PETERKEMPTNERMACHTMARKETING©
Faberstraße 28 • A - 5020 Salzburg • http://www.kemptner.com • UID Nr.: ATU50302300

Offsite Sale Self Service Terminals: Design Considerations

0 Preface:

In retail solutions over the past 10 years, self-service functionality has been called for by many systems operators. This being for many reasons an understandable desire, and examples for the feasibility to be found in certain applications such as parking, public transport, etc., it comes as a surprise that consumer oriented businesses are not penetrated much more with this kind of machine based solution. It is only computers, after all.

Yet, the fact remains that there are lots of manufacturers, dozens in the German speaking world alone, offering terminal solutions with a remarkable lack of success. In part this must be ascribed to them being technical wizards and offering solutions without selling a business case for the buyer to benefit from, in part, though, there seems to be poor understanding of the ergonomics that needs to go into the design of such machinery.

I will be attempting in this document to highlight some of the more crucial points to be taken into consideration in the design of hard- and software of sales terminals and give some advice on how to evade some of the traps and loopholes of terminal design.

1 Love Me for What I Am, for Simply Being Me: Terminal Expectations

One of the most prominent sources of dissatisfaction with terminal systems is to be found in the expectation towards the system's benefits.

Quite clearly, there are things a self service kiosk system has to offer which can not easily be achieved by other means. Among others, these are 24/7 availability, possibility for placement in locations undesirable or impracticable for manned operation, and functions to show or explanation the saleable good to the prospect in great detail.

It is exactly these properties that, by the same token, deceive operators into burdening the system with all kinds of expectation as to what additional help or relief they can get from the machine. Sales people desperately struggling to sell their automats are obviously prone to join and support that hype in order to promote a favorable cost/benefit ratio.

It has to be said, though, that satisfaction can not be guaranteed unless there is one easily communicable task the system can take care of that in itself suffices to pay back the investment. Attempts at paying the system out of replacing costly sales personnel are bound to fail just as much as trying to have the machine take care of marketing which it can't because it can not "reach out" to potential customers.

My advise is: Use the machines for what they can do best. Formulate that task narrowly. Do not try to earn back on "side effects" such as advertising or cross-selling.

Telefon / Fax: +43 662 821518 • Mobil +43 699 11300802 • e-mail: peter@kemptner.com
Bank: Konto-Nr.: 91021162 • Raika Morzg-Nonntal • BLZ 35040 • SWIFT-Code RVSAAT2S

2 Come Play with Me: Attracting Users

Most of the people looking at buying self service kiosks (and those who make them, too) start thinking at the point where the user is already standing in front of the machine and ready to play.

In most places, however, the user is not expecting the machine to be there and the presence of the equipment and its role, for instance the possibility to shop there, must be advertised heavily.

There is more than one way to achieve that:

2.1 Traditional Marketing Means

You will not make much business out of your terminals unless these are integrated into your general marketing scheme. That is to say, many people will completely ignore the machines unless they are educated by your brochures, flyers, adverts and TV commercials about how and where they can benefit from using them. This requires of someone in marketing to actually know what these benefits are and to formulate these. It also requires the concentration on a communicable few things to do at the terminal. Most of all, it requires one party to be the leading interest. Otherwise, everybody will expect everybody else to provide that marketing.

2.2 Placement

Many projects have encountered a substantial lack of acceptance due to poor placement of the machines. Obviously, there will always be other interests fighting for the same space, and often, there are legal considerations involved as well. Still, some postulates can be formulated:

- Put the machines in people's path. Do not send people to hidden locations.
- Select places where people are not in a hurry to pass by.
- Find out where people are inclined to look for the service offered and be there.

2.3 Self-Advertising as a Housing Design Goal

Forget aesthetic considerations. Do not listen to architects. Look at arcade game machines instead. Even if the playfulness they suggest is avoidable in selling environments, there are things to be learned from them:

- Be bold. Do not blend in with the environment. The machine must be difficult to ignore and inviting curiosity.
- Provide space for advertising. Place it above the screen so one can see it even when people are standing in front of it. This does not mean empty space. Why not put some of the machine's intestines above the screen rather than below.
- Use that advertising panel for the machine itself ("Ski Passes Here" or "Book your Vacation", etc.). It must be easy to learn what the thing is there for or why people are crowding up in front of it. People will not be curious enough to just go there and find out for themselves.

