



TECHNOLOGY INSIGHTS

Digital Camera Technology Untangled

Why megapixels are misleading and lenses still matter

1. Every technology has its limits

Digital Point-and-Shoot cameras are pushing the technological envelope so hard that some pundits are predicting the imminent demise of consumer-level Digital SLR cameras. Even \$200 digicams (Digital Cameras) produce pictures that delight casual shooters, and fancier models are on offer all the way to \$1,000, way past the prices of entry-level DSLRs. Finding your way around the digital camera market is harder than traversing the Scottish moors on a moonless night. This guide is an attempt to create order out of the current chaos.

The megapixel myth

The megapixel race reminds me of the ghetto blaster wars a couple of decades ago, when the makers of boom boxes tried to outdo each other with ever higher PMPO (Peak Music Power Output) ratings. PMPO is an artificial measurement that has little to do with the real world. Watts expressed in RMS are a better guide but still have little bearing on the quality of the music.

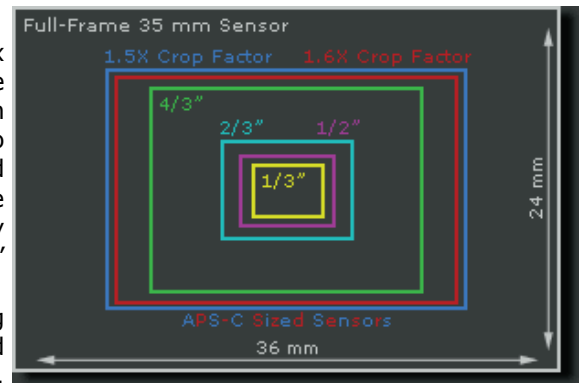
Much the same applies to megapixels in digital cameras, especially the point-and-shoot digicams, and yet the race shows no sign of ending. Panasonic's new Lumix DMC-FX150 and Canon's Powershot G10 bridge camera go over 14 mp, and Nikon's P6000 isn't far behind. Others are joining this pointless competition daily.

Pixels are the tiny specs that make up digital images on a screen, but the term is also used to express the number of image sensor elements of digital cameras. More accurately, digital image sensors use electronic wells to collect photons (units of light). Larger sensors allow larger wells to be used that can capture more photons, improving the dynamic range in the eventual picture.

Making sense of image sensors

The diagram on the right is about 2x actual size. The big full-frame sensor is the size of the old 35mm film negative. In serious photo circles, 35mm film is still the standard other sensor sizes are compared to, in part because many 35mm lenses work on 'full-frame' DSLRs.

Smaller DSLR sensors have a cropping effect on photos, due to their reduced field of vision with 35mm lenses.



Source: <http://www.cambridgeincolour.com/tutorials/digital-camera-sensor-size.htm>

For consumer DSLRs, most makers use the APS-C sensor with a crop factor of 1.5 (Nikon) or 1.6 (Canon). Canon's older, up-market 1D models have a crop factor of 1.3 (not shown on the diagram). Canon's 1Ds and 5D models use a full-frame sensor. Olympus, Panasonic and Leica use the 'Four Thirds' format, which employs a sensor half the size of the full frame type (the green outline) that yields a crop factor of 2.

When it comes to telephoto lenses, the crop factor has a multiplier effect on focal length. For example, a four-thirds lens with a 250 mm focal length covers the same angle of view as a 500 mm focal length lens on a full-frame Nikon D700 or Canon 5D. It gets trickier with zoom lenses: the standard kit lens for the Olympus E420 is 14mm – 42mm, which looks like a very wide angle lens until you multiply by 2 and get a mid-dling range of 28 – 84 mm. The Nikon D40 kit lens is 18 – 55 mm, which equals 27 – 82 in 35mm terms. Yes, it pays to take a calculator with you when you go shopping for DSLRs and lenses.

