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I3A Meets in Denver

Our first reaction to the program, with the theme **Inspiring Imaging Innovation**, held in early June was that it resembled the 6Sight meeting of last October. Several speakers were the same people. But, as we listened to the various presentations and panel discussions we realized that the orientation was different and the time allocated to speakers was longer. A CPIQ (Camera Phone Image Quality) initiative meeting on the day before the meeting brought a record number of attendees, as those people stayed for the annual conference.

Where Goes Imaging Innovation was a fascinating keynote from *Steve Hoffenberg* of Lyra Research (www.lyra.com). Innovation is both a process and a result, he said. He provided examples of the “Dimensions of Innovation”, citing discontinuous vs. continuous, concept vs. process, demand-driven vs. supplier-driven, base technology vs. applied technology, and technology vs. marketing. Looking at the convergence of imaging and mobile communications, he asked whether convergence is an innovation.

Reviewing innovations in image capture, he looked at Compact Digital Still Cameras (DSCs), citing: style and ergonomics, optics and battery life (Casio Exilim), while cautioning that this category is at greatest risk from camera phone encroachment. For Performance DSCs, he sees innovation in extended zoom range (Olympus 550 with 18x), higher sensitivity: with the goal of flashless photography, connectivity (WiFi, but what is the demand?), and resolution. With Digital SLRs, innovation is being applied to control, speed, durability, resolution and even pricing in his opinion.

Hoffenberg cited data from a 2007 Lyra DSLR Users Study asking the importance of different advantages of a DSLR over a non-SLR digital camera. With 318 responses, the highest difference was low shutter lag and superior lens quality, followed by wider range of focal lengths, advanced controls and a higher resolution sensor.

Looking at the innovations being applied to cameraphones, he identified optics (deliberately defocused by CPM, wavefront coating, liquid lenses, artificial “muscle” and nanozoom) stabilization, resolution (now 5 MP and higher), speed (shutter lag), software/Operating System and connectivity (WiMax, WiFi, Bluetooth, teleprints). Commenting on the resurgence of video, which he attributed to YouTube, he noted that innovation in Digital Video Cameras includes image stabilization and hi-res still image capture.

On the output side, he reviewed innovation that now provides consumers with a wide range of products for viewing images, including “lab” prints, “home” prints, “kiosk” prints, online services, PCs, TVs, photobooks, music players, photo viewers, cameraphones, digital frames, and photo merchandise. For “living room” viewing there are portable DVD players, Apple TV, slideshows and HDTV (U.S. household penetration of HDTV is forecast to exceed 70% in 2015, although the deadline for mandatory availability has been delayed to February 17, 2009).

He quoted a Cisco/Economist Intelligence Unit 2007 global business study identifying the most innovative countries (based upon business criteria) as: Japan, Switzerland, U.S.A., Sweden and Finland. China ranked 54th. In contrast, Lyra data on the most important markets for imaging innovation indicate China (driven by mobile innovations), U.S.A., Japan, Germany and the U.K. as the top five.

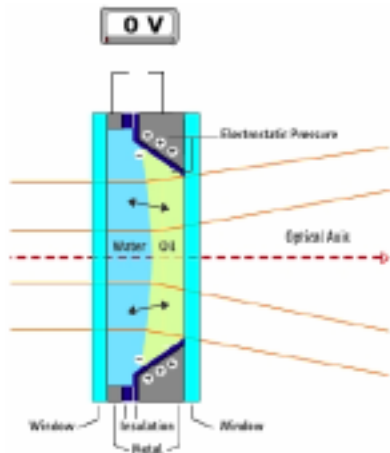
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He said that in the Lyra 2007 China Digital Camera User Survey 80% of respondents reported retail over-the-counter service as their primary method of obtaining photo prints. Household penetration of digital cameras in China is <5% nationwide and, by end of 2007, China will have more cameraphones in operation than any other nation.

Etienne Paillard from Varioptic (www.varioptic.com) spoke about **Liquid Lenses**. He suggested that demo videos could be viewed at <http://www.varioptic.com/en/tech/technology02.php/>. His tunable lenses have no moving parts, a fast response time (no hysteresis response curve) and a 20 diopter range, permitting focus as close as 5 cm. The key principals of liquid lens operation are electrowetting, iso-density and drop centering.

Figure 1A - Liquid Lens Operation

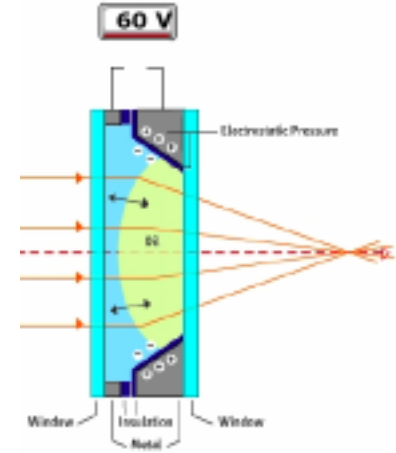


• At low voltage the lens is slightly divergent

As shown in the adjacent diagrams, at low voltage the lens is slightly divergent (left), and as the voltage increases it becomes more convergent. The optical power of the lens varies almost linearly with the voltage being applied within the working range of the lens.

