

The Red REVOLUTION

Rarely does the launch of a new camera hog the headlines as much as the RED. The branding has caught the imagination of both trade press and camera crews, cutting through the plethora of model numbers on the market with simple, memorable brand names evoking epics, monsters and mysteries. But is all the hype justified? In this, Zerb's first proper look at RED, David Fox summarises the functionality currently on offer and previews the second generation which is just around the corner. Then we have a selection of user impressions from across Europe.

No camera has ever been introduced on such a wave of anticipation, and pre-orders, as RED Digital Cinema's RED ONE. The \$17,500 price and 4k resolution promised film-makers top-end quality at low-end prices. Since it started shipping after IBC 2007, and with two years of rising expectations before that, RED has already sold some 5000 cameras.

Now the hype is building again, following the recent announcement of its next generation of systems: Scarlet and EPIC, a series of eight camera sensors that will form the core of two highly-configurable camera systems, including a huge 617-format 28k sensor capable of producing a picture two-and-a-half times the size of Imax. EPIC and Scarlet are expected to appear over

the next 18 months, although as RED admits on its website (www.red.com): "Specifications and delivery dates are subject to drastic changes."

The ONE show

There were certainly many changes before the RED ONE was finalised, and it has been upgraded numerous times since. There have also been problems. Some have criticised the claimed 4k resolution, arguing that the Bayer filtering needed on a single sensor camera reduces this in reality, as does the wavelet compression, leaving the true system resolution much lower than the chip resolution. Others have complained about the delays and customs rigmarole necessary to send cameras back to California for repairs.



▲ RED build-up



▲ Normal configuration



▲ Video set-up

"RED has done 17 major upgrades since the camera started shipping a little over a year ago – adding new features and capabilities"

However, all the users we spoke to loved the picture quality; RED has been continually addressing bugs through firmware fixes; and it recently opened a European centre at Pinewood Studios to provide better service to customers in Europe, the Middle East, India and Africa.

"We are constantly improving and reworking our technology ... via software updates to the camera. We have done 17 major upgrades since the camera started shipping a little over a year ago – adding new features and capabilities, including new image processing, new exposure metering tools and higher slo-mo frame rates," explains RED's 'Leader of the Rebellion' Ted Schilowitz.

Everything you need for RED is now in place, he claims. "We have had two zoom lenses and a 300mm prime shipping for many months now, and our new 18–85 zoom has just started shipping." The RED ONE can also use any PL-mount lens as it has a Super 35mm-sized CMOS sensor (4096x2304 pixels; 16:9).

"[Our] Apple development relationship allows people to edit the footage natively in lower resolutions via QuickTime reference movies, or render to ProRes for HD broadcast quality editing and finishing, and our REDCINE, RED ALERT!, REDrushes and REDline (all free software utilities for the RED) are being used all over the world for projects. Adobe support is in the works – we've been showing the early test versions," he says.

The camera has already been used on various TV shows, such as the

VFX-heavy *Sanctuary* for SciFi, the Swedish-based detective series, *Wallander*, for the BBC, Warner Bros' *Supernatural*, and the ABC-produced *Reaper*. Plus, there are hundreds of commercials being shot around the world on RED. Consultant colour scientist, and GTC member, Alan Roberts, has tested the RED ONE (and many other cameras) for the BBC. "I find the RED a very exciting and intriguing camera. It is the sort of breath of fresh air that the whole industry needs." He believes it is competing with such cameras as the Sony F35 (see 'The best of both worlds' in this issue) and ARRI's D21, and is convinced that "wavelet compression is the way to go. The REDCODE does work very well."

As for how it compares, he couldn't reveal, but the results of his study will probably be published on the BBC's R&D whitepapers website (www.bbc.co.uk/rd/pubs/whp/).

Prokit experience

One user/hire company that needs no further convincing is Prokit (www.prokit.co.uk), which has four RED ONEs, with four more on order. It hires them out for £250 a day (£1000 a week), including a lens, four memory cards or two drives, and a set of batteries. Its cameras have been used on a lot of music videos, for a visual effects sequence on *Quantum of Solace*, and briefly on the latest Harry Potter movie.

Prokit also runs RED Experience days (also £250, with the first day's hire free), to introduce camera crew to the controls and workflow, and allow them to shoot with the camera.