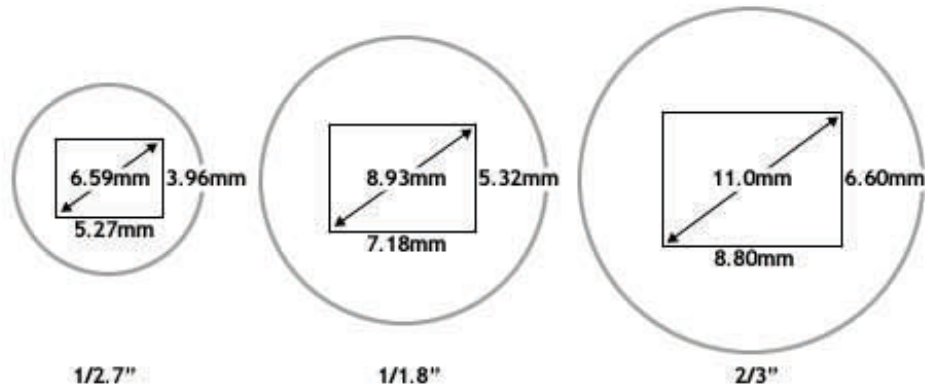
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Crop factors aren't an issue with digicams but getting a handle on their sensor sizes is tricky since the digicam makers use imperial fractions like 1/1.8" to confound us. Here's a translation, courtesy of <http://www.dpreview.com/news/0210/02100402sensormsizes.asp#bottom>



Almost all fixed-lens digicams use sensors in this size range, and that's a handicap. Here's why: The APS-C size sensor used in consumer DSLRs (blue line in the diagram above) has a surface area of about 400 mm², while the common 1/1.8" digicam image sensor covers just 38mm², one tenth the size. Tiny sensors with lots of pixels produce photos with more noise and poorer dynamic range than large ones.

As pixel counts go up in the same space, signal-to-noise ratio suffers. Squeezing 14 megapixels on a sensor the size of a fingernail is a sure way to reduce signal clarity and drive up the noise level. One way of looking at this is that the Nikon DSLR's pixels are fat and happy cows grazing on an open pasture, while the digicam's pixels are more like battery hens treading on each others' toes.

In the right light, even battery hens can look attractive

Any camera can take good still photos in clear daylight. This is not where you see the difference between digicams and DSLRs, nor in simple subjects like houses or motor cars. Skies and skin tones are trickier and the differences become obvious in poor light. Long-shot landscapes are hard on pocket cameras and can be hard on the shooter as well, given the awful viewfinder digicam makers like Canon throw in (at least most Canons have one).

Still, every now and then some serious shooter will put up his hand and say his new digicam made him wonder why he bothered to take the \$50,000 Hasselblad out of his safe <http://www.luminous-landscape.com/reviews/kidding.shtml>

I've made some great shots with my little Canon as well. This one (right) was taken with an 8mp Powershot A590 IS and looks perfectly sharp on a 75 x 50 cm canvas. A friend's 12mp Canon Ixus 960IS costs over twice as much but struggles to resolve the extra detail it captures. The result shows up as additional noise—see below.



The point here is that getting great seascape shots from a DSLR is pretty easy, while it's hard work or a lucky strike with digicams.

If you just want snapshots for the family album, the image quality of today's \$150 digicams is more than good enough, but you'll curse the thing at birthday parties or family picnics: by the time it's ready to shoot, the kid has bolted and the dog has shot through with that sausage. It takes two seconds to get ready again, longer if you've shot with the flash - it's enough to make you want throw the thing into the fish pond.

Digicams are to action shots as a wristwatch is to timing an Olympic 100m event. DSLRs autofocus in an instant and shoot fast, even from a cold start, and as soon as the trigger is pulled they're ready for the next shot. And all the controls are the right size and in the right place.

Good Digicams are handy, but good DSLRs handle like great motor cars.

When the light fades, so do digicams

The higher the pixel count goes in Digicams, the harder it is to get clean shots. These photos (below) from my own collection clearly show the furriness that characterizes digicam shots, notwithstanding the Canon IXUS 960's 12 megapixel count. These are 100% crops of admittedly challenging long distance shots from Cremorne Point as the sun set. Canon left and Nikon D40 right.



