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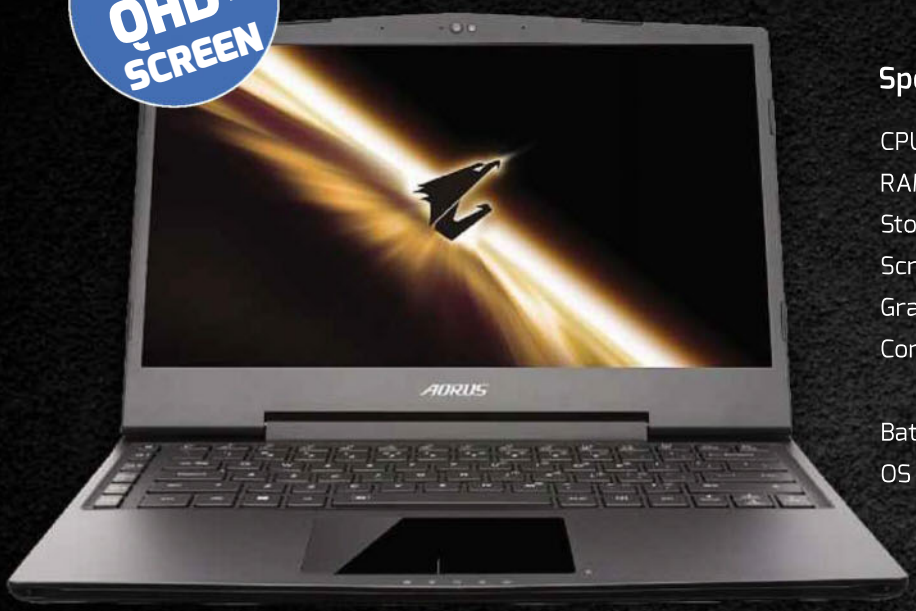

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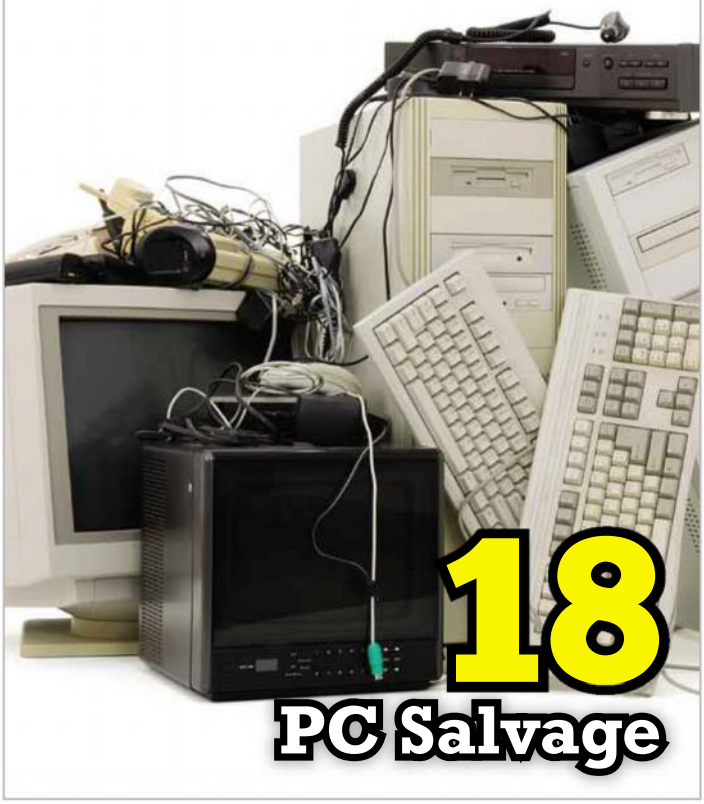

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The amount of storage you can buy these days is scary, when you think that less than 20 years ago 1GB drives were common in PCs – not that we're complaining, of course. In fact, in celebration of this evolution, we've been looking at six drives ranging from 4TB to 6TB and putting them to the test

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56 The Rise Of eBay

Meteoric is perhaps an overused word, but it really does seem apt when talking about eBay, a firm that has grown to massive proportions in a relatively short amount of time. It's not just eBay itself that's getting rich, however: many of its users are also making huge amounts of money by selling through it. Of course, it's not without its problems, as David Crookes explains

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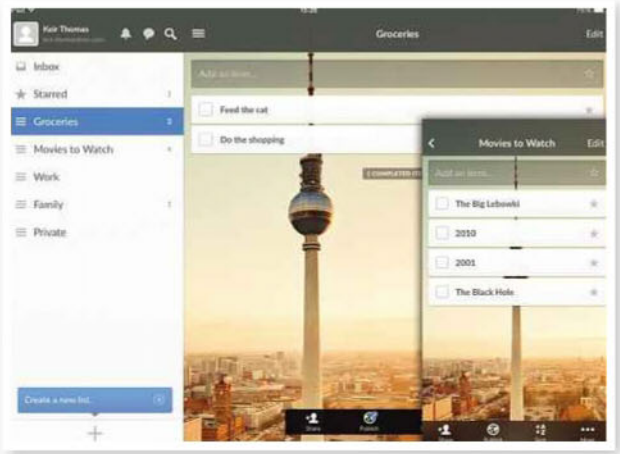

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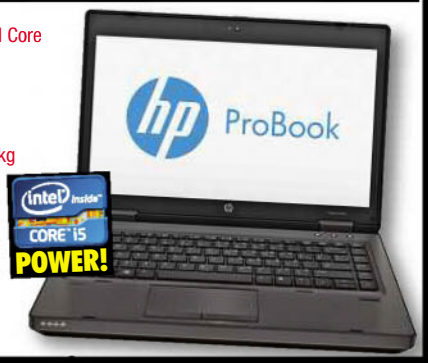

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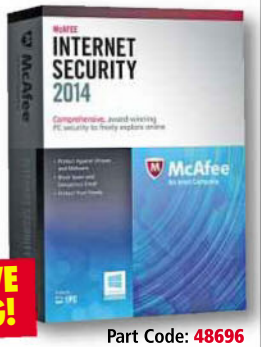

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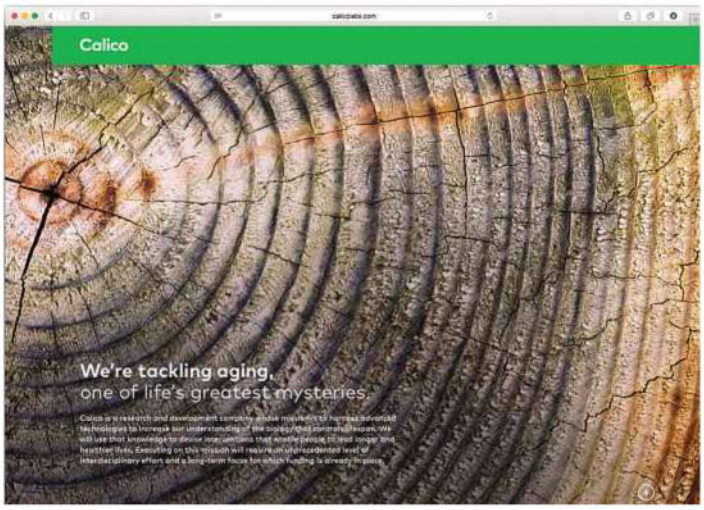
Google Are Big Changes Afoot?

With Google having a reshuffle and promoting Sundar Pichai to number two, David Crookes looks at the pressure and possible changes it may bring



At the end of October, Google had a small reshuffle. These things can tend to be rather boring and businesslike, exciting only for shareholders or *Financial Times* readers, but when it involves a company like Google, people sit up and take greater notice. It's no surprise: we all use Google, so we all want to know if what it is doing will affect us in any way.

On the face of it, this reshuffle doesn't appear to be anything other than a simple promotion. A memo sent out by Google explained how CEO Larry Page was going to transfer leadership of the core Google products to Sundar Pichai, the head of Chrome, Android and Google Apps, and how Pichai was going to be responsible for Maps, search, Google+, commerce and ad products, research and infrastructure. It also said that six executives – including the head of search, social media and research, all of whom previously reported to Page – would now be directly under Pichai.

> **"Despite frequent rumours that Chrome OS and Android will merge, they have continued to co-exist"**

If you believe that this news is purely about rewarding rising star Pichai and giving Page a little less work to do, then you'd be mistaken. There is more to it than that. *Re/code*, which was the first to report this memo, says Page will now concentrate on NEST, Calico, Google X, corporate development and the legal, financial and business side of the company, but this move is also Page's way of saying that Google needs to be freshened up.

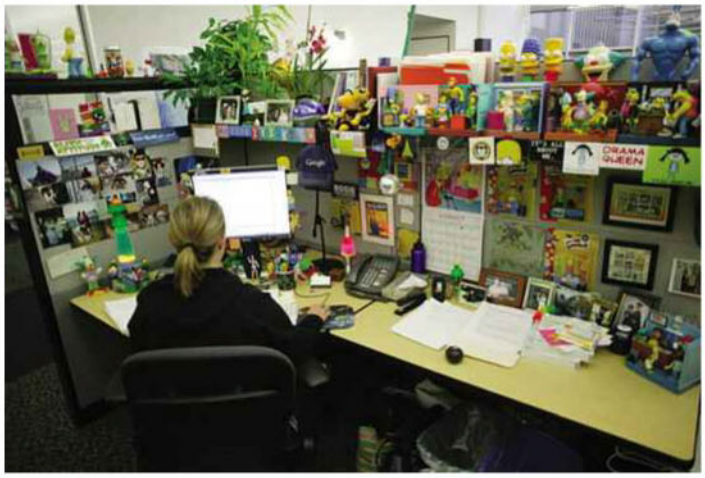
Since its inception in 1998, Google has grown at an extraordinary rate into one of the world's best-known companies, with its corporate fingers in a multitude of pies. As time has gone on, Page's role has been said to have created a bottleneck so, by reducing the number of reports and duties he has to deal with, Page is hoping to focus his attention on existing and new products.

The fact he is comfortable doing that speaks volumes, and contradicts his reputation as a self-confessed control freak who has always wanted to have a final say in everything that Google is doing. As *Business Insider*'s excellent 'Larry Page: The Untold Story' article explained (it's well worth looking up), he grew to detest management layers, believing them to be an impediment. There are many stories about how he has preferred to cut through them in a bid to get closer to those who he feels matters most: Google's very talented base of engineers.

At one stage, when Page was 28, he tried to axe his project managers and ensure all Google's engineers reported to the newly-recruited VP of engineering, Wayne Rosling who would then report directly to Page. It didn't work out the way he wanted and the move was opposed by many of Google's other senior bods, who feared it would make for directionless engineers. It serves to illustrate Page's desire to have as few barriers between him and Google's workers as possible, however.

What we are seeing with the reshuffle, though, is a sense that Page has recognised the need to step back; it also makes clear his trust in Pichai, and his willingness for him to represent a new management layer for a number of Google's business. While Pichai will report directly to Page, the promotion will inevitably mean a different perspective and a new approach for the future of many Google products. Except one – which we'll come to later.

"I think the intention is to continue innovation at the company," says Wedbush Securities Google analyst Shyam Patil. "I think Larry Page assumed the CEO role a few years ago and



Another View

Two years ago, *Forbes* magazine claimed Google was anti-competitive and had been engaging in systematic theft which, it explained, was the avoidance of the standard cost of propertied goods for which law-abiding competitors must pay.

It has been accused of copying millions of books without permission; allowing tens of thousands of copyrighted videos to be available on YouTube; and infringing the copyright of a host of newspapers, artists, trademark owners and photographers.

For Robert Enderle, the principal analyst of the Enderle Group, the Google reshuffle allows Page to better address these issues.

"It will free Page up and separate him from growing liability for anti-trust and IP theft issues which seem to suddenly be surrounding the company," he claims, adding: "The timing seems very close to both things suddenly becoming very visible and it isn't unusual for an executive to hedge and set up a scape goat when this happens."

Who Is Larry Page?

Larry Page was born on the 26th of March 1973 in East Lansing, Michigan, to computer expert parents Carl and Gloria. He became interested in computing aged six and went on to study computer engineering at Stanford University, meeting Sergey Brin with whom he developed a search engine as a research project.

Having raised $1 million from investors, friends and family, both men left Stanford, despite not finishing their studies, to launch what came to be known as Google in 1998. It was one of the very early web search tools, not only listing results in order of popularity, but giving people what they wanted at lightning fast speeds. Page and Brin became co-presidents until 2001 when they hired Eric Schmidt to be chairman and CEO.

Married to former model Lucinda Southworth (Virgin founder Richard Branson was his best man), Page is seen as a 'private man' who is awkward in company, but he can relish his moment in the spotlight. That said, he once said (in 2008) that he would give only eight hours worth of press conferences, speeches or interviews for that entire year. He became CEO of Google in 2011.

became bogged down in normal day-to-day duties. This change will allow him more time to focus on the future and areas of innovation and less on management tasks on a daily basis which can be done by someone else. If it works out it should help Google make better products and services in the future."

Android/Chrome OS merger?

So what can we expect? First of all, it would be surprising if this move will lead to any specific new products over the next year. The move is more likely to provide a focus for innovation beyond 2015, but we would not be surprised – now that Google's product line has been carved into two – to see some fundamental future changes to the existing products that Pichai will be overseeing.

Android and Chrome OS are likely to be impacted the most, given Pichal's history with the two operating systems (Pichai was the person who instigated Chrome back in 2008, and in 2013, he took over Android and Google Apps too). Over the past year, we have seen overlaps between the two becoming ever larger. Firstly, Chrome introduced its own set of apps, some of which can be used offline, and, secondly, in September this year, we saw a move to allow Android apps to be used within it.

There is also an expectation that Chrome extensions will, at some point, be able to run within the Android version of the browser, bringing its desktop-like features to the mobile OS. This would also be great for developers, letting them to inject greater flexibility in their apps and potentially allowing for a wider, more profitable market that should unleash creativity further.

Yet analysts suggest the two won't get together as one just yet. "They've spoken about it in the past but it's a bit tougher to do especially given that one is built for touch screen mobile specific devices and one is not", Patil tells us. It's also true that despite frequent rumours that Chrome OS and Android will merge, they have continued to quite happily co-exist and even co-operate.

That doesn't mean thing's can't change, though. Pichai said in an interview with *Wired* in 2013 that there was to be an increased focus on finding "commonalities" and sharing code between the platforms. "Maybe there's a more synergistic answer down the line," he said – and with Pichai running a wider range of Google divisions, he may feel his energies are best served by pushing for even closer Android/Chrome OS integration, eventually leading to a single operating system that will seamlessly run across all devices.

The Social Network

So what else? Well, with Google+ now part of the Pichai portfolio, it is likely bigger changes will be afoot for the company's beleaguered social network. Google+ hasn't had the easiest of times. Its head, Vic Gundotra, left earlier this year for a new challenge and, despite having 300 million members, Google+ bosses are very much aware that so many of them have signed up simply to access another Google service. Google+ certainly isn't anywhere near as influential as Facebook, and as a

Who is Sundar Pichai?

Born Pichai Sundararajan in 1972 in Chennai, Tamilnadu, India, Pichai has risen from his role as a middle-manager at Google to effectively become Larry Page's number two. His credentials are not in question. He has a Bachelor of Engineering degree from IIT-Kharagpur, an MS from Stanford and an MBA from the Wharton School of the University of Pennsylvania. He joined Google in 2004.

He was initially responsible for Chrome and Chrome OS as well as Google Drive. In 2013, he began to oversee Android. One of his biggest, earliest innovations was a toolbar that enabled Google to make its search engine the default option on Internet Explorer and Firefox. Fear that Microsoft would make it difficult to install lead to the development of Chrome. Pichai is married with a son and daughter.

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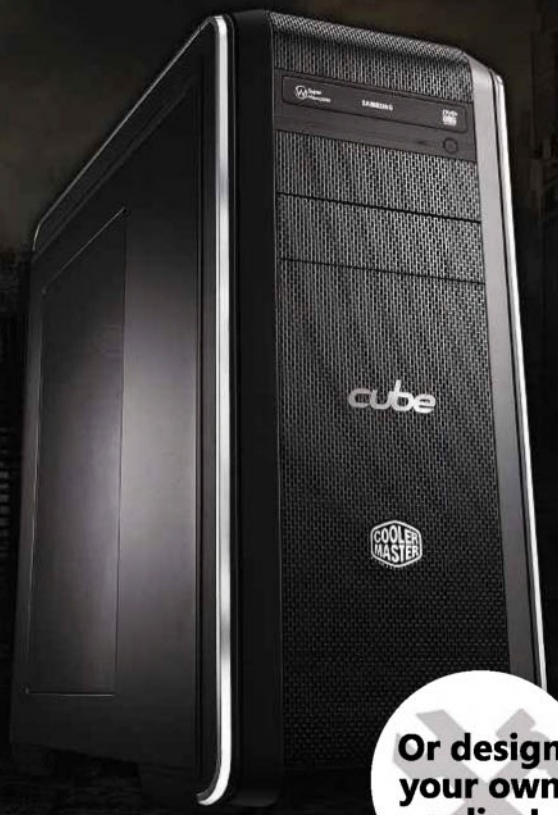

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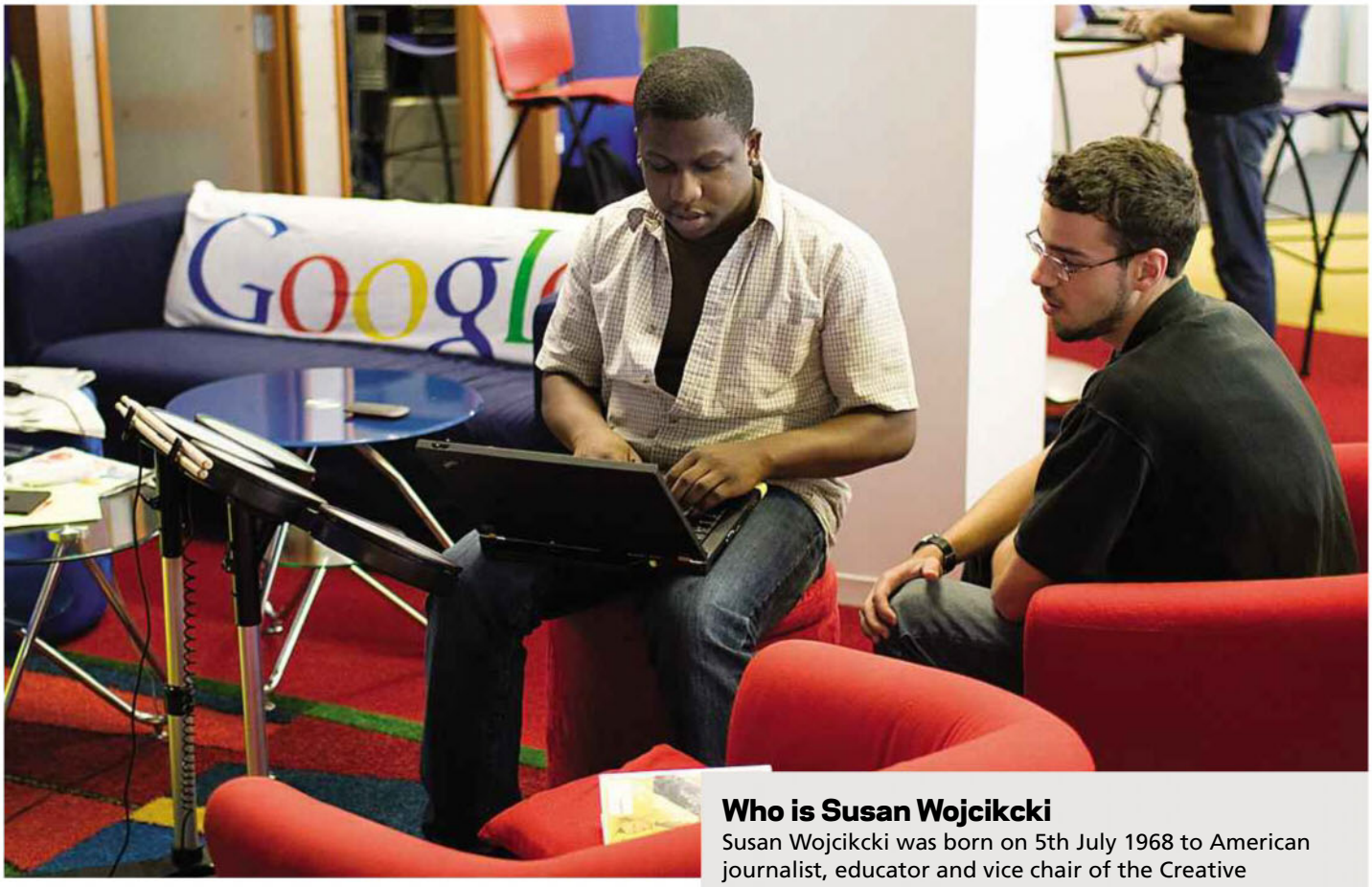


social network it even lags behind the new boys Ello – certainly in terms of the excitement it has generated since it came into being in 2011.

One of Pichai's first tasks, then, will be to figure out what he should do with it. According to reports by *TechCrunch*, Google+ has a relatively small development team thanks to around 1,000 employees within the division being moved to other projects in April this year. This, however, will make it easier for Pichai to axe Google+ should he want to. It wouldn't be the first Google social network to go: Google Friend Connect launched in 2008 and was retired in 2012; Google Buzz arrived in 2010 and flew off the radar just a year later.

There are alternatives to pulling the plug or simply persevering now that the man who oversees Chrome OS and Android has his hands on it. Pichal may decide to make Google+ entirely integral to both operating systems, letting it gather data that can be used for future product designs. He may believe it is better to just split the products that form Google+ into their own apps. It can draw inspiration from Facebook with regards to this: Facebook's major worry has been the emergence single-purpose social apps of the likes of Instagram and WhatsApp which is why it snapped them up. Creating a specific tool for a specific task is an attractive proposition for consumers and Google could exploit this market.

By doing so, Google would be able to build up smaller but no less significant communities around shared interests. Google+ Photos could rival Instagram, for instance. Google is not adverse to splitting products, either. We've already seen Google successfully offer separate social apps with Hangouts and Voice. Given Pichai heads up Google Apps, a fragmented break-up of Google+ could very easily be on the cards.

Who is Susan Wojcikcki

Susan Wojcikcki was born on 5th July 1968 to American journalist, educator and vice chair of the Creative Commons board of directors Esther Wojcicki and emeritus professor Stanley Wojcicki. She was brought up on the Stanford University campus, but she studied history and literature at Harvard University, graduating in 1990.

In 1998, she became Google's first marketing manager. Her sister Anne married Sergey Brin. At Google she helped pioneer the Google Doodles and she also led the advertising and analytic products department. She oversaw Google Video and when the search engine giant bought YouTube for $1.65 billion in 2006, she became Senior Vice President. In February this year, she became the head of YouTube.

Wojcikcki reports directly to CEO Larry Page. She is married to Dennis Troper and she has four children.

The Way Forward

So what of Maps? For so long, Google Maps has been the standard bearer, the stick that Google has consistently used to beat Apple (which had troublesome beginnings in the Mapping business that continue to haunt it, even though its app is now very much improved). It has also made great strides over the past year with better real time traffic views and apps optimised for iPad and Android tablets.

The Maps apps were rebuilt from the ground this year so we can't see a major overhaul happening again in the near future. Rather, Pichai will most likely leave the team to get on with it for the time being while exploring more revenue streams. The custom maps that Google now offers, which labels every street around a landmark and features cards that summarise places of interest, will be of great interest to advertisers and will likely be exploited further.

> **"Pichai's promotion will mean a different perspective and a new approach"**

Indeed, Google's prize cash-cow – advertisements and promotions – will be firmly to the forefront of Pichai's mind now that he oversees that division too. It could well be that he looks towards an umbrella approach, spying opportunities that cross from apps to app, OS to OS. This will prove particularly important when it comes to search.

Over The Page

What about Larry Page, then? In September this year, reports suggested that he was in the midst of setting up a "company within a company" and that it had come to be dubbed Google 2.0. In looking after this, Google is about to go in directions that could very well leave its rivals standing.

The Microsoft Lesson

Google is by no means the only tech company which has grown big and, as a consequence, has needed a reshuffle in order to reinvigorate it. Firms across the world realise the folly of retreading the same old ground without a fresh perspective.

Some firms push things close – an ailing Apple almost went bust before it handed the reigns for a second time to Steve Jobs – and Microsoft sometimes has an air of limping along, making mistakes and struggling to make an impact in emerging markets.

Richard Edwards, principal analyst for Enterprise IT at Ovum, believes Google can learn from these companies, though – and he cites Microsoft as the best lesson of all.

"Hindsight is a wonderful thing, and I'm sure one could write a book highlighting where Microsoft went wrong," he says. "But in essence, Microsoft hit the classic innovators dilemma, whereby products whose features and functionality closely match market needs today often follow a trajectory of improvement by which they overshoot mainstream market needs tomorrow. An example of this would be Windows 8."

He says companies need to keep watching over their shoulders to ensure they stay ahead in the tech race. "Microsoft's 'market maker' powers have waned over the last few years, due to increased competition from Apple, Google, Amazon, and others, and also due to the company's products lacking market relevancy.

"I would cite mobile as an example here. Blackberry captured the mobile email market and made Windows Mobile irrelevant. Then Apple took-over from Blackberry as the app market developed beyond PIM and email. Google was fleet-of-foot and got to market with Android, squeezing Microsoft to the number three player."

So, what can technology companies learn from this? "If you don't measure and monitor how customers are using your products and services then you risk missing the market change," he answers. "Ploughing on with what Clayton M. Christensen calls "sustaining technologies" leaves a company vulnerable to the effects of "disruptive technology". Disruptive technologies bring a new value proposition to the market, and if this meets with a market requirements then that technology disrupts the market, for example, Android-based phones were offered at lower cost than the iPhone and now dominates the market."

For Larry appears interested in how technology can have a positive impact on our lives. With NEST, he is moving into the internet of things, a world in which everything we own can be connected and run online. This is everything from our heating and lighting, to smoke detectors that not only spot a raging blaze but can work out if you've left the chicken in the oven.

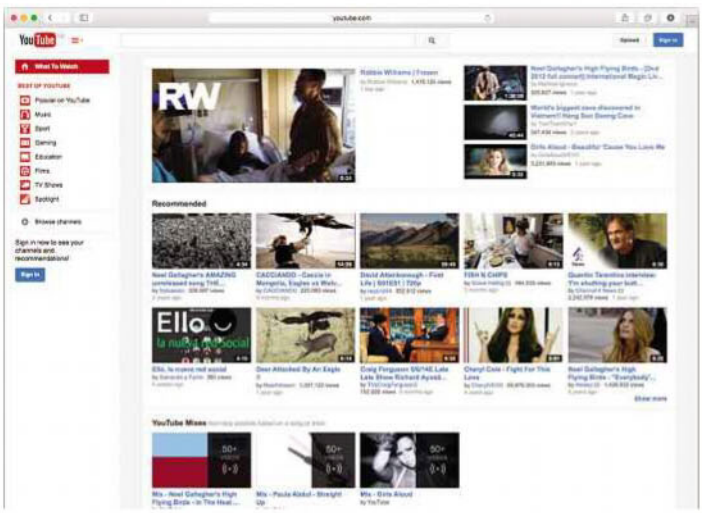
He is also looking, with Calico, at tackling the process of ageing. Calico has invested $250 million in an R&D unit that will look at a multitude of age-related diseases. It has already been working on wearable technology which allows cancers, heart attacks, strokes and other diseases to be spotted earlier than is currently possible via the monitoring of disease-detecting nanoparticles, but much more could be possible.

> **"There is talk of building a model airport and city"**

Page is also overseeing Google X, a semi-secret lab that comes up with projects as exciting as Project Glass and the driverless car. Google X appears to be interested in robotics and it has benefited from buying Schaft.inc, Redwood Robotics, Meka Robotics, Holomni, Bot & Dolly and Boston Dynamics, all of which relate to that technology. We can see many more innovations coming from this facility in the near future.

It seems Page wants to look at the 'wider picture' rather than just within Google. While he will still have a hand in Pichai's projects, he appears to be opting to spend less time on established things – the mobiles and search engines. Those to all intents and purposes, are up-and-running, requiring a capable, steady hand in order for them to remain at the forefront of technology. By having Pichai at the helm, they can have that, allowing those products to generate the revenue to fuel the newer stuff; the stuff that Page now seems to want to be more involved with.

So while Pichai gets on with securing the cashflow and product maintenance, Page can work at another level entirely. There is talk of building a model airport and city, for instance; indeed Google is already building an air terminal at San Jose International for the private jets of its company execs. "There will be more innovation around driverless cars, Google Glass, NEST, the internet of things – all of the teams in these areas will be where Page will want to spend more time in terms of thinking about the bigger picture," says Patil.



Larry Page's Rules of Order

Very early on, Larry Page wrote down some Rules of Order that he expects Google employees to abide by. The idea is that creativity and ideas are able to flourish and that those on the 'shop floor' have as much of a voice as those higher up the food chain. There are just five rules; most of them go against tradition. Not that this has harmed Google whatsoever.

- Don't delegate: do everything you can yourself to make things go faster
- Don't get in the way if you're not adding value. Let the people actually doing the work talk to each other while you go do something else
- Don't be a bureaucrat
- Ideas are more important than age. Just because someone is junior doesn't mean they don't deserve respect and cooperation
- The worst thing you can do is stop someone from doing something by saying, "No. Period." If you say no, you have to help them find a better way to get it done

Watch Out....

That one exception that we mentioned 1,506 words ago? That would be YouTube, the one division that neither Pichai nor Page is directly overseeing. YouTube will remain under the stewardship of Susan Wojcicki who took over earlier in the year and who will report to Page. Pichai will not have any say in its operation at all.

One of Wojcicki's remits is to generate more profit and revenue from the video site, and thus it is looking likely that a paid-for, ad-free subscription version will be on the cards. it will, for mobile users especially, make for a faster experience (it can be frustrating to be forced through a 30-second advert on some videos). Wojcicki says this is a "near term" plan and told the *Wall Street Journal* that it will give users choice.

One of the reasons for this is increased pressure from Netflix and Amazon for viewers, particularly of quality content. "There are two areas in which Google's leadership is slipping: mobile and YouTube," asserts Patil. "There will need to be a focus on solidifying Google's presence in terms of it being a destination source and a time-spent source. It has to improve monetisation. On YouTube, Google has been dominant for online video for some time but there are still no major TV budgets migrating online. Google has to look at attracting the big shows to make YouTube a big hit for sponsors."

For the time being, Google is about to test the water with an ad-free music streaming service that will rival Spotify and concentrate on videos. YouTube is said to have conducted deals with Universal Music, Sony and Warner as well as many independents and what this deal and the entire reshuffle shows more than anything is that Google is not about to stand still.

YouTube is pushing forward into different markets and looking to generate more revenue. Pichai's expertise is set to steer Google's familiar products into the future with an emphasis on research and innovation. Page is looking to expand the company with products that look to save and enrich lives. Big changes are most definitely afoot – and its rivals will be watching on anxiously for some years to come. **mm**

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PC Salvage

Mark Pickavance talks about breaking down old computers, and how to divide the results into parts you'd like to keep and the rest

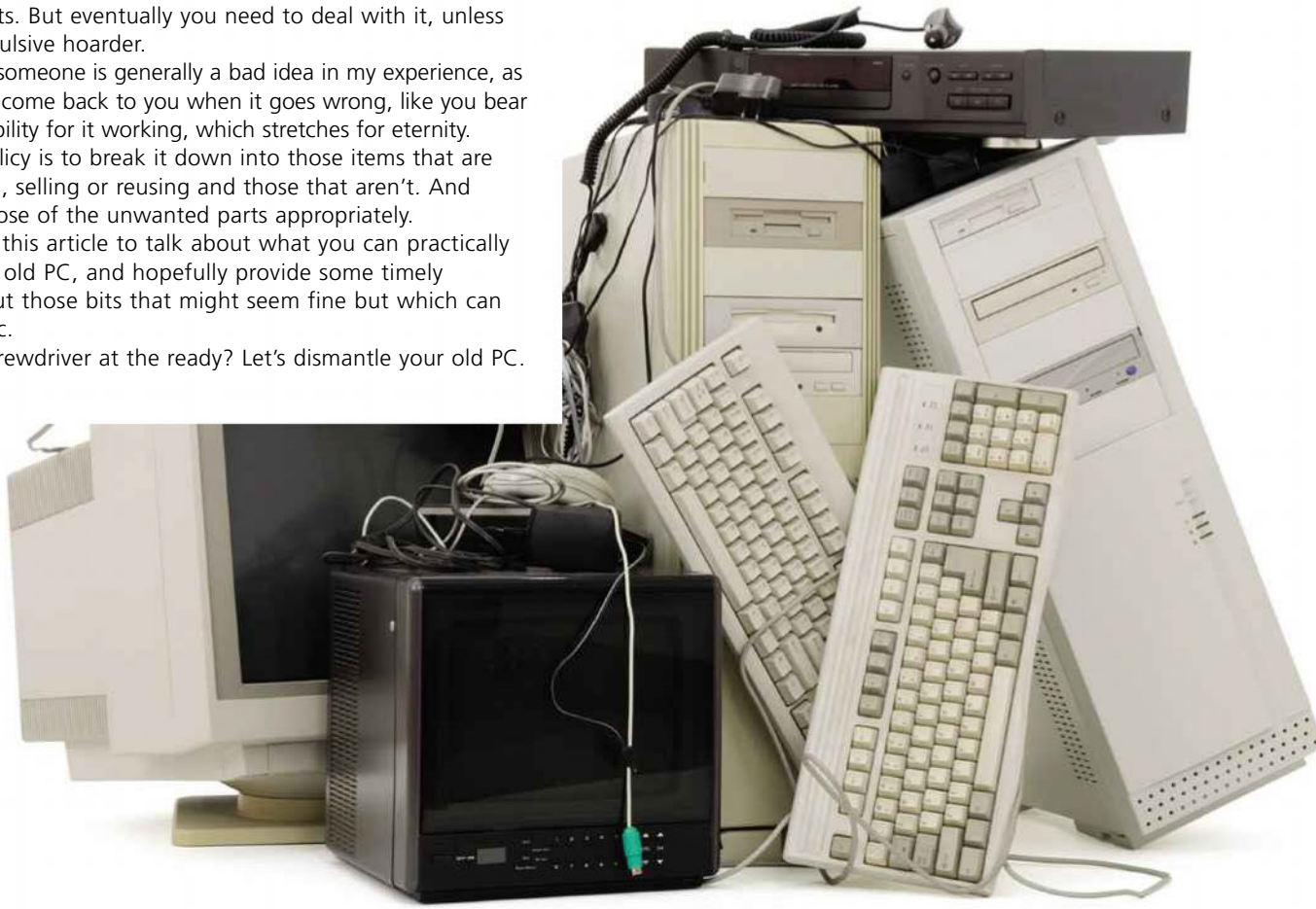
When you have old PC hardware, it's tempting to store it far from sight and make-believe that this no longer exists. But eventually you need to deal with it, unless you're a compulsive hoarder.

Giving it to someone is generally a bad idea in my experience, as they invariably come back to you when it goes wrong, like you bear some responsibility for it working, which stretches for eternity.

The best policy is to break it down into those items that are worth keeping, selling or reusing and those that aren't. And obviously dispose of the unwanted parts appropriately.

I've written this article to talk about what you can practically reuse from an old PC, and hopefully provide some timely warnings about those bits that might seem fine but which can be problematic.

Got your screwdriver at the ready? Let's dismantle your old PC.



Coolers And Fans

These parts by their very nature do tend to take some abuse over their working lives, and therefore you need to be initially suspect of them as potential spares or reuse candidates.