2.4 Sign Posting

There is much to be said for signposting. Be very clear and bold indeed with signs pointing to the machine. In store situations, it is advisable to have signs on the shelves themselves, indicating that more information on the particular piece of merchandise can be obtained at the machine. Do not forget to tell people how, i.e. which “button” to press.

If merchandise is to be sold at the machine that exceeds shelf capabilities, placing a model or picture of the item with a reference to the terminal in the shelf is not a waste of shelf space.

2.5 Motion Sensor Activated Action

Much work has been dedicated to the topic of attracting users by flashing lights, voice recordings, or video sequences triggered by motion sensors (similar to the notorious toy parrots outside of certain shops in our pedestrian zones).

This has to be addressed with much care, as it can easily be perceived as a disturbance, or in case of too much traffic have no effect at all. It is advisable to use such means where

- The machine is situated in a relatively quiet place and it can be expected that users go there knowing the machine is there due to some signing or other directions. In this case, the sensor-activated action can lower the user’s interaction threshold.

3 One Size fits All (or does it?): User Physiognomy

People come in different sizes. Height can vary greatly and it is one of the more difficult tasks to design a terminal so that tall men and small women can equally view the screen and use the terminal’s actuating mechanisms. In many cases, it will be necessary to offer at least the information services to children as well, and wheelchair-bound persons add a new order of complexity.

The most commonly found solution to this problem is to tilt the screen away from the user so that most persons need to look down upon it which makes for some standardization. This , on the other hand, comes with problems of illumination and weather (see there).

One solution is the mounting of at least the user-oriented parts on height-adjustable stands. While this is certainly the best solution ergonomically, this can turn out to exceed budgets and is also bound to require more maintenance than other solutions.

In some instances, it will be possible to situate the screen very low indeed and offer a chair (which will have to be pushed away easily for wheelchairers), thus eliminating the height discussion entirely.

The solution with the greatest potential as a good compromise is to tilt the screen the other way, that is to say with the lower end of the screen further away from the user than the upper end, so that tall persons can look straight while smaller persons have to look up a little. This comes with the advantage that the light related problems can be minimized, as can weather effects and in case a keyboard is required, that has some protection against falling dirt or rain as well. From a physiological point of view this is beneficial in that it is more healthy and less tiring to stand upright and not to bend over something for long.

4 Let the Sun Shine In: Light as a Disturbing Factor

One of the more crucial problems with the optical interface between computers and humans, is ambient light. Office environments usually take that into account, often by means of expensive lighting and shading, but also by placing monitors in certain orientations.

Light comes in as a two-way problem: There is obviously the question of reflections on the screen, but there is also the question of the possibly built-in camera having to deal with a difficult bright background behind a probably shaded user.

Putting up a public terminal, you do not usually get that chance. Other than in arcade game emporiums or gambling halls, you will always find not the right lighting, and customers are often particular about the location. There are, however, some things one can do:

- Selection of the screen: CRT monitors and color LCDs are actively emitting light. Thus, light from outside reduces readability. The only technology offering the reverse effect, i.e. improved readability with more light is monochrome LCD. In simple applications this should be considered. A growing number of applications, however, will require color so the importance of this is diminishing.
- Orientation: The sun is our prime enemy. The terminal should always be oriented so there is no direct sunlight on the screen at any time. Even in rooms with windows or glass fronts, this is always something to watch out for. The same obviously applies to spotlights used in doors. Also, indirect sunlight can be quite bright. Particularly in winter, wide stretches of landscape behind the user can present a venerable illumination problem. It is advisable to use the shadow of a building to place the terminal, and to orient it so the screen faces the potentially darker building. Where this is impossible, it should face north.
- Curtains are often found in Japan. The user steps in between the screen and a curtain hung from some protrusion about 2 ft. from the actual machine. Effective but not very attractive.
- Filters: Flat wire grids or polarizing filters can be mounted in front of the screen. They reduce the effects of disturbing light somewhat. At vertical screens, they are usually good enough for indoor applications. Care has to be taken when selecting components such as touch screens. Some might not be compatible. Also, some screens might not be bright enough or the resolution might disagree.
- Recessing the screen: It has been tried with changing success to recess the screen so as to use the surrounding frame for shading. With screen sizes growing, this will be less effective in the future.
- Tilting the screen: Many terminals have the screen tilted with its upper rim away from the user so that the screen is effectively facing up. This of course means that it is difficult not to have the sun or overhead lamps shine right on the screen, resulting in disturbing reflections.
  Light and reflection considerations speak strongly in favor of slightly tilting the screen the other way, as was suggested in the physiognomy section and will be when it comes to dirt and weather. This way, we get a relatively well calculable source of reflected light to deal with (the floor), and a well defined background for which to adjust the camera.