This furriness is most likely due to diffraction and is very hard to sharpen up, even with serious photo editing. All those pixels just go mushy, whereas Nikon pixels respond very nicely to editing for anything from exposure to sharpness, suggesting that its fatter pixels are more robust. And the Nikon produces far superior colour in all conditions. The Canon has the numbers on paper, but the Nikon delivers the goods on the screen.

Diffraction occurs more readily at smaller apertures, anything lower than f/5.6 in some Digicams, and noise rears its head as soon as the camera pushes the ISO setting up to compensate for poor light. 200 is already chancy, and 400 not a good idea. High-pixel-count digicams give their best results at 80 or 100 ISO, with the lens wide open (f/5.6 or lower). Finding the optimal aperture can be difficult.

To overcome these in-built limitations, digicam makers put a lot of work into their processing chips and firmware. Canon has just released DIGIC IV, which is claimed to provide faster image processing when compared to DIGIC III, improved noise reduction in high-ISO images and improved performance when handling 14-bit RAW images.

This is what **Digital Photography Review** said after testing Canon's new Powershot G10 with DIGIC IV - <http://www.dpreview.com/reviews/canonq10/page24.asp>: 'In trying to keep ahead of the megapixel race, Canon has produced a camera that in the real world can't deliver on the promise of the styling and control layout. In the studio it produced some incredible results at base ISO, but out in the real world and as ISO settings increased, the loss of fine detail and increase in noise really let it down. A camera is ultimately about taking pictures, and that is why we put so much emphasis on the image quality output.'

2. Anyone mention optics?

Just about all my best photos have come out of a 6mp Nikon D40. Yes, 6 megapixels is more than enough for great photos if they're fat and happy pixels. You could double the pixel count and not see the difference. You might see one if you quadruple it - Sony's new Alpha 900 has a 24mp sensor. Canon's top model offers 21mp. Both cost thousands of dollars.

As it happens, other factors tend to have a much bigger impact on Image quality than pixel count. DSLRs are about lenses, a wide range of interchangeable lenses, from consumer lenses to professional grade items with high-grade optics. Lenses vary a great deal in acuity, colour and speed (light sensitivity), but even consumer-level DSLR lenses can surprise with the quality of their results.

The shots below are from a comparison of a 14mp Sony Alpha 350 (left) with a 10mp Nikon D80 (right), and they show the difference a lens can make.



Source: <http://www.digitalreview.ca/content/Sony-Alpha-A350-Compared-to-Nikon-D80-pg1.shtml>

These are tiny crops enlarged to 100%, and the Sony's shows obvious chromatic aberration and is less sharp than the Nikon's, despite the higher pixel count. The reviewer comments: 'Although the Sony AF DT 18-70mm f/3.5-5.6 zoom lens is reasonably sharp in the center, it quickly deteriorates as you move towards the edges of the image area.' The Nikon lens showed better edge to edge sharpness and detail at 18mm, 35mm and 50mm. The 18 - 55mm kit lens is about the cheapest lens Nikon makes.

That's why the experts tell us to invest in 'glass', not camera bodies, and because today's digital cameras are much like today's laptops or mobile phones: they're hot this year, old hat next year and of no value to anyone the year after that. SLR lenses from Nikon, Canon or specialists like Sigma will hold their value for many years.

More pixels make more work

If the advantages of extra pixels are dubious, their drawbacks are obvious when loading photos on a PC: the files are very large and slow to process. If you're a dead keen amateur, you may find a major PC hardware upgrade necessary. Big files also take up lots of space on hard drives, with 12mp .jpg shots generating 5-6 mb files. Hard drive capacity is cheap these days but keeping these files backed-up takes time.

The good news is that most digicams let you adjust the working pixel size, so you can turn down the pixel count for the family snapshots. It's remarkable how little difference there is between 12 and 6 mp photos in normal screen and print sizes. It is generally advised that you need 3mp for 5x7 prints, 6mp for 9x12 and 10mp for 12x16, but I've made many sharp 75x50 prints from 6mp photos.

