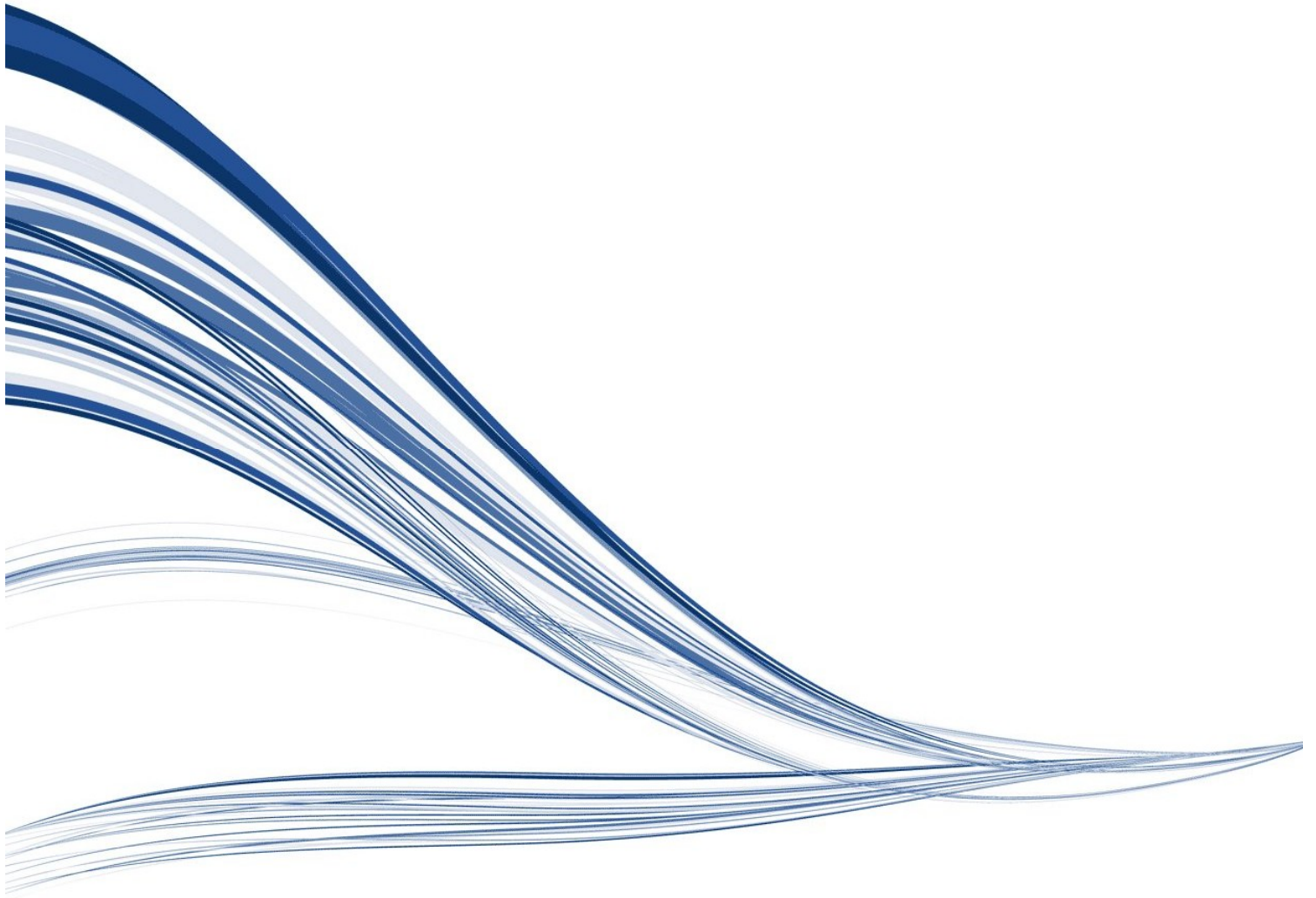


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Gaining the Edge: The User Experience in Netbook Devices

A White Paper for Netbook Manufacturers



MOVIAL

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1 Introduction

With netbook sales outpacing those of the iPhone, it is important to understand the emerging role of this new category of mobile device, and examine the future role netbooks will play. This paper takes a look at the current state of netbook user experiences, provides use cases and their corresponding hardware and software requirements, identifies usability problems and their solutions, and offers a look ahead at emerging trends and future possibilities.