Fans that are heavily dust coated have usually suffered some bearing wear due to the imbalance that causes. Given that these are generally inexpensive items, and unless it was some sort of emergency, I'd never build a new PC with old fans; I'd be tempted to bin them from the outset. Only if they're a recent addition or if they're custom sizes that go with a case you also intend to keep would I even consider keeping a fan.

CPU coolers are another matter, as they generally use 80mm or 120mm fans that can be replaced if they become too dust damaged.

The calculation that you need to do with them has two components. The first is based on the mounting that it is designed to support (LGA 775, AM2, etc.) and if you still have in your possession any of the parts to support other standards.

You can't realistically mount an exclusively LGA 775 cooler on a modern LGA 1150 system, so unless you have a project to rebuild an old system the point in keeping it isn't well defined.

The other consideration is that CPU coolers generally need plenty of cleaning to be made serviceable again, and you need to balance that against the relatively low cost of buying something new.

Based on the number of old processor coolers I've got around, I probably need to be taking my own advice and chucking more of these items out. A spare CPU cooler isn't a bad thing, but more than four or five seems excessive.

As a rule I'd generally keep any enclosed water cooling systems unless they show abrasion wear on the connecting tubes, because they can be expensive items and a good upgrade to a fan based cooler.

Processors

The CPU is probably the most valuable part of any PC, so even if I have no obvious plan for it, I generally keep them.

A useful exercise to do after you've confirmed what specification they are is to take a quick look on eBay to see what they'd sell for. That can be a slightly soul destroying exercise if you paid plenty and they're going for a tenner, but it might be that they're worth slightly more.

If they don't cross the line of resale, then I usually keep them either to replace those lesser devices in the odd PC that people bring me or even to make paperweights out of them. I'd recommend if you have any designs with pins, like AMD or older Intel processors, that you press them into some foam padding to protect the pins. There isn't much that's worse than digging out an old CPU to replace a damaged one to discover the pins have been bent.

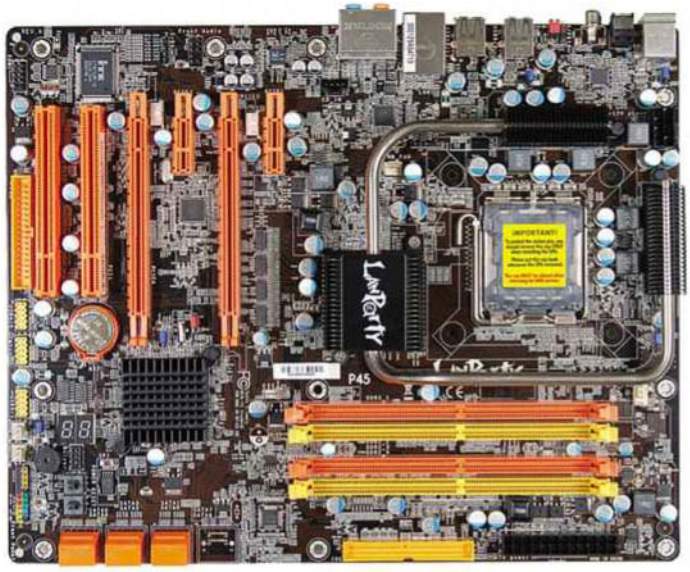
In terms of reusing old processors, you need to really do your research in regard to what CPU will work on what motherboard. For a long time Intel persisted with Socket 478 and LGA 775 while continually changing the underlying technologies, such that older processors fitted but often didn't work on later platforms.

But this is even true of relatively recent systems, like the LGA 2011 platform, which has morphed to now support DDR4. As the memory controller on an LGA 2011 system is in the processor, an original CPU won't work on the new X99 motherboards that support the new memory technology.

There's another twist to this which I encountered on AMD systems also, which is where the CPU will work, but only at a specific BIOS level or above.

Therefore, if to intend to do a CPU upgrade with a reclaimed part, then it's worth putting the latest BIOS release for that motherboard in place before ripping out the old CPU.

In short, always keep processors, probably even if you have no obvious reason for doing so.



Motherboards

Whereas CPU are keepers and fans are generally junked, motherboards exist in that strange twilight world were there fate is difficult to determine.

Unless it's a relatively modern or high-end item, my general reaction would be to bin it, because the chance of you needing it again isn't high. But especially when it's a working item, there's a natural instinct to hang on to it, rather than contribute to the landfill problems of the world. It's a fine line, and you need to make that call yourself.

If you do decide to keep it, I'd find a box where it won't be crushed, and as it's an LGA socket with those tiny exposed socket pins, I'd either find the plastic socket cover that came with it or stick the CPU back in there to keep them from being damaged.

Those who take their kit archiving really seriously (and I've done this myself) will go to the maker's website and download the latest drivers, BIOS, utilities and the manual in PDF form. I'll then burn all this on a disc and include it in the box.

The number of motherboard brands that no longer exist is high, so assuming all these files will always be available isn't good tactical thinking.

I have one last tip about motherboards that I've learned from bitter experience, related to when you take a board out of the case, remove the I/O shield and put them together. Twice recently, I've gutted a system, and forgot the shield, which has subsequently been dumped with the case.

A system without an I/O shield is just plain wrong, isn't it?

Memory

Like the CPU, I always keep memory, even if these days it's no longer as amazingly expensive as it once was. Ironically the stuff that's worth really looking after is the older modules, like original DDR and DDR2, which are both rather rare now.

The longer you hang on to it, the more valuable it might become, as those trying to maintain old systems struggle to find the necessary parts.

What you can't do is take old memory and make it work on a modern system, and that even includes some of the early versions of DDR3. The first DDR3 modules were only rated to 800MHz (PC3-6400), and this is below the normal speeds that modern motherboards and processors are expecting to run at.

If you intend to use old modules, its worth researching the new system and determining what it will take and what it won't.

As a rule, never mix old stuff with new, even if it might double your available RAM, because the memory system will be pinned down to the speed of the slowest modules, and it's a very effective way to destabilise a system.

It's better to keep the modules as spares or even resell them, rather than saddling a modern system with old slow modules.

RAM is always a keeper, unless you know it to be faulty.

Power Supplies

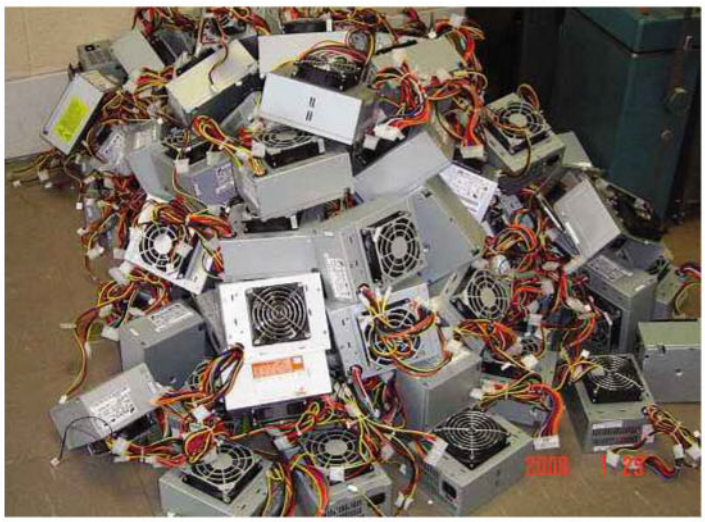
In a single word, no. A power supply that I keep from an old system needs to be something really special, because there are so many very good reasons not to keep them.

The first of these is that without disassembling them, it's impossible to get all the dust out of them, and as a rule I wouldn't advise anyone to open theirs up.

But even if it looks fine and the fan rotates nicely, I'd still be highly suspicious of taking an old supply and connecting it to a modern system, even if it had the right set of cables.

The problem with the PSU in a PC is that they're a part that dies quite often, either because they have an inherent fault, they're overloaded or dust creates new pathways for the power to go places it shouldn't.

If you're lucky, when the PSU dies it does so quietly, but I've had a few that have gone 'pop' in a very audible fashion, and it can be scary. What's an even greater concern is that when they do expire they can, under some circumstances, unleash power on the PC that it's ill-equipped to handle. The likely result can be a motherboard with a fried sub-system, dead memory or even a video card killed.



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Given all those possibilities, would you really want to chance that with a modern system? No, not really. If it's a budget limitation that you need to reuse the supply, then you just need to get a strong vacuum cleaner and make your best attempt at getting the dust out. You also need to be mindful about what the power demands of the new system are and that they don't exceed the PSU's capabilities.

Many motherboards that use ATX 24 connectors will run with an ATX 20 cable in them, though you can get cheap converters that fix this issue. A greater problem is that older supplies don't provide all the special power saving modes that a modern PSU offers, so you may find that your modern system can't sleep or hibernate correctly because of it.

As a rule, ditch old PSUs, as they're more trouble than they're actually worth. Trust me on this one. Is that burning I can smell?

Video Cards

Again, video cards are a tough one, because it's easy to spend lots on these devices and then they rapidly become obsolete. That imparts more value to them in your mind than they really practically have, which makes it harder to bin them.

How useful they are will be entirely dependent on how old they are and specifically what edge connector they use to connect to the PC. If it's PCI Express, they're definitely keepers, even if it's the oldest version, because they'll generally work on any modern system with PCIe slots. There are some weird exceptions to this, to do with odd voltages that some early cards used, but PCIe has been better than most card connecting technologies for backwards compatibilities.

And though this is a generalisation, any discrete PCIe card is usually better than built-in video, especially that provided by Intel.

Where things get less certain is if the card uses technology that predates PCI Express, like PCI or even AGP or VESA Local Bus. Of these, the only technology that is currently still supported is PCI, and unless it's something of an emergency or a special technical requirement, I wouldn't advise it.

Older technology will only work on old systems, and therefore if you keep an AGP or VESA card, then you've become a technology archivist.

I do know some developers who have used PCI cards to allow them to have as many displays as possible on a system, but it would be easier to buy an AMD video card with six Eyefinity outputs these days, should you really need that number of displays.

Every bits box has a few video cards in it, but they rarely get to play a game again.

Better cards have some resale value, if only to the person who already has one and was always curious about how they worked in SLI/CrossFire mode.

Hard Drives

It all comes down to size and connection technology in respect of hard drives, because there seems little point in keeping drives that couldn't contain a modern operating system or that use an antiquated interface.

So what's the least usable size these days? Personally I wouldn't keep anything less than 60GB, because that's the smallest practical system you might put windows on.

But it's not just about size, because drives that are smaller will generally be IDE, and their performance relative to modern SATA mechanisms will be dire.

As a rule, whatever size they are, I wouldn't keep any drive that predates IDE, because unless you're looking to build your own museum of computing, ATA, EISA and SCSI drives aren't useful or big enough to hold a single movie in standard definition.

You'd also have some fun getting an interface card to allow you to access them on a modern computer, which would cost you much more than a replacement drive.

The largest IDE drives reached about 500GB, a size worth having, though most motherboards no longer have the IDE interface needed to connect them.

You can get small adapters that allow you to connect an IDE drives to SATA or USB interfaces, but make sure that you get one that is for connecting an IDE drive to a SATA port and not one that's to connect a SATA drive to an IDE port.

These adapters only cost a few pounds, and they'll also allow you to reuse an IDE optical drive in a SATA system.

Before you rush out and buy one, I'd consider that typically the IDE drive won't be quick, and if it's been used heavily, it's more likely to fail than an entirely new unit.

Where I might shy away from using a reclaimed IDE drive in a front-line system, but I might consider using an external IDE USB box to make use of the drive.

If you go decide to dump the drive, remember that someone might amuse themselves by retrieving your personal data. So some mild modifications with a hammer might be a good idea before sending it for scrap.

Cases

Being in this business I've had some amazing cases over the years, some that cost plenty of money. If they accept the standard ATX layouts, there's no good reason why after they've seen a good clean they can't be reused.

The main reason that cases get disposed of is that they have broken plastic parts on them or they're excessively grimy or scratched.

If you want to repurpose a case, make sure that when you first assemble a system in it you take all the unused parts (drive bay covers, etc.) and put them in a box, I usually use the motherboard box. Then when you gut that system, you can put back everything as it should be, rather than leaving gaping holes in the case.

Where you can run into problems with cases is when they're not actually a generally used standard or they're not a common one.

The chief villain of this type of deviation is Dell, which decided long ago that standards were something other PC makers

followed. Over the years, it'd made ATX system that won't accept normal sized motherboards and PSUs that have strange projections on them for no good reason.

It was also one of the very few builders foolish enough to embrace Intel's entirely failed BTX standard that is odd in many respects. BTX is dead and buried and only of interest to the technically curious.

Non-standard cases might look nice, but you might have difficulty fitting standard parts in them, so they might be more trouble than they're ultimately worth.

Cables

Just bin them! Old cables are just a very effective means of storing up a problem for another time and then unleashing it on you. Fresh cables are cheap, and you know they're very likely to work perfectly.

The only exceptions to this I'd make are headers for USB that go to card end plates, because these can be useful occasionally. But some of the early ones are wired in an alternative fashion, so check they work before deploying a system with reused ones on it.

PCI Cards

Somewhere in a box I have a ton of PCI cards that do all manner of things. But, unless they're really specialised, all the things they generally do are either included on modern systems (like USB) or they're somewhat defunct.

There's a temptation for some people to fill slots because they're there, but I'd resist that inclination if at all possible, because it leads to the dark side.

If a PC doesn't specifically need those extra USB ports or SCSI or a TV adapter, then don't burden it with them. The more complicated you make a PC, the more likely is that you'll introduce a problem component.

Those cards that you know work and you have the driver discs for (critical…), I'd bag and keep. I've had a PCI LAN card come in handy when an on-board Ethernet interface died, so some cards can be useful.

The worst thing you can do is just to rip the cards out and throw them in a box, because some have so little product coding on them it can be really challenging to work out what they are a few years down the line.

Cards without organisation are just bits in a box waiting to be thrown out at a later date. Some sandwich bags and a marker pen could easily make them more useful when you suddenly have a need down the line.

Things To Sling

I've talked much about how you can reuse parts, but there are a bunch of items that can come out of old systems that need to see the bottom of a bin.

At the top of my list are floppy drives, because only the completely crazy would still be keeping data on 1.4MB magnetic media. If you still have something on floppy, you need copy it to a USB key or a CD, and dump this ancient technology ASAP.

I predict that someone will read this, go to do it and discover the discs are no longer readable. That's karma in action.

In the same boat as the humble floppy are modems, because they don't work well with modern digital telephone systems, and most web locations would take weeks to appear if accessed by dial-up. I've had people explain they keep theirs for faxes, to which I reply that 1986 rang, and it would like its red braces back.

Modems won't be making a comeback, and unless it's a really special one, neither will old sound cards, like the original Creative Sound Blaster. Along with them you can wave goodbye to analogue TV decoders (no signals left to decode), Zip drives (like it still works), proprietary scanner cards, parallel port cards, CD-ROMs, keyboards prior to PS/2 standard and anything that was once beige.

But the golden rule is to ditch anything that has caused problems at any point, because they'll come back and bite you later.

Remember, the chance of you throwing out something useful later is actually much smaller than keeping multiple items that you never have a good use for again.

Final Thoughts

There's something deeply satisfying about deconstructing a PC, even if I usually end up coated in dust and with some skin missing from my knuckles in the process.

However, there's little point if you intend to keep most of the parts, as they'll take up more storage space separated.

What leaving them complete also allows you to do is to test if a part works correctly, before transplanting it elsewhere.

That said, old computers don't generally improve like vintage wine, so you need to be a little ruthless about what you want to keep and what might be better on the other side of a reclamation centre.

I'm a firm believer in reusing old part where possible, but not to silly extents where the new system is compromised by having painfully small hard drives or under-specified RAM. Being realistic about what you can use and what needs replacing is paramount.

But (and this is an important point) when you do finally have a collection of the no longer required bits, dispose of them responsibly. Most municipal dumps have a special area for electronics, because they can contain toxic chemicals, along with more useful items like gold and platinum. Putting it in with your household rubbish makes it much less likely that it will be properly recycled and therefore should be avoided.

All system builders end up with a bits box, the contents of which are usually a mixture of the potentially useful and terminally nostalgic. The exact balance of those two parts is the true skill, because old computer junk probably occupies a calculable percentage of the attics and garages of the UK. **mm**

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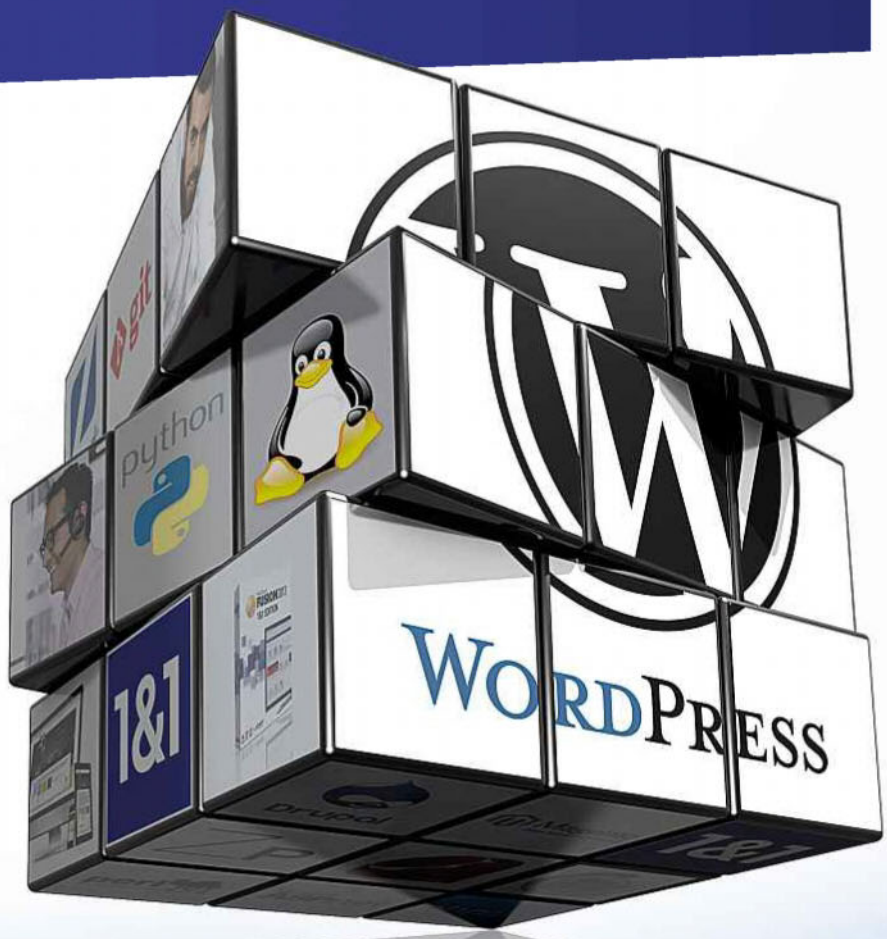

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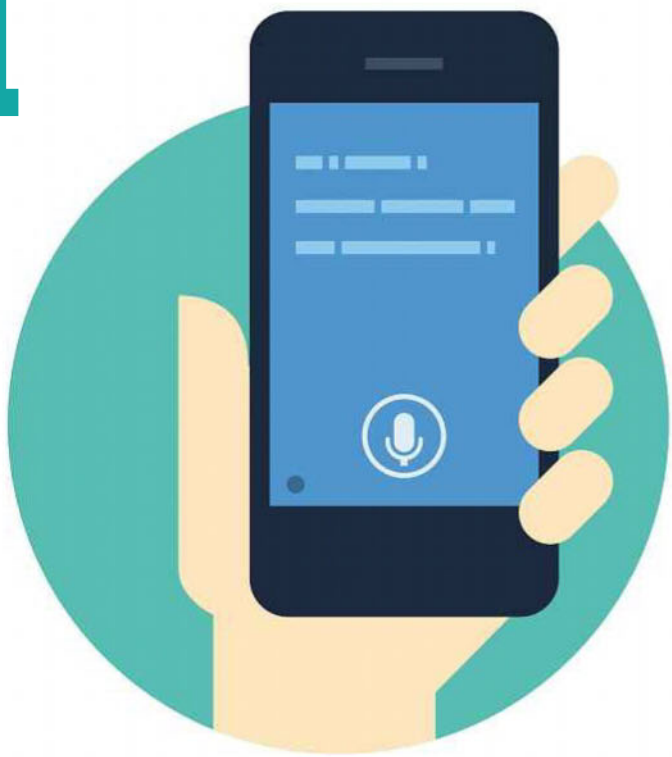
The Rise And Rise Of Voice Control

Sarah Dobbs looks at all the gadgets you can control by speaking to them...



Computer, identify malfunction.' Remember when voice-controlled computers were only available on *Star Trek*? It seemed like our lives would be much easier, if only we could tell our computers what to do by speaking to them directly rather than having to type in a series of complicated commands.

Now, though, voice control is being incorporated into more and more gadgets and systems. You can tell your iPhone to send a message without having to type anything in; you can probably call your GP and make an appointment without ever speaking to a human being. Crude at first, voice control systems have evolved to be able to understand a wider pool of words and sentences and to interpret a wider variety of regional accents. Voice controlled devices are slowly but surely becoming a part of everyday life. But has it really solved any problems? Or does it just make things more difficult? Let's look at the various places you might find voice recognition software and weigh up the pros and cons...

Telephone Booking Lines

Unless you're partially sighted, this is probably the first time you came across voice recognition software in the wild. Employed by cinemas and doctors and anywhere else you might want to book tickets or appointments in predetermined slots, automated telephone booking lines were able to recognise a few specific words. You'd usually be given a couple of options to choose between, to make sure you didn't go off menu.

The benefits: Automated systems like this have some pretty obvious benefits: they mean users don't have to wait on hold for a member of staff to become free to talk to them, which in turn means they're cheaper for the companies using them, since they don't need to employ so many people.

The pitfalls: Unfortunately, if you've ever had to use these systems – especially the early ones – you'll already know what's wrong with them. Even though they're only designed to recognise a few different words and phrases, they still often struggled with those, particularly if you didn't speak in perfect Queen's English.

Also, though this can't be blamed on the voice recognition software, the menu trees these programs worked on are often very limited, and if you find you want to say something that isn't covered by the three or four options you're offered, you're out of luck. Some systems even hang up on you, rather than transferring you to an operator, if you don't choose quickly enough. So that's not really ideal, from a customer services point of view.

Dictation Software

Another early use of voice recognition was dictation software – software designed to translate speech into text on a screen. The idea was, again, that this would speed up workflow, since reports wouldn't need to be audio-typed by actual humans. People with sight impairments might also use this software as an alternative to a braille keyboard.

The benefits: In theory, they can be beneficial to industries that involve a lot of audiotyping, and they can be invaluable to people who can't type on a traditional keyboard for whatever reason.

The pitfalls: The fact that journalists still have to transcribe their interviews manually speaks to the reliability of most of these programs. It's possible to spend as much time correcting mistakes in a software transcription as you would have done typing it up yourself in the first place.

There are some speech-to-text programs that are very good, but those tend to be very expensive, and they also involve quite a lot of training – both of the program and the user – to get the best out of them.

Mobile Devices

There's been some sort of voice control built into mobile phones for a while (they're pretty much perfectly designed for it, given the built-in microphones and all), but Apple's Siri, launched for all iOS devices in 2011, was the turning point. Now talking to (as opposed to into) your phone is almost normal. Android, Windows and BlackBerry devices all have varying degrees of voice control too, with basic tasks like sending messages, making calls and opening apps available on all platforms.

The benefits: Voice controlled functions on a mobile are most useful when there's some kind of restriction involved – so again people with sight impairments or maybe people with impaired fine motor skills who find it hard to use the small buttons on a mobile phone.

> **"It's possible to spend as much time correcting mistakes in a software transcription as you would have done typing it up"**

It's likely that people also use Siri to do things like make calls and send messages while driving – it makes a certain sort of sense, especially if you're using your iPhone as a satnav. Don't take this as a recommendation, though. The American Automobile Association did a study into the use of voice-activated systems and found that using Siri while driving dramatically reduced a driver's reaction times.

The pitfalls: Well, aside from the dangers of using voice-activated phones while driving, if you've used Siri much, you'll have noticed that it's not always completely accurate, and even when it is, it's not always helpful. It's improved since it was first launched, but it's got a way to go yet.

And while voice controlled features like calling someone might be perfectly useful, if you have a more complicated query you need Siri or Google to answer, you'll need to make sure you have a decent data connection. Voice files are uploaded to the cloud to be analysed, since your phone probably doesn't have the processing power to analyse it properly, and that can take both time and data. So there's a way to go before phones can do away with keyboards entirely.

Search Engines

Speaking of Google, though, the search giant added a voice feature in 2011. If you have a microphone plugged into your computer or if you're using Google search on your phone or tablet, you can ask Google to search for something just by speaking the words. That's maybe the closest we have, so far, to that Enterprise computer.

The benefits: Nothing we haven't already covered, really: you can search the internet without having to type on a keyboard.

A Very Quick History Of Voice Control

A voice-controlled computer seemed impossibly amazing even when Captain Jean Luc Picard was using one, but actually the first computer that could recognise human speech was created in 1952 by Bell Laboratories. 'Audrey' could only understand numbers, but by 1961, IBM had developed the 'Shoebox', which could understand digits and also simple commands like 'plus' and 'minus', which meant users could tell it to do basic arithmetic.

The US Department of Defense funded more research into speech recognition throughout the 1970s, and that led to the development of 'Harpy', a system that could understand 1,011 words. After that, research turned to teaching computers to understand sounds rather than templated words. That meant systems developed in the 80s could recognise potentially thousands of words, but since computers still had limited processing power back then, everything ran pretty slowly.

The first proper consumer speech recognition product was Dragon Dictate, launched in 1990. Dragon Naturally Speaking is still one of the most popular dictation products, but thanks to Apple and Google and co, most devices now have speech recognition built in and don't need special software – Although we probably wouldn't want to have to dictate an entire Micro Mart feature to Siri.

as typing, and again there might be some accent difficulties, but it's pretty good, all things considered.

Games Consoles

Games consoles had started to introduce voice-related elements a few years ago (the *SingStar* and *Rock Band* franchises, for example, required voice input), but it was the Xbox Kinect that introduced proper voice commands. Microsoft handily provides a list of all voice commands you can use with the Xbox One, from 'Xbox on' to switch the console on through to 'Xbox send a message' and 'Xbox watch TV'. No extra apparatus is needed, and according to the instructions you don't even have to raise your voice – but you do have to leave a second or two of silence before giving a command, so the Xbox knows you're talking to it.

The PS4 has some voice control features too, but not quite on the same scale, and you have to use a headset or microphone.

The benefits: As far as games consoles are concerned, the voice control aspects seem to be less about accessibility and more about coolness. It's pretty cool to be able to tell your console to turn on and have it obey, without you needing to press a single button. To actually play games, though, you will need to revert to the controller, so you'll still have to search down the sides of the sofa to dig it out before getting your *Call Of Duty* on.

The pitfalls: When Microsoft launched adverts starring *Breaking Bad*'s Aaron Paul showing off the Xbox One's voice commands, there were reports that him saying 'Xbox on' in the ad turned Xboxes on in people's homes. Only some users reported the issue, though at the time there was some concern that competing games companies could launch ads that messed with Xboxes and deleted saved games or did other nefarious things. (That hasn't happened yet, though!)

Mostly, gamer feedback has indicated that it doesn't always work, and the launch of an Xbox One minus the Kinect suggested a lack of confidence in the universal appeal of voice control.

Cars

This probably isn't a use of voice commands you've come across in your daily life, but car manufacturers have been experimenting with the use of voice control in cars. The idea isn't – yet – to create a Knight Rider situation, but to give drivers hands-free control over their radios, air conditioning and GPS systems.

The benefits: In theory, being able to tell your car to turn up the air-con or navigate a new route to avoid an accident on the motorway should be brilliant, especially for people who drive a lot alone. It could mean drivers could keep their eyes on the road and their hands on the wheel, rather than having to faff with unintuitive knobs and buttons.

Accent Troubles

One of the problems with voice recognition is, even when they're speaking the same language, not everyone pronounces words in the same way. Even on our little island, there are enough different languages that not everyone can immediately understand one another, and it turns out computers have much the same trouble.

When Apple launched its 'Siri' personal assistant, lots of people were disappointed because it turns out there are some accents Siri just can't understand. Like Scottish. Or the deep south American accent. And the Xbox One had to launch without voice controls in Australia last year, because it couldn't handle the Aussie accent.

Nuance, the company behind Dragon Naturally Speaking, builds several different types of accent recognition into its products, including 'southeast Asian' and 'Hispanic', but even those categories aren't really adequate to cover the broad spectrum of English-speaking accents. One of the accents Dragon can recognise, for example, is 'UK'. Considering how different Scouse, Geordie, Brummie and Cockney accents are, we reckon there might still be a few problems with that…

The pitfalls: In practice, voice recognition software isn't quite up to the job yet, and in studies it's proved just as distracting, if not more so, to try to get the car to understand what it should do using voice commands than standard controls. And obviously anything that distracts or frustrates someone behind the wheel of a moving vehicle is a very, very bad idea indeed. We'll have to wait and see if voice control features in cars can be made usable enough to be worth the potential safety risks.

Other Applications

That covers most of the places voice control is being applied at the moment, though there are surely more ways of integrating it into gadgets and software that we'll see over the coming years. As the software gets ever more sophisticated, it should be able to understand more accents and different sentence structures, which will make it more reliable and therefore more useful. Microsoft is reportedly working on a kind of Babelfish device that can translate spoken words in real time over Skype, for example, which could help cut across language barriers around the world. But really, the thing I'd be most excited about is super reliable, cheap transcription software. Come on, someone, please? **mm**

David
1995 - 2012

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Your Letters

Rotten Apple

How odd it is that we're all being told to buy watches again, after the mobile phone industry made them all but obsolete. And who's telling us to do this? The mobile phone industry, of course.

Clearly, they've run out of ideas and are desperately looking for something to sell us. But why would I want to spend hundreds of pounds on a smartwatch when I can pick up a cheap Casio digital for a couple of quid? I simply do not understand the point.

Of course, Apple has got in on the game now as well, and we all know how much the sun shines out of its behind, don't we? In the same way, it's arrived late to the party with its contactless payment system, and we're all supposed to think it's a game changer. Why? Just because it's Apple – no other reason.

Maybe the government should start printing bank notes with the Apple logo on them. Then they'd double in value and we could probably pay off our national debt by next week.

Grant Mallard

Closed Windows

The way Microsoft releases a terrible OS, followed by a good one, followed by another terrible one and so on makes me think it must do it deliberately. For example, we all hated Windows ME, so when XP came along, we were all thinking "Wow, thank good goodness we don't have to use XP any more!" Then it did the same with Vista and Windows 7, and now we have the confusingly named Windows 10, which will replace the much maligned Windows 8.

Well, you know what, Microsoft, up yours! I'm going to stick with Windows 8 (well, 8.1), just to spite you. I'm not going to spend money to help you fix your mistake. I'll just continue installing tweaks to make Windows 8 more like Windows 7, and you won't see a penny.

Allan Lance

Export Everything For Firefox

After reading the How-to Basics in issue 1333, I felt compelled to write in. In the article, an interesting approach was taken to backing up settings and data for various browsers. However, I feel there is a much simpler solution.

I use Firefox exclusively, so therefore can only confirm this method works for the Firefox browser. Go to the Firefox menu and navigate to the help menu, now click on the Troubleshooting option. This will open up a browser tab/window. Under the Application Basics header, click on the 'Show Folder' option next to Profile Folder (alternatively navigate to 'Computer> Local Disk (C:)> Users> 'You'> Appdata> Roaming> Mozilla> Firefox> Profiles').

If you've got there through the Help Shortcut, you want to back up one folder so you're in the Profiles folder. You should see your File Folder listed with '.default' suffix. Ensure Firefox has been closed and copy this folder. If Firefox is running, complications may ensue due to the copy of data that is currently in use.

On the Firefox browser you wish to copy your installation to, navigate to the same (equivalent) folder. Close firefox. Now open the .default folder and delete all contents. Go to your backed-up folder, copy all contents and paste into the empty folder of your new Firefox. Some apps will run compatibility initially, but you will have an exact replica of your 'lived in' Firefox. All passwords, extensions, history etc. Even settings within the extensions are remembered (for example, the Blocked sites in NoScript etc).

I make a backup of my Firefox profile folder every few months or so, and it's a total lifesaver for fresh installs of Firefox.

Andrew Kaar

GET IN TOUCH...

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By post
Micro Mart
30 Cleveland Street
London
W1T 4JD

Online
forum.micromart.co.uk

Component Watch

This week we've got five great sub-£50 upgrades

Upgrading your system is often seen as an expensive job, especially if you're trying to improve performance at the same time. It doesn't have to be like that, though. This week, we're looking at a few system upgrades you can make for less than £50. All of them are worth doing, and all of them are sure to improve an ageing system in need of a little bit of a refresh!

Deal 1: Western Digital 1TB Blue
RRP: £45 / Deal Price: £40

Western Digital's Blue drives are configured for day-to-day use, giving them better performance than other Western Digital models (regardless of price), but what makes particular model so attractive is its two year warranty and free year of Western Digital Care Express, which gives one a one business day RMA replacement in the event of a drive failure and an extra year of warranty with registration. This, coupled with lower failure rates than Seagate drives gives you an upgrade worth paying for. It may only be a five quid discount, but you get a lot for your £40.
Where to get it: Dabs (**bit.ly/1oQ4s4h**)

Deal 2: Zalman Z11 Plus Mid-Tower Case
RRP: £60 / Deal Price: £35

Many an experienced system builder will tell you that a quality case is not only vital when building a new system, it can do wonders for an older machine as well. Whether that's by introducing improved passive cooling capabilities to aid airflow, or just making the task of adding new hardware that little bit easier, there are gains to had. If you're looking to buy a new case, you could do worse than this Zalman Z11 Plus; it's stylishly designed, with clean lines, an acrylic side-window, a selection of vents, dust filters for the PSU and an anti-vibration rubber stand. We're pretty confident you won't find a better case for less money than you'll pay here.
Where to get it: CCL (**bit.ly/10v9mZp**)

Deal 3: Noctua NH-U9B SE2 Cooler
RRP: £80 / Deal Price: £44

It's been around for a few years, but the Noctua NH-U9B SE2 can still turn heads. It's compatible with virtually all AMD and Intel chips, and designed to keep overclocked models at low temperatures without making too much noise (thanks to dual 90mm fans, which force air over a huge heatsink). This cooler isn't going to win awards for its compact design, but it has won awards for its performance – and if you think a three-year warranty shows a company's confidence in its product, what does the six-year guarantee this product has say? Quite simply: 'quality'.
Where to get it: Scan (**bit.ly/1oQ55KY**)

Deal 4: PowerCool X-Viper 650W
RRP: £53 / Deal Price: £41

Most PSUs under the £50 barrier are 500 watt, but there's one notable exception: the PowerCool X-Viper 650W. As well as having a full 150 watts advantage over its competitors, it has one of the highest amperage ratings on its 12v rail (44 amps) and a solid 80+ Bronze rating for efficiency. Coupled with a 140mm Fluid Dynamic Bearing fan and semi-modular design, it's a PSU upgrade that'll be worth every penny.
Where to get it: CPC (**bit.ly/1suAY6J**)

Deal 5: Asus USB-AC53
RRP: £55 / Deal Price: £35

The price of Wireless AC adaptors is dropping, so you can now get the excellent Asus USB-AC53 for well under £50. 5th-generation wi-fi compatibility in both 2.4GHz and 5GHz flavours give you speeds of up to 867Mb/s with a compatible router. There's a WPS instant connect button, and it comes with its own stand and USB extension cable allowing stable and easily optimised positioning. One of the best wireless adaptors around, internal or external!
Where to get it: Currys (**bit.ly/1zdCwuy**)

NEWS AND VIEWS

Lenovo Plays With Google

Collaboration across company's PCs and tablets

The History Of Game Developers

Interactive timeline maps out gaming's rich history from Nintendo onwards

Now this is a very nice little news bit: **PriceSpy.co.uk** has created an interactive timeline to celebrate the rich history of some of the most popular developer studios in the gaming industry.