Raw makes more work

Some amateur Digital SLR shooters take themselves so seriously that they shoot in Raw format, an option all DSLRs offer along with JPG. Camera Raw is the unprocessed file of the detail the electronic sensor captured. Professional shooters who pay close attention to every pixel on every photo have good reason to shoot Raw, but why would the rest of us go to the trouble?

Raw files are several times the size of our already bulging JPGs. Whatever the virtues claimed for Raw files, from greater detail to wider dynamic range, they're not discernable to the naked, untrained eye. And shooting Raw slows even good DSLRs down (not just in multi-frame shots), clogs up memory cards and bogs down PCs when it comes to processing.

Raw workflow is slower and more complex than JPG editing, and Raw processing software (Camera Raw or Lightroom from Adobe, Capture One Pro or Aperture from Apple) tends to reflect that fact in steeper cost and learning curve. Here is one pro's view on the Raw vs JPG debate <http://www.kenrockwell.com/tech/raw.htm>

In real life, the camera/lens combo you use and your ability to compose pictures at shooting

time are the key criteria for making great pictures. Next comes the photo editor you're using, and even more so your aptitude with it. These factors make far more difference than the number of pixels your camera boasts.

3. Format Wars

Bridge cameras—a bridge to where?

The profusion of formats churned out by the digicam makers adds more complexity. Bridge cameras are meant to fill the gap between super-slim digicams and bulky DSLRs.

The price gap has already vanished, with the Olympus E420 and Nikon's D40 selling for as little as A\$650. The Nikon's twin-lens kit adds a very sharp 55mm – 200mm zoom lens for another \$200. The Canon G10 (right) from the same source is listed at \$620.



It used to be simple: you bought a digicam because it fit into your pocket or handbag or glove box and took easy pictures. You bought a DSLR if you wanted higher image quality (especially in poor light conditions), a decent viewfinder for picture framing, faster shooting, better handling and the creative flexibility offered by multiple lenses.

A bridge camera is tempting if you want the best of both worlds, or if a DSLR is just too much of a hassle to cart around—let's face it, even the small ones are bulky with almost any lens fitted. By the time you add another lens, the flash and a few filters, you need a bag to carry all the kit, and you've spent well over a thousand dollars. And now you're locked in on the brand's 'system' because those lenses won't fit on any other camera.

Bridge cameras put all the bells and whistles into the box, right up front, from a zoom lens to a Live View screen and a video shooting option. There's not much you need to add down the track.

Sadly, bridge cameras tend to deliver the worst of all worlds: image quality is no better and poor light is still an obstacle due the tiny digicam sensor. It won't fit into any of your pockets either unless you wear cargo pants or a photo vest, and the autofocus and shutter performance is still painful. Check shutter speeds here: <http://www.cameras.co.uk/html/shutter-lag-comparisons.cfm>

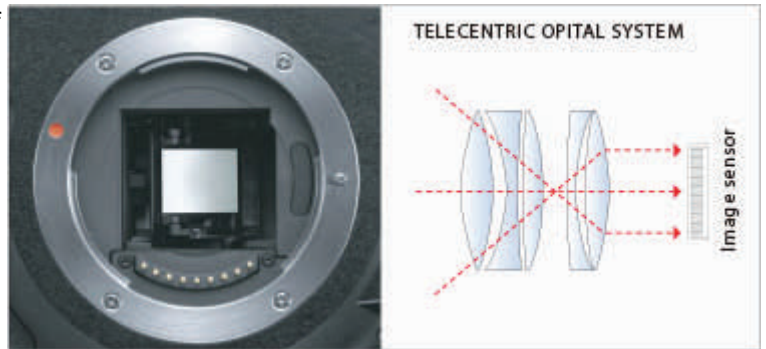
Incredibly, the G10, Nikon P6000, Panasonic Lumix Fx150 and other bridge cameras feature a Raw shooting option. The makers and their acolytes flout this feature as a teenage boy might flout his broken voice as proof of his manhood. But why would anyone buying a camera like this want to weigh it down further by shooting in Raw? Is the typical buyer of a bridge camera really going to process raw images? Or is this just another gimmick that camera salesmen can throw into the already dizzying mix?

