 'slow (*yukkuri*) voice' feature slows down the caller's voice, improving comprehensibility and allowing the receiver to hear speech more clearly. This works by identifying when there is no sound activity in the message and using this space to slow down the actual spoken segments. In the same vein, an automatic brightness feature on the LCD screen senses and responds to environmental light levels. These features are contained in a model very similar in size and weight to the 2003 Raku-Raku F672i discussed earlier: the F883i's screen is slightly larger (60 mm compared with 53 mm) and demonstrates the advances made over a four-year period in a 'mainstream' *keitai*. In the D800iDS model, an add-on auto-scan feature, allowing for easy movement of the cursor for those with arthritis or tremor, moves the cursor until the user presses the button. The 'mobile wallet' (*osaifu-keitai*) capability is now becoming ubiquitous in many mobiles and facilitates easy passage through e.g. ticket barriers for those who would find the physical handling of money or complex ticket-issuing interfaces problematic.

7. Image and anxiety

7.1. *God-like but no longer a consumer*

'*Okyaku-sama wa kami-sama desu*' – 'the customer is god': Japanese corporate culture, a synthesis of Confucian ideals of a harmonious society, philanthropy, continuous quality improvement, and good business sense, has a long and committed tradition of working tirelessly to improve products and services from a customer perspective. A survey, by the author, of recent marketing literature for the keitai discussed here, for the sophisticated and discerning Japanese 'baby boom' generation, which now possesses considerable economic leverage, reflects the demand for reassurance, choice, quality, and lifestyle, whatever be the individual level of capability. But over the past 20 years or so, there has been a change in understanding of the customer from what was previously called '*shouhisha*' 'people who consume', to what the Hakuhodo Institute of Life and Living (a think tank of Hakuhodo Inc., Japan's second largest advertising agency, conducting research primarily into lifestyle and emerging trends) calls '*seikatsusha*' 'people with lives' (HILL 2006). This is increasingly reflected in marketing and corporate literature scenarios showing how mobile technologies enable individuals of a wide range of abilities and lifestyles to participate in a technologically enabling and seamless world of work, activities, and lifestyle (NTT DoCoMo 2007b).

7.2. *Aesthetic appeal*

However functionally appropriate the design of these phones might be, their appeal also needs to be discussed in terms of their desirability and perception by their users. One designer reported that 'many older people hesitate from buying [the TU-KA S] as they dislike its outer image that is obviously for seniors, even though it is easy to use' (Kawahara 2005), and in Nikkei Design (2005), the issue of its lack of a screen or camera and the degree of its attractiveness to older users was discussed. Kawahara reminds us that within the group that might stereotypically be labelled as 'the elderly', there are further sub-groups, each with its own preferences. He says, '... although it was received favourably by those over 70 it was not received well by those around or under 60 years old. Psychological and aesthetic factors that cannot be measured by operability or simplicity are thought to have contributed to its poor acceptance by those in [their] 60's'.

Increasingly, manufacturers are using well-known Japanese designers as consultants, in addition to their own in-house teams, to help develop and market products attractive to customers. This has to be understood in the context of a consumer culture fixated by brands. For example, the KDDI Junior Phone A5525SA with its child-friendly screens is designed by Fumie Shibata of Design Studio S, the quiet and understated F883i Raku Raku Basic by Kenya Hara, a design director from Muji famous for its simple 'no-brand' approach to design, and the colourful SA 800i Kids Keitai and FOMA F801i Kids Keitai by Kashiwa Sato, whose own company Samurai is known for a prolific range of colourful and innovative designs ranging from architecture to graphics. Japanese companies also commonly outsource concept design to design companies overseas, particularly the UK. KDDI has been particularly prominent in using well-known designers through its 'au design project'.

7.3. *Reassurance in an age of anxiety*

KDDI and NTT DoCoMo each has its own distinctive branding associated with customer-oriented design. These are not marketed as UD designs *per se*, as business is cautious about such overt associations, but with other qualities which touch the hearts and minds of its customers. NTT

