Touching Origami: Microsoft's UMPC Platform

by Geoff Walker

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On March 9, 2006, Microsoft and several OEM hardware partners announced a new mobile computing platform. Previously code-named "Origami", the new platform will be known generically as the "Ultra-Mobile PC" (UMPC). Microsoft's basic description of the UMPC is "a device-like computer that is small, mobile, and runs the full Windows operating system. The UMPC goes anywhere and does anything that your current computer can do." Simplified to an advertising slogan that we'll all be tired of shortly, it's "The Ultra-Mobile PC: Go everywhere. Do anything."

The UMPC runs Windows XP Tablet PC Edition 2005. This allows Microsoft to position the UMPC as "having all the functionality of Windows XP Pro with the additional pen and ink functionality of the Tablet PC". In other words, "it's not really a Tablet PC, it's the same old XP that you know and love, so there's nothing new to learn". Microsoft emphasizes that the UMPC runs the same applications "previously available on desktop, laptop and notebook computers". And, "beyond that, the ultra-portable size; lower price point; integrated WiFi, Bluetooth and Ethernet; and support for other technologies like GPS, make the UMPC suitable for a wider range of compelling mobile PC experiences". Intel simplifies it down to "The UMPC is mainly designed for content consumption."

Figure 1: Samsung's UMPC

What a UMPC Really Is: Once you cut through all the hype surrounding the launch, it becomes clear that the UMPC is simply a low-end, slate-form-factor Tablet PC. (Figure 1 shows Samsung's UMPC). What differentiates it from "regular" Tablet PCs are the following: (a) emphasis on touch as a primary user interface, (b) focus on the consumer rather than enterprise, and (c) lower price point resulting from low-end hardware.

Microsoft's minimum hardware requirements ("baseline specifications") for UMPCs are shown in below.

Specification	UMPC Minimum Requirement
Display	7" or smaller, landscape orientation, minimum 800x480 (Wide VGA), with 800x600 (SVGA) and 1024x600 (Wide SVGA) available through video scaling rather than scrolling
Input methods	Finger touch and stylus, hardware controls (navigate and select with buttons), or external keyboard
CPU	Intel Celeron M, Intel Pentium M, or VIA C7-M
Storage	Minimum 30 GB
Battery life	Minimum 2.5 hours
Network connectivity	WiFi, Bluetooth or Ethernet
Weight	2 pounds or less
Operating System	Windows XP Tablet PC Edition 2005 (eventually Windows Vista)
Optional features	Compact flash or SD slot, external monitor support, GPS, webcam, fingerprint reader, digital TV tuner, etc.
Target price range	$600 - $1,000

Screen Size: The UMPC's seven-inch screen size is the result of Microsoft's study of what they consider to be the minimum useable size for a highly mobile Windows device. An excerpt from a posting by Otto Berkes (UMPC architect) in the Origami Team Blog (http://origamiproject.com/blogs/) says it very well:

> "My concept model was based around a 7-inch display panel which was significantly larger than previous concepts, but still small enough to allow a highly mobile design. We had previously done functional prototypes using a 4-inch display, and the feedback was too often 'the size is very interesting, but it's hard to really use Windows and applications on something this tiny with such a small screen'. The PC is primarily a visual experience, and there's only so much data you can represent on a very small display surface. And navigating through (or even to) applications – or simply reading text and web pages – was very difficult. A very small display just doesn't have enough surface area to easily support the touch and pen-based interaction needed on a very mobile PC geared for on-the-go use. The moral of the story is that just because something can be done, doesn't mean it should."

Very supportive of OQO, isn't he? The seven-inch screen makes the UMPC larger than a PDA but smaller than a notebook. This is the "tweener" space where nobody's ever been really successful. Microsoft has tried and failed at least twice before to create a product in this space – for example, the Handheld PC (HPC) and the Jupiter (Windows CE) mini-notebooks in the late 1990s. Admittedly, both were crippled by running Windows CE rather than full Windows, but the tweener size was also a problem. Too big to go in a pocket, but not big enough to sport a display and keyboard suited for real work. It's a tough space.