The interactive tool will let you see where and when game developer studios were opened, which game series they have created and which have fallen by the wayside. Charting from as far back as 1889 when Nintendo started on its own path to glory with the mass-production of its *Hanafuda* playing card game, the following 125 years would see the birth and growth of an industry worth many billions of dollars, with hundreds of developers creating hundreds of games and selling millions of gaming consoles globally.

Relive the glory days of the NES, Sega Megadrive and Super Nintendo systems at **tinyurl.com/nk2bwbn**.

Dark Souls II Voted The Year's Best

Golden Joystick awards now in 32nd year

The Golden Joystick awards are something of a big deal in gaming circles so we're sure that the peeps behind *Dark Souls II* were delighted to see the title judged to be Game of the Year for 2014.

Conversely, the year's much-anticipated and most expensive game of all-time *Destiny* failed to bag any prizes at all, despite four nominations. Other actual winners on the night included *Hearthstone: Heroes of Warcraft* and *Assassins Creed IV: Black Flag*, which won two awards each.

For the creator of the *Metal Gear Solid* series, Hideo Kojima, the ceremony was particularly sweet as he was given a lifetime achievement award for his 30 or so years in the business. Well done, that man.

QUICK BITS... According to reports, Yahoo is sitting of $83m of unsold Fire Phones. This news came along an announcement of a

Next time you pick up a Lenovo Think-branded Windows PC or tablet you'll be able to see the fruits of the company's partnership with Google as Google Play Music All Access will be able to be accessed instantly from the devices.

What this means, in layman's terms, is unlimited, on-demand access to a catalogue of over 30 million songs, the ability to create custom radio stations, browse music curated from Google's music team and share music with friends on Google+, Facebook or Twitter. Also, up to 20,000 songs can be stored from an existing music collection (iTunes, CDs, for example) for free. Any devices purchased between September 12th and January 12th will have a 90-day free trial, while anything before and after this timeframe will get free 30-day access.

Don't Box Me In

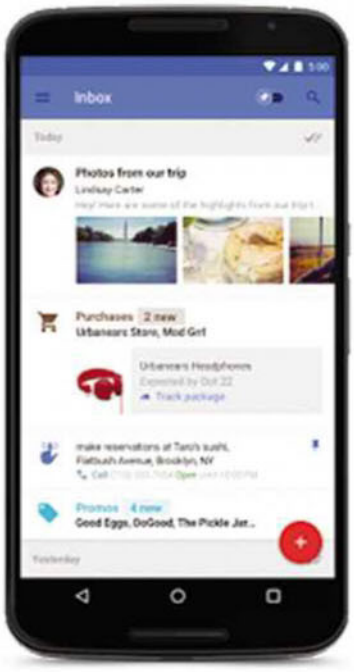
Google unveils new email app, Inbox

Google is trying to bring you on board with its latest mobile app intended to take more control over your email inbox, called – erm – Inbox. Right.

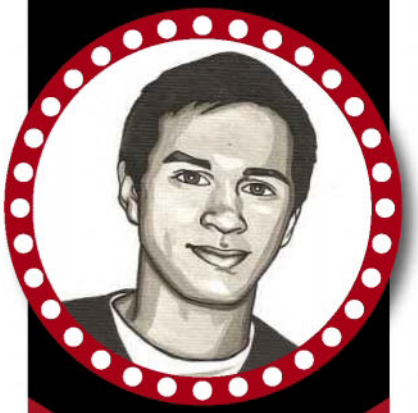
Yes, Inbox is "years in the making" and has been developed by the team behind Gmail, although it's an entirely separate thing to Gmail, designed to work in tandem with it. In Google's own words "it's a completely different type of inbox, designed to focus on what really matters."

So what exactly will Inbox help with? Bundles, for a start. Bundles helps you to stay organised automatically by grouping together similar types of mail (bank statements, for example) which can be determined by you. Inbox highlights key information from messages, such as event information and photo attachments, to give you what you need to know at a glance.

There is much more besides, but you'd be best to head for the Inbox website for more details – that'd be **www.google.com/inbox**, then. Even if you are interested, though, you'll have to wait until you receive an invite from Google to give it a try. If you're impatient, email **inbox@google.com** to get on the list as soon as any more invites are available.



$437m quarterly loss. Yikes!



This week's look at salvaging PC parts touches on a subject that I'm sure many of us are more than familiar with.

We invest not only good deals of money but also plenty of time in putting our computers together, upgrading them and so on. It's no wonder that when time comes to think about moving on to a new system, it's often hard to let go.

You open the case of your old machine, peer inside at the components within, and inevitably you think, "Ooh, that might come in handy!"

Undoubtedly, there will be things in there that will be worth hanging on to, but as Mark Pickavance tells us, it's just as important to realise what should be consigned to the bin. Yet how many of us have boxes filled with IDE cables, CD-ROM drives and other bits of obsolete technology? I certainly know I do.

Maybe we can all agree to get rid our junk for the new year. And if not... well, there's always next year.

See you next time...

Anthony

Editor

Meanwhile... On The Internet...

As another tech/media newbie to be gobbled up by the big boys (**tinyurl.com/MotI1336a**), it's probably unsurprising that **Twitch.tv** – a site that specialises in the streaming of gameplay footage – is looking to clean up its act a little. Valued at something in the region of $1bn, it has spent the months since the news of its sale to Amazon addressing the way the site deals with intellectual property, such as the use of music in its streams (through a team-up with **www.audiblemagic.com** – **tinyurl.com/MotI1336b**), and lately the dresscode to which its streamers must comply (**tinyurl.com/MotI1336c**).

These new rules (**tinyurl.com/MotI1336d**) expressly forbid "wearing no clothing or sexually suggestive clothing – including lingerie, swimsuits, pasties [**tinyurl.com/MotI1336e** – if, like us, you were wondering] and undergarments... as well as any full nude torsos, which applies to both male and female broadcasters." So there... It would seem that the 'Meanwhile... HairyChestFest™ Pokémon Challenge' will have to be cancelled.

While it makes sense to make such things clear, and it's very important to Twitch's image (and thus its value in the wider media marketplace) that it does not become overrun by attention-grabbing, ad-revenue-chasing tactics as its popularity grows, it has tried to play down the changes. Cloaking them in *Top Gun* volleyball references and sarcastic hashtags. Some people, however, are questioning the motives a little more closely and wondering if the site is in any position to morally judge its own policy (**tinyurl.com/MotI1336f**), and whether it will slip into the common double standards that often surround such edicts, and whether such rules already amount to a double standard in a genre that has fallen back on sexualisation in the same way much media does (**tinyurl.com/MotI1336g**). Unfortunately, such musings are a simply a rehash of an oft-seen argument; only the platform has changed.

You'll know Glenn Greenwald as the man largely responsible for bringing the documents pilfered by infamous ex-NSA man Edward Snowden to wider attention. You may recall that shortly after the release of said documents, he finished his stint with the *Guardian* to begin his own site, *The Intercept* (**tinyurl.com/MotI1336s**) for First Look Media (which, incidentally, has its own problems at the moment: **tinyurl.com/MotI1336t**). You may even recall that a while back we reported that an article (**firstlook.org/theintercept/2014/08/05/watch-commander**) on said website, which outlined the scope of the US terrorist screening databas and how nearly half the people on it had no known direct terrorist links, had alledgedly begun a search among the US intelligence community for a second Snowden-esque source.

Well, reports this week seem to indicate that the US security service seems to have found that person (**tinyurl.com/MotI1336u**), but that it is reluctant to formerly prosecute the individual due to the possibility of creating Manning-esque PR backlash and generating sympathy for whistleblowers of this type (**tinyurl.com/MotI1336v**).

InfoSec expert and blogger Bruce Schneier has long posited that there are in fact three sources (**tinyurl.com/MotI1336w**) for the information leaking out of the US government and its branches, but believes that the person is this case is in fact the "second leaker" (**tinyurl.com/MotI1336x**) mentioned by Greenwald in the new documentary about Snowden, *Citizen Four* (**citizenfourfilm.com**).

GamerGate is a cause célèbre that's just kept running on... while the issue could not have been said to have escalated quickly (**tinyurl.com/MotI1336h**), escalated it has. Yet, in a week that saw Zoe Quinn on the front page of the BBC News site (**tinyurl.com/MotI1336i**), Adobe tweet its disdain for the concept (**tinyurl.com/MotI1336j**) and *The Verge* declare it 'Dead' (**tinyurl.com/MotI1336k**), we were reminded once more that nothing – but nothing – is dead until Stephen Colbert twists his knife (**tinyurl.com/MotI1336l**). If there was any spark at all in the corpse of the campaign, his genius "seperate but equal" line – which mainlines America's segregated past (**tinyurl.com/MotI1336m**) – surely extinguished it? We can but hope...

In case you didn't know, let us state now our unending respect for **www.theregister.co.uk**, or *El Reg* to its friends (we're just admirers from afar). Consistently a go-to place for insightful yet irreverent comment and analysis, this week it' turned its glare to the goings-on at Whisper in the light of *The Guardian*'s accusations that despite claiming to be a completely anonymous service, it was in fact tracking its users (**tinyurl.com/MotI1336n**).

Whisper's reaction to this has been high-profile suspensions, threats of sackings and a lengthy rebuttal, which Kieren McCarthy takes great joy in pulling to pieces in a great analysis piece (**tinyurl.com/MotI1336o**) that doubles as a handy guide to decoding everyday corporate guff and obfuscation. Nice work.

.AVWhy? Videos For Your Eyes... Not Necessarily For Your Brain

We've been teased about this already this year (**tinyurl.com/MotI1336y**), but the word it that this video (**tinyurl.com/MotI1336z**) promoting Hendo's Kickstarter page is the real deal... Yes, the age of the hoverboard is upon us, ladies and gentlemen. Fronted by Greg and Jill Henderson, the campaign has raised over $400,000 in just 11 days, with 11 of those backers quickly stumping up the $10,000 the firm was asking for to reserve one of the first production decks, thus selling out the first run. So you'll have to wait a little while to see one in your Christmas stocking.

Aaaaaaaaand Finally...

While as matter of policy we try to stay away from the viral bait that is *The Tonight Show With Jimmy Fallon*'s YouTube channel, we simply could not let this week pass without commenting on this week's appearance of erstwhile Potter Daniel Radcliffe, who took to the show to promote his new movie but ended performing Blackalicious's Alphabet Aerobics, and ultimately bringing the house down (**tinyurl.com/MotI1336p**). Frankly, it made his stellar *QI* debut (**tinyurl.com/MotI1336q**) look boring.

Oh, and how spiffing to hear that HRH herself has decided to join the Twitterati (**tinyurl.com/MotI1336r**). One is totes over the moon for ya hunz... LOL. #Madge.

QUICK BITS... Apple iTunes sales have fallen by 14% this year, according to the Wall Street Journal

Caption Competition

You can always rely on a feline to bring forth the funny, though – as Doctoryorkie correctly observed in our forum thread – some of the more obvious jokes are generally verboten in polite company such as what we are used to keepin'...

- **Frank Everett: "**Not bad, but I look better when photographed with my right profile prominent."
- **Frank Everett:** "Bye sis - I will Skype you again soon."
- **D-Dan:** "I'ze got fame, ~~meow~~ now.**"**
- **Martin Prince:** "How you feline, buddy?"
- **doctoryorkie: "**Americans launch food channel for dogs."
- **doctoryorkie:** "The cat sat on the mat."
- **Ondrive:** "You're a handsome devil... What's your name?"
- **doctoryorkie:** "American has more than one book shock horror."
- **Wyliecoyoteuk:** "Hmmm. GSOH, good mouser, Likes long walks, tongue baths and night singing, sounds Purrfect... Glad I logged into matchcat.com!"
- **JayCeeDee:** "Give me a break, Dad – not more baby photos, please!"

The winner this week however, was ~Wiz~ with "The purrrfext selfie!"; an object lesson in simplicity (and how to win a caption competition, if we're honest).

To enter this week, head to the 'Other Stuff' section of our forum (**forum.micromart.co.uk**) and say something funny (but not too rude) about the picture below or email us via **caption@micromart.co.uk**.

Microsoft Ditches The Nokia Name

Also posts decent first financial quarter

It's been little under a year since Microsoft bought Nokia's mobile devices division, but the company has now decided to drop the Nokia brand from its new smartphones – instead, they'll be known as Microsoft Lumias. it's not a massive surprise, if we're being honest.

Microsoft has been shifting away from the Nokia brand since it bought the division for around £4.6bn and you can expect the brand name to be phased out "in due course".

Meanwhile, things are looking up for the company's financials as it revealed it's posted better than expected sales and revenue – a record revenue for the first quarter, in fact. Specifically, that revenue figure was $23.2bn, up 25.2``% on the same quarter in the 2014 financial year. While it reported a fall in profits because of costs related to its purchase of Nokia and various job cuts over the year, the £2.8bn profits figure is still better than what many expected.

Well done, Satya and chums.

Facebook Rival Promises Ad-Free Experience

Your user data is safe with Ello

A new social network, going by the name of Ello, has promised that it will never sell user data or include advertising during your time on the site. How so? The network is a Public Benefit Corporation, stopping current or future owners from breaking that promise.

Interesting. So how is it going to make money? By micro-payments for features beyond the standard. Investors are certainly keen, pledging $5.5m and publishing a one-page document summarising the pledge.

It's difficult to see this being a big success, to be honest – but we wish all behind it well.

Snippets!

Facebook Introduces Rooms App

Facebook is "excited" to bring Rooms to its barrage of apps, this one letting users create places to hangout to discuss your Facebook interests, plus invite others to join too. Available on iOS, the app harks back to those early web communities where people used to hang out in forums and the like to share their interests with one another.

The company could also be facing a legal issue with the app, courtesy of the people behind a separate app also called Room who are claiming Facebook has stolen its intellectual property.

NASA Audio Available For Free

If you're interested in any way in the space missions of the past (and, indeed, why wouldn't you be?) you will probably be keen to hear of the uploading of 60 samples of historical audio from NASA missions to the agency's dedicated Soundcloud account – **soundcloud.com/nasa**.

These samples include the famous "Houston, we've had a problem" and "The Eagle has landed" and this is a genius bit of history right on your PC.

UK Pilots Association Questions Drones

The pilots association Balpa has aired concerns over the introduction of large drones into UK airspace, noting that strict regulations must be introduced before they can be allowed to appear in the skies. Noting that the public must be protected against drones sharing airspace with regular aircraft, the worries have been aired following safety concerns over recent incidents involving drones, with one reportedly flying "deliberately close" to a passenger place earlier in the year.

US Patient Sues Hospital Over Viral Picture

The last thing you need when you're ill

A patient at a Los Angeles hospital is suing over a photo of her which went viral after a nurse who snapped her injuries and decided to share it.

The patient was treated back in 2012 after trying to commit suicide by pushing pencils through her eyes, leaving her blind according to the lawsuit. The nurse snapped the photo of the lady, with the pencils still in place, before sharing that with another person, who then passed it to a chap who posted it to a 'shock' website. It was subsequently viewed 192,000 times.

The patient's lawyer has tried previously to get the hospital to get the photo taken down by exercising their copyright over the image, but it's since come to this. The lawsuit continues.

Google Exec Falls From Great Height

Take that, Baumgartner

Everyone surely remembers the name Felix Baumgartner? He was the man responsible for the world record altitude jump via parachute back in 2012 (was it really that long ago?) and gained a fair bit of publicity for doing so.

We wonder if the same media attention will be focused on senior Google vice president Alan Eustace, who has beaten Baumgartner at his own game by falling further. In your face Felix, and all that sort of chest-beating thing.

Carried by a large helium ballon from New Mexico to a mighty 25 miles above the Earth, Eustace (a 57-year-old, by the way) took an almighty leap and reached speeds of over 1,300km/h in doing so (that's more than the speed of sound, to give it some context), taking around four and a half minutes for him to find his feet back on the ground. We're quite sure that when he touched down, Eustace felt on top of the world for achieving this.

Get it? On top of the... Oh, forget it.

HRH Tweets. Twitter Reacts

The BBC were, probably, not amused

In what is a first for our reigning monarch, the Queen has sent out a tweet via the **@BritishMonarchy** Twitter account.

To mark the launch of a major new exhibition at the London Science Museum, Her Majesty posted "It is a pleasure to open the Information Age exhibition today at the **@ScienceMuseum** and I hope people will enjoy visiting. Elizabeth R."

A fairly standard first attempt, truth be told, but when the BBC reported the news, its live broadcast was unfortunate in that it also included a derisory response from another Twitter user with a fair amount of bad language involved. Oops. Other choice replies included questions about *X Factor* and requests for a selfie.

QUICK BITS... Microsoft is to rollout unlimited OneDrive storage to Office 365 customers

Arrests Over Cash Machine Malware

£1.6m stolen across UK

Three people have been arrested in connection with a nefarious cyber attack that infected cash machines with malware in order to steal £1.6m from across the UK.

Detectives raided homes to grab the three (two from Portsmouth and one from Edmonton) who were then all released on bail afterwards. As for the campaign itself, it took place in London, Sheffield, Doncaster and Brighton with 51 cash machines targeted over the May Bank Holiday weekend.

Good to hear, to be frank.

Russian Government Airs Health Warning Over Selfies

Head lice a major worry. Apparently

Who knew that selfies were the cause of so much concern? Especially to Russians... Well, a government agency in the country doesn't care much for them, apparently, warning against the taking of group selfies. The reason? The spreading of head lice. Eek!

Russian citizens on social media have had a laugh at the advice from on-high, though, with one reportedly saying "Are they suggesting most young Russians have lice?", but that's just nit-picking, surely?

Twitter Gets More Users

Shock? Not really

Twitter has announced that it's even more popular than ever with double its sales and nearly a quarter increase in its number of active users for the third quarter of the year.

This amounts to an extra 13 million monthly active users between July and September, so that's 284 million users in all, we're told. Wow.

Interestingly, though, its shares fell 8% after it announced an actual loss of $175m for the period, while predicting fourth quarter sales of around $450m.

NoPhone Attracts Kickstarter Funding

Warning: This is all a bit silly

Bored with the whole smartphone phenomenon? Want a simple device without complicated features such as cameras, games and, hey, even the ability to make phone calls? The NoPhone might just be for you.

This, quite obviously, ridiculous product is basically a rectangular block with nothing but a mirrored front, allowing you to take selfies in "real-time". Designed, presumably, as a statement against the growth of the smartphone market, the NoPhone is a genuine Kickstarter project, having raised over $8,000 for its creators to date.

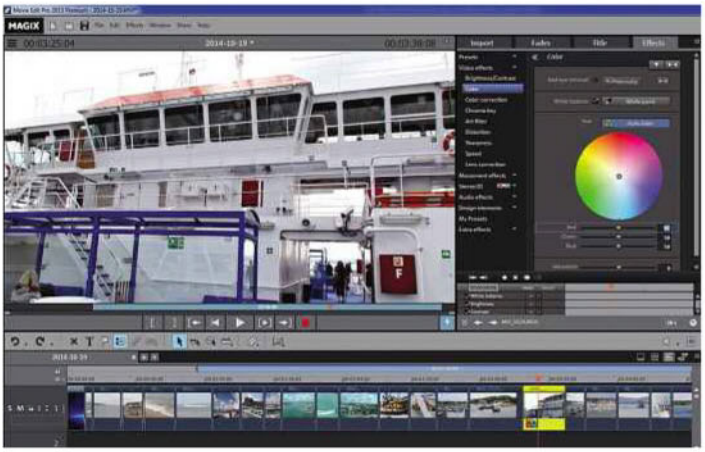
Proof, perhaps, that the Internet is, at times, an utterly bonkers, brilliant place.

Movie Edit Pro Premium 2015

Turn those video clips into a full productions with Magix's Movie Edit Pro 2015 range

DETAILS

- **Price:: £100 (Pro: £60, Pro Plus: £80)**
- **Manufacturer: Magix**
- **Website: www.magix.com/uk**
- **Required Spec: Dual core 2.0GHz processor, 1GB RAM, 2 GB hard disk space , DVD drive, GPU w/ 1024x768 resolution, Windows XP, Vista, 7, and 8 (32- or 64-bit)**



Colour and white balance is a doddle with Movie Edit Pro

Lots of options, to sort out sound issues using the in-build Mastering Suite.

There are a number of choices to make once you decide to invest in a video editing solution, from how much you want to spend, to how involved you want to be in the editing process. Whatever decision you arrive at, I'm fairly certain you'll come across the Magix Movie Edit Pro range of products, because they cater for every level to the semi-pro levels. They all represent good value, particularly as the company has just upgraded the whole range.

While they are all capable of producing a finished video production, naturally the amount of money you invest will have a bearing on the included features and, to some degree, the polish you can achieve with it.

Consequently, I've based this review on the Movie Edit Pro Premium 2015 product, which I believe now offers the best features-to-price ratio. Having said that, if you're new to video editing you may still prefer to start with one of the other products. You can check out the differences between them in detail at **tinyurl.com/nq6dzjh**, a page that lists the main features along with the extras you get with each product.

Pro Premium includes more than enough to justify spending the extra cash. For instance you get a range of cinematic and lighting effects from Red Giant that would normally cost over £200, and a NewBlue Titler EX plug-in that retails for £119 in standalone form. These are in addition to a catalogue of features that reads like a movie maker's wish list: things like full 64-bit support, multicam editing for up to four cameras, fisheye distortion correction, advanced colour correction and Proxy editing for smooth 4K and HD editing. This is a very useful feature if you're working with HD files, which on some PC systems (because of the file sizes involved), can cause the program to become sluggish. With Proxy editing all the editing is done on lower resolution (automatically created) "proxy" files. When you're finished editing the program (again automatically) uses the full resolution files to create the final exported video.

The interface for the 2015 series has been improved with larger and more intuitive buttons; they've also made the method of operation easier. This means most editing functions can be done using just the mouse, making the process much quicker by reducing the required steps. I also like the additions made to the Movie and Slideshow Wizard, a feature designed for those that want to create a cinematic masterpiece with the minimum of effort. You select the footage you want to use, choose a theme, some music, decide on the range of transitions and let the program do the rest.

Another very interesting development is a free Android app called Movie Edit Touch. Although it was not available at the time of writing, it will apparently allow you to do rough editing of footage from your mobile devices on a tablet or smartphone, and then allow you to upload your work to Edit Pro via wi-fi when you get home to add the finishing touches.

Magix has always been generous when it comes to effects, transitions and templates. and this edition is no different. You get over 1500 in the premium package, as well as HDR effects and some new professional templates as well.

This is a fairly substantial upgrade, although in my opinion the value is certainly in the extras included with the premium version. However, if you want to see the differences for yourself, there are free trial versions you can download on the Magix website.

mm Joe Lavery

Magix have produced a toolbox full of goodies that makes video editing a pleasure

MSI Z97 Guard-PRO

Overclocking just got good again

DETAILS
- Price: ~£90
- Manufacturer: MSI
- Website: http://goo.gl/MqR1mM
- Required Spec: 4th or 5th generation LGA 1150 CPU, DDR3 RAM

The MSI Z97 Guard-PRO, not just made for the overclocker and Bitcoin miner

Anyone who wants a stable backbone to their next build will benefit here

Remember a time when we used to be able to overclock an air cooled system for results that would beat a PC that cost twice as much? Of course, back then things were slightly different, and the motherboards we performed these feats on seemed a little more hardy than many of today's offerings.

MSI newest board, the Z97 Guard-PRO, is an old-school overclocker, though, that can squeeze out some pretty impressive results thanks to its stability and features.

It's an ATX board with an 1150 socket for 4th and 5th generation Intel processors and the titular Z97 chipset. There are six SATA 6Gb/s and an M.2 port, with SATA5 and 6 being unavailable when an M.2 drive is fitted, one PCI-E 3.0 16x slot, one PCI-E 2.0 16x slot, and four PCI-E 2.0 1x slots. Four DDR DIMM slots provide a maximum of 32GB of 3300MHz (overclocked) memory, and four USB 3.0 ports on the back, along with two USB 2.0 ports, make for an decent enough base on which to build a good all-round system.

To get the best overclocking from this board, MSI has included a six-phase Pulse Width Modulation controller to help prevent damage to the components over time. Added to that is the MSI Military Class 4 high quality components, extra circuitry protection, a coated PCB for humidity protection, and further protection from Electro Static Discharges. There's even an Eco Power element in place that can save you up to 29% off the standard power usage – although not necessarily when overclocking the socks off a CPU.

Using an Intel Anniversary K-Edition Pentium G3258, there's a good chance of being able to overclock it up to 4.5GHz (even slightly beyond) purely on air cooling. Admittedly we didn't want to push it too far; our days of laughing heartily as a chip goes well beyond the 80°C mark, followed by a loud pop are over, we'll leave that for the more youthful and daring among you.

However, the emphasis here is on stability and higher than standard grade components. When used correctly, the MSI Z97 Guard-PRO is an astonishingly good and value for money solution for a system that's expected to remain on for longer than normal periods of time, not to mention the overclocking options. As MSI state clearly on the packaging for the Guard-PRO, this a board that is also aimed at those who mine for cryptocurrencies with all six PCI slots being able to be used at once while still providing optimum space for airflow.

Included into the mix is MSI's proprietary software, in the form of the MSI Command Centre. With this you can perform all manner of one-click overclocking, fine tuning, driver updating, and configure an unlimited RAM DISK function. To add to the Eco function we mentioned earlier, the Eco Centre will allow the hardware to turn off unused chips and functions on the motherboard, to help further decrease your electrical bill.

For around £80 to £90, depending on where you shop, the MSI Z97 Guard-PRO proves to be an effective and low cost motherboard to build an incredibly stable system or a server with, or a system for overclocking or Bitcoin mining.

mm **David Hayward**

Great value for an ultra-stable motherboard, with plenty of potential

MSI X99S SLI Plus

EDITOR'S CHOICE micro mart

A powerhouse motherboard ready and capable for extreme setups

DETAILS
- **Price: ~£160**
- **Manufacturer: MSI**
- **Website: goo.gl/aOOg0k**
- **Required Spec: LGA 2011-3 Socket Haswell-E/EP CPU, DDR4 RAM**

MSI's Z97 series motherboards are impressive, representing an alluring combination of both style, power and affordability. Their loaded feature sets made good sense to the system builder or someone looking to build a new PC. Now MSI have released the X99S SLI Plus, an all-black 'military editionm board that significantly ramps up the number of features, style and power, while still remaining well within the bounds of realistic pricing.

Supporting the new Core i7 Extreme Edition processors, this LGA 2011-3 socket board is quite a thing to behold. It offers four 16x PCI-E slots that can support quad-SLI or CrossFire setups, eight banks capable of taking DDR4-3333 (OC) memory (up to 128GB Quad channel mode), and SATA Express (SATAe) connectors for the new generation of SSDs that can churn out eye-watering 10Gb/s transfer rates. That's just the tip of the iceberg, though.

The design of the board is a stunning black throughout, with angled and futuristic VRM and PCH heatsinks, Super Ferrite Chokes, and aluminium Solid Capacitors, this ATX board wouldn't look out of place in the Batmobile, let alone a side windowed case. As we've come to expect from MSI boards their OC Engine and OC Genie are incorporated to allow more flexibility when trying to attain higher overclocking results. With the OC Genie you can press the appropriate button on the board while the system is powered off, and on the next boot the processor will automatically overclock to its optimal performance.

Turbo M.2, Guard Pro, USB Steel Power, ten SATA III ports (two of which are reserved for SATAe), four front and eight rear USB 3.0 ports, Optical S/PDIF out, five OFC audio jacks, and the Command Centre software makes for a board that you would expect to cost several hundred pounds. However, MSI have managed to squeeze all this into a wallet pleasing price of around £160.

With an i7 5820K installed, along with 16GB of 2800MHz DDR4 Corsair Vengeance, GeForce GTX 780Ti, and an OCZ 120GB SSD the 3DMark 11 Extreme scores of 4908 combined are not to be taken lightly.

Like the Monolith from 2001, this board will evolve your PC into the dominant species

Quad-SLI or CrossFire, Quad channel DDR4 memory, and support for i7 Extreme Edition CPUs

Obviously with quad-SLI under full steam, or a more powerful CPU, the benchmarks would be significantly altered; in fact the SLI Plus' sibling board, the X99S XPower AC made a mockery of the previously held Cinebench record recently on an overclocked i7 setup running at 5,930MHz.

Of course large numbers are all fine and well, and they do highlight the incredible level of engineering and capabilities of the MSI X99S boards, but actually using one in a real world, day to day environment is something else. Thankfully the X99S SLI Plus does a superb job no matter what the situation. It's a super-stable performance motherboard on which to build your next system. Together with the Guard Pro feature, the higher quality components used throughout, and the advanced power management and performance mean that this is a board any user could seriously consider, not just the extreme processing or overclocking crowd.

The MSI X99S SLI Plus therefore represents a fantastic deal, where you can unleash the full potential of your hardware and have the stability and assurance of an extremely high performance machine.

mm David Hayward

Superb components, features galore and great value too

micro mart
9 Quality
9 Value
9 Overall

Eyefi Mobi 8GB

Mark tests a card that adds a wireless capability to almost any digital camera

DETAILS
- **Price: £34 (8GB), £50 (16GB), £66 (32GB)**
- **Manufacturer: Eyefi**
- **Website: en.eyefi.com**
- **Required Spec: Windows 7 or 8 Pro with wi-fi capability, 10MB free disk space, 2GB RAM.,Smartphone/ tablet w/ iOS 7.0 or Android 4.0.3, compatible camera**

I've covered wi-fi enabled SD Cards before in *Micro Mart*, but the Eyefi Mobi seems something subtly different. Saying that, this is intrinsically a Class 10 8GB SD card – and, by modern standards, a jolly expensive one. However, the built-in wi-fi technology could actually make the limited capacity a largely moot point.

The way this technology works is very simple, and given the complexity of what happens that is massively reassuring. To connect the Eyefi Mobi to a PC or mobile device (Apple or Android) you need to download their app and install it.

When the application runs it will ask for a unique code that the Eyefi comes with on a plastic card. Code entered, you are asked to put the SD card in your camera and take a picture. This enables a connection to be established and it then sends the picture back to the phone, tablet or PC. Settings in the app allow you can choose where the images go, and on Android you can also have them synced to Google's cloud services. In addition, Eyefi have also bundled access to its online service Eyefi Cloud for 90 days, after which you need to pay £35 per year to access that facility.

For me, a person who takes lots of photographs around the house, this works really well. I put this card in a camera, and then return to my PC, where magically all the images are already waiting for me to work on further. I can also see that it might also work well with a laptop or tablet on location, as long as there was sufficient storage for the images to accumulate. One caveat is that the target hardware must have wi-fi, though you could add this to desktop computers for just a few pounds, if needed.

What impressed me most was that the speed of transfer is more than fast enough to keep up with my picture taking, unless I used continuous mode. Some very modern cameras also include Eyefi card support, so you can enable/disable upload in their menus. It's compatible with 700 camera models, and I tested it successfully with both Canon and Nikon gear.

If this all sounds great, and you must have one, then there are a few other things I need to warn you about that might influence your buying decision. One limitation I noticed immediately is that it won't transfer RAW files, as that's a feature Eyefi has decided to restrict to the premium X2 product range. However, for those that use RAW+JPG shooting mode you still get the jpg files, incidentally.

Another twist is that you can connect multiple devices, like a tablet and a phone, but it will only transfer to one of them at a time, and it's never certain which target it will pick.

These limitations somewhat scupper the Eyefi Mobi's potential for the professional photography market, but we suspect Eyefi are fully aware of that. They don't really undermine those who want to add a wi-fi capability to their existing compact camera, though. I'd also say that Eyefi's simple connection technology is far superior to the majority of camera-based Wireless implementations.

The Eyefi Mobi is an interesting product undermined only by a few, mostly intentional, limitations.

mm Mark Pickavance

Simple to use wi-fi SD Card for cameras

Zotac Zbox PI320 Pico

Zotac take the expression 'small form factor' and compresses it relentlessly

DETAILS
- **Price: £160**
- **Manufacturer: Zotac**
- **Website: www.zotac.com**
- **Required Spec: USB keyboard, mouse, display and operating system**

Having been wowed by how small the Zbox Nano was a few weeks ago, nothing quite prepared me for the amazing miniaturisation that enabled a whole PC to be placed inside the Pico's tiny case. At just 115.5mm x 66mm x 19.2mm this is actually almost the exact size of an iPhone 4, albeit double the thickness.

In to that pitiful volume Zotac has managed to shoehorn a quad core Atom Z3735F (1.33GHz – burst to 1.83GHz), 2GB of DDR3L, 32GB of eMMC storage along with 802.11n wi-fi, Bluetooth, a MicroSD card slot, an audio jack, HDMI and no less than three USB ports. To all intents and purposes, it is best to think of this machine as the guts of an Intel-based tablet, minus the touchscreen parts, obviously.

Specifications	
Product	ZBOX PI320 Pico
Memory	2GB DDR3L
Storage	32GB eMMC (integrated) Expandable via microSD/SDHC/SDXC (up to maximum of 128GB)
CPU	Intel Atom Z3735F (quad-core, 1.33 GHz) Burst frequency up to 1.83 GHz
GPU	Intel HD Graphics
Video Memory	Shared Memory
Display Options	HDMI (with HDCP)
Card Reader	3-in-1 (micro SD/SDHC/SDXC)
Ethernet	10/100Mbps
WiFi	802.11n wi-fi & Bluetooth 4.0
USB Ports	3x USB 2.0
Audio	HDMI audio (bitstream) 3.5mm output
DirectX Support	DirectX 11
Other Features	Intel Virtualization Technology (VT-x)
Windows	Windows 8.1 with Bing (x86) pre-installed

The 32GB of storage is a somewhat confined space, but does leave the user with 20.4GB of unused space to fill after the installed OS has taken its share. If that seems inadequate workspace for your needs you can slot another 128GB of working space with a MicroSD card. Greater external storage can also be added via USB storage, Cloud or Network shares.

The MicroSD slot is the only available upgrade available, as the memory and existing storage are all part of the tiny circuit board that's not easily accessible inside the case. There's a trade-off here to achieve this scale, and customisation is its first victim.

Packing all this technology inside to deliver an entirely passively cooled solution is certainly impressive engineering, but to then offer it with Windows 8.1 (with Bing) for less than £160 was the bit that utterly blew my mind.

Though questions about this hardware's ability to handle a desktop OS were foremost in my mind when I first booted it up. My experience was generally positive, as the majority of mundane computing tasks this system breezed through. There is more than enough power for web work and presenting streaming content like Netflix, even in 1080p resolution. It can even play 1080p MKV packaged video smoothly using desktop applications. Metro Apps like VLC seem to stutter trying this, but Media Player Classic works flawlessly.

The tablet-friendly Windows 8.1 interface is also something of a hindrance on a system that doesn't have a touchscreen, but you can easily address that with some free applications that make this system much more like Windows 7.

A tiny system that runs a desktop OS could be useful

to many people, had Zotac not made some odd hardware choices that make it less desirable for some applications. One such decision is that, for whatever reason, Zotac decided it only needed a 10/100 Ethernet port rather than something faster. Had it been given Gigabit networking, this would have made a perfect Micro Server, or firewall, but the server requirement would have also required them to provide USB 3.0 ports, and all three on it are only USB 2.0. Those two unfortunate choices make this a much less appealing solution, because it's not going to be rapidly servicing requests or processing large files with both these limitations.

> **"Two unfortunate choices make this a much less appealing solution"**

That's a genuine shame because, unless you're looking for a stripped down client that's running Microsoft's generally unloved OS, then I'm not sure who would be interested in the Pico beyond it's curiosity value. It also makes me wonder if it might have worked better with Chrome installed, rather than Windows 8 – even though that may seem, at first, to be the big selling point.