DoCoMo's 'hearty style' branding has three elements, '*anshin*' (peace of mind – e.g. locating devices), '*kantan*' (ease of use – e.g. simple email-generation, or magnified fonts to increase legibility of characters or owners' manuals written in Braille), and '*omakase*' (i.e. automatic adjustment of sound quality or brightness levels), whose purpose is to convert 'anxiety to security' – something it regards as a 'social mission' (NTT DoCoMo 2006a). NTT DoCoMo sees this approach extending over the customer range to produce 'overwhelmingly easy-to-use mobile phones suitable for as many people as possible'. It seeks to achieve this by considering usability, accessibility and the design of the interface, and by adaptations for different user needs and groups. KDDI's brand is its 'friendly design', offering simple operating modes, e.g. a '*deka-moji*' feature to allow users to customise font sizes to their own preference (common now in most mobiles in Japan), and simple manuals. Softbank, whose main customer appeal has been its inexpensive tariff plans, did produce its 304T Simple Phone in 2006 but made very little virtue of its universal features and attached no similar 'hearty' or 'friendly' branding. The idea of a friendly, caring company is reflected not only in the designs of the phones themselves, but also in service plans, and other aspects of customer services including websites and support at counter services. NTT DoCoMo's retail outlets are designed to be barrier-free and equipped with videophones providing information in sign language and in 2004, the company won a 'G-Mark' Japanese Good Design Award for its 'Hearty Plaza' in downtown Tokyo, which provided a variety of barrier free and training services. The difference between accessibility in NTT DoCoMo's retail showrooms and Softbank's might be explained by the fact that accessibility legislation was enforced and predated NTT DoCoMo's privatisation, whereas Softbank is a new company without that tradition or awareness.

Significantly noteworthy is the way that service providers, manufacturers, and designers recognise and understand the relationships between the primary user of their products, whether this is the older person or the child, and those who are the secondary users such as their guardians, relatives, or carers. New technologies have been exploited to provide products with features that help allay particular anxieties. For example, scenarios appearing in TU-KA S advertising illustrated a worried daughter unable to reach her mother by landline phone if the mother was working in the garden, and another with an older person being unable to find a public phone while travelling, as conventional mobile phones were apparently too difficult for her to use. In both scenarios, the TU-KA S comes to the rescue. Great virtue was made in the 'Safety' book, in cartoon mode, of the caring mother-child bond (mother with apron, and child with ubiquitous yellow sun-hat worn by primary children throughout Japan) mediated by the technological features accompanying KDDI's Junior Phone A5525SA, with the friendly telecoms satellite hovering watchfully overhead (au-for-KDDI 2007) (Figure 11), reassurance for an anxiety in a somewhat comfortable society.

This ability of the *keitai* manufacturers to capitalise on social phenomena can also be seen in the case of *puchi iede* (petite running away from home), referring to teenagers who stay away from their homes for several days or weeks. 'Family members can "reach their *puchi iede* through their *keitai*", so they don't file a missing person report' until the child generally returns home (Matsuda 2005). The SA800i Kid's Keitai limited access to specified websites, and web-browsing was denied between 10:00 pm and 6:00 am. In the year of its introduction, NTT DoCoMo also ran a Kid's Keitai Safety School to teach children information about proper etiquette and safe use of mobiles, supported by a special website called Mobile Hiroba (plaza) and leaflets written in a child- and family-friendly manner. According to its company report of 2006, about 600 classes were held across Japan for elementary school students, junior and senior high school students, and local community groups and '... four months after the launch, sales of the "Kids' PHONE" amounted to 170,000 units, and a total of 200,000 contracts had been concluded for the '*imadoco*'TM service'. (NTT DoCoMo 2006b). However, apart from concerns from other quarters about phone use issues such as repetitive strain injury, and absorption rates of radio frequencies on the developing cell



Figure 11. NTT DoCoMo's 'anshin' (safety) marque within its heart-shaped logo, and au-for-KDDI's safety booklet for parents concerned about their children's location (photo © Alastair S. Macdonald).

tissue of young children, recent (AFP 2008) worries have been expressed in the form of a report by the Japanese government about the level of use, and susceptibility of children to online security issues such as cybercrime. The panel producing this report called for carriers to develop phones with only a talking function, a GPS system, and a '30 minutes' use at-a-time rule (Kageyama 2008).

8. Lessons and questions for the future

It is worth mentioning briefly that there are mobiles manufactured outside Japan which attempt to address some of the same issues discussed above. For example, the Easy 5, manufactured by US company ITT, is a short mobile (w 55, h 87, d 22 mm) having five large buttons storing preset numbers (and which distributors such as Silverphone can preset for the customer) plus a call button. The Owasys 22C (w 29, h 118, d 27 mm), from the US's Capital Accessibility, is designed as a screenless speaking phone for the blind. It has 18 'well-spaced' buttons, but the call and disconnect buttons are similar in size, and it is relatively expensive in the UK. Both are promoted by the UK's Royal National Institute for Blind People (RNIB). However, neither of these has the *anshin* features of e.g. the A101K or the Raku-Raku Phone Simple. By comparison, the Japanese models reveal Japan's technological, network service provider, and design superiority.