Although Microsoft and Intel are "partnered" on the UMPC, Intel's view of the UMPC is quite a bit broader than Microsoft's. Intel's concept videos (available on both of Intel's UMPC websites (http://umpc.com/ and www.intel.com/design/mobile/platform/umpc.htm) are more creative in a hardware sense. Both of Intel's concept products have physical keyboards; one has a thumb board that swivels out from underneath the device while the other is more like a cleverly hinged convertible (see Figures 2 and 3). Both of Intel's concept products also have smaller screens, probably around four or five inches. And of course the concept products are impossibly thin. But then – why not? All Intel has to do is sell CPUs. Of course the CPU is the core of the product, but Intel doesn't have to deliver on any of the product concept ideas they're creating. Consumers don't think of Intel when they think of mobile devices like the UMPC, they think of Microsoft. It's Microsoft who has to deliver software that actually makes the OEMs' hardware devices work. Microsoft by necessity is tied to reality far more tightly than Intel. Intel's contribution to the UMPC marketing effort probably causes more confusion than benefit.

Figure 2: Intel's concept UMPC with rotating thumbboard.

Figure 3: Intel's concept UMPC in convertible style

Other Hardware Specifications: The remaining UMPC hardware requirements aren't unreasonable for a low-end Tablet PC. Allowing a Celeron M reduces cost, but it means that performance on Celeron-M-based UMPCs (which includes two of the initial four products!) is going to be very sluggish. Graphics by necessity will be of the integrated variety – and probably only DX7-DX8 level, so forget any serious 3D games. A battery life of 2.5 hours is known to be insufficient for enterprise users, and the consumer's tolerance for short battery life is even lower than that of the enterprise user, so this is likely to be a big problem. But it's not rocket science. A Tablet PC with these specs should have an average power consumption of around 8 watts. To keep the weight under two pounds, the OEM is realistically limited to three lithium-ion cells, so the typical UMPC battery pack will be around 28 watt-hours (3.7V

x 3 cells x 2500 mAHr = 27.8 WHr). Allowing for the efficiency of the internal DC-to-DC converter, and allowing for a little reserve margin at the low end, battery life ends up being around 24 WHr / 8 Hr = 3 hours. Eight watts is an average; if you do something heavy (like watching a movie on an external DVD drive) that keeps the system pumping full blast all the time, battery life could drop to under 2 hours. As a reality check, consider the Samsung UMPC. It's a Celeron-M-based design and quotes normal battery life of 3 to 3.5 hours. When watching a DVD using an external drive, Samsung says the battery life drops to 1.7 hours (that's 1 hour and 42 minutes – shorter than many movies).

I have to chuckle when I hear someone like Intel Marketing Director Brad Graff (as interviewed by CNet's News.com) say that "in later generations, probably next year or later, the devices could have the pocket size, all-day battery life, and $500 price that Microsoft and Intel are aiming for". As previously noted, seven inches is about as small that the Microsoft product architect thinks the screen should get, so it's probably not going to be "pocket-sized" next year. And all-day battery life is only going to happen if an OEM ups the battery cell count from three to nine (3.7V x 2500 mAHr x 3 strings of 3 cells = 83.4 WHr = 9 hours of battery life) – which increases the system weight by about three-quarters of a pound and the system volume by about 15%. Battery energy density is changing slower than practically any other computer technology, so "all day battery life" in a two-pound UMPC isn't going to happen next year.

Initial UMPC OEMs and Products: Five OEMs announced UMPCs at the launch. These include Samsung (the best known one), ASUS, Founder (China's #2 PC manufacturer, a $3B company), Tablet Kiosk (a small American OEM), and PaceBlade Japan ("PBJ"), a small offspring of the original PaceBlade OEM in Taiwan. Both Tablet Kiosk and PBJ source their products from Amtek, http:www.amtek.com.tw a Taiwanese ODM, so the two products are very similar if not identical. Figure 4 illustrate the remaining initial UMPCs.