Four Thirds – Gimmick or genuine advantage?

The Four Thirds format is a new design developed by Olympus, Panasonic and Leica based on a 13x17mm sensor. The new format promised cameras and lenses designed for digital technology, and thus the world's most compact camera system capable of professional results. The 4/3 name is taken from the common TV and digicam 4:3 photo format (most DSLRs use 3:2) but, until recently, all four-thirds cameras were DSLRs.

Four Thirds makers have a point, because Canon, Nikon et al simply bolted new sensors and electronics into their old film bodies and added a few new lenses. 'If a traditional 35mm film-size or APS-size image sensor is used,' it says on the Four Thirds website <http://www.four-thirds.org/>, 'the only way to ensure that the light is passed through in a straight line to the image sensor is to increase the size of the optics. When the Four Thirds system was designed, special care was taken to avoid this problem and to achieve the optimum balance between high picture quality and compact size.'

4/3 system lenses tend to be of telecentric design, which is said to result in reduced colour crosstalk and fewer shading problems with digital image sensors. A lens mount twice the diameter of the image circle is said to improve image quality further by allowing lens designs that result in light hitting the image sensor directly even on the periphery of the image.



Its detractors say that the 4/3 system employs a smaller image sensor – as shown by the green 4/3 rectangle in the diagram on page 1 – which generates more digital noise at higher ISO levels than the APS-C sensor used in consumer DSLRs.

Olympus has produced a range of competitive 4/3 cameras and pioneered features like Live View, but hasn't made big inroads on its competition. The size advantage is not that great - E420 (right, Nikon D40 left. (picture source: gzmmodo)



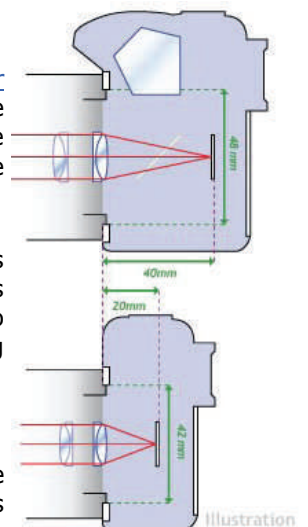
The E420 is a full 100 grams lighter than the D40 – 375 vs 475 – and the D40 is already a very light camera

since its body does not include an auto-focus mechanism (just like the E420). However, the Nikon seems to win on image quality - <http://www.digitalcamerareview.com/default.asp?newsID=3642>

The E400 range has produced the smallest, lightest DSLRs ever made, but even with its aggressive pricing Olympus hasn't eaten chunks out of Canon's and Nikon's markets.

The Four Thirds System includes a standard lens mount that allows customers to choose any combination of bodies and lenses produced by 4/3 partners. This isn't the advantage it ought to be since Olympus is the only 4/3 partner with a comprehensive lens catalogue. Lens maker Sigma now offers a range of lenses with 4/3 mounts, but Panasonic relies on Leica for lenses and cameras – the Lumix DMC-LC1 is a Leica D3.

The few Leica lenses are expensive as well as big and heavy. [Popular Photography review](#) says that is so because 'Four Thirds lenses require extra-large glass elements (relative to full-frame 35mm lenses) for the greater light gathering required to transmit rays perpendicularly to the sensor plane. Otherwise, unacceptable edge falloff results.'



That's the opposite of what the 4/3 marketing hype says - 4/3 system lenses being potentially lighter, cheaper, and sharper. Olympus and Sigma lenses are less clunky but it's clear that the Four Thirds design promise has yet to be fulfilled. It's also clear that 4/3 partners Kodak and Fuji are still hedging their bets.