"This is the most revolutionary step in camera design since the invention of video tape," says managing director, Mark Holmes, who placed his order after seeing the Peter Jackson footage at IBC 2007. "We love the picture quality," he says. "The best thing about it is the price for the quality." He also likes the fact that it can be continually improved. "It doesn't have built-in obsolescence. "There were issues with the workflow initially, but Holmes believes that some people may have been unaware that when they finish recording, the camera automatically creates four files (three different proxy files and a 4k file). "You work on the smallest one or the 1k and do your colour correction etc, and then apply it to the 4k file and render that. It's so simple. That is down to Final Cut Pro, but Avid and Adobe are now compatible too."

Both Holmes and Roberts recommend shooting 4k to maximise depth of field opportunities, and then



▲ Mark Holmes, Prokit

outputting to 2k or HD. However, at 4k, the maximum frame rate is 30 frames per second (fps). One client wanted 120fps, and for this you have to drop to 2k (it is up to 60fps at 3k), but virtually all other Prokit RED clients have shot at 4k.

There are two compression rates: REDCODE 28 and REDCODE 36. Holmes recommends generally using 28, because it's faster to process, but for visual effects, where you might want to capture more colour information, it may be better to shoot 36. "Visually you can't see any difference, but some visual effects artists want more information that they can mess with afterwards."

Focusing is critical. Holmes comments that people moving



▲ RED simple set-up

"the eight new sensor systems now promised ... will form the basis of the two modular camera systems so customisable that film-makers will be able to create more than a million different configurations"

The Red Revolution

from video zoom lenses to 35mm primes on a single sensor can find the transition difficult, but those used to working with 35mm film won't have a problem. "It's a very shallow depth of field."

Also, cameramen used to working on video tend to overexpose the pictures. He recommends stopping down and using the histogram and 'traffic light' readouts to get the exposure right. "The pictures look extremely dark as you're recording it, but they look fantastic on the Mac."

Epic adventure

RED has been teasing us since last spring with hints at its next developments: a low-end 3k camera called Scarlet and a 5k version called EPIC. The arrival of digital SLR (DSLR) stills cameras from Nikon and Canon that can shoot HD forced it into a rethink. The scope of Scarlet, and especially EPIC, has grown considerably. The eight new sensor systems now promised (including five new sensor sizes) will form the basis of the two modular camera systems. These will be so customisable that film-makers will be able to create more than a million different configurations.

The sensors start with a 2/3-inch 3k unit, rising to that 617-format 28k monster (or as RED calls it, the Mysterium Monstro), which should also deliver 261 megapixels for photographs, as all the systems will be able to capture stills too.

At the moment, the cost of each sensor unit ranges from \$2500 to \$53,000, but buyers will also have to budget for all the extras (batteries, i/o, monitors, viewfinder, lenses, recording media, grip, etc) needed to build a system. The cameras will take a wide range of movie, broadcast and stills lenses (including a range of different formats from RED itself), with different selections of mounts available for different sensors.

The cheaper, smaller Scarlet-based systems encompass a 3k sensor shooting at up to 120fps (150fps burst – and taking still pictures at 4.9MP), a 5k Super 35mm (S35) version at up to 30fps (72fps burst, 13.8MP stills), and a 6k full frame (FF) 35mm, at



▲ RED EPIC

30fps (72fps burst, 24MP stills). The smallest sensor will also be available in a model with built-in 8x zoom lens aimed, presumably, at the camcorder market, as it should cost less than \$4000 for a complete package.

The more fully featured EPIC-based sensors include the 5k S35 at up to 100fps (13.8MP) from \$28,000, 6k FF35 at 100fps (24MP), and the 9k at up to 50fps (65MP stills) at \$43,000. Higher frame rates will be possible at lower resolutions (as high as 350fps at 2k). The 645-sized 9k is the same size as the photographic medium format film used in Hasselblad or Mamiya cameras, and the FF35 sensor is the same size as a photographic 35mm film frame rather than a 35mm movie frame.

There will also be a choice of higher compression bit-rates, with REDCODE 42, 80, 100, 225, 250 and 500 (generally increasing in line with the cost of the sensor systems).

Some models should be on show at NAB 2009 (although not delivered then), while others should be at IBC. The biggest, 28k 617 model (261MP), which will shoot at up to 30fps, won't be released until 2010.