However you look at it, the Pico hasn't got enough power to be a real office workhorse, and it's rather expensive for just the media playback role. That last task is also undermined by the provided combination power-pack and cable that extends only 1.5m, insufficient length to easily connect the Pico if it's mounted to a TV using the provided VESA bracket.

That leaves the Pico as a Windows 8 bargain of sorts, for those people who don't need rapid file access or great performance but do need that OS (with Bing). I do hope Zotac can find these customers, or revamp the Pico to widen its appeal, or even launch an Android or Chrome OS version.

Even with all the caveats, it's worth noting that this must be one of the cheapest Windows 8 machines available, but the problems I have outlined then conspire to make it much less useful than it could have been.

mm Mark Pickavance

Incredibly small PC that comes with Windows 8 for Bing pre-installed

PhoneEasy 624

Michael has been putting a new Doro handset to the test

DETAILS
- **Price: £130**
- **Manufacturer: Doro**
- **Website: www.doro.co.uk**
- **Required Spec: n.a.**

While Doro may have recently entered the smartphone market area with products such as the Liberto 810, the company has not forgotten its feature phone roots. AS such, in adding to its 3G feature handset portfolio, Doro has recently released its PhoneEasy 624 model.

With a metallic red outer casing and white trimmings, the PhoneEasy 624 is of a clamshell design. Reasonably compact, with dimensions of 102 x 52 x 19mm and weighing 104g (battery included), the PhoneEasy 624 is supplied with a charging stand, micro-to-stand USB lead, three-pin power plug, earphones with a mute control, lanyard and User Manual. When charging this device you can either use the stand or connect direct to the mains with the supplied equipment.

In its closed state, a 40 x 15mm monochrome display can show the time and status indicators such as received messages or missed calls. When open the PhoneEasy 624 features a 49 x 36mm colour display offering a resolution of 320 x 240 pixels. While hardly eye-catching, this screen is fine for the tasks it needs to perform. There is an alphanumeric keypad, a couple of speed dial buttons plus camera and SMS shortcut options along with the usual call, end/power, left/right soft keys and a basic navigation pad.

Having just mentioned the camera shortcut feature, it bears noting that the camera is a 2MP model supported by a flash. This combination proved to be barely adequate; images were dark and of disappointing quality. This feature, we feel, will hardly be called upon by many users.

We did appreciate how easy it was to remove the back cover to reveal the battery compartment. This cover slides off easily, making it easy to reveal and access the compartment for the SIM card and 800mAh Li-ion battery plus an optional memory card slot (either microSD or microSDH), which can supplement the meager 74MB of built-in storage the review model had available.

When you first turn it on, a setup wizard will lead you through the process of making choices such as language, display settings and whether to log into the Doro Experience for remote access features. It was this last feature that caused me a problem. I had inserted a new PAYG SIM card, but had neglected to put any money on it. As a result the handset was unable to make the necessary Doro Experience connection, but it still kept trying. As there was no cancel option, the only way I could discover to navigate around this impasse was to remove the battery. Doro should definitely consider adding a cancel button.

In other respects, the Doro PhoneEasy 624's performance lived up to expectations. You have access to normal and large text plus a range of volume levels and hearing aid compatibility for those whose facilities might have diminished somewhat. You can make and receive calls plus send MMS and SMS messages. The unit's phone book can hold 500 entries with a photo option, while a Call log keeps a track of the last 60 operations performed.

Other features include a calendar with daily reminders, torch, FM radio and weather report for your location. This handset also has Doro's usual user-configurable 'Assistance' button for easy calling when help is required, plus there is support for ICE (In Case of Emergency) information and storing important medical details.

mm Michael Fereday

A useful handset for 'silver surfers' who are not into photography

BT BT8500 Advanced Call Blocker

BT finally addresses cold caller misery, with a smart looking phone

DETAILS
- **Price: £50 Single, £60 Twin, £80 Trio, £100 Quad**
- **Manufacturer: BT**
- **Website: www.shop.bt.com/**
- **Required Spec: BT Direct Line**

Working from home I get nuisance calls every day, even though I've been registered with the TPS for more than a decade. My obvious conclusion is, if Ofcom hadn't guessed yet, most companies don't give a flying fig about you, your fines and rules. The BT BT8500 Advanced Call Blocker is a DECT phone with a difference that might swing this war in your favour, by providing you with a means to block calls before the phone even rings.

The phones themselves seem well made and comfortable to hold, even if the colour LCD on them seems incredibly small by modern smartphone standards. For the 'BT Call Guardian' technology to work, though, you'll need the Caller ID service active, for which BT charges you £1.75 a month. With that service active you can identify who is calling, and if it's one you recognise as a pest you can zap it into oblivion by pressing '3' on the handset. Equally if it's that friend you actually want to talk to you can press '2' and give them with clearance to call forever more. Pressing '1' will answer the call, but doesn't sanction them for subsequent visits.

The lists these actions generate are automatically shared between the phones, and you can manually add numbers to get the system up to speed. Helping this phase the default setting for the phone is 'announce mode', where a caller must say their name when they call or the system won't let them through. This is especially good for automated calling systems that play messages and silent calls.

The beauty of the BT8500, based on licensed TrueCall technology, is that once you've established who you're expecting to call the system catches most nuisance calls without you ever hearing the phone ring. As a blanket defence you can set the phone to ignore all numbers that aren't on your list, or only demand a name exclusively from International callers.

So does it work? Well, yes, it seems to, but that doesn't stop me having a few reservations about the technology, and how it's implemented in this phone.

Those who would benefit most from this device are the elderly, who I know from bitter experience are targeted by unscrupulous sales operations. Except there's a strong possibility that hit they could hit the wrong button and exclude their closest relatives from calling, unfortunately. There's also currently an issue with identifying International Callers with Caller ID, because BT didn't correctly implement it initially in the exchanges. This is something it has promised to fix soon, and once that is done you can snag those selectively along with the UK based telephone cowboys.

There are still companies spoofing the phone system with fake numbers, but that's for BT to address at a much higher level, I'd suggest. That aspect does make me wonder that if BT can put this technology in a phone, then why can't they run it as an additional service to Caller ID?

While BT are mulling those vexing questions, the BT8500 does offer a modicum of relief from commercial or abusive calling that's probably worth the extra cost of these over ordinary DECT phones. I do hope the BT8500 signals a brave new world, where phone calls exclusively come from people you actually want to speak with.

mm **Mark Pickavance**

A phone that can help to insulate you against most unwanted calls

GROUP TEST

High-capacity Hard Drives

SSDs may hog the limelight when it comes to building or upgrading a PC, but we still need ample storage for the latest operating systems, games and programs.

Traditional hard drives are far from dead, and with their available capacities increasing by the week we're looking at some pretty impressive numbers. David Hayward gets hold of six high-capacity drives and sees which are worth investing in.

High-capacity Hard Drives

Western Digital 6TB Green

DETAILS
- **Price: £194.99**
- **Manufacturer: Western Digital**
- **Website: goo.gl/cmQ18V**
- **Required spec: SATA-3 connection for best performance**

▲ *With 6TB for under £200, the WD Green drive isn't too bad a deal*

▲ *By increasing the areal density, WD can fit in 1.2TB per platter*

Western Digital has a long and worthy history with the PC user. Way back in 1989, its 20MB hard drives were the best around for the average consumer and offered the best value in terms of gigabytes per pound, which even then was amusingly £50,000 per GB. It's no surprise, then, that one of their newest drives starts this particular group off.

The Western Digital 6TB Green drive (model WD60EZRX) is a pretty impressive bit of kit. Obviously, there's an immense 6TB storage capacity to play around with, a size that even these days we'd be hard pressed to fill within a year, but there's more to it than simply oodles of space.

This 3.5" SATA-3 model comes with a two-year warranty, an on-paper transfer rate of 175MB per second, WD's branded Intellipower RPM (which can spin the drive up to 7200rpm if it's being thrashed by the OS) and 64MB of cache. And because it's a Western Digital Green drive, it's designed to run cool and quiet.

The drive does perform remarkably well under stress and, as the advertising states, it's also pretty quiet. This is mainly due to the Intellipower technology that WD uses in its Green drives, a technology that utilises the best balance of spin speed, transfer rates, the hardware cache and the firm's own caching algorithm. All this combined means you'll get a performance hard drive when you need one, as well as one that's conservative on power use too.

Western Digital's colour coded labelling often confuses the consumer. Which should you go for: the WD Red 6TB drive or the WD Green? The difference between them isn't too vast. The Green, as we've said, is a more rounded desktop drive for the average consumer. The Red 6TB version of this drive is more suited for RAID setup environments and offers a longer warranty. There are also Blue, Black and Purple label drives as well, but thankfully to avoid confusion, they haven't hit the 6TB mark yet.

There's also a further technological leap in terms of the drive's internals. This is one of the first drives available to the consumer that breaks the 1TB per platter capacity without having to rely on shingled magnetic recording, heat assisted magnetic recording, helium or any other novel forms of engineering. This of course means that the WD drives, thanks to increasing the areal density of the platters, can now store 1.2TB per platter and cut the overall cost of the drive significantly.

The cost to the consumer is a surprisingly low £195, depending on where you shop, which isn't too bad for a drive of this capacity. This makes the WD 6TB Green come in with a mere 3.2 pence per gigabyte. Not too shabby.

This 6TB Western Digital drive puts hard drives firmly back on the map. In a world where SSD technology is fast becoming the norm and with their prices dropping by the minute, there's still room for massive capacity, low cost, traditional spinners. All in all, excellent value for money.

HGST Ultrastar He6

DETAILS
- **Price: £391.99**
- **Manufacturer: HGST/ Western Digital**
- **Website: goo.gl/9bkmJ4**
- **Required spec: SATA-3 connection for maximum performance**

It's full of helium and 6TB of space

The helium cause less friction, which allows for more platters

There's something of a heated debate raging the internet as to who launched the first 6TB hard drive: was it HGST or Seagate? For most of us, though, we don't care who did it first, as long as it was finally done. The argument rages on however, regardless of what we think.

HGST, which is a Western Digital company, may (or may not) have crossed the 6TB finish line first, but there's no denying the fact that they are without a doubt the first manufacturer to produce a hard drive filled with helium.

This is the world's first hermetically sealed, helium-filled hard drive, with a complex seven platter design. Helium, as any good science teacher will inform you, has only one seventh the density of air, so replacing the air inside a drive with this gas means there's a significant reduction in drag caused by the spinning platters. This in turn offers lower power consumption and greatly improves the lifespan of the internal components – at least in theory anyway. It has to be said that since this is the first time helium is being used, there's an element of the unknown about it. But HGST seems to have confidence, even to point of stating an SSD-like two million MTBF value with regards to its longevity.

Other more down-to-earth specifications include a 64MB cache, 7200rpm, a 177MB/s sustained transfer rate and a typical average seek time of 8.5ms. Plus of course there's that lovely 6TB of space to play around with.

You could be forgiven for thinking that this is a more enterprise, business-oriented drive rather than something for the average consumer. To a certain degree you're right, the data centre admin will no doubt be rubbing his or her hands together at the thought of inserting dozens of helium-filled hard drives into their arrays at night. But HGST has targeted a wide spread audience with this drive, proclaiming that it's just as suitable inside a desktop PC as a RAID-endowed mission critical server.

The price, however, may put the desktop consumer off somewhat. At around £390, this is certainly not the kind of technology you'll splash out for without great consideration first. It's clear that despite the low power consumption and potential longevity of using helium inside a perfectly sealed hard drive, the manufacturing costs have increased rather a lot. That naturally means you'll have to foot the bill for such engineering.

As a result, the cost per gigabyte is increased to 6.5p. It doesn't sound like much, but when you're looking at six thousand gigabytes (more of less) per drive, the pound signs soon start adding up.

Nevertheless, the HGST Ultrastar is an impressive breakthrough and a very quiet, quick drive to use on a daily basis. In all honesty, you won't really notice the difference this and the previous WD Green drive, which is £200 cheaper. So it's up to you if you want to embrace helium-filled hard drives or not. Once quick thought, though: if the drive is so well sealed so the helium can't escape, why not just have the interior in a vacuum? If that's possible, surely that would create zero friction?

Anyway, a perfectly good drive, albeit a rather expensive one.

Seagate ST6000NM0024

DETAILS
- **Price: £363.71**
- **Manufacturer: Seagate**
- **Website: goo.gl/3rDXA3**
- **Required spec: SATA-3 connection for maximum performance**

This Seagate model is the direct competitor to the previously reviewed HGST and the other side of the argument as to who released a 6TB hard drive first.

Rather than opting for exotic engineering methods involving hermetically sealed, helium-filled hard drives, Seagate has instead developed its own method of storage technology called shingled magnetic recording (SMR).

SMR basically increases the areal density of the individual platters up to 25% by effectively squeezing the tracks per inch closer together. The tracks then overlap each other, like shingles on a roof, as Seagate informs us, allowing for more data to be written to the same amount of space. As new data is written, the drive tracks are trimmed and shingled, and thanks to a smaller reader element on the drive head, the data can still be read off the trimmed track without compromising its integrity or reliability. Okay, so it's fairly exotic, we'll give you that.

In addition to a spot of roofing, Seagate has also been busy improving the more familiar sounding technologies within the drive. There's an impressive 128MB of multi-segmented cache, the drive spins at 7200rpms, and the idle power usage is 6.9W, rising to 11W when under typical operation. And as we've seen with the previous two drives, 6TB means you can store millions of MP3 tracks and as many videos of cats flushing toilets as you could ever hope to.

The Seagate 6TB Enterprise drive, with Shingled drive technology

Shingled magnetic recording is something you'll no doubt hear more of in future

Whereas HGST is quite happy with its helium-filled drive being used by both desktop and business users, Seagate is more comfortable with this model drive being used in the server room. The obvious giveaway is the big 'Enterprise Ready' label across the surface of the drive, as well as the less obvious cloud image in the corner. However, although these drives may well be destined for the data centre, no doubt storing other users' videos of cats, there's no reason why the desktop consumer can't enjoy their speed, impressive five-year warranty and 1.4 million hour MTBF reliability; except maybe the price.

As with the HGST model, this isn't the cheapest drive available. For around £364 you could own one of these fine Seagate examples, which is admittedly cheaper than the HGST. That makes this model a bit cheaper at 6p exactly per gigabyte or near enough for our brains to comprehend at least.

The Seagate ST6000NM0024 is more than just a mouthful of letter and numbers; it's actually an extremely reliable, quiet and quick drive to use day to day. The combination of improved technology, capacity management and large cache memory make for a very good drive to have in your system, regardless of whether that's a gaming PC or one of many web storage solutions in the air conditioned sanctuary of the data centre.

But as with the previous example, the WD Green still offers the same kinds of speeds or at a rate that mere mortals can't possibly perceive, compared to this drive, and it does it for a tad under £200 less as well.

If it's increased reliability and huge capacity you're after, though, this is a drive worth looking at.

Toshiba MG04ACA500A 5TB

DETAILS
- Price: £318.26
- Manufacturer: Toshiba
- Website: goo.gl/nrGdZS
- Required spec: SATA-3 connection for maximum performance

The Toshiba 5TB drive is one of the most reliable available

It's quite power hungry, though

While the race for the magical sixth terabyte was being won, Toshiba slipped under the radar with its Enterprise Nearline technology drives. These drives offered the user 2TB, 3TB, 4TB and 5TB models at a more reasonable price than the then brand new 6TB competition. But can Toshiba hold on to this advantage?

This model uses the next generation of Nearline archiving storage to help increase the capacity through some advanced compressions methods, while still retaining the speeds necessary for normal hard drive duties. Nearline is a technology that was mainly used on tape drives and MAID (Massive Array of Idle Disks) setups, where reliability and durability are key.

Naturally this means that the MG04ACA500A is clearly aimed at the business and enterprise market. However, as an average consumer, you can reap the benefits of this 1TB per platter drive, with its 1.4 million hours MTBF, 128MB cache and sustained transfer rates of 205MB per second, in a NAS setup or something similar.

The drive spins at 7200rpm and, when combined with the large cache and the read/write technology Toshiba has implemented, the MG04ACA500A manages to top the scales in terms of the access speeds, albeit only marginally. While on paper the speed tests are nearly 30MB per second quicker, the reality is often only in the order of a few megabytes.

The obvious disadvantage here, between this model and the previous two, is the lack of that extra terabyte. In a world where a slight advantage over the competition can mean ultimate success, we get the feeling that Toshiba dropped the ball by releasing a 5TB model among the 6TB examples. It's certainly going to be hard for Toshiba's drives to get noticed when stood next to these behemoth capacity examples.

Saying that, though, it's a good drive. And it's slightly cheaper than the previous two drives at around £318. But due to the lack of 1,000 gigabytes, this puts the Toshiba MG04ACA500A at 6.3p per gigabyte, which is better than the HGST, but more than the Seagate and considerably more than the Western Digital Green drive we began the group with.

The Toshiba MG04ACA500A does just manage to keep its head over the rising tide of larger capacity drives, but for the average desktop user it's a little too niche, as the Seagate and HGST were, but for the business and enterprise user it's certainly a cheaper alternative. The lack of that extra terabyte, however, will automatically put it to the bottom of the list. If you're building an infrastructure based on high capacities, then the 6TB models will no doubt be preferable. If, though, you're after reliability to cost, while still retaining a higher than normal level of capacity, then we think the MG04ACA500A will probably do the trick.

Western Digital 4TB Purple

DETAILS
- Price: £126.32
- Manufacturer: Western Digital
- Website: goo.gl/Bqh3Ho
- Required spec: SATA-3 connection for maximum performance

We take a bit of a dip in the capacities now and drop to just 4TB, which is still quite a lot of space, but after using 6TB drives, it feels like you're missing something.

We also make a return to a Western Digital drive, this time the Purple range of drives. According to the colour coding scheme as set out by Western Digital, Purple hard drives are designed for home office or small business users' surveillance systems. The low power consumption and reliability of these branded drives are ideal for always on, 24/7 CCTV solutions.

To better aid this line of work, there's an added technology at use called AllFrame, which works with ATA streaming to improve playback, reduce frame loss and stop any lost footage issues that, according to WD, standard desktop hard drives suffer from when put under this type of strain.

You can read into all that however you like; the amusing truth of the matter is that these drives are exactly the same specification as the previously reviewed Green drive, except for the lost 2TB of extra storage.

There's the same IntelliPower technology, the same SATA-3 6Gbps interface, and the same 64MB cache, complete with bespoke algorithm to help improve the performance. The only thing different we could tell was the lower 150MB/s sustained transfer rate, compared to the Green version's 175MB/s.

The reliability and data integrity are identical, except for the fact that the Purple version carries a three-year warranty rather than two years. And the power use is only slightly out by a few hundredths of a watt. And as you would expect, the same increased areal density is being used in this model as in the other models of this generation drive.

We've already established that the 6TB Green version in Western Digital's range is a fantastic drive that's excellent value for money. Well, if you're willing to lose a couple of terabytes, then this 4TB Purple version will set you back a reasonable £126. This puts the gigabytes per pound value at 3.1 pence, which makes it 0.1 pence better than the 6TB Green drive.

Watching 0.1p is a little extreme, even for our miserly tastes, so the question at hand is really down to the fact that for around £70 more you could have 6TB instead of 4TB.

The near-identical specifications do make you wonder if the other colours in the Western Digital range are actually worth bothering with. Where it states that one colour is more ideal for a particular purpose over another may well be correct, but for most of us, a SATA hard drive will work to its maximum in one PC or another regardless of whether it's searching for extra-terrestrial life, monitoring your back garden or just playing *Minecraft*. Does it really matter?

Either way you look at it, the Western Digital WD40PURX 4TB is a great drive that will no doubt see you well for a number of years.

It's a Purple labelled WD now

4TB is still quite an amount of space to play around with

HGST Ultrastar He8

DETAILS
- **Price: £690**
- **Manufacturer: HGST/ Western Digital**
- **Website: goo.gl/BVFEkO**
- **Required spec: SATA-3 for maximum performance**

It's remarkably difficult to get six different hard drive manufacturers these days in a single group. There was a time where the likes of Fujitsu, HP, Hitachi or even Iomega would have been mentioned. However, they're all pretty much defunct, sold off to WD, Toshiba or Seagate, or they left the industry altogether.

Therefore, we thought we'd throw in something outrageous into the mix: the HGST Ultrastar He8.

As you can imagine, the He8 is the next level up from the previously reviewed He6. The same hermetically sealed units contain the same amount of helium, and the performance gained from using this gas instead of boring old air means a lot to those who monitor benchmark numbers like a hawk. The difference here, though, is that this is an 8TB hard drive, one of the first of its kind.

This is actually a second-generation HelioSeal (the helium sealing platform) drive, which will offer the lucky owner a 23% lower operational power use over a standard 6TB air-filled drive; 44% more power efficiency, measured in watts per terabyte; and an impressive two million hours MTBF with a five-year warranty.

The drive technology and layout is pretty much the same as the 6TB HGST He6. The seven platters are more compacted together thanks to the reduction in drag created by using helium instead air. This gives roughly 1.14TB per platter in this case, with the unique possibility that in the very near future we're likely to be including a 10TB drive with 1.42TB per platter in a group.

Wishful thinking that may be, but nonetheless the technology is there, and there's no reason why HGST can't squeeze a little more out of this particular helium-filled party balloon.

More helium and more terabytes this time around

8TB is pretty amazing, how long before 10, 12 or even 16TB are available?

"Even those with exceptionally deep pockets will baulk at having to part with nearly £700"

There's only one slight problem at the moment with this model drive. Where the Ultrastar He6 cost a rather expensive £391, the He8 is going to set you back an eye-watering £690. Our calculations make this a cost per gigabyte of 8.6p, which is quite a lot; in fact, we're looking at 2004-ish price per GB numbers here. Still, you do get to store in excess of two million pictures and something like 4,000 DVD films, should you wish.

Ultimately, the HGST Ultrastar He8 is borderline fantasy land at this present moment in time. Even those with exceptionally deep pockets will baulk at the thought of having to part with nearly £700 for a single hard drive, especially when for that amount of money you could have three WD Green 6TB drives RAIDed to 18GB.

Still this product is out there to buy, and if you're taken in with thoughts of helium hard drives and are consumed by the thought of the latest and biggest technology, then this is certainly the drive for you. The rest of us can perhaps wait until the price drops and 10TB drives are on the shelves.

Western Digital 6TB Green

With 6TB of storage and at a cost of just 3.2p per gigabyte, the Western Digital Green drive is a pretty good buy.

Plus it doesn't come with all the enterprise ceremony, so the cost is significantly lower.

Western Digital 4TB Purple

Ignore the choice of colour coding for the time being; the Purple 4TB drive from Western Digital is the next best high capacity drive you'll find.

Even 4TB will take some doing to fill to the brim, and by then you'll probably be able to buy a 12TB drive.

How We Tested

Each drive was hooked up to a standard desktop PC and formatted to a single, maximum partition in NTFS. Also, when possible, we tried the drives out in a group RAID installed in an older ZyXEL NAS unit.

	WD 6TB Green	HGST Ultrastar He6	Seagate ST6000NM0024	Toshiba MG04ACA500A	WD 4TB Purple	HGST Ultrastar He8
Price	£194.99	£391.99	£363.71	£318.26	£126.32	£690
Capacity	6TB	6TB	6TB	5TB	4TB	8TB
Cache Size	64MB	64MB	128MB	128MB	64Mb	128MB
Avg. Read Time	8ms	8.5ms	8.6ms	8.5ms	7.5ms	8.5ms
Avg. Write Time	8.5ms	9ms	8.9ms	9.5ms	8ms	9ms
MTBF	1,000,000 hours	2,000,000 hours	1,400,000 hours	1,400,000 hours	1,000,000 hours	2,000,000 hours
Avg. Power Consumption	5.3W	7W	10W	11.3W	5.1W	7.4W
Cost Per GB	3.2p	6.5p	6p	6.3p	3.1p	8.6p

Tech Origins
eReaders

David Briddock examines the journey to digitisation of the novel

Electronic books, or eBooks, which attempt to replicate the format of a paper book, have been around in some form or other since the dawn of personal computing. The development of complementary eReader devices is a much more recent phenomena, though.

Adobe

For many computer owners it was Adobe's PDF document standard that first delivered digital books to their hard drives. According to Adobe's website over 500 million copies of Acrobat Reader were downloaded around the world from 1993 to 2003.

Things really started to accelerate in August 2000, however, when Adobe bought Glassbook and in one fell swoop acquired eBook reader and server technology. Less than a year later, in January 2001, Adobe launched its Acrobat eBook Reader software. Once installed that application could manage a personal PDF file library of copyrighted books. Digital books that now had colourful covers, user-definable font size, searchable contents and the capability to incorporate a reader's notes and bookmarks.

Around the same time Adobe also showed off its Content Server, and a few months later entered into a partnership with Amazon. At launch Amazon's new eBookStore had 2,000 copyrighted books ready for immediate download by anyone using the Acrobat eBook Reader software.

Desktop To Mobile

Reading PDF books on a desktop PC, or a heavy laptop of the period, was a far cry from curling up on the settee with a good novel, though. As early as the middle of 2001, Acrobat Reader had started to appear on PDA Devices such as the Palm Pilot and the Pocket PC. However, while this was a big improvement in terms of portability, the small and relatively low-resolution screens couldn't replicate a paper-based reading experience in a favourable way.

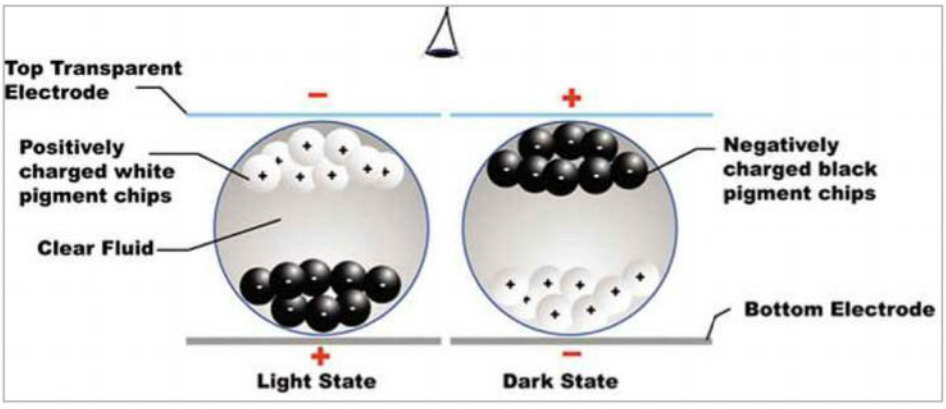
With this as the goal, a few companies embarked on building large-scale PDA devices. Unfortunately, these turned out to be quite cumbersome products, incorporating battery-hungry grey-scale LCD screens and extremely limited storage capacity. With a price tag of running in the hundreds of dollars understandably they failed to set the world alight.

ePaper

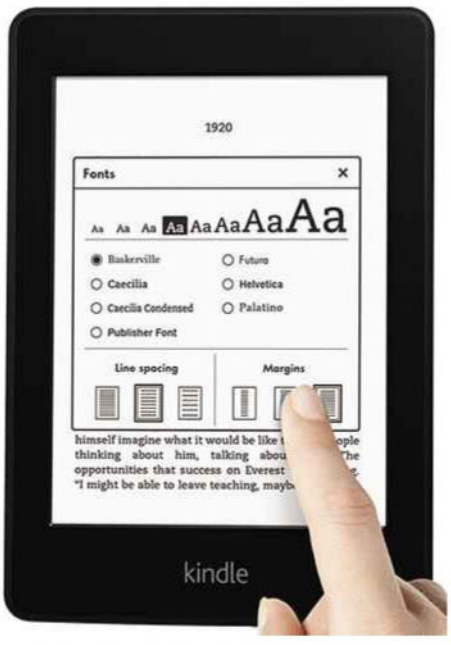
What was needed was a small and light, dedicated book reading device with a long battery life and a screen that could be read outdoors – say in the park or at the beach. A solution came in the form of electronic paper, or ePaper. Here particles are suspended in an oil-like medium and can be moved in response to a changing electrical field. The result is black and white pixelated pattern suitable for rendering text and mono images.

Unlike LCD screens these ePaper screens worked well in bright conditions and needed less far power to operate – what's more, they could maintain a pattern indefinitely even when the power supply was disconnected. This meant battery life was extended from a few days to many weeks. However, as the particles move relatively slowly ePaper displays are unsuitable for fast animations or video.

Sony was one of the first companies to produce slim, lightweight eReader products based on ePaper technology, but it wasn't long before Barnes and Noble got in on the act with their Nook eReader range. As we all now know, however, it was Amazon's Kindle devices and huge bookstore that really took the eBook world by storm. Even today, many consumers can only think of the Kindle when eBooks are mentioned. mm



ePaper Technology



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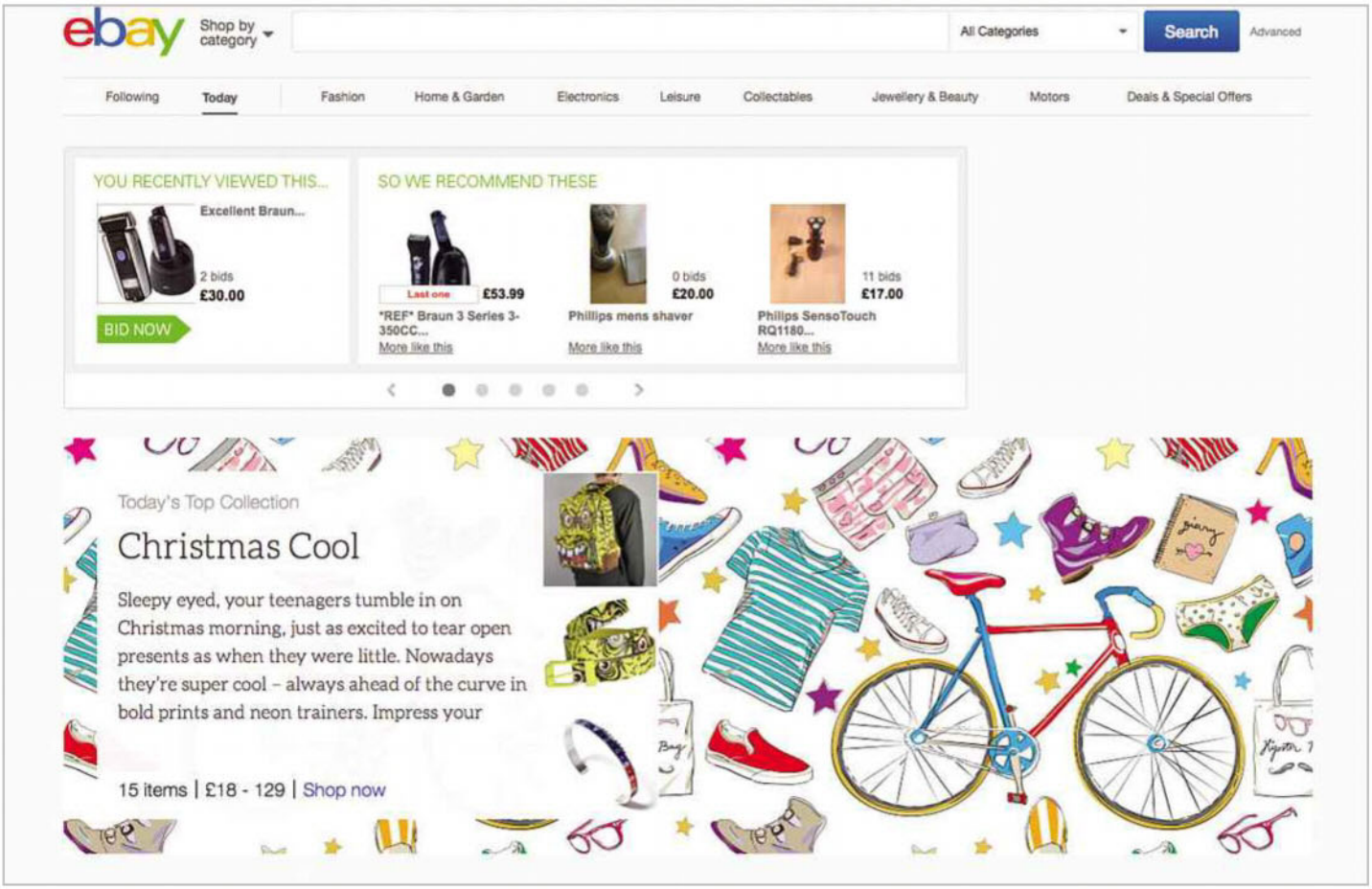
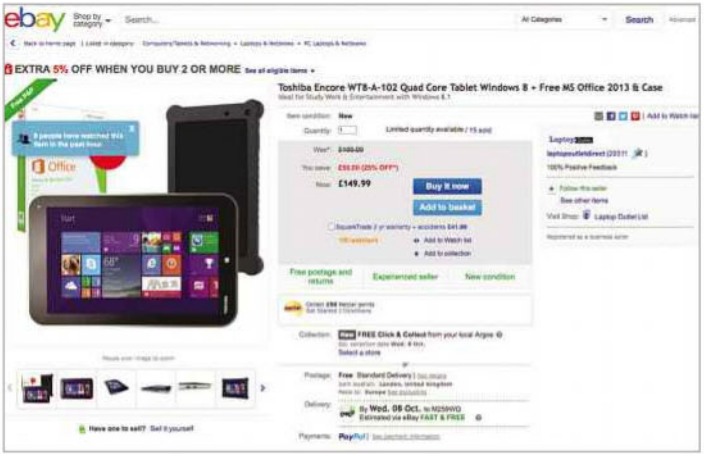
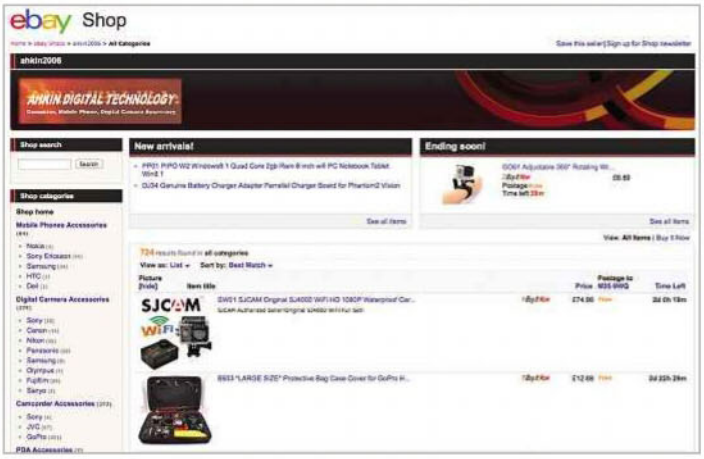
Adapt Or Die
The Rise And Rise Of eBay

As eBay beats Amazon to become the most popular UK retailer on mobile phones and tablets, David Crookes looks at how the auction site has changed and why others struggle to compete







Everybody knows eBay and everybody has a story to tell. A few years ago, a dinner party was incomplete without someone mentioning a bargain they had managed to win in an auction or the incredible price that an unwanted trinket they had found in grandma's attic had fetched. Along with the soaring profit they were making in the buoyant property market, everyone, it seemed, loved an eBay success.

The press certainly lapped up all things eBay. Reporters pounced on stories about fully functioning kidneys for sale (illegally, of course, but at a starting price of $2.5 million). They covered a bobsleigh team that put itself up for auction ahead

"What buyers really want is choice, convenience, a feeling of safety"

of a Winter Olympics. People were caught in the moment, auctioning anything they could get their hands on, from an egg to a pinch of fairy dust (yours for a couple of quid). Some wag tried to sell the town of Bridgeville in California in 2002. Three others have put it up for sale since.

But eBay today is not what it used to be, and we're not donning some rose-tinted Versace glasses (£45) when we say that; it's the actual truth. The first item that sold on eBay.co.uk was a three-track CD by The Scorpions, which fetched £2.89 worth of bids but today – more than 15 years, three billion items and £65bn of sales later – just 25% of the items sold on the site are done so via an auction. The rest are sold at a fixed price, and this shift has very much been a deliberate one.