Figure 4: UMPCs from PBJ, Founder, and ASUSTeK

Of these five OEMs, only Tablet Kiosk and PBJ are current Tablet PC OEMs – and they're both very low visibility. It's reasonable to ask why none of the big Tablet PC OEMs such as HP or Acer were among the initial UMPC OEMs. I'm speculating here, but I can think of at least four possible answers: (a) since the UMPC's focus is consumer rather than enterprise, maybe the existing OEMs weren't that interested; (b) maybe the OEMs have been burned too many times by Microsoft's "trial balloon" platforms (remember the "Smart Display"?); (c) maybe the OEMs considered the UMPC to be a diversion from where they want to go; or (d) maybe Microsoft intentionally went looking for other, new OEMs in order to expand the Tablet PC ecosystem.

The details of the four initial UMPCs are covered in the news section of this issue. There you'll find a specs comparison table, so the details are not repeated here. Looking at the products as a group, the differences are in the details. Some have card (CF or SD) slots, some don't. Some have docking connectors, some don't. Some have an integrated camera, some don't – and so on. The good news is that there are substantially more differences between the products than there were in the original round of cookie-cutter "Palm-Sized PCs" in the late 1990s (all of which failed in the marketplace). That platform taught Microsoft that they had to leave enough wiggle-room in the base specifications so that OEMs could differentiate their products effectively.

Touch, Pen Tablets and Tablet PCs: Before getting into the touch aspects of the UMPC in more detail, it's worth taking a brief detour into touch history. Many of the pen tablets that pre-dated the Tablet PC (1989-2001) used resistive touchscreens (passive digitizers). Most of these pen tablets were used in vertical applications such as sales automation, insurance inspections and utility maintenance. The specialized applications on these pen tablets ran under MS-DOS or Windows 3.1 & 95 and they almost never used the standard Windows user interface. Instead, interaction with the application was accomplished through check boxes, drop-down menu lists, radio buttons and simple data-entry fields. The majority of the user navigation and control was done with a passive ("stick") stylus because (a) a stylus is much more precise than a finger, and (b) applications sometimes required numeric or simple text input. In real-world vertical applications on pen tablets, screen space was often at a premium, so screen layouts almost never allowed for the enlarged targets required for finger touch.

When Microsoft decided to create the Tablet PC in 1999, they focused primarily on digital ink. The quality of the ink was believed to be paramount, both visually (smooth like ballpoint pen ink) and technically (high-speed, high-resolution data points). Touch was not seen as having any significant value, and this was reinforced by the lack of real finger-touch in most existing pen tablet applications. Accordingly, in 2001, Microsoft decreed that an electromagnetic (active) digitizer was required in all Tablet PCs. The digitizer hardware requirements were as follows:

- Cursor must track the pen when hovering 5 mm or less above the screen surface.
- Sample rate must be at least 100 samples per second.
- Resolution must be at least 5X the LCD pixel density, but not less than 600 ppi.
- Cursor must be within 3 mm of the pen tip everywhere on the screen.

Hover (the ability to hold the pen above the screen and have the cursor track the movement of the pen) was seen as absolutely essential to normal Windows operation because it's equivalent to simply moving the mouse without clicking. With a resistive digitizer, you can't move the cursor without clicking unless the tablet designer creates a special "hover mode", which adds undesirable complexity for the user. Sample rate turned out to be not that much of an issue because most resistive digitizers were capable of providing 100 samples per second. High resolution was felt to be very important in order to be able to create smooth digital ink. Microsoft's recommended digitizer resolution was 1,000 ppi, roughly 5X that of the typical resistive digitizer. Finally, good cursor positioning accuracy with respect to the pen tip was essential for basic usability.