Micro Four Thirds – a better bridge?

Perhaps the 4/3 coalition realized that it wouldn't reap the full benefits of the new format until they threw the SLR's old mirror box out the window. This format was only announced in August 2008 and, as yet, there is only one Micro 4/3 camera in production: the Panasonic Lumix G1 shown over the page.

The picture on the right is misleading since the bigger gun here is by far the biggest gun Panasonic makes (the Leica-based one). The Lumix G1 is in fact not much smaller than the Olympus E420 and weighs about the same. Apparently Panasonic didn't want to opt for too radical a look so the G1 looks like a pre-shrunk DSLR, even though it has no mirror box.



A second puzzle is the price – about A\$1,500 with a single lens. That money buys two Olympus E420s or one Canon 40D or one Nikon D90, both serious cameras for serious amateurs. We can only wonder where Panasonic sees the target market for the G1. Is it upwardly mobile folks who don't mind paying extra for a sexy new product, like those who buy super-slim laptops?

That's a pretty narrow market for a consumer electronics giant like Panasonic, so is the market of pro shooters who want a small high-quality camera for location testing. With only two Micro 4/3 lenses available at this time, the pros won't be rushing in yet. M4/3 cameras can take standard 4/3 lenses with an adaptor ring but that spoils the neat size of the package.



One thing that hasn't been shrunk for the M 4/3 design is the sensor, so picture quality should be much the same as that of the current 4/3 cameras. At 17x13mm, the Four Thirds sensor is about five times bigger than the biggest sensor fitted to any bridge camera.

Olympus lifted the veil from its M4/3 plans with a product preview at the recent Photokina in Cologne. The preview was short on detail but the concept pics show an almost digicam-sized body (left). There's no viewfinder or rangefinder on the prototype, just an LCD on the back, so it seems that Olympus will target users of Digicams who want better performance and flexibility. They're used to getting by without a viewfinder.

Suddenly the 4/3 standard begins to make a whole lot more sense. Once the size is right, all Olympus has to do is get the pricing right so that its M4/3 models slot in just above the bridge cameras and ultra zooms, right next to entry-level DSLRs.

Premium digicams

To older eyes, the new Micro Four Thirds system may look like the digital version of the old rangefinder camera, which used a range-finding mechanism to measure the subject distance and put it in sharp focus. With no mirror box, rangefinders were advertised as slim, lightweight cameras that offered smallish interchangeable lenses.

Leica was the biggest name in rangefinders, and today Leica makes a digital version called the M8. It costs many thousands of dollars, so it's of limited interest here. The low cost path to owning a **Leica** is via the **D-Lux 4**, which is only \$1,300. This turns out to be the **Panasonic DMC-LX3** with a Leica badge and firmware (and the LX3 is about half the price). Leica claims that 'the overlarge size of the 1/1.63" CCD image sensor increases image quality distinctly.'



'Overlarge' means a sensor of about 50mm² surface area in this case, much the same tiny sensor size that graces other digicams. It's easy to make bold claims, that's why we had the maths lesson at the beginning.

There are ever more contenders pushing into the premium digicam space: **Ricoh's GR Digital II** and **GX200**, **Sony's DSC W300**, the **Samsung HD 100 NV** and, of course, the Canon G10 and Nikon P6000 we mentioned at the beginning. Despite their high price tags (and pretensions to match), they still suffer from the twin digicam handicaps of sluggish operation and poor image quality in real-life conditions.



Only **Sigma**, the lens maker, has introduced a compact digital camera with a decent size image sensor: a 20.7mm x 13.8mm 3-layer **Foveon** 14.1-mp sensor that records full color information at every pixel location.