It started around five years ago when eBay started to put a greater emphasis on fixed price purchases, or the Buy It Now, and then began to promote top-rated sellers to a larger degree. The company had a fair idea about what would happen: everything it does it trialled in its labs first to assess the impact of it ("We examine the impact of any changes we make to the site, however small," says Valerie Nygaard, eBay's senior director of EU Buyer Experience).

The upshot is that, today, more than 140 UK brands and retailers rub shoulders with 200,000 independent traders. And that has changed the expectation people have of eBay. Rather than trying

"An Item Is Bought Every Second"

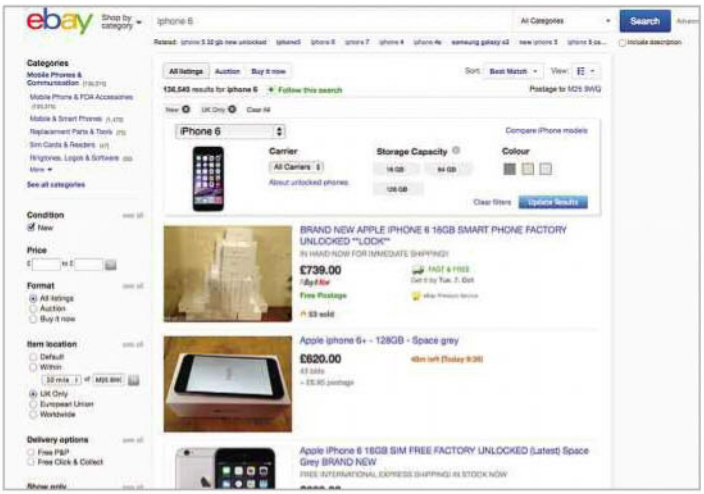
Valerie Nygaard, eBay's eBay's senior director of EU Buyer Experience, reacts to Ofcom naming eBay as the most popular UK retailer on mobile.

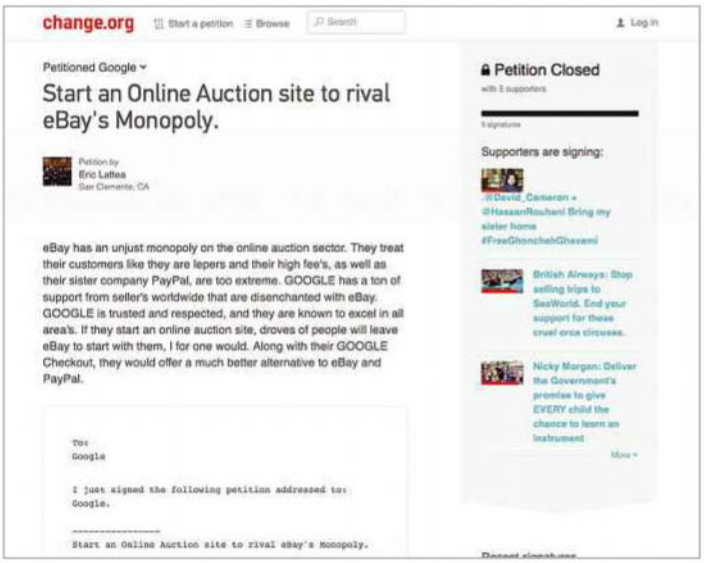
Micro Mart: What have you done to the eBay mobile app to help make it so popular?
Valerie Nygaard: Recent changes have included a redesigned look and feel of the eBay apps for iPhone, iPad and Android and Windows 8, which now include larger images and personalised feeds. When we look at the UK in particular, the defining characteristic of consumers is that they shop by mobile. They're voting with their feet and with their swipes, taps, zooms and pinches, and they want to be able to continue their shopping journey seamlessly from whenever they last left off. We're constantly listening to our users, from running surveys to get the views of tens of thousands of users.

MM: eBay has moved away from a pure auction model and there are many more Buy It Nows around. Why is this?
VN: Today, 75% of the items sold on the site are now fixed price, and 70% are brand new. Shopping is now about bringing online and high-street experiences together, combining stores, websites, apps, catalogues, marketplaces, call centres, click and collect, home delivery and social media. We believe we're uniquely positioned to capitalise on such omni-channel retail strategies, partnering with retailers large and small to help them compete.

MM: Has eBay ever worried about a rival setting up an auction site?
VN: eBay has evolved and we see ourselves as less auction site and more trusted retail partner.

MM: How would you say eBay is as true to its roots today as it was back when it started?
VN: We've always strived to offer incredible choice and diversity – a combination of great value and the aspirational. We've worked hard to maintain this as shopping has transformed thanks to the growth of online shopping and the adoption of smartphones. This presents a challenge, especially when it comes to transferring the whole eBay experience into a tiny piece of retail estate – the mobile phone.





to outbid others or sneak in a 99p win in the middle of the night, buyers are using eBay in the same way as they use any other online retailer. They want to make an immediate purchase and get the item in their hands as soon as possible. "The thing is when me and you buy something, we basically want it now," says eBay expert Matthew Ogborne, a co-Founder of UnderstandingE.com. "Anything past next day is now deemed to be late. With a typical eBay auction you have to wait several days for it to finish. Buy it Now means that you can have it as soon as possible."

In the process, bargains are more difficult to come by (although Ogborne says there is more to it: "What buyers really want is choice, convenience, a feeling of safety"). Naive buyers who slapped in large bids early in an auction's run used to be a major problem, but today savvy sellers are the issue. Sellers are very much aware that they can tick the 'completed listings' box when searching for an item to see how much similar products have sold for, allowing them to price their own in the same price bracket. But that's life, and the increased profits sellers are raking in are keeping them coming back time and time again.

"You need to be a bit savvy to be successful on eBay," says Robert Pugh, author of The eBay Business Handbook who also writes a weekly newsletter (**intel.harriman-house.com/ebay-bulletin**). "You also need the right product. But there are discussion boards to help. People love to tell others what they know. There's a sense of sellers being in it together and it works very well."

Can eBid Beat eBay?

Some brands can become so big, their trademarks are adopted by the public as generic names. Hoover is a good example of this: people very often talk about hoovering their carpets. But while the same can be said of Google – people google their search terms – eBay is a little different. When we talk of eBaying an item, we really mean eBaying an item. Which is, we would assume, rather disheartening for those that try to rival it.

We've discussed in our main piece the desperate attempts to encourage new players into the space that eBay so comfortably occupies. Each one has failed. But one company has continued to try to take on eBay, a lesser known firm called eBid, which set up in London in 1999 by co-founders is Mark Wilkinson and Gary Sewell and which, it may surprise you, is now a $6 billion marketplace spanning 23 territories, covering more than 100 countries and five continents.

Micro Mart: Why did you launch eBid?
Mark Wilkinson: We launched eBid in 1999 with the goal of creating an affordable space for merchants of all sizes. Even as the e-commerce industry has been assaulted by varied economic forces, we have continued to keep our mission goals. We are confident that eBid remains one of the best values of any site, worldwide, and we have pledged to always maintain that.

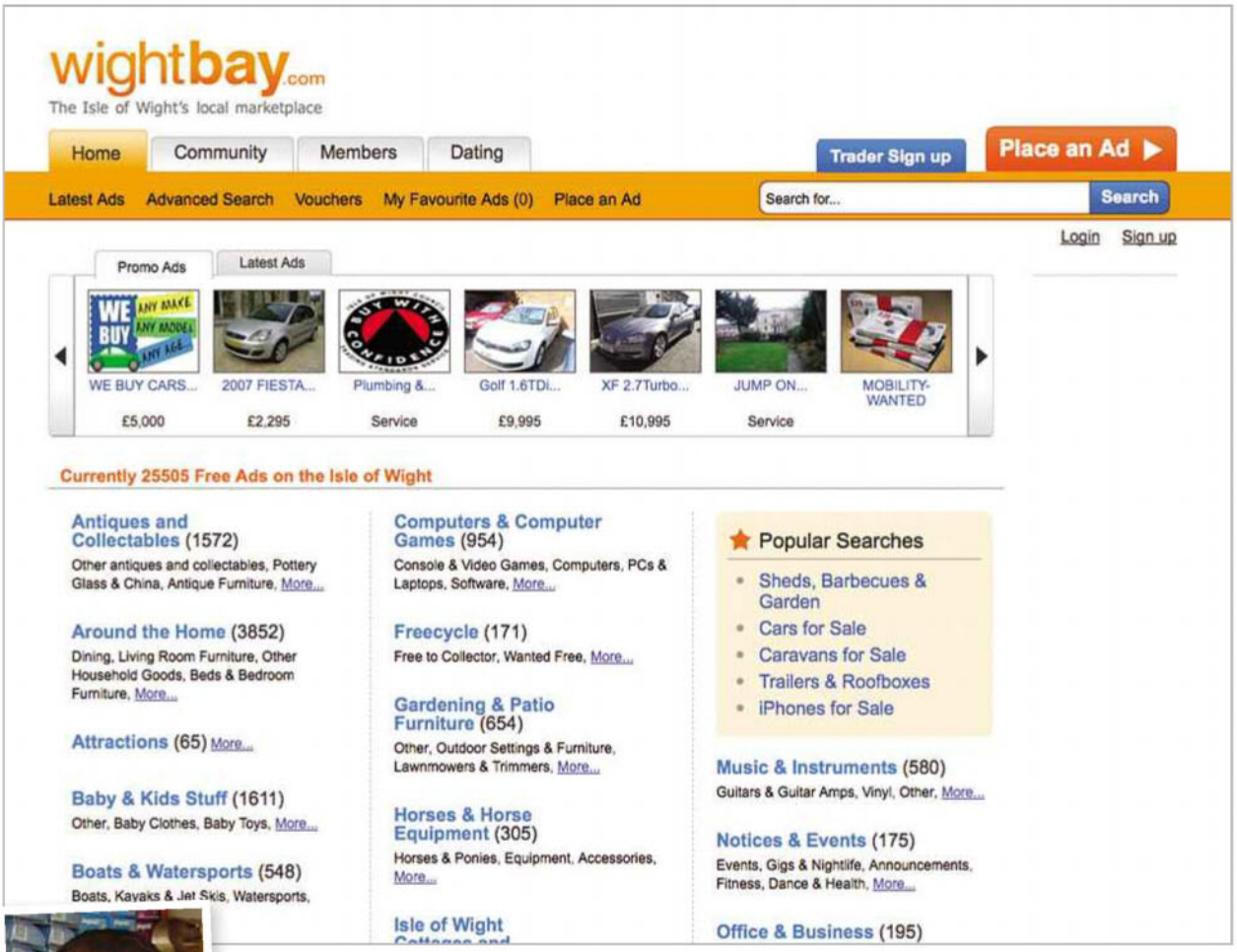
MM: How do you attract and retain customers?
MW: Our valued customers will not see an increase to their final value fees, nor will eBid adopt any other complicated and confusing fee structure as many sites do when confronted with a budgetary challenge. Our 14 years in business have proven that.

MM: Why does everyone keep talking about eBay?
MW: Due to our commitment to remain cost effective for our customers, our advertising budget is not at the scale of our major competitor. We have opted for a more targeted approach to attract both buyers and sellers to our marketplace. The bulk of revenues are spent (at no extra cost to our customers) for our sellers' products to be advertised on Google Shopping and also general keyword targeted advertising catering to attracting buyers and sellers.

MM: Why do you spend money on Google Shopping?
MW: Google Shopping used to be a free service but now runs on a cost-per-click basis. That was a speed bump we had to overcome, because passing the cost on to our customers was not an option to us.

MM: What would you have in an idea world?
MW: We would hope to also entice into selling on eBid in our value environment and help us increase brand awareness of the eBid name.

Successful sellers are clever enough to price their items cheaper than on other websites. Some snap up special offers in supermarkets and department stores, wait for the offers to end and then undercut the current price. Others buy job lots from wholesalers or from abroad. Many flock to car boot sales.



Robert Pugh

But Pugh says acting slowly is the secret: "Research the market. All sales of the past two weeks are visible. You can see what others sell and how they sell them before you take the plunge. You may have something you cherish and feel is worth a lot of money but isn't worth anything or a 1963 Action Man which is worth a fortune – you don't know. You need the stock supply in place but that's the same with any business. A lot of people make their own thing and turn a hobby into a business. It's not difficult, and there are not many tax implications. You can write off the costs, and the chance of making enough money for the first three years is low."

But while eBay still attracts millions of buyers looking for items that shops wouldn't sell ("It has opened up a huge international car boot," says Mark Hardisty, organiser of annual gaming event Games Britannia), 70% of items sold are now new, according to Nygaard. What's more, earlier this month, Ofcom's Communications Market report said eBay, with a reach of 34%, beat Amazon (with 28%) to be named the most popular retailer in the UK on mobile. "It's almost like Debenhams online, only with tens of millions of stores inside," says Pugh. "And people are accessing it wherever they are – in a cinema queue, in the pub or just anywhere they can get a signal."

Pugh is one of tens of thousands of UK eBay sellers who have abandoned their careers to work on the site full time. He left his job as a sales executive for British Telecom ten years ago at the age of 39, having sold a few odds and ends that were lying around the house. He then started buying up high-quality brand toys from car boot sales to sell on eBay, building up a successful eBay toy company in the process. As his daughters grew older and began to desire cosmetic products, Pugh took a keen interest and drifted into selling mascara and lipstick. That part of his growing eBay empire has a turnover of £250,000-a-year.

"The good thing about eBay is that if you want to sell one thing a week and have a curry, you can but if you want to sell a thousand items and change your life, you can do that too. The flexibility and start-up costs are zero really, and you can do what you like," he says, having embarked on a third eBay business, this time selling DIY items to landlords up and down the UK. The idea for that came from a sideline of renovating old homes. Pugh is a busy man, it seems. "We'll turn over £50,000 a year with that business from a standing start," he adds, and you can't fail to be inspired.

> **"I'd love to be able to give idiots bad feedback"**

Not that Pugh is short of inspiring stories. "One bloke I know works for air traffic control and in his spare time he sells boot laces and shoelaces on eBay," he says. "And he's now made his fortune. You wouldn't think it possible. To you and me, a shoelace is something to tie up, but kids see them

as fashion statements – there are red ones, yellow ones, blue ones, thin, thick, all this kind of stuff, and they put them on their Nike trainers. So they need these. But this guy is now on a beach in the Caribbean having made his first million. You can do anything really."

That said, there has been simmering anger among many sellers that the changes made by eBay over the years have given them less freedom than they were used to. In August, the fact eBay hiked its fees generated more anger than the website crashing for the tenth time this year.

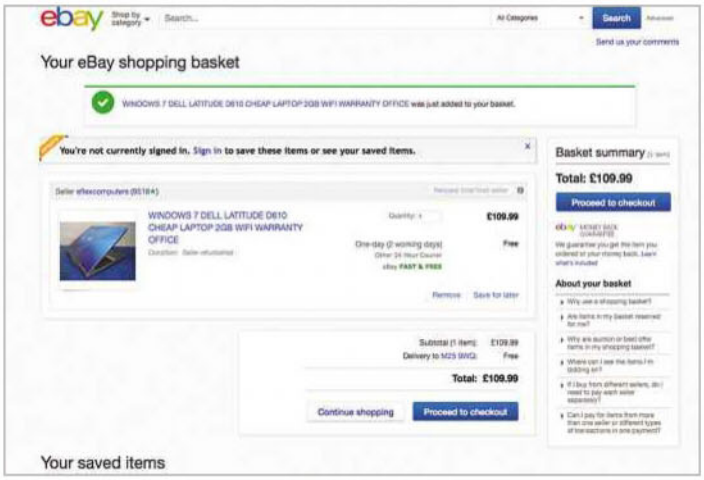
Adding a Buy It Now option today costs a flat fee of 50p whereas previously items priced below £25 attracted lower costs. The Gallery Plus feature, which allows for larger images to be displayed on many types of listings, costs £2.50 rather than 95p, and adding a subtitle to listings is now £1, up from 35p on three-to-ten day Buy It Now listings (but down on the £1.05 it cost for 30-days). Reserve price fees have risen from 3.5% to 4%.

Sellers say the changes bring them under great pressure. "You work yourself to the bone. You're hanging on an knife edge when they make these changes," says Alison Abrunerias, a former nail technician who turned to eBay as a way of distracting herself following a diagnosis of breast cancer and went from earning £70-a-week in employment to turning over close to a £1m each year. "There were no rules when I started, but now you're a part of eBay and that is how you have to look at it. There is no point in going on there thinking you're going to be doing your own thing because it isn't going to work. If they say you jump, you say how high."

Abrunerias doesn't sell on eBay any more, but she admits to being addicted when she did. "I was selling for six or seven years and I did it at the right time, when it was exploding and I had a niche," she says. "I sold from a box room, and then I moved because I needed space. My son went to university and I filled his bedroom and then my daughter went on holiday and I filled hers. Then it started going in the dining room and the lounge and the garage was full of it. And I thought I've just taken over the house that we've just bought so I opened a small wholesalers. I didn't get a thrill by buying something and going, 'Look what I have won'. I didn't give a monkeys. I wanted money in my pocket."

> **"You're hanging on an knife edge when they make changes"**

She says the inability to leave negative feedback for buyers coupled with pressure to offer free postage and packing, Argos collection and speedy delivery took some of the edge off the buzz of selling. And Pugh agrees, to a degree. "I'd love to be able to give idiots bad feedback, but Amazon doesn't allow this, so eBay doesn't either," he says. "But there is some protection: there's a defect rate, which looks at the number of times a customer is seen to have been upset by a trade; if it's too often, then alarm bells ring. It's also still competitive. People are disgruntled because it used to be a lot better, but it's still pretty good, and there are rules there so you just have to play along with them. The ones who moan and groan are not perhaps the one who will succeed."



Even so, some would like a strong alternative, and yet attempts to encourage the likes of Google to step in and set up a rival have not fared well: a petition by Eric Lattea from California calling for an alternative on change.org attracted just five supporters. "It's just such a massive undertaking for anyone to seriously take it on," says Dom Brookman, former editor of eBuyer and Online Seller magazine and author of Brilliant eBay. "How would you lure eBayers to another site? It would have to have a phenomenal USP to try and take it on or be really, really niche like WightBay, which is the Isle of Wight's own eBay site. It's like with Google – Bing has tried obviously, but people stick with what they know."

What this means is that eBay has been able to get stronger and stronger. Over the years, it has consolidated its position, not only through eBay itself but from Gumtree and the PayPal payment system, both of which it also owns (that said, it's looking to separate PayPal from the eBay business so that it can better compete against competitors such as Apple Pay).

Any company trying to take it on has, it would seem, missed its chance. "Due to our commitment to remain cost effective for our customers, our advertising budget is not at the scale of our major competitor," says Mark Wilkinson, co-founder of rival eBid which launched in 1999. Despite eBid being a $6bn marketplace covering 100 countries and despite zero insertion fees, a maximum 3% final value fee, a Make An Offer system, more than 11,000 categories and an affiliate program, people still talk about eBaying products in the same way as they Hoover their carpet. "In an ideal world, we would have a few more large sellers on board to improve the selection of items available for sale on eBid and obtain a more regular buying community who we would hope to also entice into selling," Wilkinson adds.

But sellers will inevitably go where they perceive the greater number of buyers to be, and eBay's strategy has been to take on the likes of Amazon head on. "Ebay has evolved, and we see ourselves as less auction site and more trusted retail partner," says Ms Nygaard. Mobile is key to this: eBay's apps have been downloaded more than 240 million times globally. In the UK, an item is being bought every second via the eBay app.

And for all of the misgivings about selling on eBay, those who do it are, by and large, fans "I was addicted to selling on eBay," says Abrunerias, who has used the proceeds to help her husband set up his own restaurant, Ole Ole in Lincoln. "I read about it, I bought books about it, I tried things and I put things together. It was like a friend, and it just grew from there," she says. "The great thing about eBay is that you can get what you want. Every time someone says they want something, I say go on eBay. You can always find it."

In beating Amazon in the UK (at least for now), eBay has laid down a large marker. "Amazon Marketplace [the part of Amazon which allows independent sellers to market items on the site] is a rival, but eBay has the critical mass," says Pugh. "We go around car boot sales and we hear all the time, 'this is £20 on eBay'. It's the barometer people work to. And if a rival came up, then I don't think I'd switch, and that's a problem for a new company: if the buyers don't go somewhere, then the sellers won't go, and if the sellers won't do, the buyers don't either. There's a lot going for eBay: there is buyer protection, money back guarantees, protection against listings that don't match the product. If someone gets a fake DVD, then they should just say 'I want my money back'. From a buyer's perspective, eBay is very secure, and from a seller's perspective you have to work with what you're given. But once you get the hang of what you can do, where else do you go?"

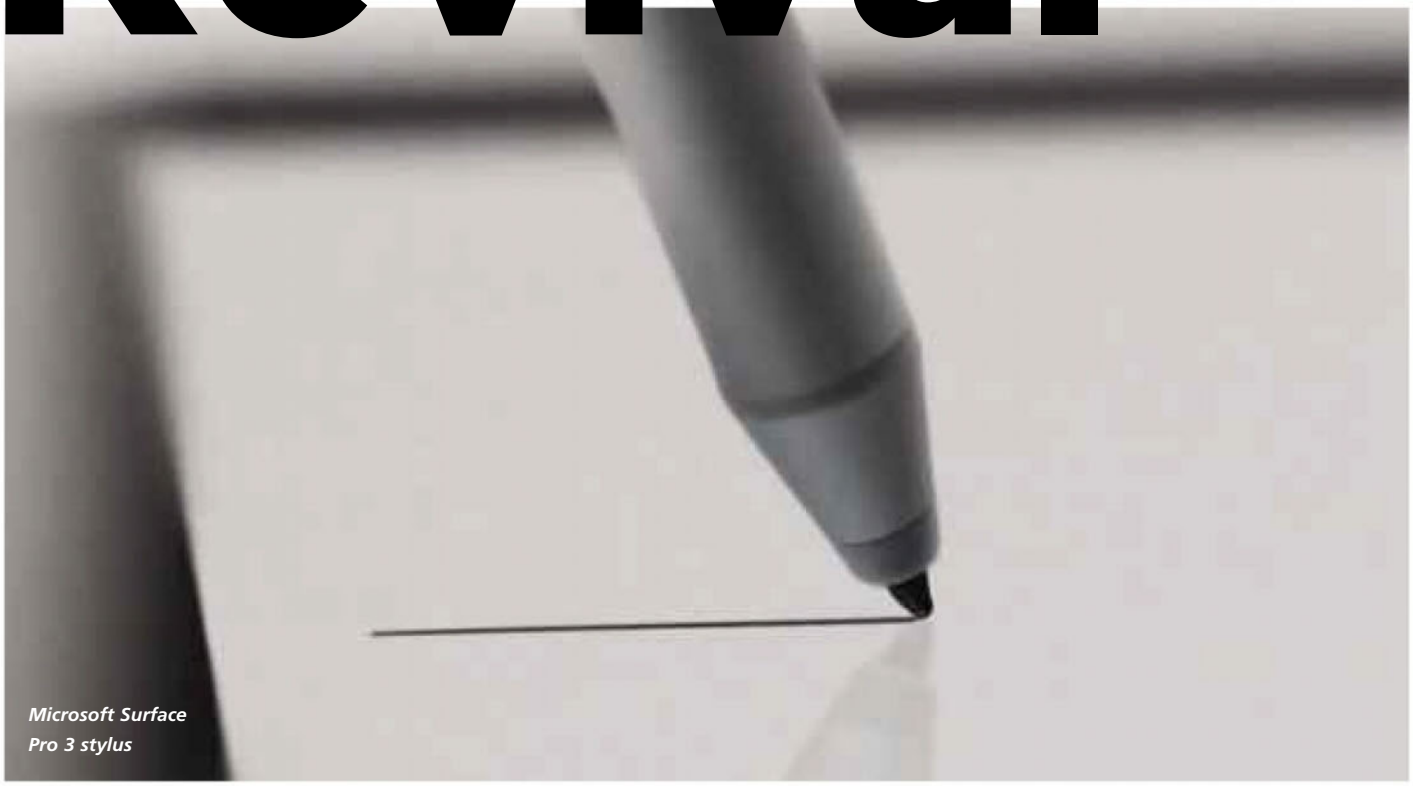
Both he and Abrunerias agree that, for buyers, eBay is close to perfecting its model. "It needed to change because thousands and thousands of people were saying 'I got ripped off on eBay', but you hardly ever hear that now," says Abrunerias. "Everybody is safe to buy on eBay and that's the way it should be."

* If you want to learn more about buying and selling on eBay, check out The Independent Guide to eBay 2015, which available in shops and online. **mm**

eBay In Numbers

1. The first item sold on eBay.co.uk was a three track CD from German rock outfit, The Scorpions, for £2.89.
2. In 15 years eBay has sold three billion items, worth £65 billion.
3. Ahead of the Brazil World Cup, 24 football shirts sold every hour.
4. In the UK an item is bought every second via the eBay app.
5. A pair of shoes sells every seven seconds; a handbag every 19 seconds via mobile.
6. 9pm is the peak time for tablet shopping.
7. UK businesses selling on eBay each export to an average of 39 countries.
8. More than 200,000 businesses sell on eBay in the UK.
9. Almost £70 million has been raised by Brits buying items through eBay for Charity.
10. More than 19 million Brits visit eBay every month.

Digital Stylus Revival



Microsoft Surface Pro 3 stylus

David Briddock wonders if we'll all carry a pen-like stylus in the future

Is the digital stylus about to make a comeback? Not since the 1990s has a pen-style stylus been seen as a suitable product for the mass market. Yet with touch-screen technology fast becoming ubiquitous, there's an obvious opening.

But where did it all start?

Early Days

Long before commercial touch-screen devices appeared, graphics artists and engineers devised various PC-connected instruments to help bring their ideas and creative designs to life.

Digitiser tablets, which acted as an additional input device alongside the keyboard (and later the mouse), were the first products to incorporate a precision digital stylus.

Samsung ATIV 2-in-1 Smart PC

A digitiser tablet has a grid-like layout of wires placed just under its surface. As a stylus is moved across the tablet's surface, it results in a measurable change in electrical inductance, which is subsequently transformed into digital data. Software then processes this data to set the display's cursor position and register digital 'ink' marks in line with stylus location and movement.

Over time, these digitiser tablets began to offer significantly higher resolutions, while the styluses themselves sprouted enhanced features like multi-level pressure sensitivity and one or more buttons.

But the advent of widely available touch-screen technology on a range of affordable devices has caused the stylus to be seen in a new light. During the personal digital assistant (PDA) era of the 1990s, a number of technology companies were inspired to market a digital stylus as a natural user interface input device.

First Attempts

The term 'personal digital assistant' appears to have been first used by then Apple CEO John Sculley when talking about Apple's forthcoming Newton Message Pad at the 1992 Las Vegas Consumer Electronics Show.

The Newton featured a pen-like stylus to operate its resistive-technology touch-screen. Stylus interaction required sophisticated software to deliver system navigation, handwriting recognition and a collection of gestures such as shortcuts for copy, paste and undo operations.

Devices like the IBM ThinkPad and Amstrad Pen Pad PDA6000 had previously tried to interest the public in the pen-like interfaces. However, it was Apple's Newton Message Pad that first brought the possibilities of digital stylus technology to the public's attention.

Unfortunately for Apple, all this real-time interaction demanded considerable processing power- something the Newton device didn't really have. This resulted in a sluggish and rather frustrating experience for many Message Pad owners. Consequently, Apple retired the Newton product line in 1998.

The Newton's demise opened the door for others to exploit the pen interface concept. For example, the much celebrated Palm Pilot range, which appeared shortly after Psion's acquisition by US Robotics in 1995, also featured a stylus and handwriting recognition.

To overcome some of the Newton's shortcomings, these Palm Pilot devices employed a novel Graffiti handwriting alphabet to improve recognition accuracy and speed. Although this was a brilliant solution, it did require owners to learn this new alphabet.

The Challenges

Of course, a digital stylus that performs just like pen on paper is the holy grail. Even with today's advanced technology there's still some way to go.

Performance is critical. To be viewed as a success, the user shouldn't notice any discernible lag or delay between stylus movements and the flow of digital ink – no matter how fast the stylus is moved, so very fast graphics drivers cards and efficient software algorithms are mandatory requirements.

Digital ink marks must be precise, accurate and 100% reliable. This is especially important for handwriting recognition interfaces or drawing and painting applications.

Today's high-performance processing CPU and graphics chips, plus impressive advances in artificial intelligence (AI) software techniques, mean we finally have the technology necessary to begin a new digital stylus era.

> **"There's no doubt the Samsung's Galaxy Note smartphone is a modern-day incarnation of Apple's Newton Message Pad"**

Samsung and Microsoft, with help from companies like Wacom and N-Trig, have decided to spearhead a new wave of mobile consumer devices designed to integrate with modern digital stylus technology.

Samsung S-Pen

Samsung's answer to the modern stylus is its Wacom-based S-Pen technology, which is incorporated into its Galaxy Note range of smartphones and tablets.

Owners of a Galaxy Note smartphone enjoy a pocketable device with a pressure-sensitive stylus suitable for surfing the web, scribbling down notes, managing tasks or shopping lists. They can even create spur-of-the-moment drawing or painting.

As it comes with high-quality handwriting recognition software, there's no doubt the Samsung's Galaxy Note smartphone is a modern-day incarnation of Apple's Newton Message Pad. The just released Galaxy Note 4 embodies updated

Samsung Galaxy Note and S-Pen

Microsoft Surface Pro 3

S-Pen technology with improved accuracy, higher sensitivity and an enhanced user interface.

Meanwhile, the Galaxy Note range of tablets extends from a compact 8" version right up to the large 12" model – which is approaching A4 paper in size. The latter is particularly attractive when reading PDF documents or for artists who require a bigger working canvas.

And now Samsung is using the very same S-Pen technology on some of its Windows-based 2-in-1 PCs. The Samsung ATIV Smart Pro range of laptops (**goo.gl/jTbMxm**) have fully detachable screens. When detached, the screen will act just like a standard tablet. Combined with the included S-Pen, it's a powerful combination that gives consumers a viable alternative to Microsoft's Surface Pro products.

Microsoft Surface Pro

Meanwhile, Microsoft decided to develop its own pen-enabled range of products. The result was its innovative Surface range, a brand new design, which offered a dual-purpose laptop/tablet device.

The Intel processor powered Microsoft Surface Pro and Pro 2 models had a digital stylus based on Wacom technology. Similar to Samsung's S-Pen, it also delivered pressure-sensitivity, along with built-in handwriting recognition capabilities. But Microsoft wasn't satisfied; it wanted greater functionality.

Therefore, the latest Microsoft Surface Pro 3 model has ditched Wacom in favour of an N-Trig solution. Why did Microsoft make such a radical change? Well, it believes N-Trig is better able to address the challenges we mentioned earlier, while also providing a number of advanced options.

For example, click the stylus cap, and the OneNote application appears along with a blank page, even if the device was previously in sleep mode, while a double-click takes a screen-shot and puts the resulting image into a new OneNote page ready for annotation.

Wacom Vs N-Trig

Wacom has been on the technology scene for decades and has a distinguished reputation in the digitiser arena. In contrast, N-Trig was only founded in 1999, yet it has already attracted strong financial backing, which has enabled it to open sales and support offices outside its native Israel in North America, Japan, Taiwan and China.

You might be wondering what the difference is between Wacom and N-Trig technology. Let's consider a number of key aspects of digital stylus technology, specifically pressure sensitivity, parallax, stroke accuracy, drift, palm rejection, hover mode, software support and cost.

Pressure sensitivity can be used to change 'inking' aspects such as line thickness, brush size, colour intensity and opacity level. The current range of N-Trig devices have 256 levels of pressure sensitivity, while Wacom devices tend to start at 512 levels and go all the way up to 2,048. In practice, 256 separate levels of pressure is far more than most people actually need with a digital stylus – or even when using an actual pencil or paint brush – so all those extra levels aren't really necessary. However, artists who work on a large canvases and with big brushes may need at least 1,024 levels, so in these circumstances, a Wacom stylus is the going to be the right choice.

Parallax, namely the apparent distance between the stylus tip and the point where the digital ink flows, must be kept to a minimum. Early touch-screens with their resistive technology (extra transparent layers separated by a tiny gap) suffered badly in this regard, but the ultra-thin coating on today's capacitive screens does

> **"Stroke accuracy is a critical requirement for drawing and handwriting recognition"**

help reduce parallax. Of course, with pen and paper, parallax is completely eliminated.

As we discussed earlier, stroke accuracy is a critical requirement for drawing and handwriting recognition. With a Wacom device, marks are placed with respect to the cursor. Unless parallax is non-existent (and it never is), the cursor and the pen tip are never quite in the same place. Modern N-Trig devices, on the other hand, are extremely accurate, with marks which appear directly beneath the pen tip.

Drift is something Wacom devices have long suffered with, and regular recalibration is needed to maintain accuracy. However, recalibration doesn't fix the problem at the screen edges and corners, which can lead to problems with toolbar and button selection. N-Trig devices, though, are always equally accurate at any point on the screen, so they don't require any recalibration.

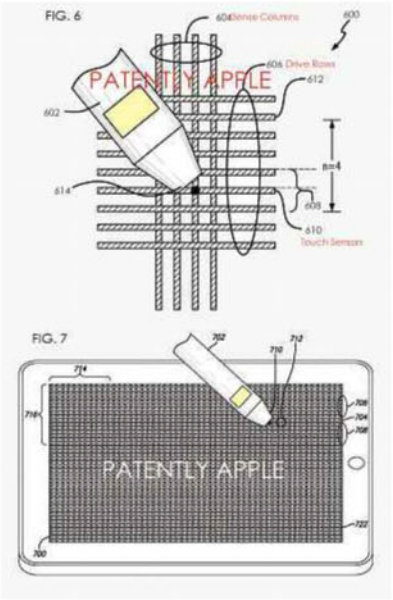
Palm rejection is essential for an authentic drawing and handwriting experience. Here the software can disregard touch signals from a resting hand and just take notice of the stylus tip. Both Wacom and N-Trig have perfectly good solutions to this problem. However, some N-Trig setups can maintain a palm rejection capability while also allowing single and multi-finger gestures in addition to stylus input. This is particularly helpful in art and photo manipulation apps when performing on-the-fly image rotation and scaling.

A digital stylus is recognised when it's close to, but not quite touching, the screen. In this 'hover' mode, a stylus cursor will appear. Wacom digitisers have so far offered a larger hover distance than N-Trig devices, but both distances are generally good enough

Digital Stylus Links

Wacom: wacom.com
N-Trig: n-trig.com
Samsung Galaxy Note: goo.gl/PcwJci
Samsung ATIV Smart PC: goo.gl/jTbMxm
Microsoft Surface: goo.gl/Q8jZGj
Apple iPen Patents: goo.gl/UsyQUv

Wacom Bamboo digitiser tablet



Apple iPen patent diagrams

to activate palm blocking when required and provide features such as context sensitive popup menus and tools.

Despite being around much longer, Watcom devices can unfortunately still run into subtle, yet somewhat annoying, driver comparability issues with certain software applications. The N-Trig system software had a few problems too – that is, until N-Trig releases its new Wintab middleware code to coincide with Microsoft's Surface Pro 3 launch. Available in 32-bit and 64-bit versions, it's fully compatible with all Windows-based N-Trig pen and touch technology (**goo.gl/L74wDq**).

As for cost, this is going to be more of a guess. As you'd expect the actual licence fee paid by companies is a closely guarded secret. However, indications are that Wacom technology is more expensive to license. Being the newcomer, N-Trig is keen to offer attractive deals to anyone who's serious about using its technology, so in some situations the price difference may turn out to be quite significant.

Active Pen

Today the emphasis is on delivering active pen technology with a more realistic pen-on-paper feel.