Accessories will be interchangeable between EPIC and Scarlet, so users can choose whatever configuration best suits their shooting style and budget. There is even a 3D rig using two Scarlets that would be compact and light enough for hand-held use.

"The electronic engines are different between each of these camera models. This means there are format capability differences.

For example, the RED ONE has 4k, 3k, 2k, 1080p (soon) and anamorphic format options. It does ramping, time-lapse, and has four-channel 24-bit audio. Scarlet will not have the full flexibility of a RED ONE. EPIC has more capability and flexibility than the other two. It is one of the reasons that the Scarlet body is smaller than an EPIC," explains RED's founder, Jim Jannard.

"Scarlet will have limited format options. RED ONE has many format options. EPIC has virtually unlimited format options." However, "all modules work with all brains [sensor cores]. There is one adaptor necessary for back modules to work with Scarlet brains. It is a very easy system."

Monsters and mysteries

Key to the developments are the new sensors: the Mysterium-X used in the 2/3-inch and S35 models and the Mysterium Monstro (FF35 and above). The X gains an extra stop of dynamic

says Jannard. "Sensors are trade-offs. Sensitivity and low noise are helped with large pixels... which means lower resolution. Speed is another issue. And then dynamic range. Pick your poison. Everyone wants it all (so do we), but it will take a couple more generations to get there. The good news is that our programme is improving in each area with every new generation sensor. We are very proud of the RED ONE's performance set compared to others currently in the industry, but customers need to judge again every year as things evolve," he adds. "The RED ONE sensor does not represent the sensor programme today. That was just our first try... two years ago."

Jannard also hopes to take on the big stills camera manufacturers. "We [...] are developing, for late 2009, a replacement for DSLRs. We call it a DSMC (Digital Still & Motion Camera)." At the moment it seems the DSMC will be a variant of the EPIC or Scarlet

camera. If you want real 24fps, 30fps or 100fps, you have to pay for it. The two systems are not in any way similar except that they have a sensor and accept lenses."

In terms of motion cameras, Jannard believes the new REDs compare favourably with the likes of Sony's F23 (2/3-inch sensor) and F35 (S35 sensor). "I don't know of any other S35-size sensor camera that does real motion for less... A stills camera doesn't qualify as a real motion camera (yet) because the only way to get any kind of motion is to skip rows... which is not a valid motion option."

And there are more changes to come before EPIC and Scarlet start shipping. "We are purposefully withholding certain info... and one bombshell. We anticipate that the competition will be working on something, so we have to be ready for a checkmate move when that happens!" says Jannard.

What about the RED ONE?

Existing users of the RED ONE won't be abandoned. "We have supported customers with firmware and hardware upgrade after upgrade, all at no charge. We have always treated RED ONE owners as we would want to be treated and we will continue to do so," he states.

"We promised that we would make 'obsolescence obsolete'. In our minds, when we released the RED ONE, we imagined that we would offer an upgrade for its sensor as technology and innovation improved. We will honour that promise. Along with the announcement of Scarlet and EPIC is a sensor upgrade for the RED ONE."

RED ONE owners can trade in their cameras for the full original cost of \$17,500 against the price of an EPIC. An additional \$10,000 will give them a special edition EPIC X, based on the 5k S35 sensor but including a CF recording module, i/o and battery modules – giving it the same functionality as the RED ONE but much higher frame rates [125fps at 4k and 250fps at 2k] and higher bit-rate REDCODE 250. Or, they can keep their

camera and get a 12% reduction on a Scarlet. The RED ONE can also be upgraded with the Mysterium-X sensor for \$4,500.

"A RED ONE owner also has priority on purchasing a Scarlet or EPIC [prioritised by original R1 delivery date]. Beyond the new Mysterium-X sensor option we will continue to offer firmware upgrades, service and parts for the RED ONE," he added.

Indeed, the latest firmware upgrade for the RED ONE is Build 17, and the beta of Build 18 has already been launched. This has already been used by Steven Soderbergh to shoot a new comedy, *The Girlfriend Experience*, and adds "native 2x anamorphic recording at 4k 1–25 fps, 3k 1–50 fps and 2k 1–100 fps with REDCODE 36 image quality to a RED 8GB compact flash card. In addition, all monitor outputs including RED-EVF, RED-LCD, HDMI and HD-SDI, preview and playback recorded images in a final presentation equivalent 2.40:1 aspect ratio," explains Jannard.