5 It's only Rock'n'Roll but I like It: Sound and Noise

Many a content comes and lives with sounds relating to the service it is attempting to sell. Also, a lot of effort is going into user guidance using speech. In fact, in Japan every publicly accessible machine talks to the user, either in order to attract his or her attention, or to ask questions and guide through the menu.

Lately, some companies are offering speech recognition in order to make interaction with the terminal more human-like and to avoid the effects of persons unaccustomed to computers having to struggle with other forms of man-machine interfaces.

Furthermore, there is an obvious temptation to use the existing lines to connect the user in case of further questions by voice line directly to some real human help. This can actually prove very useful indeed, first by providing access to information not available in the electronic content, but more importantly by lowering in many fields the threshold to actually closing a deal. Many still feel more secure dealing with real humans.

There are some considerations to take into account when it comes to using sound:

- Ambient noise: Musical trailers or jingles as much as spoken messages lose their effect entirely if the quality is less than perfect, which will invariably be the case in noisy environments such as city streets, shopping malls or railroad stations. Announcements over public address systems are the worst possible interference. If and when such influences are to be expected, the use of sound should be avoided entirely.
- Reservation: Being unexpectedly talked to by a machine is difficult for many people to handle. Also, more than one source of spoken communication (i.e. several machines in close proximity) will result in unstructured brabble. More likely than not, this will result in passers-by feeling harassed rather than attracted. This speaks strongly against using sound to attract people to the machine.
- Speech vs. Writing: It is very much more difficult to sound neutral than to read neutral. people tend to take the spoken word far more personal than what they read. Hence, starting with accents and not stopping at formulation, it is very difficult, not to mention expensive, to avoid misunderstandings or even insults.
- Privacy: Contrary to the situation at their personal internet connection at home or in the office, people tend to be inhibited by feeling watched by passers-by. While this is not a major problem when interacting with screens which would have to be watched closely in order to follow the user's steps, it is difficult for many to expose themselves by uttering commands they feel everyone can hear. More so, obviously, if they are not truly sure-footed with the command language the machine understands.

For all the above reasons, if speech recognition be used or the user be connected to a human counterpart, the use of a traditional handheld receiver is most advisable. It eliminates much of the disturbing effect of the noise and provides some of the privacy not felt when talking at the terminal.

6 Sometimes when We Touch: The Human Interface

6.1 Sweet Dreams are Made of This: The Software

Quite obviously, the software content available on the terminal is one crucial factor in the success of the concept as such. In fact, many a failure can directly be ascribed to not observing one or more of the most obvious design considerations:

- Teasers: In many cases, it will be good practice to use an animated introductory screen to invite users to interact with the terminal. This should not be classic advertising (although it might be tempting to sell) but always directly connected to the transaction the user is expected to carry out there. It is required to be very blunt and where the range of possible action is very limited (e.g. get more info on shelved items in a warehouse), omitting the intro should be considered as an option.
- Touch screens 1: There are various types of touch screens available. Considerations such as ambient temperatures or users possibly wearing gloves (particularly in outdoor applications) should be taken into account. Also, rain and dirt as well as insects should be looked at, which again speaks for a “hanging” configuration. Last, the touch screen and actual monitor should be arranged very close to each other and the alignment of the two must be given specific care (having to probe the screen several times in order to hit the desired button is most annoying).
- Touch screens 2: If touch screens be used (as will be practical in many applications), the software buttons need to be considerably larger than the link buttons in typical internet applications (again, for outdoor applications gloves must be considered). This can be achieved by designing the content specifically for use with touch screens, or by introducing an interface which similar to a lens enlarges the general area of the screen which has been touched first.
- Virtual keyboard: The introduction of a virtual keyboard to utilize the touch screen for text input can be a very good measure but has to be limited to systems where text input is the exception rather than the rule and text lengths are minimal.
- Numbers of options: The purpose of the terminal should be the fulfillment of some identifiable demand. Therefore, it can prove counterproductive to offer too much of a choice. As a rule, no more than five general options should be offered and these should be related. Example ski resort: View weather info, buy ski pass, book hotel, find restaurant, print map; Example shop environment: View info on item, view related items, compile and print shopping list, e-mail link or content home or to a friend, order out-of-stock items.
- Navigation: No matter how complex the actions available may be in the background: The user expects to see the same navigation throughout the application. Do not surprise users by varying screen layouts. If unavoidable, offer an unchanging framework around the actual content pages, always with large buttons for essential actions such as back, home, print screen, run video, and the like.

6.2 Touch-a-Touch me: Hardware Actuators

Not always is the touch screen the optimal solution to user interaction. Be it that the content can not be adjusted to the touch screen specifics, or other restrictions. There are certainly situations where using other input devices is recommendable:

- Dedicated action buttons: If the content can be managed accordingly or the number of possible user actions limited very narrow, hard buttons (as found on ATMs and dedicated APMs) are quite clearly an option. They reduce dirt on the screen and are easy to comprehend if the software is pointing at them accordingly.
- Keyboards: Where text input is important and exceeds the occasional input of names or credit card numbers, real keyboards need to be used. The most important consideration is the quality and durability, followed by the "natural" feel. The standard desktop variety is certainly not rigid enough and difficult to clean. Much use is made of foil keyboards which come with the disadvantage of not clicking the way users expect and of the normally printed characters rubbing off.
  The superior if costly solution is presented by full metal keyboards which are dust-proof, difficult to vandalize and have engraved characters which do not come off.
  Even the best keyboards deserve some protection against falling dust or rain, which again hints to a design with an overhanging screen.
- Trackballs: Many designs are using track balls or touch pads for pointing devices. While this is working surprisingly well with some arcade games, many find it difficult to adjust to the unaccustomed velocity, and track balls wear out and do not cope with dirt very well.
- Joysticks: More success has been seen using joy sticks. They must be fully sealed and short so as not to present a dirt or vandalism problem, and the synchronization of the cursor can be somewhat tricky, but they are not a bad solution.
- Game consoles: Many of the young have been growing up with Nintendo or Sega game consoles featuring a fixed array of a cross for navigation and 3 function buttons. Often older members of their families have with these as well, so there is a logic of man-machine interaction that many are already very familiar with. For many applications, this fact should not be disregarded and the elements of video game navigation can certainly help lowering the threshold to interact with a terminal considerably.

7 Casing Considerations

7.1 Whatever happened to Fay Ray: Indoor Casing

In doors, casing design is much less difficult than out of doors. Still, some critical factors remain to be taken into account, and a multitude of designs have been placed on the market that suggest that not everybody takes these as seriously as they should.