The term “netbook” is used to label mobile devices that are smaller than laptops and tablet PCs, but larger than Mobile Internet Devices (MIDs), such as the Nokia N810. The main difference between a netbook and a MID is that a netbook is suitable for productivity use because of its larger display and full QWERTY keyboard. The netbook’s size is mainly the result of the low-priced Asus Eee PC which has been selling so well that its form factor has become the de facto standard for netbooks: a device with a seven- to 10-inch display that offers a good compromise between portability and efficiency. It is small enough to fit on a coffee table while eating breakfast in a café, and large enough to include a usable QWERTY keyboard. Other manufacturers have begun to target this market, leading to competition on the hardware level which is now just starting to evolve into the development of competitive user experience features, just as this did with mobile phones.

1.1 Understanding the Importance of the Netbook User Experience

Today, netbook usability is somewhat lacking. Netbook form factor and operating systems are mostly copied as is from laptops. Furthermore, laptop manufacturers originally copied laptops from desktop computers instead of redesigning them according to the changed use cases. Because competition with technical features has quickly reached a saturation point, it is important to pay extra attention to the netbook user experience. While netbook sales may be hot today, some users will be disappointed in their purchases because they may think they are buying a mini Windows laptop. Manufacturers need to invest the time and effort in educating the marketplace so consumers understand the differences. This is a pivotal point in the industry to educate users about a new category of mobile device. Manufacturers have the chance to differentiate themselves from competitors, and mobile operators can provide users with branded products that have been tailored to meet their needs and offer readily-configured applications to access operator services.

Usability is much more than the quality of the user interface. The following image represents the key components of the user experience from a netbook perspective. Hardware features often hinder form factors, so needless “old” features have to be identified and removed (e.g. a CD-ROM/DVD-ROM drive). Other considerations than the actual device itself can also affect the user experience, such as user manuals, product support, and even the public image created by advertisements, product reviews, and word of mouth.

When designing a netbook, all these factors must work together seamlessly to give users a completely rich and satisfying experience, and carefully meet clearly defined expectations.

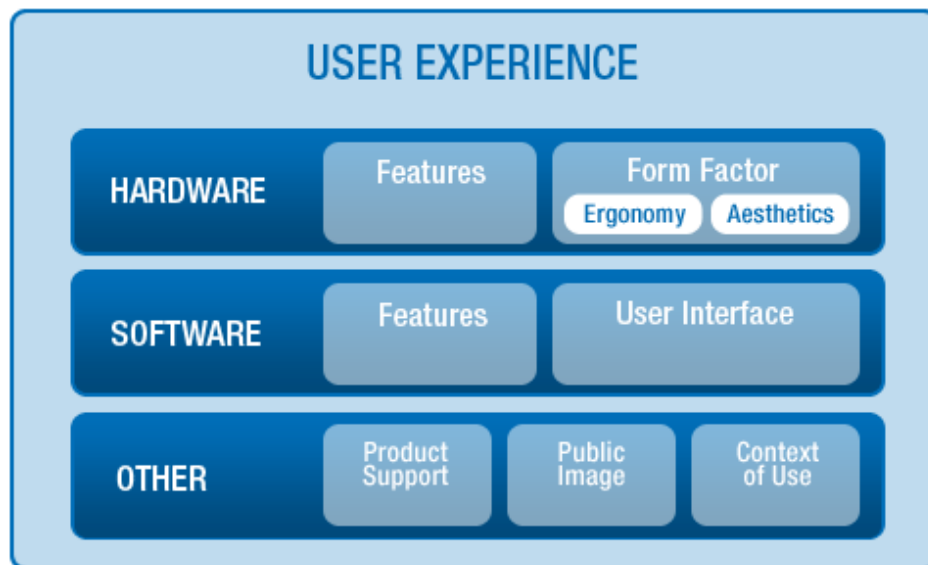


Image 1: Key components of Netbook User Experience [© Movial]