RED post-production workflows are also getting easier, with additional support from the three leading NLE companies. Adobe now has a beta plug-in bringing native support for RED R3D files to its CS4 suite (Premiere Pro, Encore and After Effects), allowing 4k resolution native R3D files to be dropped straight onto the timeline without transcoding or rewrapping.

Apple's latest version of Final Cut Pro (6.0.5) can rewrap R3D files as QuickTime files, without spending time transcoding to ProRes, to give native 2k workflows. This is also supported in Color 1.0.3, allowing colour correction to be done on the 12-bit native files. Avid is also looking to improve how its systems work with RED and has recently licensed the R3D Software Developer's Kit.

"Scarlet will have limited format options. RED ONE has many format options. EPIC has virtually unlimited format options"

range over the RED ONE's sensor (up to 11+), while the Monstro goes to 13+ stops (film is generally considered to be about 14 stops), and has 16-bit A/D compared to 12-bit for the X. The Monstro apparently has the fastest read-reset function of any CMOS sensor (to avoid rolling shutter effects), giving it the same motion characteristics as a film camera – "and getting faster with each release. Monstro will equal film in read-reset time,"

lines, but targeting DSLR cameras. "As Nikon and Canon release their 720p and 1080p, respectively, DSLRs with video capture... RED has a more advanced view of the future." He goes on to specify that they are looking towards higher resolution, higher S/N, higher DNR (digital noise reduction), higher frame rates, smaller bodies, more system flexibility, and many more options. "The strength of RED is in our sensor development programme, REDCODE, and having no legacy platforms to deal with. That left us free to explore, develop and prepare to deliver a new platform."

Of course, the RED systems are more expensive than the DSLRs that shoot video, because "frame rates cost real money," explains Jannard. "The Canon (and Nikon and Sony) are slow clock speed sensors, which are much cheaper to make. Canon gets 30fps by skipping rows during the readout. If you are good with that, it is a



▲ RED Sensor sizes

Fact File

RED website: www.red.com
 Prokit for RED hire and training
 days: www.prokit.co.uk

Versatility on a budget

Director of photography and GTC member, Dave Miller (www.redeyefilms.co.uk) first used the RED last May, on a very low budget feature film. His own was delivered in September. "I'm quite pleased I got mine later, because some of the accessories that come with it are machined better than they were initially," such as the camera base-plate, which was a bit wobbly on the tripod. RED fixed that and replaced existing plates free.

"It feels like a film camera. Put a lens on it and a digital magazine and that's all there is to it." A lot of the menu options don't matter, depending on what you are doing in post. "It's nice to shoot with a PL-mount camera without worrying about adapters or working wide open." He already had his own set of 35mm Zeiss prime lenses. "The best thing about it is the quality of the image. I think the pictures look stunning," he says. "Ergonomically, it is a bit of a beast. It takes about a minute to power up. It is basically a computer, but I don't mind that because the pictures look so good." When Build 16 was introduced in the summer, "that's when the camera came into its own. The frame rates went up, you could

shoot 4k 16:9 and it improved the picture quality."

He likes the Action Products Battery Swap Pack that allows changing batteries without powering down while still giving battery information on the camera. This can be used with two batteries from any major manufacturer.

Miller has heard various horror stories about post, but believes these were mainly a case of people going into it without researching it. "That has sorted itself out as post houses are catching on, and it is now easier to get it onto Avid."

A camera for all projects

Miller generally shoots TV on Digital Betacam or DSR, promos on 16mm or HD with a Pro35 and prime lenses, and low budget feature films. "RED is great for all of these." If going to HD, the 4k files can be transferred to ProRes422 in Final Cut Pro using Log and Capture, and edited off that, but it can also go back to 2k or 4k for grading.

"It is a camera I can shoot a feature film with and it will look great on a big screen but I can also shoot an interview that I'd do on HD. You wouldn't be able to use a more



expensive camera for as many projects," he adds. "It's as close as I've seen to a 35mm camera – but with as much film stock and telecine as I want." RED is also "amazing for green screen. You can pull a key from it very easily." Miller says he would also be happy to use a D21, Viper or Genesis, "but I don't have the budgets for them". The RED, however, costs no more per day than a Varicam or Sony 900 (without a Pro35 adapter).