- Solid Stand: There is hardly ever a chance to fix the terminal to the floor. It is therefore important to design the entire machine so it has a very solid stand and not too little weight. People (and sometimes small vehicles) can bump against the terminal or treat it rough which should not result in a dislocation often resulting in broken cable connections.
- Rigidity/Longevity: We often see terminals in painted steel or plastic. Any paint will wear off eventually and should therefore be avoided completely. Stainless steel does require some cleaning but will never look shabby. If plastic be used the best practice is to either use colored-through material, or else to use transparent parts painted on the inside.
- User range: Curved designs with the screen pointing upward often come with a “belly” resulting in the screen being too far away from the user’s reach. The screen should always be easily accessible and the user should find opportunity to home in for a closer look. Therefore, the overall housing design should recess rather than bulge out under the screen. This speaks in favor of arranging components behind or above the screen wherever possible, introducing wall mount as an option and leaving room below, for instance for a shelf to put your bag while at the machine.
- Dirt is not only present in outdoor situations. A surprising mass of dust and other debris is in the air and will come down upon the terminal. The terminal’s design must therefore be sealed well enough to not let too much of it in and take into account possibly aggressive fluids used for cleaning the machine itself or adjacent installations.
  Falling debris or running fluids should not get a good chance to fall directly on the screen or keyboard, nor into card or printout slots. Again, this speaks for recessing or reverse-tilting the screen and placing mechanical interface items within that recess.
  Also, ventilation openings, where unavoidable, should by all means be hidden in recesses or built as labyrinth systems keeping dirt out.
- Cleaning of the floors is often performed using machinery and/or uncontrolled quantities of cleaning fluids. It is therefore essential not to put the terminal’s base directly on the floor but to leave some room underneath. Cable connections feeding into the floor must be protected specially. An absolute sin (seen astonishingly often) is placing the computer right at the base of the terminal, with ventilation openings close so lint and cleaning fluids can enter and knock the terminal off completely.
- Light + Sound has been covered in a previous chapter. See there. Only one thing: Contrary to popular opinion, there are many sources of disturbing light in indoor situations. More often than not these are subject to change within the life cycle of the terminal and can therefore not be planned for properly.

7.2 Raindrops Keep Falling on My Head: Outdoor Casing

What is true for indoor situations obviously applies to outdoor application. Specific factors add to making the design of a self-service terminal for the great outdoors a superior challenge.

- Light, due to the Sun's overwhelming power, is a problem of unique dimensions in the open. Various measures can be taken, neither of which in itself is ideal for all situations. See above.
  Paint or dye used for surface parts must be UV resistant.
- Temperature: Only in the open will we find a tough temperature range in which to operate. Trying to build terminals out of MIL-spec components will not be affordable and many components will not be available at all. On the other hand, it will be necessary to install heating and ventilation, in some extreme cases possibly even active cooling. In this context, the housing design will have to take a controlled disposal of water of condensation into account.
- Rain and snow: It is virtually impossible (and practically unaffordable) to design a Kiosk terminal so it is absolutely water tight. Therefore, it is required to arrange the surfaces so that falling rain or snow normally will not fall onto the screen or keyboard (…), and will also find it difficult to enter through card or coin slots and the like. As horizontal rain or snow can not be ruled out entirely, there should be an airstream combined with some drain channel behind every opening to allow snow or ice to melt and water to flow off in a controlled fashion.
  Surfaces onto which rain or snow can fall should always be sloping away from the user allowing the water to flow off without interfering with the action.

7.3 This ain't no Way to Treat a Lady: Misuse Protection

Only in well-observed environments such as café's or shops can maltreatment of the terminals be ruled out to a great extent. Other than there, whether in a shopping mall or on the street, this factor has to be accounted for.

- Vandalism: In certain environments straightforward vandalism, i.e. destruction with no aim at gaining anything, has to be catered for. Solid bodywork, fixed mechanical connection with the ground or floor, bullet-proof glass covering the screen, heavy-duty card readers and shutters at printout openings will pay off just as an automatic alarm system reporting impact over the existing communication lines.
  It can be small things that result in big damage: Do not disregard for instance youths finding it funny to stuff the little mustard bags handed out in fast food restaurants into a card reader.
- Purposeful opening: Particularly where monetary transactions are handled by a self-service terminal, criminals may want to get at the cash or just at the transaction data. Or they might just find the computer hardware attractive.
  While cash is a different matter altogether, and has to be treated following "safe box in safe box" design rules, housing design should at any rate make it impossible to get a good grip with a crowbar or to access any important screws. Keys to legally open the machine must be of a solid and difficult to forge type. An alarm system requiring code after every opening of the machine is no luxury.
  Unavoidable outside screws (never critical ones) must require custom tools difficult to imitate.
- Data protection: If transaction data needs be stored locally (which it will most often have to be), it should be protected in any way modern software offers so even if someone gets to carry the computer home they will find it difficult to extract and reuse that data.

8 Miscellaneous Topics:

8.1 Electronic/Mechanical Robustness

All components of a terminal should be selected for their robustness, and the machine itself assembled so it forms a rigid unit.

Mechanically, this means that the components should prove to be shock proof to a certain extent, cable connections should be screw-secured, and delicate machinery suspended on shock-absorbing flexible spacers. The Assembly must at least survive transport to the location or a hitting shopping cart without any component ending up on top of another.