2 Netbook Use Cases and Design Requirements

There are many possible reasons why consumers would want a small, highly-portable, computer-like device, and these reasons should be investigated to deliver the optimum design for a netbook. It is not enough to just make a netbook a smaller version of laptop. What does the user want? To fully understand the design requirements, one has to identify the various netbook user groups and use cases.

2.1 User Groups

Who would use a netbook? Who would benefit from it? The answers are those who need to combine high mobility with productivity; those who travel or move a lot, and produce and edit materials while travelling; business people; students moving between classes and taking lecture notes; consultants or employees who often need to visit customers; and freelance workers such as journalists. There are also people who will embrace the netbook purely for its affordability.

2.2 Use Cases

Netbooks are used for both work and leisure. For both, the most obvious use case is *browsing the Internet*. Users are following news sites, killing time on leisure sites, shopping online, searching for timetables, maps and other information, downloading files and media, watching streaming video, or listening to music. With the current Web 2.0 phase, many Internet consumers are also *creating and publishing content* daily. This includes writing opinions on forums, commenting via blog entries, twittering, and publishing photos and videos in online galleries. Working with Web-based or locally installed office applications is also common.

Another important use case is *communication*. Email remains the most used method of communication, but instant messaging, social networking sites (such as Facebook) and voice-over-IP calls are gaining in popularity. The use case behind all of them is basically the same: relaying a message to a person. The means is actually not that important. We are at a point in time where the underlying information infrastructure can intelligently determine how the recipient receives the message. This can be based on presence. People are sharing their presence information online, and devices can use this info to decide on recommended means of communication (e.g. SMS, email, IM,

VoIP/video call). One emerging communication trend is sharing data with friends or co-workers. Users need easy ways to send interesting Web links, online resources, and messages to their contacts.

A third important use case is *media consumption*. Users may want to watch videos, listen to music, or other audio, such as podcasts, and read eBooks. This media content can be local (stored on internal or removable memory) or it can be downloaded from servers.

Other relevant use cases include using location based services, such as maps or navigating software while roaming, various calendar-related tasks; and leisure use activities, such as playing games while waiting at an airport.

With the portability of netbooks, one can expect that they will be used anywhere. This creates some unique challenges, such as outdoors use where sunlight may hinder display visibility. Alternately, a user may be staying in a space where the device should be silent, like in a library or at night on an airplane when other passengers are sleeping.

Based on the presented use cases, some proposed requirements for a good netbook design can be found below.

Form Factor Requirements

The defining feature of netbooks is mobile use. This presents a number of requirements. Basic requirements include light weight, silent running, a readable display in outdoor lighting, and keyboard buttons that are readable in dark lighting. The device should be easy to carry or hold in one's hands for long periods of time, even if an extra battery is attached, and there should be enough friction so the unit remains stationary on a table. The casing should be hard and durable; the netbook may well drop on the floor and it shouldn't break easily. Optimally, the device should have some resistance to weather conditions such as rain or water splashes.

Advanced requirements include designing the device so that it is balanced and can be held with one hand easily, and there should be a way to hold the netbook in a portrait mode (i.e. eBook mode), while still having access to some buttons.

Aesthetics affect the user experience, too. Mobile devices are personal objects which are often used in public settings, so it should be possible to personalize them to the users' tastes. Good examples of this are hand-painted covers, custom ringtones, and accessories for mobile phones. One example of a personalized netbook is the Vivienne Tam – designed HP Mini 1000 Netbook [1]. It remains to be seen how it is received, and whether the operators and shops will start offering customized coatings for netbooks for an extra price. Colorful and customized items are not as likely to be accidentally left behind, mixed up or lost as easily as generic black or gray devices.