These requirements remained inviolate until 2005. However, since there was only one significant supplier of active digitizers (Wacom, http://www.wacom.com), there were continuous objections from the Tablet PC OEMs on the basis of cost and sole-source. The only other active digitizers that have been used in Tablet PCs to date are from FinePoint Innovations http://www.finepointinnovations.com and Sunrex/UC-Logic http://www.sunrex.com.tw, http://www.uc-logic.com. FinePoint's digitizer was in the original HP TC1000 and is in Gateway's current CX200; Sunrex/UC-Logic's digitizer was in the Averatec C3500. Every other Tablet PC in the world has used the Wacom digitizer.

How Touch Entered the Tablet PC: In 2004 an Israeli start-up called N-trig (http://www.n-trig.com -- the name is meant to be pronounced like the word "intrigue") approached Microsoft with a prototype of their innovative, integrated-dual-mode electromagnetic/finger-touch digitizer. After several months of using a variety of current Tablet PCs that had been retrofitted by N-trig with their digitizer, Microsoft "caught the touch bug" (in the author's opinion). By the end of 2004, Microsoft had become convinced that touch could be an important method of interacting with a mobile PC. Touch was added to the official list of desirable "natural input methods" along with pen, speech, hardware controls (buttons) and biometrics (fingerprint and signature).

At WinHEC (Windows Hardware Engineering Conference) in April 2005, Microsoft announced that the Tablet PC Ink APIs would be extended to include touch. Since it was already known that the entire Tablet PC API was being fully integrated into Vista (called Longhorn at the time), that meant that touch would also be supported in Vista. Some time after WinHEC 2005, Microsoft quietly informed the Tablet PC OEMs and ODMs that they had lifted

the restriction on using only an active digitizer in a Tablet PC. After more than four years of listening to OEM/ODM complaints about the active digitizer supply situation and trying unsuccessfully to entice other suppliers to enter the active digitizer market, Microsoft had finally caved. Of course, Microsoft's new-found understanding of the value of touch was also a factor. Fujitsu was the first OEM to take advantage of this change, announcing in September 2005 that their touchscreen-equipped LifeBook P1500D notebook would be available with Windows XP Tablet PC Edition (it was previously available only with Windows XP Pro). This tiny, 2.2-pound notebook uses an 8.9" LCD with 1024x600 (Wide SVGA) resolution. That's one of the scaled resolutions supported by the UMPC (see Table 1), and the screen is only 1.9" larger than the UMPC's screen. (See Figure 11 for a photo of the P1500D in tablet mode.)

Touch in Current Tablet PCs: Although it hasn't been very visible, at least two Tablet PC OEMs (Xplore and PaceBlade) have been shipping dual-mode systems incorporating two digitizers for several years. Both products integrate a Wacom active digitizer and a passive resistive digitizer. Both OEMs created this functionality to meet the demands of their vertical-market customers. Furthermore, a surprising number of the smaller Tablet PC OEMs ship both "Tablet PC" and "Touch" versions of their products. The former runs Windows XP Tablet PC Edition and incorporates an active digitizer; the latter generally runs Windows XP Pro (or sometimes Windows 2000 in enterprise environments) and incorporates a resistive digitizer. This situation is very analogous to the "Centrino Brand" situation on standard notebooks. Many notebook OEMs ship both a Centrino-branded version of their product with Intel wireless hardware, and a non-Centrino version with other-brand wireless hardware. They are forced to do so because Intel won't let them ship non-Intel wireless hardware on a Centrino-branded product. Similarly, until mid-2005, Microsoft wouldn't let the Tablet PC OEMs ship the Tablet PC OS on a system with only a resistive digitizer. It's amazing how often Intel and Microsoft try to interfere with what would otherwise be an orderly market.