Electrically, this means components must be tolerant to weak power supply (a UPS is never wasted) or electronic noise from the neighborhood (passing cars or trains can be a challenge). Also, particularly in outdoor situations, surge protection to cater for nearby thunderstorms should be a standard feature. After all, there is no terminal so counter-productive as the one telling you that “it is now safe to turn off your computer”.

Particularly if terminals are used to interact with transponder cards, some attention must be directed to avoiding interference between readers in adjacent machines.

If the user can retrieve prints from the terminal, electrostatic considerations play a vital role. Particularly in countries with distinct seasons, humidity changes can be great and electrostatic charge will, especially in winter, present a problem with paper sticking. This needs to be addressed in the design of the paper flow. The same obviously applies in parts to the management of banknotes entering the terminal on their way to the cash box.

Finally, good grounding will be required to prevent communication lines from latch-up and protect users from shock when first touching the terminal.

8.2 Cash

There are applications requiring the acceptance of cash. Although the importance of this is rapidly diminishing, it is still there. Accepting cash, and of course, having to return cash, makes terminals bigger and more expensive. Care has to be taken selecting the cash – handling components.

Of critical importance is the variety of coins and banknotes that are accepted. If a sale is supposed to be made and the user does not have just the right type of banknote on them, the buying experience is bound to end up a frustrating no-deal, probably having the person never return.

Particularly in environments heavily frequented by foreign visitors the foreign currency adds an extra level of complexity. And in countries like Italy where the largest denomination in a coin is worth only a few Cents, returning banknotes is a must.

Not that any of this is difficult, the subsystems are available off the shelf from specialists, but it must be taken into account in the early design stages so the room and the safety is there once it is required.

8.3 Cards

As a means of payment, but also as an identifier, for instance in loyalty programs, cards gain in importance. Also, cards are widely used as carriers for privileges such as ski passes, fare cards or trade show tickets.

In Central Europe, East Asia and South America, surface contacted chip cards are becoming vastly popular, while in other parts of the world the magnetic stripe will stay the main technology for many years. For pre-paid privileges, contactless chip cards are the medium of choice.

If cashless payment is to be accepted, it is important not to leave foreign cards out, which means card readers must be able to handle chip cards and magstripe cards alike. As users can not be trusted to "swipe" cards at predefined speeds, this will mean motor-driven readers retrieving the card out of the user's hand (so that the user can not interrupt by dragging the card out).

8.4 Numbers and Position of Interfaces

A consideration worth investing time and effort is the multitude of interfaces between the terminal and its users. If the machine comes with just a screen and navigation is by touch-screen, the situation is clear and manageable. There is only one interface.

As soon as keyboards, pointing devices, cameras, printer slots, card slots, or cash acceptance and return enter the game, things become rather more complicated.

If anything is supposed to be handed out to the user, it should at any rate happen through one opening. If, for instance, cash is accepted, there will be a cash return bay. If at the same machine tickets or receipts are handed out as well, this is an obvious place to offer them.

One most important point is to not have more than one card slot. Users will only know what to do if all card-shaped items are expected (and issued, where applicable) in one slot, reducing bewilderment and error. Small printouts should come out of the same slot as well.

Card slots, as well as coin slots or banknote acceptors, should not be too far away from the screen, so as to keep the user's attention to messages or directions offered on the screen.

Banknote acceptors, card and coin slots must be clearly and graphically marked so there is not much of a chance for mistake. It is sobering to watch people trying to stuff banknotes into coin slots or coins into card slots.

8.5 No Words

One final look has to be cast on user guidance:

Other than on the screen itself, where language selection can be offered, any instructions directed to the users, where required, should be graphical rather than in writing. This is not taking into account illiterates but the terminal's design must cater for

- Persons being confronted with the machine for the very first time, who will understand much more quickly if reading is not required, and
- Persons not speaking the local language very well. This is vitally important in touristy environments such as resorts, exhibition centers, or public transport environments.

Generally, even the use of graphic symbols (pictograms) should be limited to an absolute minimum and aided by arranging the components of the terminal in a way that appears logical if not conclusive given the flow of a typical transaction.