Hardware Feature Requirements

Netbook buyers have come to expect a basic set of features from laptops to which netbooks are mostly comparable. One hardware feature that reigns supreme over others is long use time. Good connectivity is essential for mobile devices, and the most useful feature would be an always-available Internet connection, an internal 3G modem. WLAN is quite important because of home networking, and Bluetooth is necessary for connecting to peripherals such as wireless headsets. If possible, netbooks should also include a Webcam and microphone, as video chatting is increasingly being used by travelers for staying in touch with others, and by those who want to save on travel expenses and are looking to keep in touch in a more personalized way. Audio playback with integrated speakers and sound plugs for headphones are basic features that are also expected.

A netbook should preferably use a solid-state drive (flash memory) for mass storage because a hard disk drive, even though it is more economical, is vulnerable to breakage if it is dropped on the floor – even if there are acceleration sensors that stop the disk before it hits the ground. Besides, a solid-state drive is lighter, quieter and more energy-efficient.

For home use, support for external human-computer interface devices should be considered. USB ports allow the use of a full-sized keyboard and mouse. Other requirements are a VGA and/or DVI/HDMI port for an external display and a sound output for using home stereo systems. It is unwise to force users to use proprietary special cables; many users are already complaining about HTC G1 Android phone's lack of a standard 3.5mm stereo plug. A small detail like this can very well affect the purchasing decision.

Software and User Interface Requirements

A critical software requirement is to support an operating system that performs well with the available processor, memory and battery. A netbook should start quickly; mobile use cases often require quick data searching, so users cannot afford to wait minutes for the operating system to boot. Users should be provided with a wide, ready-for-use set of software that would cover the use cases identified earlier in this paper, and the possibility to install third-party software.

The user interface should have an emphasis on accessibility, such as sufficiently large control elements and text size, simplified UI, and input methods. Colors and themes should be designed with enough contrast to allow use in sunlight. If possible, touch-screen control is the best input method in many use cases for mobile devices, since touchpads have weaknesses (e.g. drag and drop) and a mouse is cumbersome to carry, attach and detach.

3 About Current Devices

Here are a few actual products that have some interesting or pioneering features. Netbooks that are currently available in the market compete on technical specifications such as resolution, battery life, and processor power and less on a holistic user experience. Manufacturers are mainly imitating laptop/notebook form factor and features, just trying to make them smaller. The popularity of the **Asus EEE PC** has made it somewhat of a de facto -standard in form factor regarding size. It still has some major problems such as clumsy input methods and is missing some vital features, such as an integrated 3G modem. The **Acer Aspire One 3G** includes an in-built 3G modem making it a true stand-alone mobile terminal.

Netbooks have great potential for innovation. Some devices are already taking advantage of this, including the **Everex CloudBook** and the **Gigabyte M912**. The CloudBook is one of the few products with a novel ergonomic design; the touchpad is located on the right hand side, near the hinge. Mouse buttons are on the left hand side, so users can carry the device with two hands and still be able to use the mouse functions. This also helps with drag and drop -operations and stops unintentional touchpad use, which is a common problem with touchpads located between the keyboard and user.



Image 2: Everex CloudBook
[© Everex]



Image 3: Gigabyte M912 swivel display
[© GIGABYTE]

The Gigabyte M912 combines netbook portability with the swivel-display of tablet PCs, making it an effective eBook reader. Of course, in a mobile device all moving parts are prone to damage. A device with this form factor can potentially double as a home terminal that offers simple touch-controlled Internet access – the device could also be placed on a wall and used to play music, display weather, bus schedules and such.

3.1 Operating Systems

Netbooks are profiled as having long use time and enough power to run most productivity applications. The OS selection impacts the price point, technical performance and application support. Microsoft Windows Vista has proven to be too resource-heavy for current netbooks, so Microsoft reverted back to Windows XP. Different Linux distributions are also used, such as Novell SUSE, Xandros Linux and the Ubuntu Netbook Remix. Whatever the OS is, it should be tailored to fit the netbook use case needs in order to prevent problems such as having dialog windows that don't fit the screen. The startup time of the OS should also be minimal, and a wide range of applications should be available.