An autofocus system requires three elements: the liquid lens, a driver chip and an Auto-Focus algorithm (software). Varioptic uses components from proven suppliers, including the fixed lenses from Largan (5.5mm thick with a resolution of 300 dpi), the holder from Tyco and the driver from Rogers Corp. Focusing can be achieved in less than 800 ms

Figure 1B - Liquid Lens



Increase voltage and the lens power increases

with the MI2020 system-on-a-chip, and in under 500 ms with a dedicated ISP (integrated signal processing).

The first system being released, the 1/4-inch Varioptic I285 2 MP AF Camera Module uses the Artic 416 liquid lens, with a 1.4 mm thick fixed glass lens and the MI2020 driver, and has a 65° diagonal field-of-view, focuses in 800 ms and provides a range from micro to infinity. Its size is 8.5(H)x8.5(W)x6.0(T) mm. For higher resolutions, larger modules are needed: 3 MP - 1/3-inch 9.0x9.0x7.0 mm, and 5 MP - 1/2-inch 12.0x12.0x9.5mm. As future versions are developed, Paillard expects that the liquid lens section will be reduced. So, samples this year will be: 2MP - 1/5-inch 6.5x6.5x4.5mm, 3MP - 1/4-inch 8.5x8.5x5.5mm and 5 MP - 1/3-inch 9.0x9.0x6.5mm, and at the end of next year he expects autofocus module sizes to be 2MP - 1/7-inch 4.5x4.5x3.5mm, 3 MP - 1/5-inch 6.5x6.5x4.0mm and 5MP - 1/4-inch 8.5x8.5x5.0mm. The liquid used in the lenses functions over a temperature range of +60°C to -20°C, although the operating speed decreases in the cold, and it can be stored at -40°C without freezing. Power consumption is 10-15 milliwatts. The unit will also meet the standard mechanical “drop test” - dropping the cameraphone from 4 meters.

Why is a 3 MP autofocus system needed in cameraphones? For such applications as bar code reading, business card reading and biometric security (looking at the unique skin patterns on fingers, which is compared to fingerprints on file).

Based in Lyon, France, Varioptic has 55 employees. Paillard commented that there are more than 50 companies working on liquid lens technologies. Varioptic, working with CSI in Taiwan and China, is able to produce 150,000 AF modules/month, with a goal of increasing production capacity to 1 million/month by the end of this year.

Richard Baraniuk, a professor at Rice University, spoke in detail about **Compressive Imaging**. This is a new approach to data compression and recovery. Without getting too technical (for those readers who want to get into the technical details, many references may be found at <http://www.dsp.ece.rice.edu/cs/>). Traditionally, signal processing maintains that a signal must be sampled at a rate at least twice its highest frequency in order to be represented without error. However, in practice, we often compress the data soon after sensing, trading off signal representation complexity (bits) for some error (consider JPEG image compression in digital cameras, for

example). Clearly, this is wasteful of valuable sensing resources. Over the past few years, a new theory of "compressed sensing" has begun to emerge, in which the signal is sampled and compressed simultaneously at a greatly reduced rate.

When the signals of interest are compressible or sparse, it can be more efficient and streamlined to employ random measurements and optimization in order to acquire only the measurements we need. Compressive sensing is still an evolving field, and many interesting research questions remain open. Hallmarks of compressive sensing are the ability to function with a simple lens with greater computing power in the process. We could build a "dumb" camera - a single pixel CS camera? - and most of the asymmetrical processing would be done at the decoder not the encoder (camera). The image would be recreated with a Digital Micromirror Device (DMD), such as is being used in the Imaging Solutions fastPrint systems.

Megapixels: Truth and Consequence was a panel of *Ed Dowski*, CDM Optics; *Robert Gann*, HP; *Don Williams*, Kodak; and *Eran Steinberg*, FotoNation; moderated by *Sally Wiener Grotta*, Digital Benchmarks. Each panelist gave a short presentation.

Sally Grotta commented that the more the consumer hears about digital cameras, the more confused s/he has become. To communicate quality we need language and ratings that are: simple, informative, accurate and easy to remember.