A typical passive stylus has a large rubbery conductive foam tip, which emulates a user's finger. This kind of stylus doesn't offer any 'smart' capabilities. Nevertheless, it will work on just about any capacitive touch-screen device – which means just about every modern smartphone, tablet and touch-screen PC.

An 'active pen' stylus can feed back a range of usability data including orientation, angle, speed, acceleration, hover height and button presses. Typically it has a fine tip, often not much larger than a ballpoint pen.

In many ways, Wacom technology hasn't changed much from those early digitiser tablet days. It's now just moved onto the touch display itself, so while it's certainly active it's not all that smart.

N-Trig, however, is often classified as 'Smart Pen' technology. This is because it embodies various processing chips, motion sensors and wi-fi communications – all powered by miniature batteries.

As you can imagine, this opens up a huge number of creative possibilities. Turning the stylus over to use the other end could activate a different tool, such as an eraser just like with a rubber-ended pencil. Angle the stylus over to one side and you could switch modes to simulate realistic pencil shading or dynamically change the opacity levels.

This smart flexibility is why we're likely to see a lot more products adopt the N-Trig stylus technology.

Apple

And what of Apple? It seems to be curiously silent on the digital stylus front. However, as is often the case, Apple designers and engineers are secretly working on stylus innovations.

How do we know this? Well, the existence of over 20 patents for something called an iPen is a pretty big clue. And these aren't historical patents: according to Patently Apple (**goo.gl/UsyQUv**), the last one was granted just a few months ago, in June 2014.

So the question remains: when will an iPen appear? It might be quite soon. The recent partnership between Apple and IBM (which would have seemed unthinkable a few decades ago) is all about the enterprise marketplace, a domain Apple has so far failed to dominate.

A high-quality digital stylus, with a few Apple-specific surprises would score lots of brownie points. It would also be a perfect companion to the larger iPad (iPad Air Plus?) rumoured for 2015. The additional stylus support in iOS 8 (which detects a stylus contact area on the screen) is another important sign, and a touch-screen MacBook or brand new Apple 2-in-1 style laptop/tablet would certainly benefit from a high-quality digital stylus.

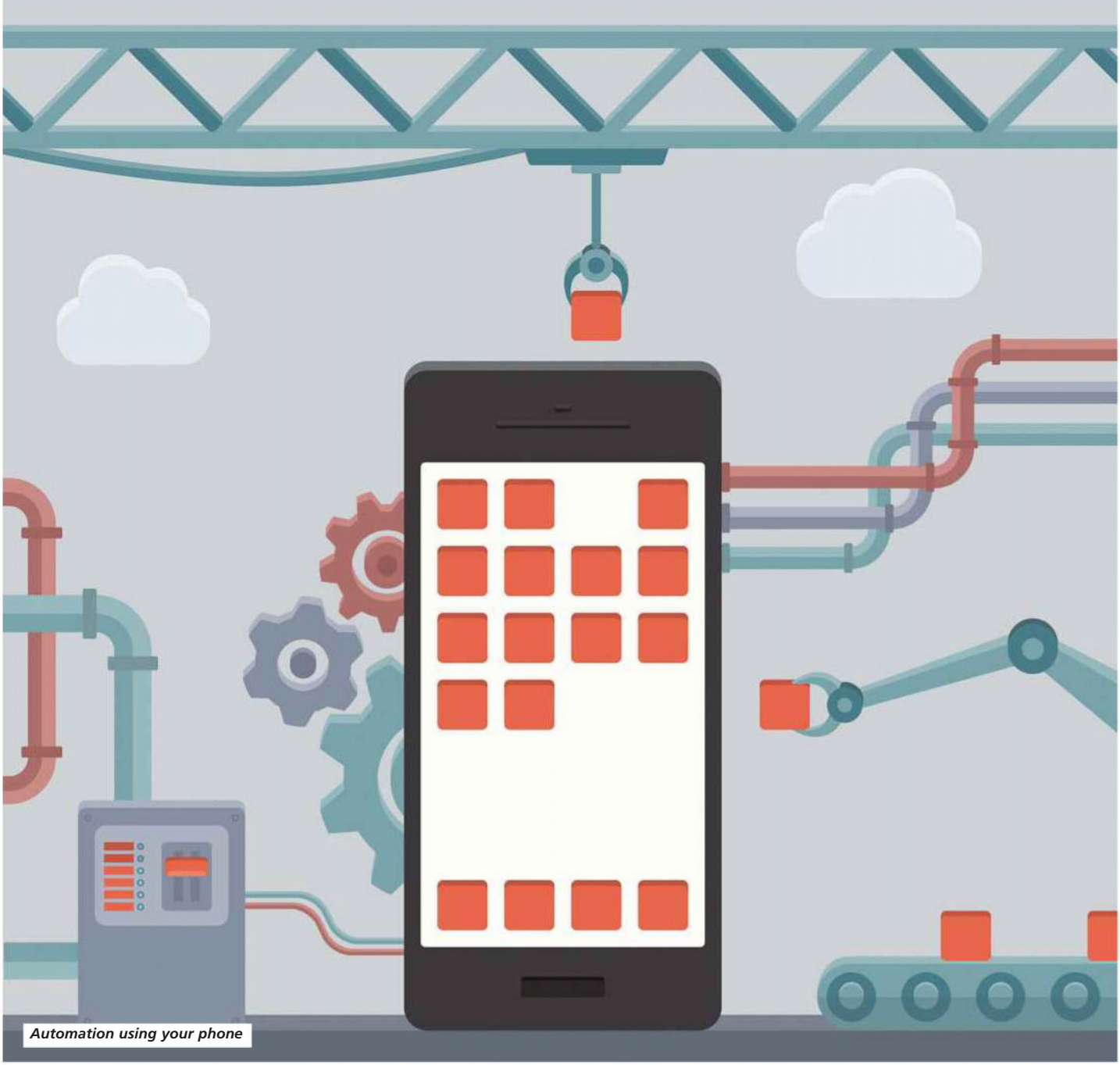
In all likelihood, Apple is still sore after the Newton Message Pad failure so won't attempt a replacement until it has something that exceeds anything else in the marketplace – and ideally has an Apple-only twist.

More To Come

Despite all the advances in technology today, the authentic pen and paper experience isn't available in a digital form, but the second wave of digital stylus technology has only just started.

And the potential for the digital stylus is enormous. Today touch-screen devices are used for just about every computing activity: social networking, office work, art, music, games and many other forms of entertainment.

Maybe we need to see a revolutionary innovation before there's a digital stylus in everyone's pocket or bag. Will this come from the likes of Apple, Samsung and Microsoft? Or will it be a new start-up that conquers the digital stylus domain? Let us know what you think. **mm**



Automation using your phone

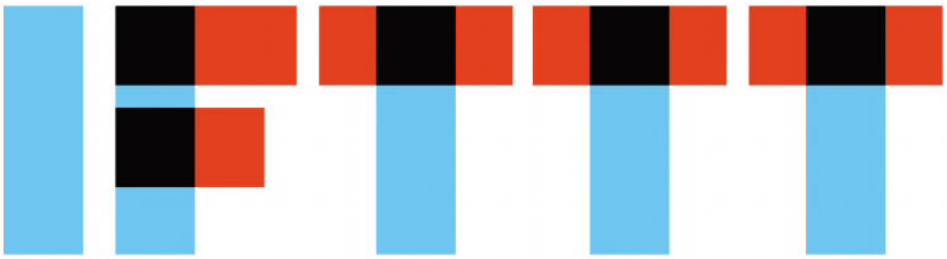
'If This, Then That'

You can make the internet work for you, so you don't have to, as Chris Salter demonstrates

Technology is credited with making life easier for us. This is unquestionably the case, but as we've moved from PCs towards mobiles, sometimes it seems that we're sacrificing some of the ease of use and openness of the desktop for the ability to carry computers around in our pockets.

One of the oft cited reasons for not ditching a computer completely is that it can perform tasks in the background and scheduled tasks – small items like completing a task at a certain point, such as updating a DNS setting or start off a backup. Mobile devices are now catching up to such ideas; iOS has the ability to set location-based reminders, and apps like Tasker allow Android to perform actions on similar triggers and at specific times. However, mobile devices still are lacking when it comes to letting users carry out specific tasks at specific times and generally allow any form of automation like scripting.

Likewise, we all use different web services to accomplish different things throughout the day. For example, we might share an image with our Facebook friends from Instagram or you might edit a document in Google Documents and then replicate the changes to a file within Dropbox. While some of these services make it easy to update other services,



others make it deliberately hard to do so (e.g. it's easy to share a picture from Instagram to Facebook or Twitter, but it's harder to send files to both Google Drive and Dropbox – especially on a mobile device!).

However, this need not be the case any more. Most services offer some form of API to allow developers to interact with the service. While most of the readers aren't developers and won't have the time or skills to make use of these, others have created various apps and tools using these APIs.

One such service is IFTTT (ifttt.com), an abbreviation for 'If This, Then That'. This service allows a user to link many different web services together, perhaps in ways the user might not have expected. IFTTT takes its roots from the ability of desktops to script and schedule items. However, everything takes place in the cloud, using cloud services you already use as well the IFTTT servers. Currently IFTTT can link to 132 services with more being added all the time. The service basically lets you connect two services together to perform an action on one service when something happens on another.

IFTTT

'If This, Then That' is a statement used throughout programming (IF and WHEN statements are in almost every programming language). IFTTT tries to take that programming phase and turn it towards web based data. By linking to different web services, it allows a user to move data and information from one service to another with little to no work on their part, short of creating the recipe itself.

IFTTT uses its own terminology to describe the items that make up the service:

- **Channel:** The channel is the name of the web service (or phone item such as iOS Calendar or Android Call) that needs to be activated. Currently there are 132, with more being added all the time. These are the main building blocks of the IFTTT service.
- **Recipe:** The name of the combination of a trigger and action (essentially, the program the you, the user, creates).
- **Trigger:** The trigger forms the first part of the programming – the 'This' part of the recipe.
- **Action:** The action part of the recipe – the 'That' part of the programming.
- **Ingredients:** The pieces of data for the trigger. For example, the ingredients of an email trigger could be: subject, body, attachment, received date and the sender's address.

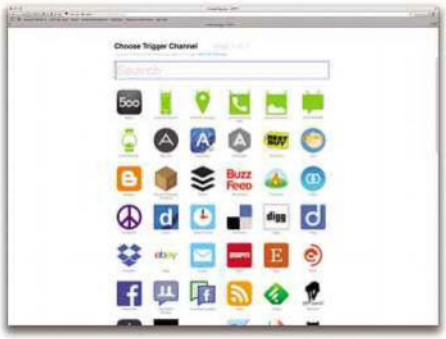
These five items are all you need to know to get your services talking between each other. No need to learn any APIs or programming; the hard work has been done for you, and all you have to do is visit the IFTTT website and sign up. Recipes are

Channels

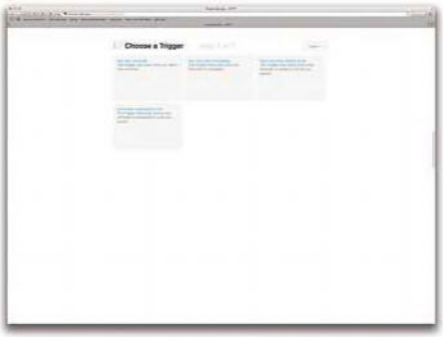
The list of channels that IFTTT offer is ever growing. Not all services, however, can act as triggers or actions: some only offer actions; some only offer triggers. However, there's a wide range, and you can always browse other user recipes. Channels include:

- Dropbox
- Instagram
- Google Drive
- Facebook
- Twitter
- Email
- SMS
- Youtube
- Gmail
- Evernote

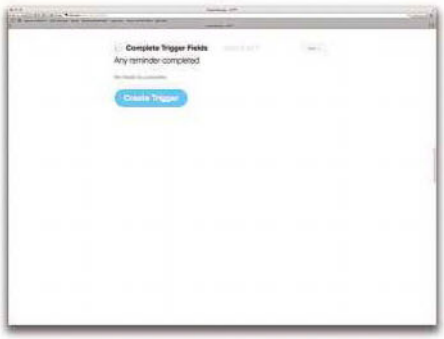
Creating a recipe, you're greeted with this



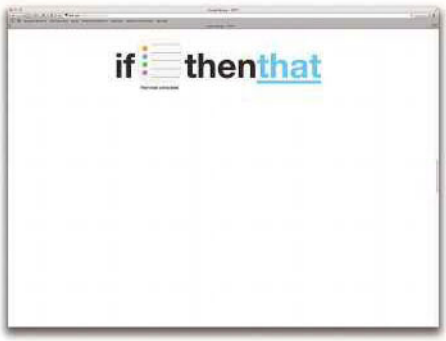
You can then select your trigger channel



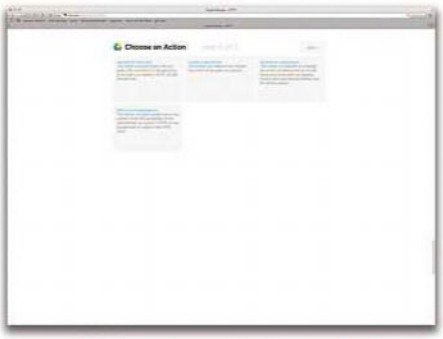
Select the trigger mechanism



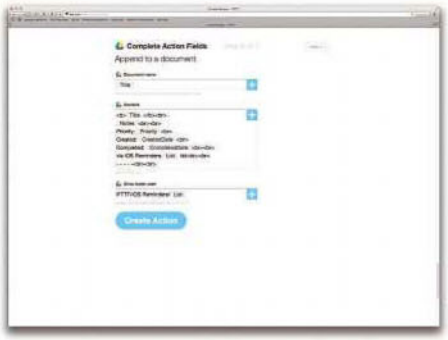
Fill in trigger if needed



Move onto selecting the That



Choose your action



Make changes to the action

Review the completed recipe

Review all your personal Recipes on your home page

created in a building block fashion, with the website walking you through how to set up each recipe.

Getting Started

Getting started is as simple as visiting the IFTTT website, where you'll be presented with the list of channels to start adding. You can add as many or as little as you want, and IFTTT provides a massive range of user created recipes for you to browse so you can add these already created recipes to your own account. The recipe creation process couldn't be easier:

- **Step 1:** Create account, log on and start to create a Recipe.
- **Step 2:** Select the trigger channel. Not all channels can be used as triggers and likewise, not all channels can be used as an action. Feel free to explore the channels on offer and see what each channel is capable of. These are fully explained on each channels page, explaining what actions will be a trigger and, if capable of action, what can be passed to the action from the trigger.
- **Step 3:** Selecting the trigger channel will let you choose what actions can trigger the next stage of the process. For example, the Twitter channel can trigger an action when you favourite a tweet or if you tweet a message with a specific hash-tag. Likewise, the Facebook channel can trigger when you're tagged in a photo, among others. On most channels, these triggers are quite wide ranging and should all you to create a wide array of triggers for each service.
- **Step 4:** Fill in any details that you might need for the trigger mechanism. For example, Dropbox allows a Recipe to be run when a file is added to a folder. After selecting that trigger, you then have to specify in what folder the file has to be added for it to run. Depending on the trigger, there may not be anything to fill in here.

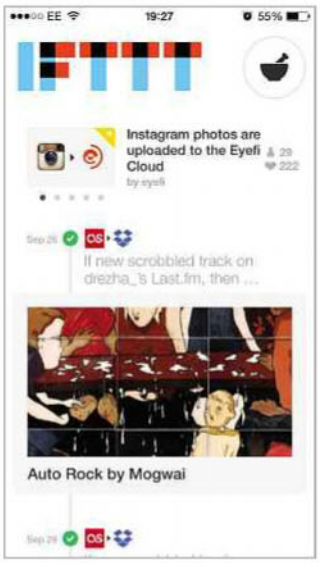
Authorisation

IFTTT requires that you grant it access to each channel or web service you want to use. Some services, like Dropbox, can grant some apps or programs limited accessibility, but IFTTT often needs full permissions (it does for Dropbox). Most services are quite good in letting you know what IFTTT will be able to do when you connect it to the service. However, if you're not someone that's keen letting a third party have access to the service, then unfortunately you'll be doing each of these recipes manually, as IFTTT cannot function without access to the accounts. You can select each service to use, though; you don't have to use them all.

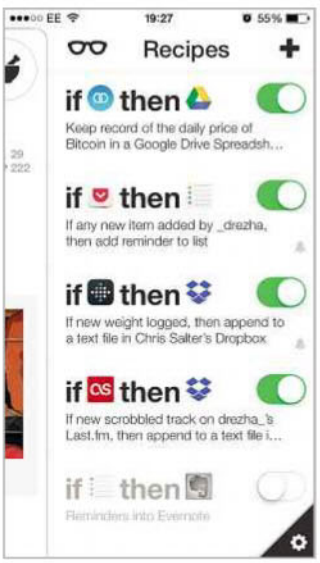
- **Step 5:** Move onto selecting the action you want to perform.
- **Step 6 –** Choose the action response. For example, in the images, I'm getting IFTTT to keep a record of all the tasks I complete using iOS reminders to Google Drive for archiving, should I ever want to view these from the past. It should be noted, that this recipe will work only with items marked as complete on an iPhone or iPad, not iCloud as it's the iOS device that triggers the recipe – other triggers might be just as picky. The trigger offers a range of options: for example, the Google Drive triggers can create a new file or append to a current file. This recipe will use the 'append to document' option, as I want to create a single file with the completed reminders in. Other options will allow you to create a new file for variables passed to the action.
- **Step 7:** Once the trigger and action have been chosen: you are presented with the option of how the variables affect the trigger. In this example, I have to name the file and location of the file within Google Drive that I'll be appending the tasks to. Likewise, I'm given a number of fields to customise the final output to the file as. These variables can be selected from drop-down boxes, and you're able to make changes to the text stored. Again, the number and type of fields you can customise is based on the trigger and action channels, with certain channels offering more information.
- **Step 8:** The final step is to look over the completed recipe. It provides a summary of the recipe, and you can give it a title to let you remember what it does. It also lets you select if you want notifications when the recipe runs (notifications will be in your notification centre on your respective mobile device).

Currently, IFTTT only allows for one action and one trigger within a recipe. This does mean that massive recipes aren't possible. However, it is possible to link different recipes together to form a chain if you need to. In addition to web services, IFTTT offers Android and iOS apps, which allow you to create recipes on your mobile device and let you receive notifications on your phone when specific recipes are run online. In addition, they can also interface with the some of the default apps on your phone to create recipes (for example, iOS users have Pocket articles sent to the iOS Reminders app, reminding them to read the article later, or have a new contact added to a spreadsheet in Google Drive).

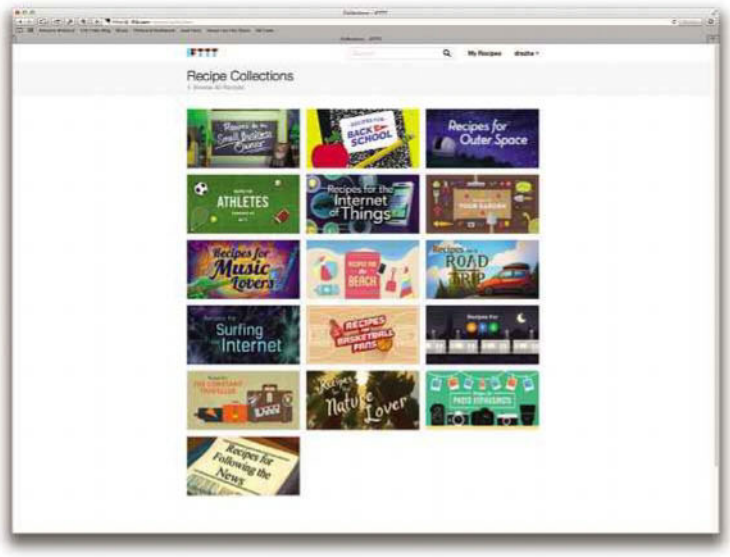
IFTTT is currently a free service, though there's no indication of a paid service. A number of restrictions exist on various services (such as the Dropbox download option) which is potentially an issue with the service API, rather than IFTTT's servers, but it's something to bear in mind. IFTTT runs (or polls) services every 15 minutes, so some rapidly changing information may not appear on the



The main screen on iOS shows a summary of previously run recipes



The IFTTT app lets you create and view recipes within the app



IFTTT provide a selection of recipes in collections. You can also browse user created recipes

triggers, though this is fairly good at finding what's changed. An example is my Last.fm scrobbling history: this is copied to a flat file database in my Dropbox folder. I'll listen to more than one song every 15 minutes, but IFTTT will only update the Dropbox file once every 15 minutes. However, it's able to pick up the songs that have been scrobbled since the previous time IFTTT ran the recipe, and therefore I have a full scrobbling history.

Examples

With so many channels, there are a huge number of potential recipes. Some examples of what can be achieved are shown below:

Action: Fitbit (Weight logged).
Trigger: Dropbox (Append to file).
Outcome: Appends the following text, where the values in brackets are variables {{Date}} | {{Weight}} | {{BMI}} to a file to create a flat file database (based on Markdown, though replace | with , to create a CSV file).
Action: WordPress (New Post).
Trigger: Evernote (New Note).
Outcome: Creates a new note in a notebook with the post content and link.
{{PostContent}}
 on WordPress: {{PostUrl}}
 {{PostPublished}}.
Action: Facebook (Tagged in Photo).
Trigger: Dropbox (Download File).
Outcome: Downloads any photos you are tagged in on Facebook to a folder in Dropbox.
Action: YouTube (New Video Uploaded).
Trigger: SMS (Send an SMS).
Outcome: Whenever a video is uploaded (from a specific user), be sent a text message informing you.
Action: Android Phone Call (Any phone call missed).
Trigger: Google Calendar (Quick Add Event).
Outcome: Add an event 'Call {{ContactName}} back at {{FromNumber}}' tonight that will create an event that day to ring back the missed call.
Action: Time (Set time).
Trigger: Twitter (New Tweet).
Outcome: At January 1st every year, tweet Happy New Year! All the best!.

Internet Of Things

IFTTT can form part of the 'Internet of Things' – the connection of various uniquely identified embedded computing devices. For example, smart homes have been talked about in the past, which include items such as wireless light bulbs (Phillips Hue), thermostats and alarms (Nest), weather stations, plug sockets and music players. All of these items together are combined to form a 'smart' house, allowing owners to control items from anywhere within the house (either via a remote such as a phone or even near field chips) and even outside the house via the internet.

PC Automation

While IFTTT uses web services to create tasks that are run automatically, you can use it along with something like Hazel (OSX) or Belvedere (Windows) to run complete tasks on your computer. This would allow for a number of tasks to be completed online with IFTTT, sent to your desktop via Dropbox or similar and then have local scripts and programs work on them and then send them back to the cloud for other IFTTT recipes to work on them (for example, download files from a website into Dropbox, have your local machine sort them into different folders and then have IFTTT trigger notifications to your phone).

Conclusion

IFTTT offers an easy way to link together various web services. While some services offer the ability to be connected and actions performed on one service to be mimicked on another (Twitter allows you to post your tweets to Facebook automatically), IFTTT offers more flexibility and the ability to connect services that don't offer this linking by default. It allows a lot more interaction between web services and a lot less effort for the user.

The number of recipes number in the thousands, with more services being added, so it's worth regularly checking the website to see what services are being added (or perhaps use the IFTTT channel to email/text/notify you with service updates!).

Hopefully this guide has allowed you to understand how IFTTT works and given you some ideas on what you can achieve with it and how you can get it working for you. Automating the web is now a lot easier! **mm**

To-do Apps For iOS

Keep track of what you need to do with Keir Thomas' selection of five apps that let you make lists

There are many basic human tasks that have been enhanced via portable computing devices. Keeping a to-do list is one of them. In fact, it's so easy to keep a simple list of what we want to do next that there's very little excuse not to do so, and the Reminders app built-in to iOS does an excellent job of scratching the itch most of us find ourselves with. That's not to say it can't be improved upon, however, and that's what we examine this week.

Most apps reviewed below expand into the territory of collaborative working, for example, letting you share with others what needs to be done. As usual all of them can be found in the App Store and were tested on an iPhone and iPad running iOS 8.

Todo Cloud

As its name suggests this app is all about writing your reminder lists on a cloud in the sky, where it can be shared with other devices (including Android) or accessed via the **www.todo-cloud.com** website. There's nothing new here, of course, and the built-in Reminders app already plugs into iCloud and lets you share lists with other iCloud users. However, Todo Cloud is mostly aimed at groups such as office workers who want to delegate and share tasks. There's no reason why it can't be used by an individual, however or in a family environment.

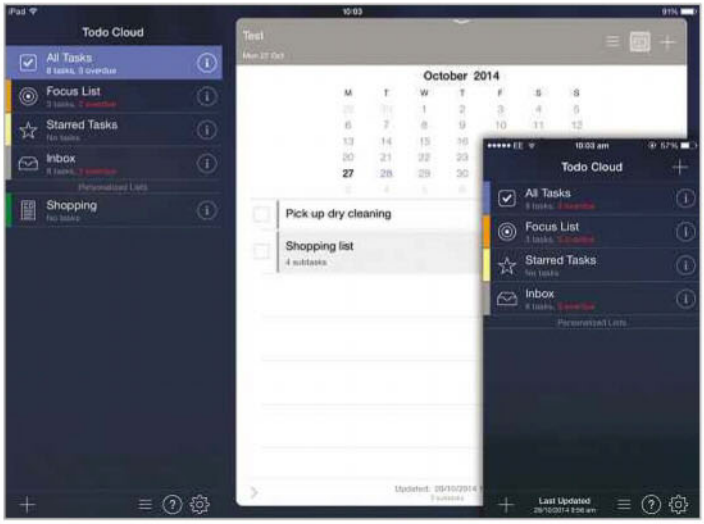
On first use, Todo Cloud can be somewhat overwhelming, and we got the impression this is a 'kitchen sink' app that includes just about every possible feature. In many ways this rubs against the concept of to-do apps, which are supposed to keep things simple. Take creating a to-do entry, for example: Todo Cloud is hierarchical, so although it's possible to create a basic entry in the list you could also create a 'project' or a 'checklist'. A project is essentially an entry that can have its own separate lists, in which you can create separate to-do and checklist entries. A checklist is, as you might suspect, a separate checklist within a main list. Confused? We'd like to say it makes sense within the app, but the fact is that any hope of 'at a glance' comprehension flies out of the window.

In both landscape and portrait orientation on an iPad task lists are shown on the left, and the contents of the lists displayed on the right. On a phone the app opens to show the tasks lists, and selecting any then displays its contents full screen.

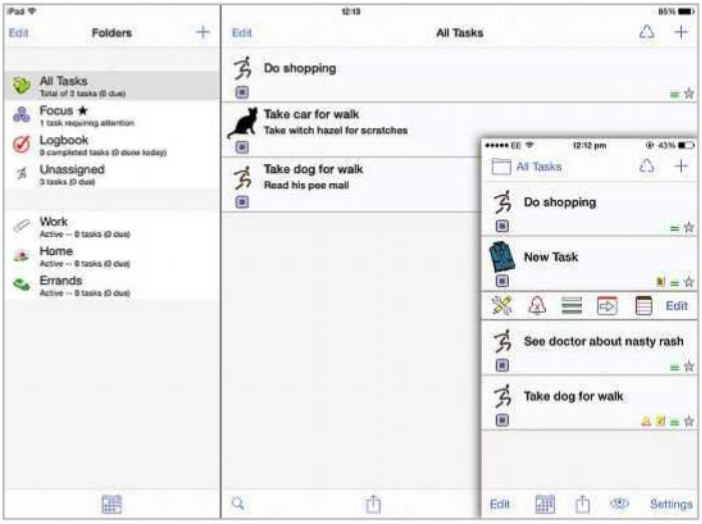
Tasks, projects and checklists can have due dates and times set for them or location alerts, just like with the built-in Reminders app. They can also be tagged and have comments attached to them. Task Actions also mean tasks can be linked to a contact, phone number, location or URL.

The app is free to download, but this is an illusion because it hooks into a subscription service, and if you don't pay up then you can't use the app (although you can still access the service through the website). In fact, you'll need to hand over either $2 per month or $20 per year in order to keep using the app beyond the 14-day trial period.

Paying up brings significant advantages, including the ability to use Siri to add reminders/to-dos. Setting this up is fiddly, though, and the developer's instructions are out of date. We got it working eventually, however. Additionally, the paid upgrade allows you (or indeed anybody) to email a To-do to a special address, and it will then appear on your list. Aside from opening up Todo Cloud to



Todo Cloud brings collaborative and cross-platform support to the to-do concept, although it can all be a little confusing



Errands To-Do List is the classic example of an overengineered app that sacrifices simplicity for purported "good design"

situations where you can't access the app, this also allows a degree of scripting and automation if you're that way inclined. You'll also get email confirmations when tasks are added, modified or deleted by others.

There's much to like with Todo Cloud, including cross-platform support, but this is ultimately an industrial solution geared around collaborative working.

Errands To-Do List

This app's creator claim that it's well designed but, upon starting it for the first time, you might realise how subjective a phrase that is. Forget about the smooth lines and fonts of the iOS 7/8 visual overhaul. Central to this app's design is an icon of a stick figure seemingly treading in mud while heading a star like it's a football. You'll see this everywhere, including on each and every task you add to a list because he's used as the default icon. Manually switching to 'condensed' mode gets rid of the little guy, which also fits more tasks onto the screen, but this made us wonder why condensed mode isn't simply activated by default.

On an iPad the app follows the usual rule of displaying the titles of task lists on the left of the screen, along with special headings such as Focus and Logbook, which let you see which tasks require attention and which tasks have been completed, respectively. On the right the actual tasks are listed. On an iPhone the task list can be summoned by tapping the folder icon at the top right, although you can also swipe left and right to move between the various lists.

Creating a task is a little cumbersome; you must first tap the plus icon at the top right then type the title and optional details beneath, and once that's done another screen appears where you can set the priority of the task, its due date and time, whether it has an alert, and whether it's repeated. The result is that it's a little hard to simply tap in a quick reminder, as it is with the built-in Reminders app. On the plus side, however, each task can be assigned a unique icon or a photo, and this appears in the list instead of the little stick figure (or not at all in the aforementioned condensed view).

Tapping a task once created offers the ability to adjust any of the above features, and also add extensive text notes. Curiously, here you can also add a contact by tapping the plus icon, but all this seems to do is insert the details from the contact card, such as email addresses and phone numbers. We're not sure what the purpose of this is. The rather confusing "Notes as Checklist" option lets you convert the notes section into a separate tick-box list of its own, thus allowing primitive hierarchical list making.

A nice feature is that tasks can be duplicated, which avoids the need to recreate an irregular task each time, and deleted tasks are sent to a recycle bin from where they can be fished out again. Tasks can also be mailed.

The developer also boasts that Errands is a fully functional free app, but we think that's a bit of a stretch as it will cost you £2 for some pretty vital features, including iCloud syncing between all your devices, passcode lock for privacy, and more sounds.

> **"It will cost you £2 for some pretty vital features, including iCloud syncing between all your devices"**

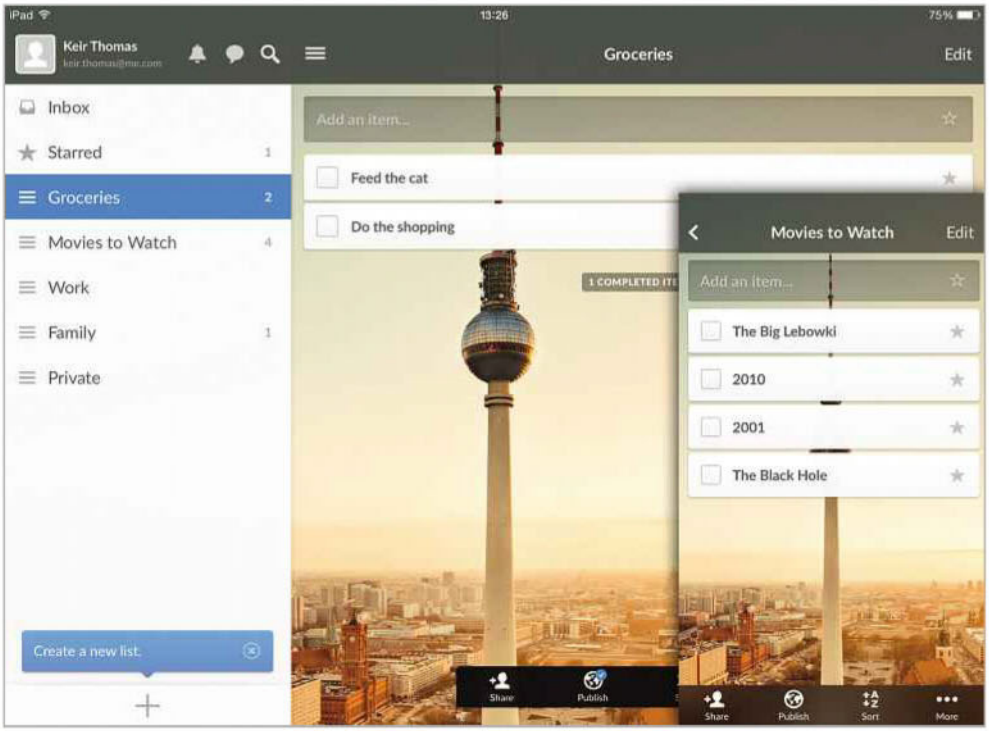
This is a nice app but two words best describe it: over engineered. Using the app is just a little too clumsy and the interface a little too cluttered for our tastes.

Wunderlist

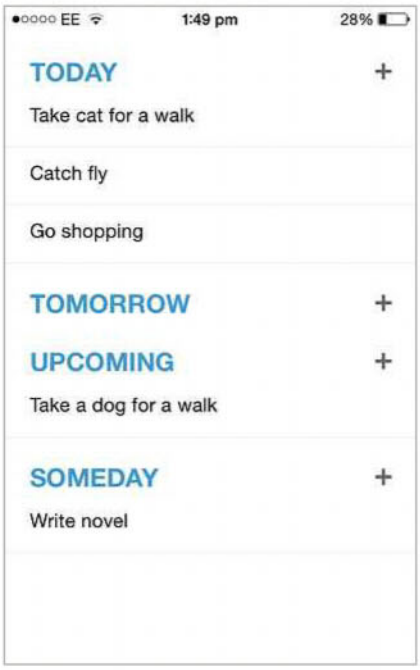
Another app built around the idea of collaboration, Wunderlist sets its sights on friends and family working together, rather than simply businesses. Thankfully, it also keeps things blissfully simple. On both iPad and iPhone the app first asks you to create an account, then suggests some default task lists. On an iPhone, the app then switches to the default task list and you can add new items instantly by simply typing them. On an iPad the same is true but at the left of the screen the task lists are shown, while on an iPhone it's necessary to tap the back button to view them.

Tasks can be starred, in which case they'll appear in the Starred task list, and tapping them offers the chance to set a due date and reminder. Tasks can also have subtasks attached to them, and also notes, as well as file attachments (including files from your Dropbox account).

Crucial to Wunderlist's raison d'etre, however, is the ability to add comments to notes. Other people who you share the task with can also add comments, and entire conversations can be had in this way. Sharing task lists is done by simply tapping the Share button at the bottom of the screen and entering the email address



Wunderlist is blissfully simply to use yet offers sophisticated collaborative tools for groups and workplaces



Any.DO looks great and has all the features most people need, yet it left us feeling strangely underwhelmed

of another Wunderlist user. You can also opt to publish the task list as a webpage, in which case you'll be given a unique URL for the Wunderlist website. Anybody can view the page but those with Wunderlist accounts can also log in and check off tasks as well as add comments. A particularly nice touch here is that you can click to get HTML code to embed the list as an iframe within any existing web page. Back in the app lists can also be emailed and printed, via AirPrint, and you can email tasks to a special address so they magically appear in your lists. The Alert Centre tells you when people you're collaborating with have assigned you to-dos, as well as when they add files.