The Linux variant gOS Rocket has a rich graphical user interface that resembles a Mac OS X. This may help users to feel familiar with the system, but could lead to users having false expectations which might lead to heavy disappointment (more about this later).



4: gOS home screen [© Good OS LLC]

4 Problems and Solutions

The main problem with mobile devices is *navigation and data input*. Even in netbooks, the keyboard can be so small that it's sometimes borderline unusable (usually 80 to 95 percent of normal size) and using a touchpad is inaccurate; hitting small controls and resizing windows can be a nightmare. Proper ergonomic design can help with these problems, like in the CloudBook example earlier, but software solutions should not be overlooked.

Some design suggestions for improving navigation are to:

- make buttons and control widgets larger and more suitable for touch screen and mouse use
- use the valuable screen edges well
- maximize efficient use of the screen space with hide options
- re-think old ways to remove useless UI elements and put added emphasis on mobile use cases
- investigate algorithms for "smart" mouse/touchpad/trackball control
- offer reasonable defaults for everything, e.g. new windows and dialogs should open at an optimum size without the need to resize them all the time which is the case with many of the current systems.

Many mobile users don't seem to learn to use the provided shortcuts (such as the application list of Symbian S60) to cross-navigate the applications, instead they tend to return to home view first when changing applications. Therefore a good navigation feature is to emphasize the home view and offer a hardware 'Home' button for quick home view access, as proven by iPhone reviews and user tests.

Another practical problem is the *limited vertical screen space*. This is an interesting UI design challenge. Because netbooks are so close to real books in size, the user should be given the option to use it in portrait mode for suitable applications. This would make the netbook an efficient eBook reader and would also offer a better way to read emails, forum posts and news on the Web. Rotation should be quickly accessible or preferably automatic if the device is equipped with motion sensors. This portrait mode should of course be taken into consideration already when designing the form factor and ergonomics, so that the netbook can be held comfortably and some hardware buttons can be mapped to turning pages intuitively.

When portrait mode is not feasible, vertical space should be maximized by analyzing all horizontal status- and toolbars. Are all of them necessary for mobile use cases? Can they be combined with

other bars perhaps by removing less used controls or moving them to menus? Could the bars be hidden most of the time and invoked when needed? Could they be replaced with vertical bars?

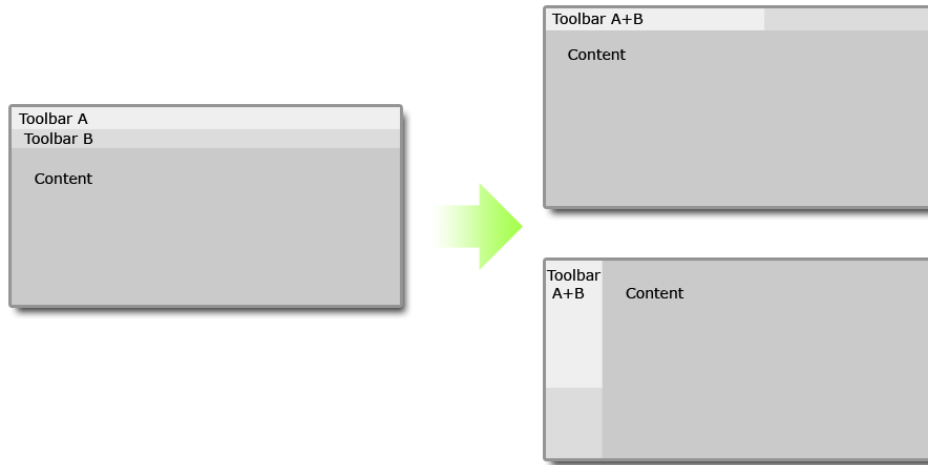


Image 5: Maximizing vertical space [© Movial]