Haiku/UMPC at WinHEC 2005: In his keynote speech at WinHEC 2005, Bill Gates showed a concept product called "Haiku" (see Figures 5 and 6). This concept product, developed by Otto Berkes, the UMPC architect, intentionally assumed significant advances in technology that hadn't happened yet. In other words, it was a product that couldn't actually be built. While it's admirable of Microsoft to push the boundaries and think ahead, it also unfortunately sets expectations too high, too early. The first-generation UMPCs look positively clunky next to Haiku.

Figure 5: "Haiku" concept product

UMPC Touch Pack: The only part of the entire UMPC announcement that is actually something totally new is the UMPC Touch Pack. The Touch Pack, which is available only to UMPC OEMs, consists of the following five applications/features:

- Program Launcher: This utility allows the UMPC user to categorize applications into folders to make them easier to find (remember the Windows 3.1 Program Manager?) and to select a category from a large-button list (see Figure 7). In his blog, a UMPC team member described the Program Launcher as "totally cool looking" – that's so Microsoft!
- Touch Improvements: This run-once utility makes about 10 setting changes to Windows to make it easier to use on a small, touch-enabled computer. These settings, all things that Windows already supports, includes such things as widening the scroll bars, enlarging the minimize and maximize buttons, showing folders in thumbnail view, etc. Not all users may appreciate all of these changes – especially the thumbnail views on a small screen.

Figure 6: Bill Gates showing the "Haiku" concept product at WinHEC 2005

Brilliant Black: This is a new skin for Windows Media Player that fills the entire screen and provides large media control buttons (see Figure 8).

- DialKeys: DialKeys is an innovative on-screen keyboard for Windows XP developed by Fortune Fountain, Ltd., http://www.fortune-fountain.com. It consists of two translucent, wheel-shaped software keyboards at the lower corners of the UMPC screen so you can type with your thumbs while holding the system in both hands (see Figures 9, 10 and 11). Having long thumbs would seem to be an advantage with this keyboard...
- Sodoku: Sudoku is a numeric logic game that's very popular in Europe and is gaining popularity in the US. This version was written in mid-2005 by Stephen Toub, a Microsoft programmer, on a flight back to Seattle from Europe (he describes the event in his blog, http://blogs.msdn.com/toub/default.aspx). The program is "optimized for touch and the pen", which basically means that the boxes and buttons are large (see Figure 12).

Figure 7: UMPC Program Launcher

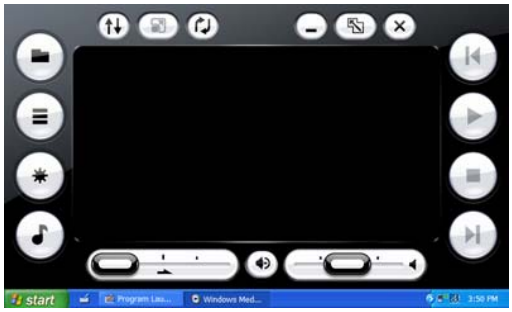

Figure 8: "Brilliant Black" Windows Media Player skin

"New" is relative. None of these five Touch Pack components break new ground. In addition to not being developed by Microsoft, DialKeys isn't even new -- Fortune-Fountain appears to have been shipping it since mid-2005. It's currently shipping on the Fujitsu P1500 convertible Tablet PC. Nevertheless, taken together, the five components give a reasonable impression of optimization for touch.

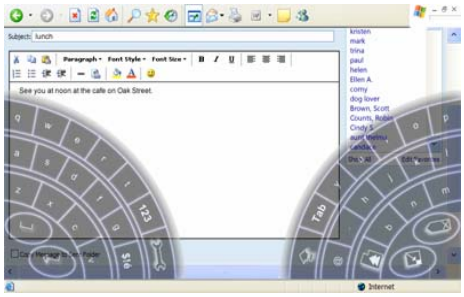

Figure 9: DialKeys on-screen thumb keyboard

Figure 10: Close-up of thumb on DialKeys keyboard on Samsung UMPC

Figure 11: DialKeys running on a Fujitsu P1500 convertible Tablet PC

Using Windows on a UMPC: If you've never used full Windows on a PC with a resistive touchscreen before, you'll find that it takes a little getting used to. The key differences are as follows:

1. There's no hover. This is the biggest difference. It means that when you would normally move the pen over a photo or other item on a web page to see if it's clickable (i.e., if the cursor changes), nothing happens. It means that tool tips don't appear until you actually click on the icon or button – which negates the purpose of the tool tip. Not having hover makes using Windows quite a different experience. After all, remember that in 2001, Microsoft was absolutely convinced that it was absolutely essential on a Tablet PC.