The more traditional Bayer-sensors capture one color at each pixel location and interpolate the other two colors from surrounding pixels, which isn't optimal for image quality. The Foveon sensor sounds like a genuine advance but its raw image files are only 4.64-megapixels in size, which Sigma claims is equivalent to a 14.1. Many don't buy the logic—more insights here: <http://www.seriouscompacts.com/2008/02/sigma-dp1-14mp-or-46mp.html>

In its assessment, Imaging Resource says of the Sigma DP1: 'It's hard to discount the smooth beauty of the DP1's output ... but the slow autofocus, difficult interface, and slow post-processing required to achieve that excellence is hard to ignore.'

In other words, the Foveon sensor is a success but the camera suffers from the usual digicam operating speed limitations. The recently announced DP2 may address some of these issues. Sigma also makes the SD14/15, serious DSLRs that use the same Foveon sensor. Sigma has now acquired Foveon, the company, so it is clearly convinced by the technology.

Super zooms and ultra zooms

This category has flourished against the odds, producing a bulging range of products that try very hard to look like DSLRs (perhaps because DSLRs suggest serious photography) - among them the **Canon Powershot SX10 IS**, **Nikon Coolpix P80**, **Panasonic Lumix DMC-FZ28**, **Sony DSC-H50**, **Olympus Sp570 UZ** and the **Fuji Finepix S100SF**. They boast zoom rates of up to 20x and prices that can exceed those of entry-level DSLRs.

Lens technology has seen many innovations, like built-in AF and Vibration Reduction, and zoom lenses covering a range from wide angle to telephoto have become common in DSLRs. Several makers now offer affordable 18 - 250mm zooms for APS-C sensors (27 - 375mm) and, as usual, these advances have come down the line. That you can't change the lens on ultra zoom digicams is no longer the handicap it once was, as many DSLRs are bought with a single lens of this kind that stays put. It seems many buyers want the quality of DSLRs without the pain of changing lenses.

The lens built into the Fuji S100FS covers 28 - 400mm, one of the more modest zooms at 14x. Fuji claims to have done away with the old bugbears of AF and shutter lag and noisy images in bad light. The S100FS boasts an ISO range of up to 6400 (at 6 mp) and claims to shoot up to 50 continuous shots at 7 frames/sec (at 3mp). Fuji also claims 'a wide dynamic range of 100-400% that's previously only been available to users of the highest-end D-SLR cameras.'

Reviews of the S100FS (right) laud the handling, optics and image processing engine, but say the camera is still slow to start and slow to shoot.

It takes a long time to recover from shots in burst-mode, and noise still muscles in when the ISO goes up more than a notch or two. The S100FS may look expensive at A\$800, with \$600 about average for this group, but a DSLR zoom lens alone would cost the same kind of money, and you'd still need a body to screw it onto.



One camera breaks the mould is the **Casio Exilim Pro EX-F1** (right), a 6 megapixel point-and-shoot 12x zoom with the ability to snap 60 frames per second and to provide high speed recordings at up to 1,200 fps.

The EX-F1 sure overcomes the shutter lag problem but reviewers note that it's big, heavy and awkward to use. It also costs A\$1500, which puts it in a specialty class where it will attract mostly sports coaches or parents who think they are.

The new EX-FH20 offers higher pixel count and lower speeds - 40 shots per second and movie recording at 1000 fps - at a price closer to \$1,000.



4. Which formats will prevail?

Pocket digicams

Frankly, the image quality the digicam makers have squeezed from their tiny sensors is astounding, using ever smarter imaging firmware to compensate for the tiny sensors. The reason they so doggedly cling to their wee sensors is more to do with keeping the pocket digicams and their lenses compact than the cost of bigger sensors (which has come down a lot). They will no doubt keep on optimising their imaging engines to achieve better noise reduction at higher ISO levels.

Point & Shoot cameras are here to stay but their many makers will have to come up with new sales pitches since there's no point in raising the pixel count any further. Operating speed might be the next target, or should be. The reason DSLRs AutoFocus so much faster than digicams is that they use a separate AF sensor and a technique called phase-detect autofocus, which makes for very fast AF operation. In most SLRs, that sensor lives in the bottom of the mirrorbox, with light reflected down to it by a small secondary mirror.