Another challenge is getting users to *adapt to changes*. An alarmingly high return rate for netbooks with a pre-installed Linux operating system has been reported (about four times that of Windows netbooks [2]). It seems some users are disappointed or frustrated because the product user experience promise was too close to Windows. A logical solution is to offer something special that looks distinctively different from Microsoft's products. HP did this rather effectively with their HP Mini 1000 Mi edition Netbook's customized dashboard-style interface that effectively hides the underlying Linux OS. In marketing, the performance benefits of Linux such as lesser memory consumption and faster loading time of the OS should be emphasized.

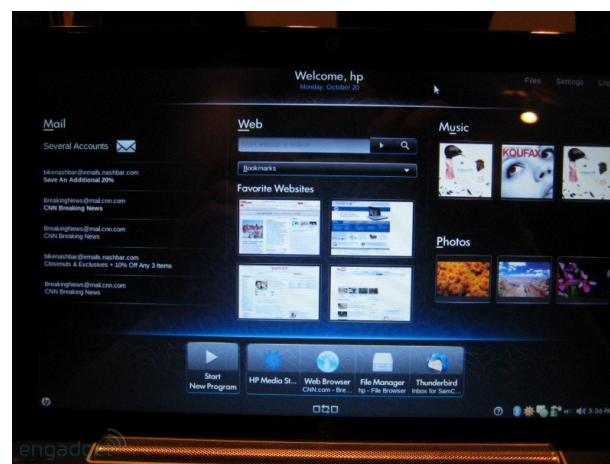


Image 6: HP Mini 1000 user interface [© Engadget]

5 Future Directions

To better understand future user experience needs, user studies should be executed and the product development process should be revised. One trend currently affecting user experience is the rise of the touch screen. Many manufacturers have published plans for touch screen netbooks. Asus, the netbook market leader, has promised a touch screen Eee PC for Q1 2009 [3] forcing software developers to think over old conventions. Windows 7, which is also targeted to be a netbook operating system, includes multi-touch and configurable gestures according to Microsoft's recent demo videos. The OLPC 2nd generation (one-laptop-per-child project [4]) images may still be preliminary mockups, but a pattern is emerging. EBooks and eLearning are big markets still waiting for takers [5].



Image 7: OLPC 2nd generation mockup [© OLPC]

Use case-based design is showing results: Lenovo's IdeaPad S10e has an "Instant On1" feature which allows the user to quickly check emails and calendar, and browse the Internet or use media features without fully starting the actual operating system.

What purpose would a home netbook serve, if there already is another, more powerful computer in the house? The flipping display device such as the Gigabyte M192 (that was discussed earlier) could double as a touch screen home control panel that could be used to display everyday status information such as time, calendar events, weather, bus schedules or initiate actions such as play music.

More and more applications are moving to the server side. Using productivity applications via Web browsers instead of installing them locally ("cloud computing") makes maintenance and administration easy or completely hidden, and doesn't require as much processing power and memory on the netbook itself.

Getting rid of old conventions that strain the usability of netbooks requires development of completely re-thought operating systems or GUIs that are scalable, light on resources, easy to develop applications for and easy to maintain. Moreover, the form factor of the device has a huge potential to evolve towards meeting main netbook use cases. The emergence of cloud computing and fast wireless connections suggests that users will start preferring solutions that provide optimal access to data stored in centralized data storages. The aforementioned aspects provide a great opportunity for device manufacturers and mobile operators to improve customer relationships with their end users.

Movial Corporation provides exceptional software design and engineering for telecoms and consumer electronics. The Company has been designing user experience and developing software and operating systems for numerous mobile platforms since 2001. This experience allows Movial designers to clearly identify problems and see opportunities to enhance the user experience of netbooks on every front. Some common problems and principles are discussed here, but optimal results require case-by-case studies of hardware and applications.

Contact Movial if you need expert user experience design services or realizations of Linux-based mobile operating systems.

6 Sources

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