Task lists can be sorted alphabetically, via their due date and by their creation date. You can also sort by whom the task is assigned to, and what its priority is.

Aside from a handful of other smaller features, that's about all there is to say about Wunderlist. It's a sophisticated service that deliberately keeps things simple for the user, while ticking off most of the feature list you might expect.

Wunderlist is free for iPhone, iPad, Android, Mac, Windows and via a web interface, but there are limitations: 5MB file attachments, for example, and only 25 assignees per shared list. Should you decide to add subtasks then you can add only 25 per each item in the list. You might think that none of this is a drastic reduction in usability, and you'd be right. The only people likely to be interested in the £3 per month/£35 per year "Pro" accounts are corporate types, for whom Wunderlist would be a sound investment.

Any.DO

This iPhone-only app, usable in magnified mode on an iPad, is built around the idea of typing tasks and then assigning them to today, tomorrow, and some time after that. It works in a rather clever way in that when the phone is held in portrait orientation tasks can simply be created and then added to a Today, Tomorrow, Upcoming, and Someday list. However, turn the phone on its side and a calendar appears wherein you can drag any task to a date on the calendar to set that as a due date. The app hooks into your existing calendars so you can also see any appointments you have.

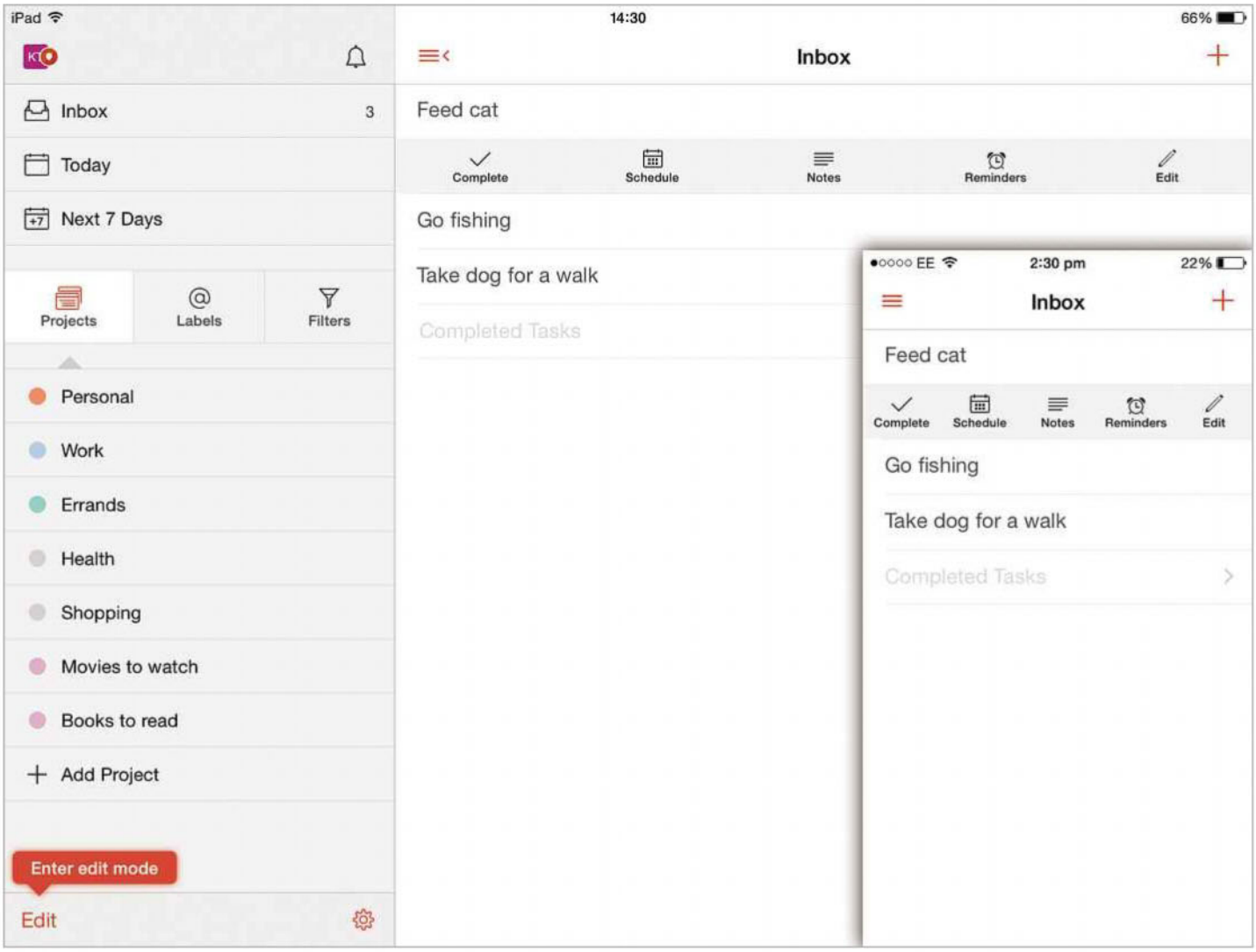
New tasks are created by pulling down on the screen when the phone is held in portrait orientation. You can then type a task, or tap the microphone icon to speak. Tasks get entered onto the Today list by default, but tapping the plus button alongside any of the other headings lets you add tasks there instead.

Rather than use the typical tickbox system to mark off completed tasks, Any.DO asks you to swipe to the right on a task, which then scores through it. The task doesn't disappear, however, and swiping left again will un-complete it. Tapping the X icon at the right of a task will delete it permanently, although you can also shake the phone to remove them – a cute touch.

> **"It ticks all the required feature boxes, yet isn't quite as seamless to use as other apps reviewed here"**

Tapping a task also lets you set a date and time for a reminder, as well as set a repeat. Location-based reminders require a premium upgrade, however. Tasks can also have notes and files attached to them, including photos, movies, and audio notes. You can hook into Dropbox too. Tasks can also be shared with other users, and subtask lists added.

Tap the coloured blobs icon at the bottom left and you'll be shown the Moment screen: a trill will sound, the app will greet you politely, and beneath will appear a summary of your upcoming tasks. Buttons along the bottom then let you browse further ahead in time. This didn't do much for us – we'd rather just look at the task list, to be honest – but the developers clearly think it's a defining feature because you only get to do this five times each month without stumping up for a premium upgrade. That'll cost you £2 per month or £19 per year. For that you'll also



▲ *Todoist offers simplicity yet packs in a powerful feature package, making it ideal for those who find the basic iOS app lacking*

get the ability to add location-based alerts to tasks (though this is a feature that's built into the default Reminders app), plus a handful of other tricks such as the ability to personalise the app and attach files of any size.

Any.DO also exists online, allowing you to manage your tasks through a web browser, but overall we felt very underwhelmed by the app and the service it's attached to. It ticks all the required feature boxes, yet isn't quite as seamless to use as other apps reviewed here – or even the built-in Reminders app.

Todoist

Yet another app that aims to add sophistication to the simple concept of to-do lists, Todoist ticks the same feature boxes as most other apps here, but also adds its own for good measure. Once you've registered, the app opens to the Inbox, which is the default 'project' – which is how Todois refers to task lists. Other default projects include Work, Errands, Shopping, and others, but you can easily add your own. On the iPad the projects list is shown at the left, with the task list at the right, while on an iPhone this same view can be displayed by tapping the menu button at the top left.

New tasks can be added relatively easily by tapping the plus button at the top right of the screen. All that's strictly necessary is to enter a title for the task, and then tap Done, but here you can optionally change the project the task is assigned to, alter its due date, set a priority, and create the seemingly mandatory subtask list. If you're prepared to stump up £20 per year for Todoist premium (no, we've no idea why To-do apps are so expensive) then you'll also get the ability to add reminders to tasks, as well as add notes, tasks, voice messages, and labels. That's quite a list of somewhat useful features that are missing in the basic app. In addition to showing tasks by project, you can also opt to filter them by their priority level or label – although the latter will again require you upgrade first.

Like some other apps here Todoist eschews the traditional tick-box concept. Instead, tasks are marked as being completed by swiping them to the left, in which case they disappear instantly from the list. Tapping the Completed Tasks heading lets you salvage them should you want to reuse them or simply view the notes attached to the task.

Projects can be shared with others, in order to collaborate with others, so that they can also create and complete tasks within the list. An unusual, but potentially useful feature is that projects can be archived rather than simply deleted out of existence. Additionally, tapping the profile button at the top left displays your progress through the week completing tasks. Rankings are even provided in order to see how you compare to others.

Todoist seems to scratch the itch of expanding upon the basic Reminders app but without adding too much clutter, and without focusing on collaboration. It's recommended for anybody who's found that the basic iOS app isn't quite enough. **mm**

Remembering...
IBM Blue Lightning CPUs

Back to a time when processors had super-cool names

IBMs range of processors in the early 90s were licensed from Intel and started with the then pretty solid 386SLC, which stood for 'Super Little Chip'. It was a more advanced version of the 386SX, and the improved power management and added cache at the time made it perform as well as the equivalent Intel 386DX processors.

IBM didn't stop there, though. After the initial success of the slightly cheaper than average 386SLC CPU, it marched onward and released the new 486 Blue Lightning range, which consisted of the 486 DX2-50, 486 DX2-66 and the 486 DX2-80. There was also a 486 DX2-100, but that wasn't really regarded as a true Blue Lightning chip.

It was the DX2-66 that we owned way back in the day, an excellent budget processor that, due to the licensing agreement, could only be sold in full systems or barebones upgrades. The lower price meant that for a fraction of the cost of a 'proper' Intel DX2-66, the rest of us could own an equivalent powered system and finally get to play *Doom* in full screen mode.

The Blue Lightning CPU was fast becoming the popular kid on the block, and the range was extended to fit into the unbelievably modern ThinkPads and top the 100MHz mark, which, as you can imagine, was a simply crazy speed back then.

The Good

The good points were many, but the generally cheaper than average price was the main draw for this CPU at the time. But with some careful selection of components and some clever overclocking, the Blue Lightning CPU could be used to create the fastest PC around.

The Blue Lightning DX2-66 was really good at being overclocked. So much in fact that 75MHz and beyond were all within the chip's capabilities without a hint of it going pop. And if you managed to get hold of the right motherboard, usually the ones based on the Alaris Cougar motherboard, there was room to fit an extra Pentium Overdirve without it disabling the Blue Lightning processor.

The result was a blisteringly fast machine with a main CPU running at 75MHz or beyond and a Pentium Overdrive (which were more advanced co-processors, or at least that's how we thought of them) running at 60MHz, with a combined cache of around 48KB.

Did You Know...

- The floating point performance was actually slight better than an Intel 386 with a Maths Co Pro.
- The Blue Lighting chips were actually built under licence from Cryix, which got its licence from Intel.
- They were, unfortunately, unable to address more than 16MB of RAM.
- An early Blue Lightning DX2-50 looks exactly like the CPU from a Terminator.
- Rumour has it that the Blue Lightning chips were also impervious to an EMP blast.

Needless to say, *Doom* raced along at 50-odd frames per second, full screen and everything. More to the point, you could finally play *US Navy Fighters* or any one of the *Chuck Yeager* titles.

The Bad

Despite all the good things that the Blue Lightning chip offered, it did have some annoying peculiarities.

The worst of these was the fact that high DMA audio would never work, so there were no sound effects in *Doom*, *Discworld* and a few other games. There was a way around it, but it was hit and miss if it worked, and it had the tendency to make the game pretty unstable at the same time.

Also, the Blue Lightning CPU appeared to have something against networked HP printers in Windows 3.11 for Workgroups. Whenever you attached a shared HP printer on a PC with a Blue Lightning chip fitted, Windows 3.11 turned off the network card. Take the HP printer away, and everything went back to normal. The only way around it was to use a weird Kyocera driver that somehow worked with the HP printer.

Conclusion

Thanks, IBM, for a wonderful CPU and for stopping us listening to sound effects in *Doom*. Oh, and for giving us early techies a networking headache.

Now that's how you make a chip: resembling the thing the Terminator had in its head

Why doesn't Intel give its processors superhero names?

IBM! Yeah! Stretching the boundaries of computing

The Things That Frustrate Us About... Tumblr

Isn't it weird how the word 'tumbler' now looks like it's been misspelled? Sarah finds some other annoying things about Tumblr

Words are so over. If the insane popularity of Twitter, a social network that limits your posts to just 140 characters (less than the length of this whole sentence) weren't enough to sound the death knell for words, the rise of image-focused social networks like Tumblr, Instagram, and Pinterest might have done it. I'm only exaggerating a little bit, but it is interesting how the way we communicate online is evolving to encompass GIFs, emoji and extreme shorthand over, you know, full sentences.

Tumblr was one of the fastest growing social networks last year, which led to Yahoo! shelling out a huge amount of cash to acquire it. Appreciating 'it makes us feel old' isn't a valid criticism of a website, here are three things that are super irritating about Tumblr…

Argh! Endless Scrolling

Whether you're scrolling back through your own dashboard or through a search page on Tumblr, you'll pretty much be able to scroll forever. Whenever you get to the end of the loaded content, Tumblr will load more. Forever. It's sort of nice, because you don't have to click through and wait for multiple pages to load, but it's very easy to lose track of where you got to. And Tumblr's trick of switching between recent and popular content only complicates matters. And woe betide you if you found something you'll want to refer to later and didn't bookmark it in some way…

Fix it: While Tumblr can still be buggy sometimes, you just have to be smart about how you search and use all the filters you can. And if you think you might want to find something later, hit the heart icon to save it to your Liked posts. You'll only be annoyed later if you don't.

Bah! Terrible Layouts

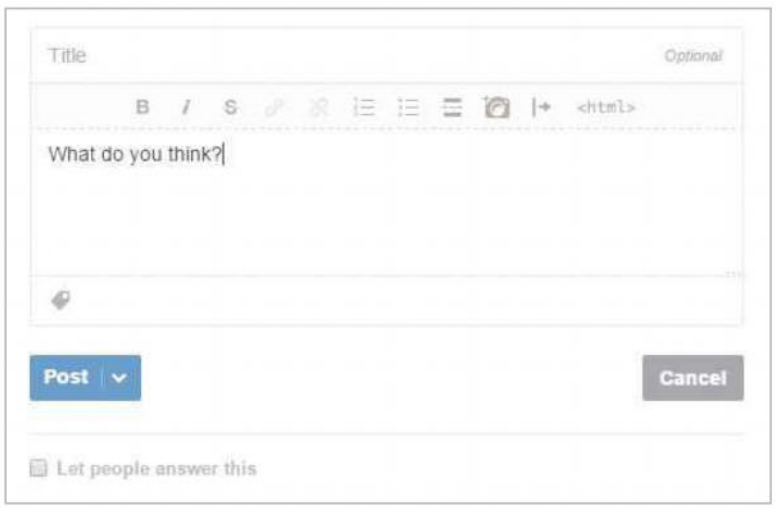
Remember all those websites that used to let you generate code for sprucing up your MySpace page? Tumblr themes aren't quite as bad as that, but some of them are nightmarish. And usually, despite the preview function, you won't realise just how terrible a theme is until you've installed it on your blog. That's easily fixed, of course, but what's worse is when you click through to the blog of someone you like on Tumblr and find they've installed one of those annoying themes that makes the back and next buttons impossible to find, hides notes and, worst of all, plays music. Why do websites with auto-playing music even still exist in 2014?!

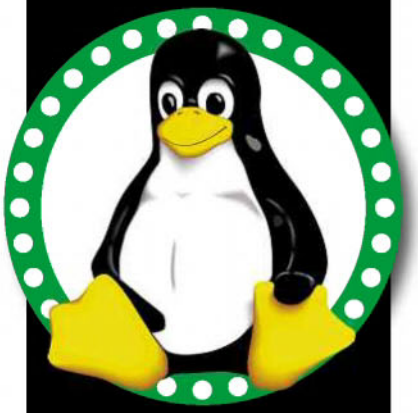
Fix it: You only have control over your own blog on Tumblr, but please try not to make it massively obnoxious.

Nrgh! No Comments

The final irritant about Tumblr is, weirdly, supposed to be a feature. Unlike virtually every website since about 2002, Tumblr doesn't have a comments section. If you want to reply to someone's post, you generally have to reblog it and add your commentary on your own blog. Why would a social network want to make it hard for users to communicate with one another? It's a mystery.

Fix it: Again you've only really got control over your own stuff, but you can install commenting plug-ins to let people comment on your posts. Or if you include a question mark in your post, you'll get the option to let people reply to your post. Sometimes, though, Tumblr will still limit who can reply and when – because it's really annoying. **mm**





Linux Win!

Dan's day out in Linux-ville

David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

Dan Roberts emailed me the other day proclaiming that despite being a Windows-only person, he finally got around to having a few days off work and installing Linux. Here's how it went for him.

"I was really surprised at how easy Mint 17 was to install," he began. "I made sense of and did everything I was expecting to myself, namely auto-sorting out the partitions." Although Dan hasn't installed Linux before, he is aware of how it partitions a drive into Swap, Home and whatever else dependent on the distro. This is something he wasn't much looking forward to, but after reading up beforehand on how to use Gparted effectively, he was pleasantly surprised to find that the Linux installation routine had advanced since the last time he looked in.

"It didn't feel like I was using Linux," was a line that stood out for me in his email. This could be considered as a double-edged statement, in some ways. One way to look at it is that it's a Linux distro perfect for those who are more familiar with Windows but want to try something new without having to go through the rigmarole of learning an entirely new system. The other way of looking at it could be that Mint is rapidly losing its identity and trying too hard to ape another OS. The ultimate Linux purist could argue that Linux should have its own look, and it should stick to that identity and not want to have become the poor man's Windows.

> "Within his new Mint installation he started to download other distros"

"It's fab!"

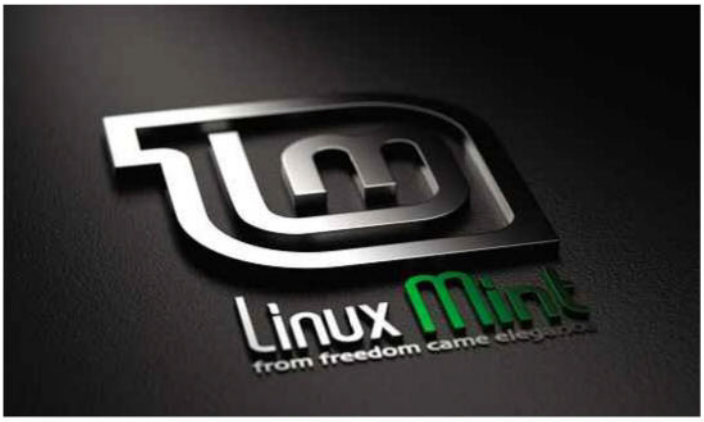
Dan then went to go through the post-installation setup. Getting his printer to work, setting up a couple of other accounts, installing his graphics drivers, installing Steam and having a browse through the available software.

"There's something for everyone in there," he said with regards to the Software Centre. "Games, education, hobbyist stuff, science, programming. How can all this be present and yet no one ever seems to mention it?" That's a good point, Dan. I think that the majority of users just take the amount of software available on Linux for granted these days, and it's quite hard to get across just what a wealth of programs there are in the few pages available to us.

After spending a couple of hours tweaking his new system, Dan then installed VirtualBox, and within his new Mint installation he started to download other Linux distros to play around with in a virtual environment.

"Linux Mint is great, it's fab! But what else is out there?" Clearly we have a new distro junkie on our hands. I offered a few interesting suggestions for him to play around with, but what about you lot? Could you suggest a few distros for him to use and expand his knowledge of Linux on.

Let us know through the usual channels, and well done, Dan, for giving Linux a try.



Linux Mint finds another convert, but what other distros could he try?

Not My Type

Despite Jony Ive being a big fan of typography, there's not much evidence of that in OS X Yosemite's Mail

You might get annoyed at typography wonks. They're the kind of people who look at a street sign set in Comic Sans and visibly flinch, or who see straight apostrophes instead of educated quotes and become apoplectic with rage at the sheer inhumanity and ugliness of it all. They don't consider *Eats, Shoots & Leaves* by Lynne Truss an amusing yarn about grammar, but a kind of religious tome to carry on their person at all times — and to smack someone with when they don't see the problem with a greengrocer's apostrophe.

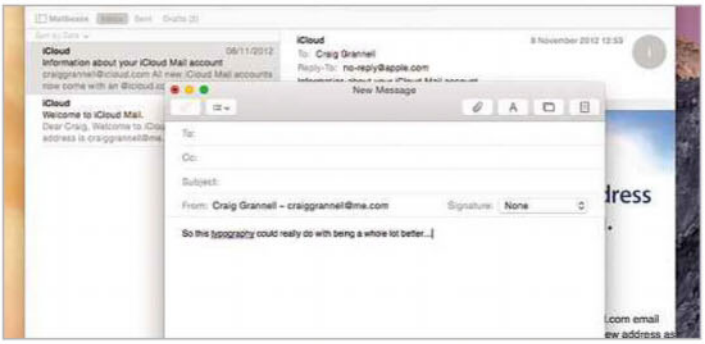
But the thing is a staggering amount of content in the world is based around words. Just think: every time you craft a word processing document or an email, you're using words; every web page you read, you're ingesting words. Short of becoming a mime and your only preferred media being television and film (as long as it's not subtitled), you're not going to be escaping words any time soon.

This, in a roundabout way, leads back to Apple. With iOS 7, one of the major elements that Apple design head Jony Ive talked about was an emphasis on content, coherence and legibility, based largely around beautiful typography. A light Helvetica Neue appeared throughout the system, aligned strictly to an underlying grid structure. The result was a system where reading text was a more pleasurable experience, and this was taken to heart by many app developers, notably those working on text-oriented products like Instapaper, Reeder and Kindle.

In OS X Yosemite, there's a clear typographic change in the system now also using a Helvetica variant throughout, and some of Apple's redesigned apps have more streamline interfaces, removing quite a lot of window chrome (if not as much as on iOS), in order to not distract from the content. But on using OS X, it's clear Apple doesn't always go far enough. Mail is probably the most obvious case in point. While Apple has no control over emails crafted in HTML (which must be rendered as per the styles set by the designer), it can do pretty much whatever it likes with plain-text and rich-text email defaults. What it actually does is essentially nothing at all — you just get the same lack of refinement and design that people have seen since they first started staring at email clients years ago.

Really, it's time for something better. Email is almost entirely about text, and yet the reading experience you get is typically abysmal. The default fonts are often quite small. The measure expands with the window, rather than the email client giving you a narrow column of text you can rapidly read. It's a far cry from the kind of thing you get in an ebook, a website or a read-later app, making email feel comparatively archaic, and all because the designers of email clients simply don't spend enough time considering the default reading experience.

You might consider this the opinion of a typography wonk — and you'd probably be right. I guess fashioning a strict typographic grid wasn't high on the agenda for Mail in OS X Yosemite, but it's disappointing we get nothing at all — no changes from the most basic of email experiences and one that doesn't remotely hold up to Jony Ive's ideals. But maybe — just maybe — if Apple made changes of its own, other companies would follow suit and email would be a more pleasurable experience. At the very least, I'd be able to stop myself from so regularly thumping people with a Truss hardback.



Typography in OS X Yosemite: still awful

Yes, it's fussy, but grids make type look great

Craig Grannell is a writer, designer, occasional musician and permanent loudmouth. He's owned Macs since 1996, when Apple was facing certain doom, and is therefore pleasantly surprised by its current success. Find **Craig** on Twitter at **@craiggrannell**

Plateauing

While technology marches onward, Ian McGurren asks: have we hit the sales peak?

Like many of you do from time-to-time, I have purchased white goods for my kitchen in the last couple of years. In my case it was a washing machine, a simple device I needed to keep my clothes from smelling and therefore people from recoiling in my presence. Therefore, when purchasing I did a bit of research, just enough to be able to balance quality with value and to be able to judge if it'll do the job for me perfectly well. It was a purchase-and-forget transaction: I bought it and was happy in the knowledge I could wash my clothes from now, until it would become uneconomic to repair. Once bought, my mind move on to other matters.

For most of us, this is a typical purchase cycle for everyday goods: identify the need, buy to fit that need, carry on with life. Typically this means that products of this nature (fridges, cars, hoovers, even televisions) are only purchased every few years. More importantly, this cycle of purchasing is infrequently governed by technological advances. I know next year's washing machine will be incrementally better, but as mine does what I need it to do, I shall not be in a hurry to sell it in order to purchase the newer model.

We've all seen the recent news reports of once major corporations struggling to post any notable degree of profit, and while the economic forecast is still unsteady, having Samsung, Apple, Sony and more in these situations is more a symptom of something bigger – market saturation.

Earlier this year, Apple posted that it had missed its target of 19.5 million iPad sales by over three million units. Both the Galaxy S4 and S5 have been relative sales flops for Samsung compared with the (still selling) S3. HTC has, despite some excellent hardware, struggled to make a dent in any sales figures for some years now. As for Sony, well, it has the double whammy of television and mobile slowdown.

So what's going on? Two things are happening – or not, in one case. Firstly, nothing is happening, as in, nobody is buying. This isn't due to the public falling out of love with technology, but instead simply continuing to use what they already own. Apple's newest mobile OS, iOS 8, has been released on all Apple devices back to the iPad 2 and iPhone 4S, both released in 2011. Even without the latest OS, many older devices still perform the main functions of a tablet perfectly well; after all, a tablet doesn't suddenly stop being able to browse the web overnight, read ebooks or watch video.

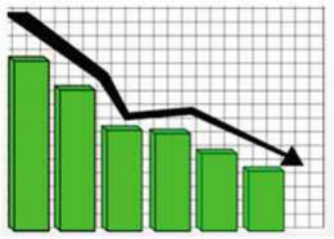
Secondly, powerful technology has become so substantially cheaper, that many consumers are rightly asking why the iPad Air 2 starts at more than three times the price as the Tesco Hudl 2. Both are tablet computers, both are well made, and both can do web, video and gaming with aplomb. Why is one £129 and the other £399? Four years ago, buying a budget tablet would have been akin to burning money, but in 2014 it's increasingly the smart choice.

It's not just tablets either. Phones hit a similar peak last year, with many devices from 2012 still performing their core tasks perfectly well. Add to that the rise of the budget handset, and the big boys are again losing their slice of the pie.

So what can the manufacturers do to arrest this slide? Typically, it's the specification arms race, with more of everything this year at last year's prices. This is most notable in that long-plateaued market, televisions. HD is no longer it, they claim; 4K is the new standard. But it isn't washing. Most HDTVs bought in the last five years are still very capable, and with no 4K content, the uptake is very slow. Phones and tablets are now featuring greater-that-full-HD screens that dazzle but do little more than the Moto G, for example.

There is, however, an increasing call for refinement of the successful formulae. One of the biggest is the clamour for even greater battery life, or even the trickle-down to make devices cheaper as economies of scale allow (something the console markets has done successfully for many years).

If we buy a car with four wheels, one released the next year with five wheels won't make us buy it when our four-wheeled car works just as well. Companies may choose to acknowledge that something has to change, if only to protect their bottom line. On the other hand, they may just tell us we need smartwatches instead. Those that make the right call could survive, but those insisting on blindly chasing the specs and marketing deceased nags may ultimately find themselves resigned to the annals of technological history.



Ian is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

Early Christmas Present

Shaun has the latest from the retro community

Shaun has a passionate interest in 8-bit computing and gaming and has been finding novel ways to use retro technology since 1994

It's official: Christmas is getting earlier every year, as the World of Spectrum forum frequenter and probably Liverpool FC fan known as SimonLCFC has released a festively themed demo of his upcoming game called *Robot Santa*, which is a explorer-type 2D platformer in which you must guide an electronic Father Christmas around a bright and colourful world in order to collect presents.

The game is built with Jonathan Cauldwell's excellent Arcade Game Designer, and there's currently enough there to whet your appetite.

In the game world, Santa Claus requires constant recharging, as not even Lapland has worked out how to make decent, long-lasting rechargeable batteries yet, but there are several points in which to do this throughout the locale. Any contact with water will render the robotic Claus useless, and there are the typical roamers and such like to avoid throughout. Even worse, those presents will remain undelivered.

The game is shaping up rather splendidly, with the current version plus further information being available via the World of Spectrum forums at **tinyurl.com/Robot-Santa-Speccy**.

Arcade Game Designer is something I've been wanting to try myself, so I'm going to put some serious effort into making my very own Speccy game – watch this space.

Demigods

There's a new game released and developed by Apsis for the Sinclair ZX Spectrum 128K, which is called *Godkiller* and is set nearly 13,000 years ago; a demigod has claimed the life and soul of your significant other, and you have the opportunity to take your revenge.

Starting in the temple of Mnar in the land of MU, your task is to find ten lost souls and three sacred objects to open the gates of time to travel back to the time and place to prevent the demigod from taking the life of your loved one. But the land of MU is strewn with supernatural beings that will take your life forces.

This game has been developed with the Mojon Twin's LaChurrera engine, with music provided by Neil Parsons. The game is currently in Spanish (but it's still very playable), with the English version in its final testing stages, with all of the information available from **tinyurl.com/klhyuvz**.

Sing along to classics like Eye of the Tiger by Survivor thanks to International Karaoke+ for the Commodore 64

Help our Robotic St. Nick collect the presents from a weird and colourful Lapland

IK+

The Commodore 64 group Digital Excess has released a piece of communal gaming for the famous 8-bit personal computer called *International Karaoke+*.

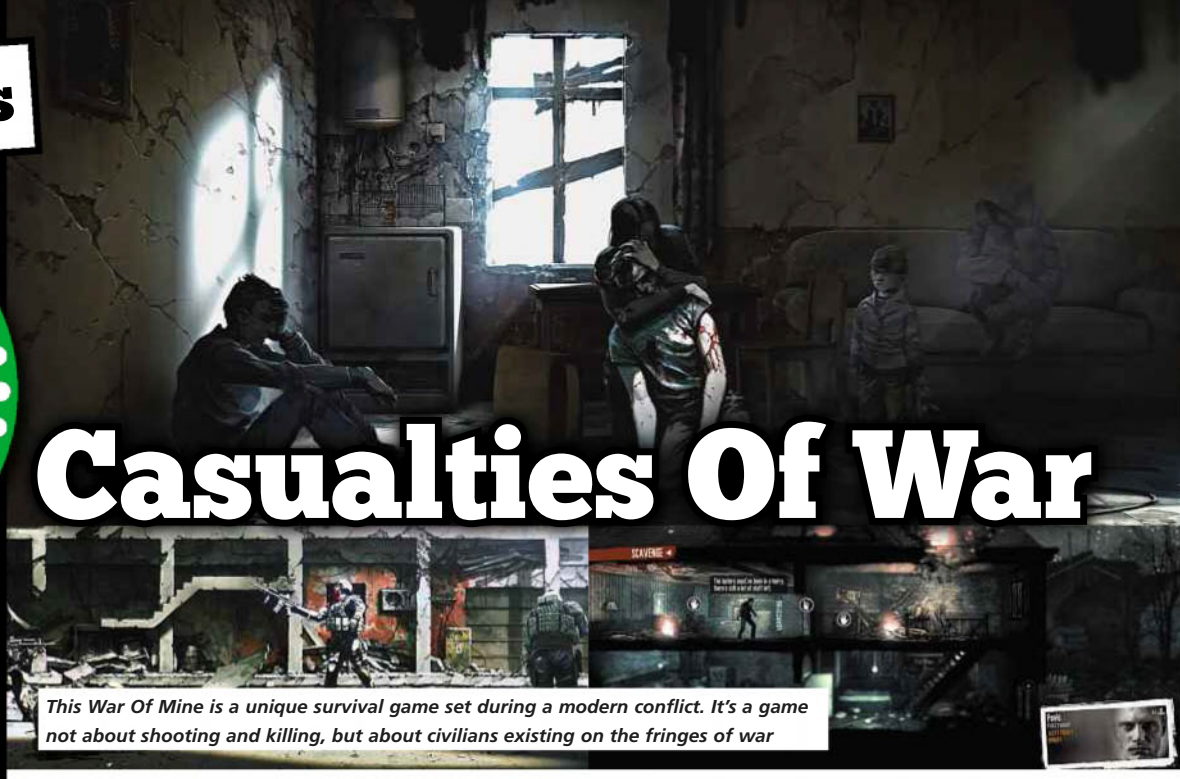
This is a game in which you simply sing along to a selection of songs converted to the C64's famous SID chip, which usually means that the songs are musically different from the original pop hits. It will display and highlight the words to the piece of playing music as you go. Think of it as a *SingStar*-alike affair without the thrills.

The original release is available from **csdb.dk/release/?id=133932**, with an extended play edition (including more song conversions) available from the same website at **csdb.dk/release/?id=134053**.

Retro

Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*

Casualties Of War



This War Of Mine is a unique survival game set during a modern conflict. It's a game not about shooting and killing, but about civilians existing on the fringes of war

This week, Ryan takes a look at the conflict survival game This War Of Mine, and checks out the extraordinary success of the free-to-play MOBA, League Of Legends...

Plug & Play

War is a common, even ubiquitous subject in videogames. More often than not, though, we're told a story from the perspective of a battle-hardened soldier. Even when a game occasionally tries to get across an anti-war theme – as *Spec Ops: The Line* did – the more contemplative elements are often drowned out by the sonic backwash of rockets and guns.

Not so *This War Of Mine*, an indie game which, refreshingly, tells its war-torn story from the perspective of ordinary people rather than soldiers or mercenaries. At its core, *This War Of Mine* is a strategy adventure, where the player assists a small group of civilians as they try to survive in the middle of a war-ravaged city. Each character you control has their own set of skills; some are good at cooking, negotiating or running, for example – each skill being key to survival as you scavenge for basics like food and water or materials you can use to strengthen your refuge from the conflict.

This War Of Mine is the product of 11 Bit Studios, a Warsaw based developer formed from former programmers who worked on such games as *The Witcher*, and this is clearly a particularly personal project for them.

Senior writer Pawel Miechowski described in a recent interview with *Rock Paper Shotgun* how he and his team were inspired to make the game after reading an article written by a survivor of the conflict in Bosnia. Warsaw was also greatly affected by the Second World War, and *This War Of Mine* was partly inspired by the experiences of the designers' family in that conflict.

"Most of us have grandfathers who survived heavy bombings and then the Warsaw Uprising," Miechowski told the website. "When the uprising was over in October 44 the city was completely ruined. People were trying to survive. They were called Robinson Crusoes of Warsaw."

Depicted in stark greys and blacks, *This War Of Mine* is a distinctive-looking game exploring difficult, thought-provoking ideas. Indeed, war is so commonly depicted as a kind of team sport in videogames that it's fascinating to see a game that deals so honestly with its impact on ordinary people. It takes the familiar language and mechanics of an ordinary survival game – the gathering, the crafting, the resource management – and ties them to something emotional and potentially shattering.

This War Of Mine is out later this year, and 11 Bit Studios has plans to expand the game – and its roster of playable characters – in future updates. You can find out more about it at **www.11bitstudios.com**.

Online

If you want an example of just how huge the market is for microtransaction-based games, look no further than *League Of Legends*. Having launched in 2009, Riot Games' multiplayer battle arena has quietly grown into one of the biggest free-to-play games in the world: according to data published in January 2014, 67 million people log onto *League Of Legends* each month.

The game's also top of the heap when it comes to the amount of money spent on the microtransactions themselves. Between January and September this year, *League Of Legends* racked up $946 million in in-game purchases, meaning that it's all-but certain that it will break the $1 billion threshold before 2014's over. The figures were recently published by Super Data Research, a company that puts out a top 10 list of MMO revenues each year. *League Of Legends* is now perched at the top spot, having elbowed aside last year's number one, the online shooter *Crossfire*. That game made $897 million over the

▲ *Within five years, League Of Legends has grown into one of the biggest free-to-play games on the planet, with in-game purchases set to break $1 billion this year.*

same period, placing it just ahead of *Dungeon Fighter Online* and *World Of Warcraft*. The game in fifth position, *World Of Tanks*, is surprisingly far off the pace in terms of profits; where *World Of Warcraft* has made $728 million so far this year, *Tanks* made around half that, with revenues of $369 million.