Changing demographics, new and emerging market sectors, the demand for innovative technologies to extend capability and increase product flexibility, new forms of social dialogue, and a smarter understanding of customers' real needs, are all factors that have led to the 'inclusive'

features discussed in the mobiles above. Other factors may have been the relatively high societal awareness of barrier-free and accessible design in Japan, and the profile of Universal Design in Japan, promoted through the IAUD (Macdonald 2006). Established in 2003, this was set up 'to address the universal-related issues of an ageing population and to better integrate disabled people' and 'to promote the establishment of the foundations of a society in which more people will feel comfortable to live'. Its members number some 150 across the manufacturing industries and include all the major companies. This type of sharing of information among companies can be found in a number of other industry associations such as the CIAJ (the Communications and Information-Network Association of Japan). Although highly competitive, there are alliances in Japan across different industries that are regarded as mutually beneficial. However, it is difficult to gauge to what extent Japanese companies' own versions of Ron Mace's 'universal design' principles, which were in vogue in Japan *circa* 2003 to 2005 following the establishment of the IAUD, have influenced the designs of the products discussed above.

A number of questions remain. With the proportion of older people in the population increasing, why are there not more models like the now discontinued TU-KA S, the Raku-Raku Simple, and the A101K (the latter two were still on the market in February 2008)? Why are some being promoted as *raku-raku* when the buttons are smaller than on these earlier models? This may be, to some extent, due now to the increasing ubiquity of age-friendly features – such as variable font size, 'clear-voice', and 'slow-voice' technologies. It may be that products like the TU-KA S have acted as 'bridges' allowing one generation of people to 'step into' the next generation of products. It may also be that older people, as Kawahara suggests, do not want products that overtly pigeonhole them as an 'older person', although the value of the TU-KA S as an exemplary mould-breaker and bridge into new technologies for many should not be forgotten. The case study of the TU-KA S, in particular, has attracted interest in the west as an exemplar of technological simplicity (Lewis 2005) and of 'disruption breakthrough innovation' (Thomond 2005) and may have influenced features in the 'Simply' phone by UK's Vodaphone. Undoubtedly, the unique play of high investment in research and development and fierce competition within its large internal market, together with many Japanese being 'early adopters' of new products, will drive innovation years in advance of what we have in the UK: 3G is a case in point, and simple button phones did not appear in the UK until 2006, but then without the other *anshin* service features.

Many of these innovative features pioneered in the niche market *keitai* discussed above have, in turn, been subsumed within the design of regular products allowing previously excluded customers the opportunity to progress from specialist products to more mainstream products. The 'reassuring' security technologies in kids' mobiles have also proved attractive to single women (audience discussion with author at Kyushu University, 11 May 2007), bringing these technologies into more mainstream products and some recent marketing literature now specifically targets women with these security features. However, will the recent government concerns about online threats to children discussed above lead to a TU-KA S-type simple phone for children, despite youngsters' sophisticated technological capabilities?

The Japanese market is renowned for its rapid turnover of consumer products. A CIAJ survey revealed that 70.1% of customers surveyed replaced their handsets in the previous 10 months, a figure which had jumped dramatically from 39.3% in 2006 and 40.7% in 2005 (CIAJ 2007). 'Super 3G' (3.9 G) is planned towards 2009, and 4G from 2010, which will significantly increase speed and variety of telecoms services (NTT DoCoMo 2007b) and the corporate future vision of 'mobility' can be viewed on their website online videos. In a country with a predilection for brands, this 'UD phenomenon' may have provided a timely catalyst for the re-stimulation and re-branding of deep-seated philanthropic values in manufacturing companies at a time of growing concern about the rapidly changing population demographic. In one of the developed world's safest societies it may also have provided a platform for manufacturers to launch advanced network and technological features that would reassure – one could argue exploit – innate anxieties in some

sections of the market. It may also have been astute business acumen, realising that an old paradigm of industrial design, of manufacturing values, of end-user understanding, and of marketing was no longer relevant in the twenty-first century, that here was an opportunity to import a useful concept and, as has so often happened in Japan in the recent past, to make it its own and to innovate globally through significant investment in technological research and development, a deep commitment to understanding the customer, and relentless attention to detail of quality of product and service.

Acknowledgements

The author thanks The Japan Foundation, Royal Academy of Engineering, Ritsumeikan University's Discovery Research Laboratory (Kyoto), Great Britain Sasakawa Foundation, and the many individuals in companies, universities, and organisations who freely gave of their time in many stimulating discussions.

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