Figure 12: Sudoku game

2. If the UMPC doesn't have mouse buttons on the front bezel, you must use the Tablet PC OS' tap-and-hold gesture in order to do a right-click. Many Tablet PC users don't seem to like this gesture, preferring to use the button on the side of the active pen (which doesn't exist on an UMPC).
3. Ink is noticeably more jagged due to the lower resolution of the resistive touchscreen. This isn't a big deal, but it's not very attractive when you're trying to draw something that looks really nice.
4. Handwriting recognition may or may not be degraded due to the lower resolution of the resistive touchscreen. Reports on this are conflicting – basically we'll have to "wait and see".

Touchscreen Specifications for the Tablet Kiosk UMPC: Now let's take a closer look at the actual touchscreen specifications on a typical UMPC. The only announced UMPC OEM to expose its digitizer manufacturer so far is Tablet Kiosk. According to their published specification, the V-700 UMPC uses a 4-wire resistive touchscreen from Transtouch http://www.transtouch.com.tw. The most interesting specifications of this hardware are shown in the table. One thing that's interesting about Transtouch is that they are the result of a joint venture between Fujitsu Components (one of the major Japanese touchscreen vendors) and CMC Magnetics (a Taiwanese optical media manufacturer who is expanding into "communications information appliances" [CIA]). The avowed purpose of the joint venture is to provide LCD touch panels for use in CIA products. Transtouch's technology is identical to Fujitsu's most basic (low-cost) product line.

Key specifications of the Transtouch resistive touchscreen used in Tablet Kiosk's V-700 UMPC

Specification	Value
Transparency	80%
Anti-glare	5%
Pen lifetime	100K characters (with 1.6 mm diameter pen tip)
Touch lifetime	1M touches (with 16 mm diameter finger)
Resolution	0.1mm (254 ppi)
Sampling rate	192 points per second
Linearity	1.5% (equivalent to 2.3 mm on the UMPC LCD)
Palm rejection	Yes

The specs shown in the table above are very typical of a standard resistive digitizer. A transparency of 80% means that the UMPC will perform very poorly in sunlight due to excessive light reflected from the screen (so you can forget about some of those concept product videos that show the UMPC mock-up being used outdoors in bright sun). Increasing the transparency and reducing the reflected light is expensive – up to 4X the cost of a standard digitizer (for maximum performance), which seems unlikely to happen in a $600-$1,000 UMPC. Anti-glare of 5% is very typical for most mobile computers (before "glossy" screens with no anti-glare became popular in the last year, that is). Pen lifetime of 100K characters (20K five-character words) seems short, but given that the UMPC really isn't positioned as a handwriting-intensive product, it's probably reasonable. To put a million finger-touches in perspective, that's five touches per minute, four hours per day, 280 days per year, for three years. Again it seems reasonable, especially since the realistic life of a UMPC is probably about 18 months due to rapid technology change. A resolution of 254 ppi is middle-of-the-road; the majority of resistive digitizers are specified with either 10-bit (1024 x 1024) or 12-bit (4096 x 4096) resolution. Mapped into the UMPC's 7 inch screen, these resolutions translate into a minimum of 171 ppi and 683 ppi respectively. A sampling rate of 192 is almost double the minimum required Tablet PC rate, which should help keep the handwriting recognition rate high on the UMPC. Palm rejection, probably the most important spec of all, is definitely included in Transtouch's product because Fujitsu understands the need for palm rejection better than any other digitizer vendor. Of Transtouch's 43 standard products, 35 are pen/finger (with palm rejection), seven are finger-only and one is pen-only. It will be very interesting to see how many of the other UMPCs include palm rejection.