League Of Legends is therefore at the top of a market that is now worth close to $8 billion, where the top three games account for one third of that, and the games below them scrabble around for what's left. Riot Games will certainly be toasting this latest indicator of its game's success, whose popularity far outstrips rival games such as *Dota 2* and Blizzard's *Hearthstone*.

What's interesting about these figures is that it shows how successfully Blizzard have managed to push *World Of Warcraft* into the microtransaction space. *Warcraft*'s dwindling subscriber figures have been much publicised over recent years, but the amount of cash made from in-game purchases seems to have stepped in to take up the shortfall; in 2013, the game made $213 million from microtransactions. This year, *Warcraft* made more than three times that sum within just nine months. Factor in the revenue from the loyal subscribers that still remain (an estimated seven million of them) and you have a game that is still enormously profitable for its owners. Little wonder, then, that Blizzard have recently pledged to put more development staff into producing fresh content for its venerable MMO. If microtransactions keep increasing like this year on year, it can certainly afford to keep producing more quests, characters and items for *World Of Warcraft*'s legion players.

Incoming

In the 1990s, the *Micro Machines* games were almost as ubiquitous as Take That. Available for just about every console and handheld you could think of, Codemasters' series of arcade racers endured for one very good reason: they were so much fun. Players took control of tiny toy cars and raced them over a range of familiar domestic settings: kitchens, gardens, snooker tables and so on.

Now the same top-down racing gameplay is back – albeit without the *Micro Machines* name – in the form of Codemasters' *Toybox Turbos*, a game clearly designed to evoke fond memories of its 90s predecessor. The domestic settings are back (down to the kitchen table, cereal boxes and slices of toast) and there are power-ups, too: hammers, machine guns, mines and more.

The real draw, of course, is the multiplayer racing – in either four-player split-screen race modes or manic online tournaments, something those of us who owned the Mega Drive version could only have dreamed of.

All this nostalgia is coming to Steam in November.

▲ *Micro Machines is back – well, sort of. That classic series' developer Codemasters is making a spiritual sequel called Toybox Turbos. Expect lots of multiplayer racing very soon*

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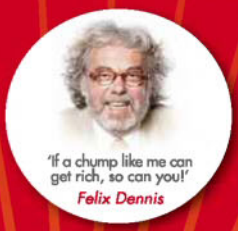

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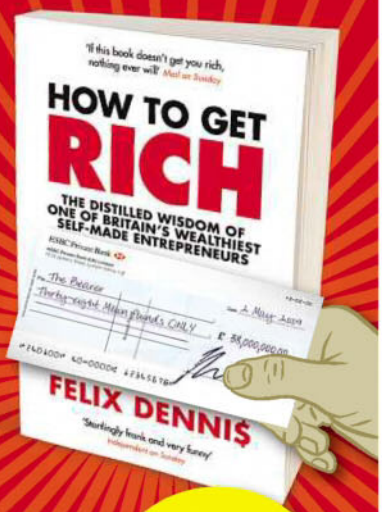

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Please try to keep your queries brief and limit them to just one question per letter, simply so we can squeeze in as many as we can each week. Please include relevant technical information too.

Aaron

Powered Homegroup

Many thanks for you explanation of homegroups. I was unable to access the WLAN facility on my router due to my ISP restricting access to some of the features.

However, thinking about the problem with your comments in mind, I started again and installed the homegroup from scratch. Instead of using wi-fi, i had started to use powerline adapters, so I installed these and linked the laptops by cable. The result is that I now have homegroups up and running as I want, and I'm sure that the throughput on the power line is better than through wi-fi.

Many thanks for your help.

Frank

Thanks for your update, Frank. It's a shame that your ISP has locked down your router, but at least you've got your network set up as you want it now. Using powerline networking is a great way to get your home connected, and it's also a great way to bypass problems with other methods, including wi-fi. And yes, it's also going to give you a better level of performance and speed than most wireless options.

If you still wanted to try the wi-fi option, however, I'd certainly give your ISP a call and see if anything can be done to access the required settings on your router. Alternatively, you could always use your own router, instead of the ISP-provided one. This would let you access all options with no problems.

Powerline networking is increasingly popular, and it's a cheap, easy and effective way to network your home

On And Off

I'm contacting you in the hope that you be able to shed some light on a problem that I'm having with external storage for the purpose of creating system image backups.

Firstly, I was using an Icy Box USB 3.0 IB-351StU3-B with a 500GB Samsung Spinpoint connected to the USB 3.0 port of my Asus P8Z77-M PRO motherboard running under Windows 8.1 Pro 64-bit. Initially, the drive showed up under disk management and I was able to start creating a backup, but the drive started to connect and disconnect, so I moved it to a USB 2.0 port and started over, completing the image (albeit slowly). The next time I attached the drive, it would connect and disconnect on both USB 2.0 and 3.0 ports, showing up as a VLI product string in devices and printers.

I assumed the Icy Box enclosure was faulty, so I bit the bullet and bought a Silverstone TS07 enclosure after contacting Silverstone customer support to ensure Windows 8.1 compatibility, but low and behold, it also connects and disconnects when attached to a USB 3.0 port, showing up as super speed device under hardware, yet my USB 3.0 flash drive works without a hitch.

I don't think it's the Spinpoint, as it behaves when attached to an USB 2.0 IDE/SATA power adapter. Is this possibly an issue with either the ASmedia or Intel USB 3.0 Microsoft drivers?

There are no Windows 8.1 drivers for this motherboard on the Asus website, and the older versions are not supported on the current platform. I would be very grateful for your advice in allowing to make the most of alleged advances in hardware and software.

Paul

This kind of problem is often caused by driver issues, especially if said issues relate to having drivers installed that are not fully compatible with your OS. After all, it's Windows that has to detect and set up the device, so if the motherboard doesn't have the correct drivers installed, Windows will have problems using hardware connected to it.

You said you've had problems finding the correct Windows 8.1 64-bit drivers for your motherboard, and these would, indeed, potentially solve your problem. I had a mooch around the Asus website, and found that the P8Z77M-Pro as a full set of Windows 8.1 drivers, both 32-bit and 64-bit. You can find these drivers at ***tinyurl.com/ner7n7l****. Have a look through the list of drivers and ensure that you're using the correct ones for your system, especially the chipset. Once installed, these should rectify your problem.*

If you still have trouble, another trick that may help is to disable the power saving options for USB, as this feature can cause disconnection

woes. To do this, go into Control Panel and then into Device Manager and locate the USB hub entries. Right-click these and go into Properties. Click the Power Management tab and make sure that the option to allow the computer to turn off the device to save power is not active (remove the tick). Next, go to Control Panel again and into Power Settings. Edit your current plan settings and enter the advanced options. Expand the USB settings and disable the option here too. This will prevent disconnections of the hardware when it comes to power saving and may help you out.

A final step you could take would be to try the Intel USB 3.0 driver, as this has fixed similar hard disk disconnections for some Windows 8 users with USB 3.0 devices. You can find this driver at ***tinyurl.com/lz38743****. Be aware that the driver may not naturally support your motherboard, so I'd strongly suggest a backup before you give this a go, just in case anything untoward happens, but it's a driver that can make USB 3.0 devices function properly in some cases.*

➤ ***If you have USB devices that disconnect themselves, try disabling USB power saving***

Read Only?

My PC has started to show a blue screen error that mentions a problem writing to read-only memory. The error doesn't always occur at the same time, and I've even had a few days without it before it comes back.

I haven't made many changes to my PC other than updating a couple of drivers for my hardware, both of which work perfectly well. I haven't installed any new software, and no one else uses the PC. It runs Windows 7. Can you help?

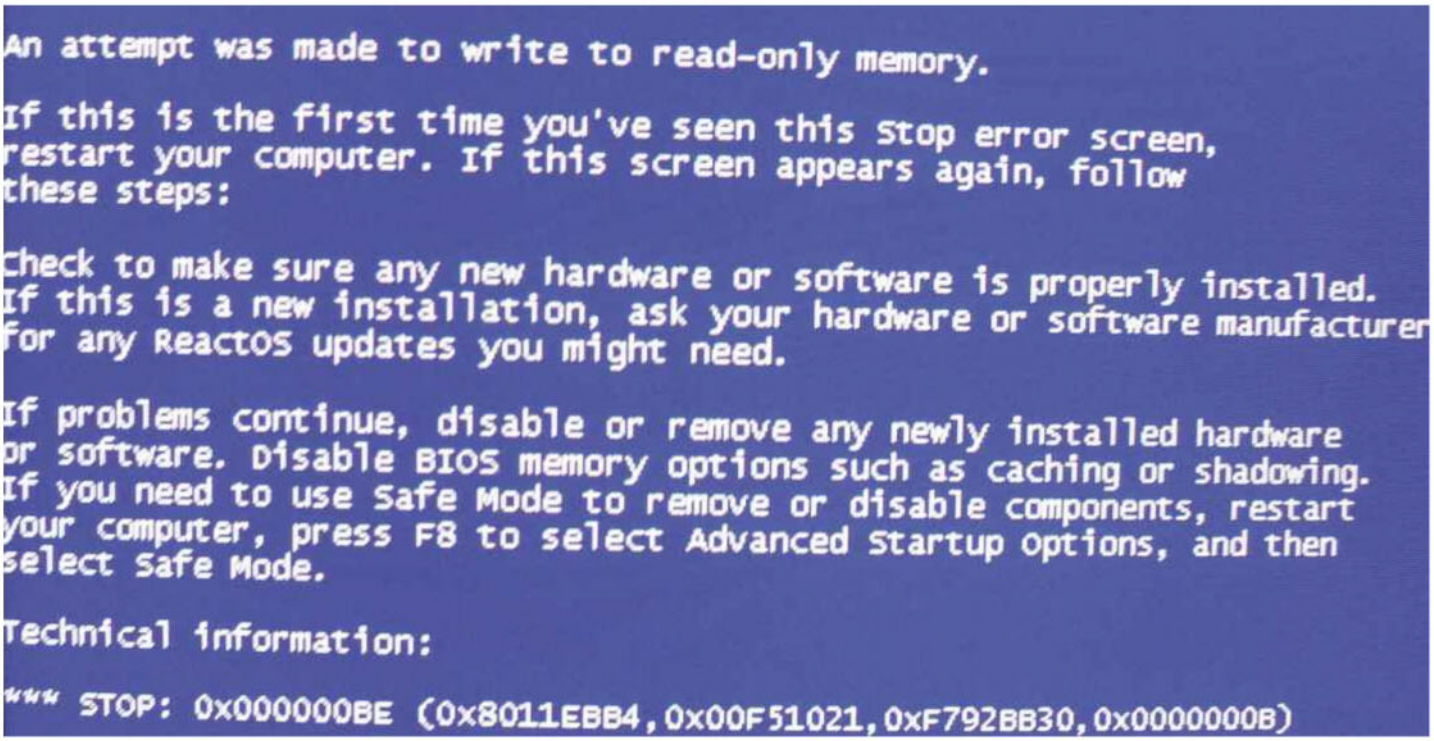
Mark

The '0x000000BE' or 'ATTEMPTED_WRITE_TO_READONLY_MEMORY' error is usually caused by troublesome drivers or firmware, and as a result, it's often seen after a user has updated their PC's hardware with new drivers. As you've recently done just that, I'd strongly suspect that this is the cause of your problem.

Faulty drivers can attempt to write to read-only segments of your memory, which prompts the stop error, as Windows halts the action and shuts down the PC in order to prevent damage. So the best way to solve this problem, or at least narrow it down, would be to undo the changes you've made with the previous driver installations and try the PC to see if the trouble still occurs.

You can do this by manually uninstalling the hardware drivers if you know what they are, or you could use a System Restore point. Whichever you choose, you'll need to give the PC a good test for a while to ensure the error no longer returns. If this ends up being the case, you know the drivers you installed were the cause, and you should download some alternative versions or stick with older ones if the hardware was working okay previously.

➤ ***Faulty drivers can cause many blue screen errors, including attempts to write to read-only memory***



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While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

Jason

Cable Guy

I run a small stationery business and have just moved into a new office. This is in a block with other offices, and internet is provided as part of the rent. Network sockets are dotted about the walls – not all of them work! – but really I want wi-fi, not cables. For my phone and tablet, cables aren't even an option. So, what equipment is required? I'm guessing I need some box of tricks or other – a wireless modem? – but after 30 seconds of looking at the networking gear on sale at Amazon my head's spinning.

C Thompson, Yahoo!

In short, the wall sockets in your office – those that work! – are Ethernet cables coming from a modem (located in another room). Therefore, you don't need another modem, just a router. Be aware that many routers are actually modem routers, designed for an internet feed coming direct from a phone line via ADSL. Steer clear.

All routers have a WAN port (wide-area network). This is where you plug in the cable for the internet feed. The WAN port on a modem router is a phone socket (RJ11), but on a plain router or cable/fibre router (no modem) it's an Ethernet socket (RJ45). When browsing for what router to buy, discount all models featuring a phone socket and you won't go far wrong.*

Both types of router will typically incorporate a network switch, comprising numerous Ethernet LAN ports (local-area network). These allow multiple devices to share the internet feed and also communicate with each other. Of course, as you're only interested in wi-fi, a switch isn't strictly necessary, and some small, portable wi-fi routers don't feature any LAN ports at all. Oh, and as it's still possible to buy non-wi-fi routers, please do make sure the router you buy does actually have wi-fi functionality!

But what if you want wi-fi?

What type of wi-fi functionality, though? Well, there's no sense these days in buying anything not supporting at least 802.11n and preferably at 300Mbps or more. All 'n' routers are compatible with 802.11g and 802.11b, so older gear will still work. If incredible speeds aren't required, something like Trendnet's TEW-711BR will no doubt suffice. That's a 150Mbps 802.11n device with a four-port switch, and I've seen it retail for under £15.

*If speed *is* a requirement – perhaps because the office internet feed is at 100Mbps or more or you'll be swapping huge files between cutting-edge devices – you may want to push the boat out and future-proof yourself a little with an 802.11ac unit. In my view, in order to reap any major benefit over the best that 802.11n can offer, you should be looking at AC1200 or AC1300 models – that is, ones offering speeds of 867Mbps. Or better, of course. Thankfully, prices have tumbled in recent months, and you might even get change from £40.*

** Most don't, but some cable/fibre routers do include a cable/fibre modem. Avoid those – you could end up in a bit of a mess!*

Forward Thinking

Here's another business-related enquiry...

I've recently started a family building and maintenance business. The work's beginning to come in, so I want to get the van painted up with the company name and contact details. I'm also looking into advertising in the local paper. Now, I see vans on the road with email addresses like 'johnsmith1968@gmail.com', and this just seems so amateurish. I'm using Gmail myself at the moment, but is there a cheap and easy way to get and use an email address that looks more professional?

Colin, Gmail

*You're in luck, Colin. Doing this is indeed cheap and easy. First, you need a domain name. There are countless registration companies – **www.domainmonster.com**, **www.1and1.co.uk**, **uk.godaddy.com**, to name but a few.*

Domains are leased, and looking at 1&1 (just as an example), some typical yearly fees are as follows: a .com name for £10.99 (99p for year one); a .co.uk name for £3.49 (again, 99p for year one); and a .net name for £9.99 (no first-year discount).

Next, you need to set up email forwarding, a service most domain companies include for free. There'll be an admin portal you can log into, and from there you'll be able to specify an email alias – sales@mynewdomain.com, for example. You'll also need to specify a forwarding address – your existing Gmail address. You can then paint the alias on your van, and any emails sent to it will be automatically forwarded. Your customers will be oblivious.

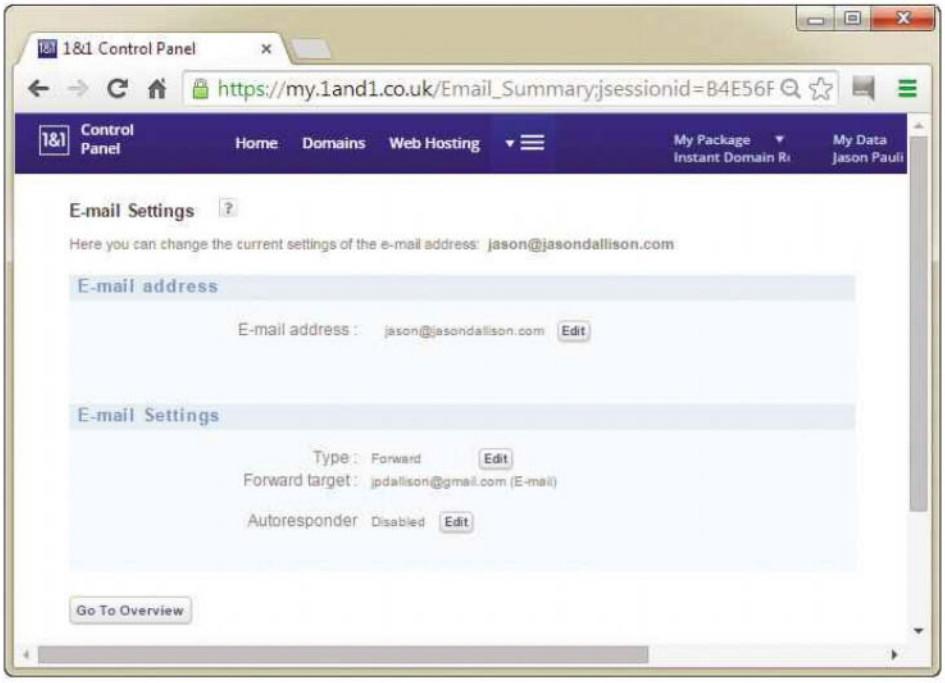
Most domain companies will let you choose multiples aliases – not just sales@mynewdomain.com but also, say, bobthebuilder@mynewdomain.

com and invoicing@mynewdomain.com. However, some will let you choose merely a single forwarding address. All email to all aliases will end up at the same place. If you'd prefer Bob's emails to go only to Bob, and invoices to go only to the secretary, ensure that having multiple forwarding addresses won't mean coughing up extra fees.

Finally, to maintain your business's professional image, you also need to configure Gmail. When you send messages or reply to them, you'll want your customers to see they've come from your alias. If they see your Gmail address, the illusion's destroyed.

In Gmail, click the cog icon and select Settings. Hit the 'Accounts and Import' tab. You'll see a section called 'Send mail as', with a link at the bottom labelled 'Add another email address that you own'. Click that, untick 'Treat as an alias', and just follow your nose, leaving all other options on their defaults. Back on the 'Accounts and Import' tab, ensure you've selected 'Reply from the same address to which the message was sent'. And that's about it, Colin!

Note – The above setup is a good idea for everyone, dear readers, not just for businesses. Have you ever switched ISP or webmail client and had to inform all your contacts that your email address has changed? Buy yourself a domain name and you can keep the same address for life. If your email provider changes, just alter the forwarding address in your domain company's admin portal. No-one will know the difference.



▲ ***Buying a cheap domain name and setting up mail forwarding will mean you'll never have to change your email address ever again***

Missing In Action

My ageing desktop PC could use a boost. I'm into video conversion and HD footage brings the CPU to its knees. The motherboard is an ASRock N68C-S UCC, but I can't find any trace of this on ASRock's website. The manual is long gone too. So what's the fastest CPU I could fit? Currently I'm running a Sempron X2 2200!

Tilo, London

ASRock sometimes retires older boards from its main product pages, and these can be tracked down by clicking All Product List. Usually, that is. As you say, Tilo, the N68C-S UCC has vanished. The N68-S UCC remains, but that's not quite the same, having just two DDR2 slots. Your board has two DDR2 slots and two DDR3 slots.

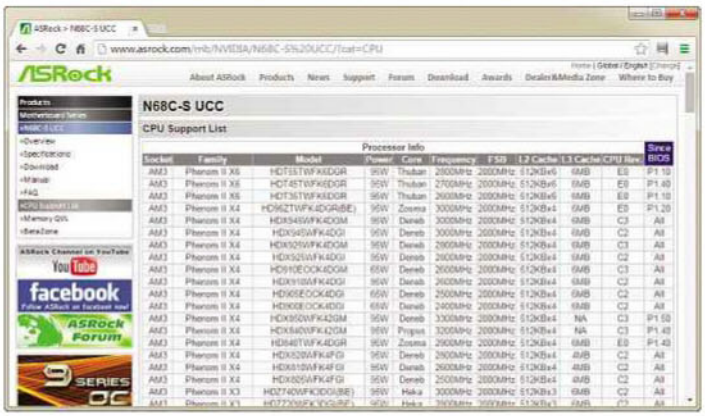
In such cases, always try banging the board's name into Google. Often a board will still exist on a manufacturer's website even when all direct paths to it have been removed. And so it is here: the top Google result for 'N68C-S UCC' is a link to the old product page. Try ***bit.do/TNZp*** *for size.*

From there you can click CPU Support List, and that'll show exactly what you're after. At heart, the N68C-S UCC is a Socket AM2 board, but it does also support AM2+ and AM3 CPUs. AM3 CPUs will work with either DDR3 or DDR2 memory (but not both simultaneously). HyperTransport on the N68C-S UCC is limited to version 1.x, with speeds up to 2,000MT/s, whereas AM2+ and AM3 CPUs can support version 3.0, with speeds up to 5,200MT/s. This limitation doesn't affect CPU frequency and thankfully has virtually no impact on CPU performance.

Of more concern, Tilo, is the board's cap on TDP: 95W. Several top-end Phenom and Phenom II CPUs draw up to 125W and even 140W. These may well work in the N68C-S UCC, but the BIOS will probably show 'Unknown' and sooner or later the increased stress on components will almost certainly cause something to burn out. Stick to the officially supported CPUs. Take special note of product codes, as several CPUs are available in more than one variant.

The fastest chip you could fit is the Phenom II X6 1055T with the code HDT55TWFK6DGR (avoid the 125W HDT55TFBK6DGR). That's a six-core 2.8GHz powerhouse – quite an upgrade from your dual-core 2GHz Sempron! Of course, whatever you upgrade to, don't overlook your cooler. Most likely you'll need to upgrade that too.

▼ ***Finding CPU support lists for older motherboards sometimes requires a bit of detective work***



Crowdfunding Corner

This week we have two interesting pieces of technology that could stop you annoying a loved one...

Soundlazer Snap

The SoundLazer Snap is a unique idea for a directional parametric speaker, which uses ultrasonic soundwaves to transmit audio in a focused beam, giving it a true directional quality. The sound can only be heard by the person sitting directly in front of the speaker, making it ideal for shared spaces or unconventional use.

This Kickstarter campaign follows up a previous one that paid for the development and production of the initial technology, and the Snap – while not strictly a retail product – is a cost- and performance-refined version of that design. It's perfect for electronics hobbyists, inventors, hackers and anyone else that likes to play with technology. Despite this, it's simple enough for novices to use and much cheaper than the original Soundlazer design, which makes it worth investigating if you think a directional speaker might be exactly what you need. It's compatible with all major audio sources through a standard 3.5mm jack, so getting it working won't take any effort at all – then the results will speak for themselves.

The project has already passed its goal and (unfortunately) the early bird tiers are already gone. You can still get a unit for $149 (plus $22 shipping outside the US) with all necessary cables, schematics and power supplies. Not a bad price at all for technology on the cutting edge of sound design.

Web: kck.st/1rKuy46
Funding Ends: Friday, December 19th 2014

Z-Charge

If you've got a smartphone or tablet, you're probably used to having a tangle of wires on your beside table so that you can recharge your various devices each night while you sleep. They're messy, they're inconvenient, and worst of all, they take up a lot of space on your bedside table. Which is where the Z-Charge comes in.

Storing up to six devices, the Z-Charge is a convenient and safe way to charge and store multiple pieces of hardware at once. Placed under a mattress, the Z-Charge can provide storage pouches on each side of the bed, with an integrated powered USB hub that allows you to charge everything at once. Devices can be grabbed quickly or stored away easily in the pouches provided, and are secured with a velcro closure. It's lightweight and adjustable, supporting phones, tablets and eReaders of any shape or size. Simply plug it into a single socket in the wall and it's ready. You can even turn it on and off via a standalone switch.

At present the campaign is almost halfway to its goal with several weeks to go, and you can still get a single Z-Charge unit for half the retail price – just €49, which includes free worldwide shipping. If you miss that, there are opportunities to pay full price (€99) but get a custom embroidered design as well. It's almost worth the money just so you always know where your phone is in the middle of the night!

Web: kck.st/1tmSP4A
Funding Ends: Thursday, November 20th 2014

Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!

App Of The Week

K7ZX

Dig out your old Spectrum and load up some classic games without destroying your tapes

After a drastic loft clearance, I managed to locate my wayward collection of ZX Spectrums. A classic 48k rubber keyboard, the hard key Spectrum plus and a 128k with the toast rack heatsink. They all worked perfectly, aside from a keyboard membrane replacement on one of them. The games, however, were a different story.

Despite being kept in a rather large box, away from the worrying attention of nesting wasps, my collection of Spectrum games shows some considerable wear and tear. The tapes either won't load, will only load halfway before cutting out, or they make a terrible grinding noise when I press the play button on the cassette recorder.

All is not lost, though, as I turned to more modern mediums in which to load up my precious catalogue of Spectrum games from the emulated versions I have stored on my PC.

K7ZX

There are a number of programs out there that are capable of converting the noise of the old Spectrum tapes into an emulator readable file, such as a .TAP, .TZX or any such container, so there must be a program that will do the opposite.

After a quick hunt through the World of Spectrum site, I came across a few candidates, one of which is this little beauty, which impressed me mightily.

K7ZX is a clever program available from the Google Code pages, now on version 4.3 (**goo.gl/8yQmZP**). It will convert the aforementioned .TAP, .TZX or .Z80 files to either a .WAV or .MP3 in a matter of seconds in either normal loading speed or to a very high speed using a basic but functional user interface.

How To

The process is simple enough. You download the zipped file, unpack the directory onto your PC, then run the included K7Zx program. Then, when the program has launched, click on the 'Settings' top menu option and choose which of the Conversion Types you want the end sound file as: Normal, Hi Speed or 'Ma Non Troppo'.

The difference is Normal converts the Spectrum game to a standard sound file; Hi Speed converts the games and plays them back at incredible speeds (a 190-second load can be reduced to just 9.5 seconds); and Ma Non Troppo converts at high speed, but not as fast as the Hi Speed option – just in case there's a problem when the file is played back.

After making your choice, simply point the program to the location of your stored emulator games files, then click on either the '=> WAV' or '=> MP3' buttons to rapid dump the sound file into the location specified next to the button.

Features At A Glance

- Free.
- Keeps your tapes safe from wear and tear.
- Super fast load up times.
- Use the actual hardware, instead of an emulator.

Once the game is converted, copy it to an MP3 player, then hook it up to your Spectrum via the Ear cable, enter 'Load ""', press Enter and press play on the selected MP3 track.

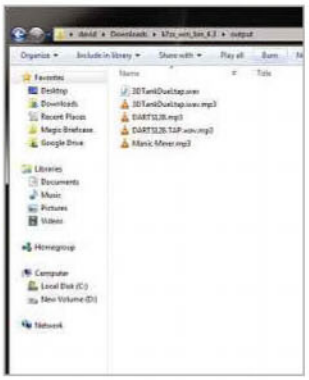
Alternatively, you could hook up your laptop/PC to your Spectrum in the same fashion and run the MP3 through the likes of VLC. Either way, the Spectrum will load up the game as if it was reading it from a tape, and you can then bask in glorious nostalgia.

Conclusion

There are many other tried and tested ways in which to do the above, but using K7ZZ has been, so far, flawless. And what's more, I get to play *Manic Miner* again and load it up in under ten seconds. A win all round.

Locate the game, choose the conversion speed and click the button

The conversion process will do its magic and produce a sound file



Navigate to the Output directory, and copy the MP3s to a player

Logging Off

If you caught the numbers, Amazon had the sort of third quarter this year that might result in a few senior people clearing their desks. It reported a $437 million loss – ten times what it reported in the same quarter last year.

Taking the majority of blame, but oddly not the only reason, was its now infamous Fire Phone, on which the company took a $170 million write-down.

So why did this product fail, when other Amazon initiatives like the Kindle and Kindle Fire did very well? It was launched into the US, UK and Germany, and sales weren't any better outside of America. In the US, it exclusively partnered with AT&T, the network most American's love to hate. And initially the phone cost them $199 on top of their contract, which is iPhone territory.

But that's only part of the story, because it also messed significantly with the Android implementation in it, to the point where the UI appeared to hinder most users rather than help them. Fire OS is technical a fork from the Android path and possibly one too far.

While some reviewers appreciated the 'being different' ethos, many just saw the Fire Phone as something primarily designed to sell Amazon products that also happened to be a phone.

Apple is proof that people will put up with amazing levels of coercion, but in a market that includes hardware like the amazing Motorola G, who would pay this sort of money (£399 PAYG!) for this specification? The answer is frighteningly few people.

In the US and on O2 in the UK, the Fire Phone is now free with a contract, but that still hasn't stopped it being one of the least popular smartphones available.

That's left Amazon with $83 million in unsold Fire Phone stock, according to their chief financial officer Tom Szkutak. What to do?

If I was Tom, I'd ring those nice people at CyanogenMod and ask them to brew up vanilla Android Lollipop OS for the Fire hardware and then sell them for £100 a smack until their gone. But given Amazon's track record, I doubt it'll do anything that customer friendly.

My guess is that it'll probably end up filling the hole left by dug-up *E.T.* carts somewhere in the desert, or the phones will be sold in bulk to Brazil, rebranded 'Scorchio'.

The lesson here is multi-faceted, because it's not just about how branding can go too far but also about what people are expecting from their smartphones.

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Microsoft learned (if it ever does) that you can't launch a smartphone that's Android without it actually being 'Google' and get it generally accepted. Phone buyers are at least that savvy, and they don't like tablets that don't come with the full Google experience either.

I mention this because of repeated reports detailing that Samsung is considering forking Android and heading away from the pack, in an attempt to bite the hand that fed it up till this point. The Fire Phone shows well that straying too far away from the path can be catastrophic, and the success of the Nexus phones show that people really prefer the core OS unadulterated.

Like fish swimming in a school, there's protection in being one of many, even if it upsets the marketing people looking to 'differentiate'. Those that stray end up being eaten first.

Mark Pickavance

LAST WEEK'S CROSSWORD

Across: **7** Electrolyte, **8** Sketch, **9** Jabber, **10** Operand, **12** Block, **14** Spume, **16** Verbose, **19** Cyborg, **20** Angola, **22** Quintillion.

Down: **1** Peak, **2** Sexter, **3** Etching, **4** Dooja, **5** Symbol, **6** Defences, **11** PhpMySQL, **13** Default, **15** Myopia, **17** Bugfix, **18** Agate, **21** Line.

DISCLAIMER

The views expressed by contributors are not necessarily those of the publishers. Every care is taken to ensure that the contents of the magazine are accurate but the publishers cannot accept responsibility for errors. While reasonable care is taken when accepting advertisements, the publishers cannot accept any responsibility for any resulting unsatisfactory transactions. This week, we continued our mission to get as fat as we can in the shortest amount of time possible. We did this via the medium of cookies. Not only did we make these ourselves and stir a load of peanut butter into the mix that wasn't in the original recipe, we also used a chopped up Snickers bar instead of chocolate chips. And when we say 'instead', what we actually mean is 'as well as'. But just in case the calorie content remained in the low thousands, we took two of these cookies and used them to make a sandwich, with a filling of vanilla ice cream. Truly this was a thing of beauty, but we didn't stop to admire it, because we were too busy stuffing our face. The only problem, of course, is that there might actually be a hint of nutritional value to this snack, thanks to the calcium in the ice cream and the protein in the peanuts. Fortunately, neither of these will hinder our progress towards dramatic and irreversible weight gain. No, if anything stops us, it'll probably be the eventual heart attack...

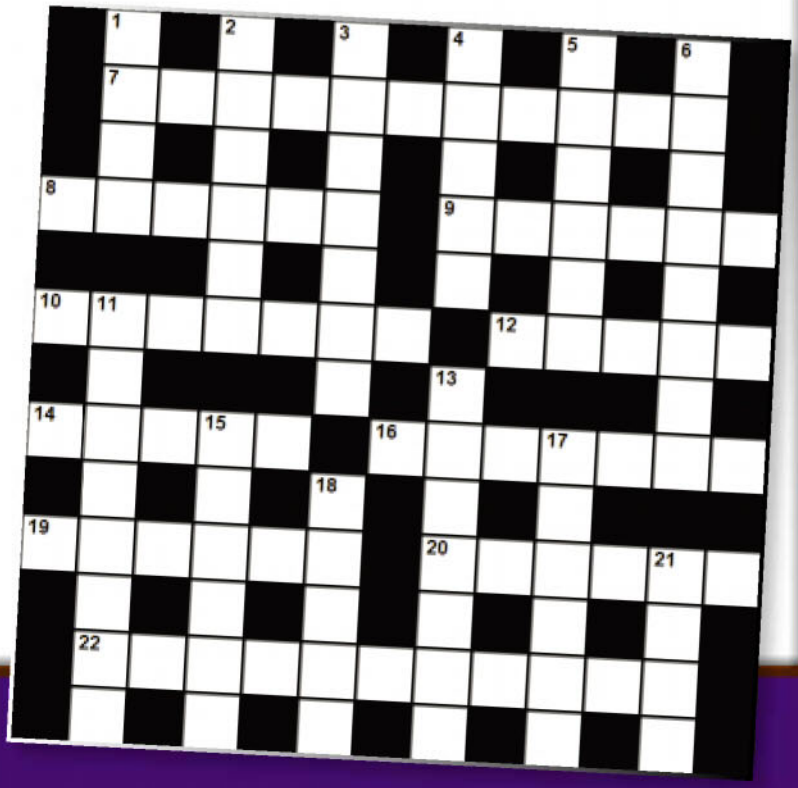
THIS WEEK'S CROSSWORD

Across

7 Consider something in far more detail than is necessary. (11)
8 A group of lines forming the basic recurring metrical unit in a poem. (6)
9 French-built anti-ship missile launched from ships, submarines,and aircraft. (6)
10 Placing documents within other documents thus allowing a user to access material in a non-linear fashion. (7)
12 Multinational multimedia software company founded in the USA in 1982 by John Warnock and Charles Geschke. (5)
14 A single computer instruction that stands for a given sequence of instructions. (5)
16 Any medium by which information can be transmitted. (7)
19 A temporary memory for data, normally used to accommodate the difference in the rate at which two devices can handle data during a transfer. (6)
20 Any inanimate object such as a mouse or keyboard that can transmit infectious agents from one person to another. (6)
22 The distinctive properties of a complex sound or piece of music. (4,7)

Down

1 That portion of a computer through which a peripheral device may communicate. (4)
2 A program that allows users on the internet to log in to remote systems from their own host system. (6)
3 Where Imgurians get social online. (7)
4 An American modem company, creator of the original self-dialing 'smart' modem. (5)
5 A spiral bevel gear is with helical teeth. (6)
6 Have a similar appearance to or qualities in common with someone or something. (8)
11 Find a numerical expression or equivalent for an equation, formula or function. (8)
13 Play or arrange tracks on a music player in a random order. (7)
15 Pay back money to a customer who is not satisfied with goods or services bought. (6)
17 A luminous cloud or a halo surrounding a supernatural being or a saint. (6)
18 Gain unauthorised access to computers with malicious intentions. (5)
21 A separately dispatchable function on a computer. (4)



In Next Week's Micro Mart*

- How to choose a remote control for your media PC
- Can technology help you beat nuisance callers?
- Make your web browsing more secure with DuckDuckGo
- Plus the usual mix of news, reviews and advice

* May be subject to change

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