Miller is also pleased with the compression system. "It's amazing. It does compress it, but it doesn't really look compressed." He shoots everything on 4k and can't tell the difference between REDCODE 28 and 36 on an HD monitor although he admits you might if it were projected.

The bit-rates are about 28MBs and 36MBs (variable bit - rate) – about 125GB per hour.

"There are a few problems with it still, such as it hanging in post when it is making QuickTime proxies and you have to power off and on, but Build 17 is supposed to correct this," although he hadn't upgraded to this when we talked in December. It also gets very hot, but there are different fan settings; and there have been problems with the 320GB hard drives, which can be affected by vibration (such as by being close to speakers at a loud concert) or by high altitude.

Miller will wait for something more concrete to appear from RED on EPIC and Scarlet, but "I do like RED's commitment to its promise to early adopters and the whole trade-in deal."

Over the rainbow

Independent film-maker, Rolf Heiler from Stuttgart, recently finished a short film, *The End Of The Rainbow*, for a German children's channel, shot with RED Build 16, an 18–50mm RED zoom and Arri PL-mount 35mm primes (85mm and 100mm).

"The camera is a beauty and films like the same. We shot on 4k 16:9 and graded the clips in REDCINE and downconverted them to 1080p 16:9 for HD television. We used audio line in for dialogue audio recording. We used Apple for the post workflow with FCP and some After Effects for compositing," explains Heiler, who is also CEO and founder of Heiler Software.

Not everything was perfect. "The RED camera is quite heavy and not easy to use on the shoulder. You need heavy tripods, big fluid heads like the OConnor 1030HDS or even the 2060." Also, the "REDCINE software is still

a little bit buggy and can also improve in the area of usability."

However, "it's a real film camera. You can use it like a 35mm ARRI with big advantages like direct control of the picture, watching an SDI monitor in HD [and] playing back the clips and no long waiting for dailies (I do this with REDrushes or just watch the QuickTime proxies)."

Also, the format gives "great freedom for post-production and no white balance issues during recording; 4k allows zooming in post; 100fps in 2k mode provides a perfect slow-mo; false colour for exposure metering is great and easy to use; [and] different gammas and colour rooms help to fix light problems in post."

However, he did have some difficulty working out the correct exposure initially, and focusing in 4k is not easy. Heiler finds you can't see unsharp pictures on a 1080p monitor, only on

the cinema screen and "4k plus ARRI Ultra Primes with T1.3 open exposure can be very difficult for beginners." You need a lot of experience in focus pulling.

Heiler is also worried about how best to store the data from the Compact Flash cards or hard disk. "It is very important to find a clear workflow for saving your data to different archive mediums," he says. "For each project we buy two LaCie hard drives and make two backups to the hard drives. We are still waiting for an optical solution which exceeds 50GB."

He would also like to see service in Germany. "There is none and if you send it over to the USA you have a big hassle with shipping, customs

and tax." The new London office should be an improvement, "but for currency and tax reasons a Euro country would be much better."

Even so, Heiler is delighted with the pictures, which are much better than HD, more like 35mm film. "The RED camera is a masterpiece of an electronic film camera. The cost is affordable, and the production costs are much smaller than film. It is definitely the revolution of film-making."



Going with the grain

Spanish DoP, Miguel de Olaso, has his own production company, RedLab (redlab.es), specialising in working with RED footage. He is also known as Macgregor (www.vimeo.com/macgregor), his user name on reduser.net (RED's forum).

"The real RED revolution is post-production. It is easy and affordable," he says. He mainly uses Final Cut Pro, Scratch (for colour grading) and After Effects.

It is possible to work at 4k on a reasonably specified Mac, even though

4k is four times the size of 2k. "You can edit in real time using QuickTime at various resolutions that are good enough for offline editing."

At the moment, it is possible to render one minute of full RED quality in ten minutes on a high-end Mac, "but if you want to deliver quickly, the proxy files can be good enough for your needs."

Many of his customers want the result to look more like film than digital, which means adding grain. "Digital only has a little noise in the



blacks, not in the mids or highlights, but film tends to have constant grain, so we add noise in the mids and highlights and smooth the digital's hard edges using the Magic Bullet suite, because it's really fast. Magic Bullet allows you to apply the grain only to those parts of the image that need it, without adding noise where it already is," he says.