UMPC Applications: Current Tablet PCs are focused on the enterprise mainly because there's very little pen-enabled software that's of interest to a consumer (see my article in the previous issue of Touch Panel on this topic).

In aiming the UMPC at consumers, Microsoft is emphasizing the familiarity of Windows XP, the product's high degree of mobility and the finger-touch interface to Windows. The pen is minimized, and handwriting recognition isn't even mentioned in any of the UMPC marketing materials – although it's included and it works. Microsoft's list of typical consumer applications for UMPCs includes the following:

- Browsing the Web
- Managing email
- Communicating in real time
- Gaming
- Edutainment
- Health management
- Keeping a journal or diary
- Listening to music
- Creating and organizing scrapbooks
- Sharing digital images
- Searching a TV program guide
- Controlling a TV or other electronics
- Watching recorded movies or TV
- Watching and tracking sports
- Managing finances
- Managing food and recipe inventories
- Mapping or following a GPS signal
- Taking notes
- Conducting research
- Managing schedules
- Maintaining a to-do list
- Managing time effectively

This is a reasonable list of light-weight consumer applications for any PC, not just a UMPC. There's nothing on the list that requires serious processing power, such as working with large Photoshop images, writing a college thesis or editing digital video. It's plausible to consider doing most of the applications that Microsoft lists above on a low-end PC. However, doing them on a PC without an integrated keyboard is a different story.

UMPC as a Keyboardless PC: The UMPC's slate form-factor is where Microsoft is making a major leap of faith. Current Tablet PC sales are over 80% convertibles – this can be taken as a clear indication that slates are mostly for specialized (vertical) applications. It's not immediately obvious that a consumer is any more willing to give up the keyboard than an enterprise user.

Of course you can use the on-screen DialKeys keyboard, and you can connect an external keyboard to a UMPC (via USB or Bluetooth, depending on the particular product). But that seriously detracts from the portability of the device (see Figure 13 for an example). Although some UMPCs will have an integrated fold-out leg on the back, using a UMPC with an external keyboard still means finding a flat surface on which to place the UMPC and the keyboard, and probably having to compromise on the screen angle. These are problems that the clamshell notebook form-factor solved way back in 1982. There's nothing to prevent an OEM from creating a small convertible UMPC (and in fact, one of the Intel concept product videos shows just such a device) – but then the UMPC becomes more like a sub-notebook, and it's been proven over and over again that subnotebooks don't sell in North America. For me, this is the rock-and-a-hard-place of the UMPC. I just don't see the average consumer adopting a keyboardless PC as their primary mobile machine.

Figure 13: Samsung's UMPC in a "portfolio-style" case with an external keyboard and an external optical drive

Of course, not everyone agrees with me. The following is an extract from a very articulate blog posting by Michael Gartenberg, a Jupiter Research analyst who spent several weeks using a pre-production UMPC:

> "Origami is different from all the tiny little Windows machines that have come before it. It's different from the Sony U-series, it's different than the Libretto and it's different from an OQO. Those machines, while wildly popular with the Japanese mainstream and US geek markets, have never taken off in a big way. One reason is that taking Windows and shrinking it down to size doesn't make it more usable, in fact less so. Add in the fact that making smaller machines means making computers that cost more, and in the US we

pay a premium for large sizes, not smaller, less functional ones. Origami gets over these issues in two ways. First, by focusing on touch and creating a new way of interacting and entering information, Origami gets over the issue of tiny keyboards. Second, Origami introduces a new paradigm for UI. Much like there were PCs with TV tuners long before MCE, the power of MCE was really the 10-foot UI. The power of Origami is really in the 10-inch UI. Finally, by focusing on what could be delivered in today's technology sweet spot, Origami doesn't come in at the $2,000 price point, a major difference in terms of who can afford these machines – and those prices will only go down".