There's no room in pocket cameras for phase detect AF sensors, that's why they depend on the slower contrast detection technique for their AF systems. The M4/3 cameras are no better off in this regard - their contrast detection AF systems are faster but the bigger lenses make them as slow as their smaller cousins.

One way to improve image quality in poor light is with 'faster' lenses. Lens 'speed' describes the light-capturing ability of the lens or its maximum aperture - f/1.4 is very fast and ideal for shooting in poor light, while f/3.5 is pretty slow. Panasonic took this approach with its DMC-LX3, which 'only' offers 10 megapixels but features a small zoom lens with an f/2.0-2.8 aperture range. That means better image quality because the LX3 will shoot at lower ISOs than higher pixel digicams with lens apertures in the f.2.8 - 5.6 range.

In-between formats

The Micro 4/3 format has much to offer on paper but it's early days. The Panasonic Lumix G1 is an achievement, and a mixed bag. It costs twice as much as the Olympus E420, isn't much smaller, only offers two lenses at present and doesn't yet do video. The G1 is more like a prophet than a product, announcing the coming of a great new technology.

Olympus doesn't have a product yet and, while we wait, we can ask how strong the demand might be for a pocket camera with interchangeable lenses. Does the chic/trendy user of such a gadget really want to be caught balancing lenses? Or is she more likely to buy a slick high-end digicam with a quality 6x zoom? My feeling is the latter, and I wonder if Panasonic and Olympus shouldn't have opted for a Canon G10 size design using their 4/3 sensor and a zoom lens.

Olympus has the most to lose of all the 4/3 partners as cameras are just a sideline for Panasonic, and Leica is a side show with a strong dependence on Panasonic. That Olympus hasn't made bigger inroads into the DSLR market suggests that the 4/3 format hasn't delivered, and that makes getting the Micro 4/3 design right even more crucial.

Likewise, Sigma could be left standing like the jilted bridegroom at a wedding unless other makers start to get behind the Foveon sensor. Then again, the 4/3 format hasn't exactly flourished despite several big companies joining the consortium. It seems the chips have fallen for digital camera formats and makers are reluctant to change.

DSLRs

A little over 2 years ago, Sony bought what was left of Minolta from Konica, vowing to carve out a share of the lucrative DSLR market. In that short time, Sony has managed to push past Olympus into third place (Canon and Nikon are in first and second) with a conventional but good value camera range. It looks like Marketing muscle is more effective in the camera market than breakthrough technology.

DSLRs make up roughly 10% of camera sales, which could even grow until an alternative format becomes competitive. Upgrade business from owners of super zooms could also help. Clearly someone who buys a camera that looks like a DSLR and weighs as much as a DSLR will realize eventually that he should've bought a DSLR in the first place and enjoyed the full benefits (especially with entry level DSLRs twin lens kits selling for much less than \$1,000).

Where DSLRs have fallen down in the past is in not offering live-view screens and video mode, two features Digicam users have long taken for granted. DSLR users have missed out on them because of the mirror/penta-prism viewfinder setup. Olympus was first to remove the Live View obstacle, and Nikon the first to offer video in its new D90. This move was followed by Canon, and improved on with HD quality, in the new 5D Mark II. Other makers will no doubt follow soon.

While we wait for more Micro Four Thirds

cameras, lenses and more competitive prices, the choice remains between sluggish digicams that need bigger sensors, not more pixels, and fast DSLRs that produce the goods but are still too bulky.



In real life, even a Canon IXUS is a hefty weight in a shirt pocket, and no DSLR or Four Thirds camera (with the extra lens) will fit into that pocket. There are of course specialist solutions that make DSLRs easier to carry, and these range from simple carry-bags to huge rucksacks with 146 compartments and room for a laptop.

Then there is ingenious solution from ThinkTank (pictured). The model for this holster is Karl Grobl, a pro who likes to carry two big Canon bodies with different lenses around to make sure he's ready for every occasion. <http://karlgrobl.com/EquipmentReviews/ThinkTankBeltSystem.htm>

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