Movie aesthetics

The University of Arts in Braunschweig has been teaching avant-garde filmmaking and motion graphics for almost 30 years. "We still have Arriflex film cameras, optical printers and a Crass animation stand, but budget restrictions have made it near impossible for students to work with 35mm film," explains Professor Uli Plank.

Replacing 35mm

"When starting to invest in semi-professional HD cameras we wanted to preserve the aesthetic possibilities of controlled depth of field in teaching, but after considering 35mm adaptors for HD cameras with small chips, we found none of them fully satisfying – there were too many restrictions in handling, lighting and resolution. Renting high-end equipment was not an option, as we are located too far from any rental houses."

Then RED was announced. "I needed some courage to use my private money, since no academic administration would allow me to pay for something that didn't even exist at the time. Being among the first 1500 subscribers, in the end I saved the university quite a bit of money with the discount RED gave to early birds."

He likes that RED offers all the aesthetic possibilities of a movie camera. "We can use our ARRI primes, but we also like the 18–50mm zoom from RED. It's very fine glass for the money; good resolution and very low distortion, just some breathing."

"The visual quality of the RED ONE regarding resolution and colour is excellent. It's better than film in these

respects and only lacks some dynamic range – it needs more precision in lighting and exposure than film."

Usability for students

"The camera has been reliable most of the time even with relatively inexperienced students. It's heavy, but not more so than a serious film camera. We use it on a geared ARRI head (with wooden legs), which pans very smoothly with the RED," he adds.

"The only recurring annoyance is occasional startup problems, which always go away on the second try. The battery contacts are of low quality and have caused some interruptions until we mildly bent them. And the joystick is a joke – both parts are not really up to the quality of the rest of the camera. The small BNC connectors have caused trouble as well.

"The audio quality is OK with a mixer, but there's some noise when connected to a microphone. We expect that to be cured by the new audio board. I really appreciate the attitude of RED as they are going to install the improved audio and i-pins at no cost. The latter will be interesting to us as the integration of real-world imagery and CGI is important in my teaching. Chromakey works quite well and until now we haven't experienced serious difficulties with the rolling shutter. Skew effects are definitely there, but much less so than on prosumer camcorders with CMOS imagers."

Post set-up

The department uses RED ALERT!, REDrushes, Final Cut Pro and Color, "and these are working quite well for us." It has a grading room with

the correct painting, lighting and calibrated screen, plus a small theatre with a calibrated projector. "We need serious processing power for the conversion from native files to ProRes, but we can use Octo-Macs from our animation department for this. The ProRes codec allows us to work with relatively cheap iMacs for editing, not needing a huge RAID like uncompressed HD."

They generally work offline with DVCPRO HD, going to ProRes for online, or convert to ProRes right from the start with half de-bayering, using full de-bayering or DPX files only for critical motion graphics or VFX work.

"ProRes is an excellent codec and we even did some film-outs with it in co-operation with a local service facility. It looked remarkably good on the big screen. Normally we show ProRes files from a computer on a calibrated Ruby projector from Sony for internal screenings, and they look very good."

The alternatives

The University couldn't afford anything more expensive, but did consider a Sony, Panasonic or Canon HD camcorder with a P+S adaptor for 35mm lenses. However, compared to high-end video cameras like the Varicam or Sony, Plank finds the RED "pretty easy to operate, very much like film. The ergonomics are similar to other heavy film cameras. Overall picture quality is excellent, although the dynamic range is smaller than with a Panavision Genesis or Sony F23/35. Low light is limited as well. It compares very well with an ARRI



D20/21. The F23 and F35 are superior in both low light and dynamic range, but tend to show some blooming in extreme conditions and would be too complicated for arts students.

"The Sony EX1 still plays an important role for us where you need something small and it's great in low light. It's the best camera below the RED's price and we have even intercut them; with decent colour grading they go together well. It's the only other camera that offers acceptable manual control of the lens and even some control over depth of field."

Plank believes that the design of EPIC and Scarlet shows that RED is "really trying hard to make 'obsolescence obsolete', as far as that's possible in this electronic age. It has been a while [since] we have seen such a modular approach to cameras. This could really signal a shift of paradigm in professional electronic cameras, together with not only blurring but deleting the line between still and motion photography."