In terms of usage model, Origami as a concept may well change what devices people carry with them. While it's not a pocketable device, Origami units by design are small enough to be kept close at hand. The fact that they run Windows means that they can excel at a variety of tasks, from productivity to games to media consumption (it's a great Slingbox client, for example). That means there's several different types of user scenarios, both consumer and business in nature that you can envision. Origami isn't an iPod killer per se, it's rather a new class of device that will compete with other devices that cost about the same. That means portable media players, game machines, GPS units and the like will face some new challenges. The fact that Origami is a PC-based platform means that there's a lot of functionality that it's going to be capable of and like the PC, be able to offer a no-compromise solution for most of these applications. Is it the most powerful PC you own? No, but the PC you have at hand is better than the best machine you leave behind.""

UMPCs Have Been Around for a While: As Michael Gartenberg notes, Microsoft didn't invent the idea of a small form-factor PC. The table below compares the essential characteristics of a few of the products that could legitimately be called "ultra-mobile PCs" (without initial caps).

Existing ultra-mobile PCs compared with the UMPC

Specification	UMPC (Typical)	Fujitsu P1500 Notebook	Motion LS800 Tablet	Vulcan FlipStart Palmtop	Sony U50/U8G Tablet	OQO Model 01+ Palmtop
LCD size	7.0"	8.9"	8.4"	5.6"	5.0"	5.0"
LCD resolution	800x480	1024x600	800x600	1024x600	800x600	800x480
Outdoor readable	No	No	Option	No	Yes	Yes
PPI	133	134	119	213	200	187
Digitizer	Passive	Passive	Active	None	Passive	Active
Keyboard (% full size)	External	Internal (84%)	External	Internal (43%)	External	Internal (32%)
CPU	Pentium M 1 GHz	Pentium M 1.2 GHz	Pentium M 1.2 GHz	Transmeta 1 GHz	Celeron M 900 MHz	Transmeta 1 GHz
Battery size	28 WHr	28 WHr	29 WHr	??	??	??
Battery life	3 hours	3.5 hours	2.5-3 hours	2 hours	2.5 hours	3 hours
Dimensions (inches)	8.9x5.7x1	9.3x6.6x1.4	8.9x6.7x0.9	5.8x4.0x1	6.6x4.3x1.0	4.9x3.4x0.9
Volume	50.7 in^3	86.2 in^3	52.0 in^3	23.7 in^3	28.8 in^3	15.0 in^3
Weight	1.9 lbs.	2.2 lbs.	2.2 lbs.	1.0 lbs.	1.2 lbs.	0.9 lbs
Operating system	XP Tablet	XP Tablet	XP Tablet	XP Pro or XP Home	XP Home	XP Tablet, Pro or Home
Price	$900-$1,000	$1,450	$1,700	Not yet in production	$1,800 (Out of production)	$1,900 to $2,100

The reader is left to draw his or her own conclusions from table above. While you're thinking about these super-light computers, consider the following information. According to Current Analysis (a market research firm), here's how sales of notebook computers break down by weight in the US:

Notebook Weight	Market Share
< 4 pounds	< 1%
4-6 pounds	34%
6-7 pounds	51%
7+ pounds	14%

For More Information on UMPCs: Curiously, there is very little hard news available on UMPCs. None of the initial OEMs have any information whatsoever on their websites. There are no detailed press releases from each OEM as there usually are with a Microsoft platform announcement. The best source of news at the present time is enthusiast websites, and they're springing up like weeds. Here's what's currently available:

- Only UMPC
- Origami Portal
- Origami Project
- Paperback PC
- Ultra Mobile PCs
- Ultra Mobile PCs
- Ultra Mobile PC Talk
- Ultra Mobilize
- UMPC Buzz
- UMPC City
- UMPC Community
- UMPC Focus
- UMPC Fun
- UMPC Site