Eran Steinberg (www.fotonation.com) spoke about The Mega-Pixel Marketing Battle: Is Pixel count an informative indication of image quality? (A critical view). First he asked: What is a pixel? Then: Are there "good" and "bad" pixels? After reviewing the "picture element" definition - known to industry members, but possibly unknown to many consumers - he asked: What is the relationship between pixels and data? He proceeded to look at the resolving power of the acquisition system, concluding that the MTF of the is limited by the worst component.

Citing Digital Benchmarks, he said that quantifying tests for image quality include: Pixel Transition MTF (ISO 12233); Resolution (ISO 12233); Viewfinder Accuracy; Noise/Uniformity (ISO 14524); Shutter Delay; Click-to-Click Recycle Time; Boot-Up Time; Battery Life/Power Drain (DC-002); Burst Mode; and Lens Distortion. In addition there are qualifying tests that include: camera handling & controls; experimental scene shooting; still life photography; pleasing colors; user group feedback; image analysis; connectivity; software bundle; and documentation.

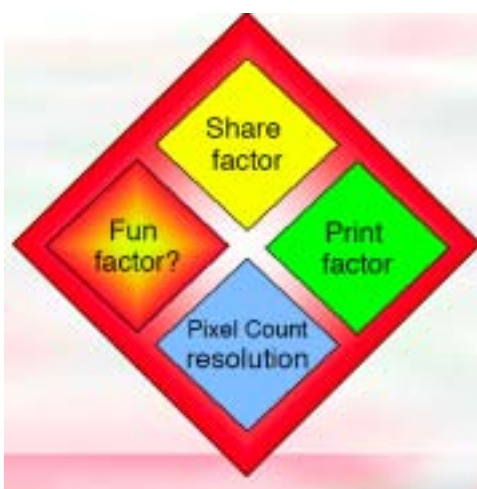
Can we produce a comparative description of DSCs that is informative, yet simple and clear, which both your mom and your teenager can relate to? Take a cue from the hazardous load material signs which are affixed to trucks, he proposed a system shown in figure 2.

Bob Gann (www.hp.com) recommended that the industry put its energy into letting consumers take a good image and encouraging them to use these photos rather than embark on a pixel war. Today's digital shoebox is so much larger than it was for film that consumers need to be informed about how to use these photos.

Megapixels" are like "PC clock speed" said Ed Dowski, they represent an easy label. But what other criteria should be used? For the engineer, the resolution line width is critical. For the sales department, the price is critical. And for the consumer, the number of pixels has become the key comparison criteria.

However, other features besides Megapixels will soon be come more important. The features of today's high-end DSCs include: Manufacturer's Reputation; Number of Pixels; Display Size; Lens Material (i.e. glass); Zoom Ratio; and Connectivity for downloading Images. Yet notably absent is image quality. New features that he expects to appear on DSCs include: No Focusing; Fast Optics; Low Light Level Performance; Very Thin; Image Stabilization; Reliability; and Expanded Connectivity Options.

Figure 2 - Suggested DSC Description



Using the title *A Believable Megapixel Metric - Debunking Specsman'shhip with Simple Science ...* and ISO compliance, Don Williams (www.kodak.com) stressed that the top requirements for DSC descriptions are that they be compatible, easy to use/understandable, "tamper" resistant, measure the true optical performance, and applicable to a variety of devices and conditions.

What is resolution? 1) The ability of an imaging component or system to maintain the contrast of finely spaced detail. 2) The highest frequency (lowest period) at which light and dark parts of an image are distinguishable. "Related" terms are the number of pixels (Mpixels), sampling frequency (dpi, ppi, lwph), limiting resolution/resolving power, Spatial Frequency Response (SFR), and Modulation Transfer Function (MTF).

Criteria dictating the resolution for digital cameras include: 1) Quality -the number of pixels (MPixels) or sampling rate (dpi); and 2) Quantity optical effects; focus, F-number/speed, optical glass quality and assembly, and camera motion. Williams suggested that:

Quantity x Quality = Effective Utility

Sensor Resolution x Optical Quality = Effective Resolution

Advertised Pixels x Efficiency = Truly Resolved Pixels

He offered the HVAC (Heating, Ventilation and Air Conditioning) Model for comparison. Under this model, consumers are provided with estimate the percentage of fuel that is converted to usable energy, so:

Advertised BTUs x Rated Efficiency = Usable BTUs (e.g. 70K BTUs x 80% = 56K BTUs)

Applying this approach to DSCs, he suggested determining the percentage of optically resolvable pixels:

No. of Delivered MPixels x Resolution Efficiency = No. of Effective MPixels (e.g. 6 MPixels x 80% = 4.8 Mpixels)

How could the resolution efficiency be calculated? Frustum an accepted optical criteria for limiting resolution must be adopted. Then, where this criteria falls relative to the theoretical limit for digital capture must be determined. **Resolution Efficiency = Optical Limit/Digital Limit**

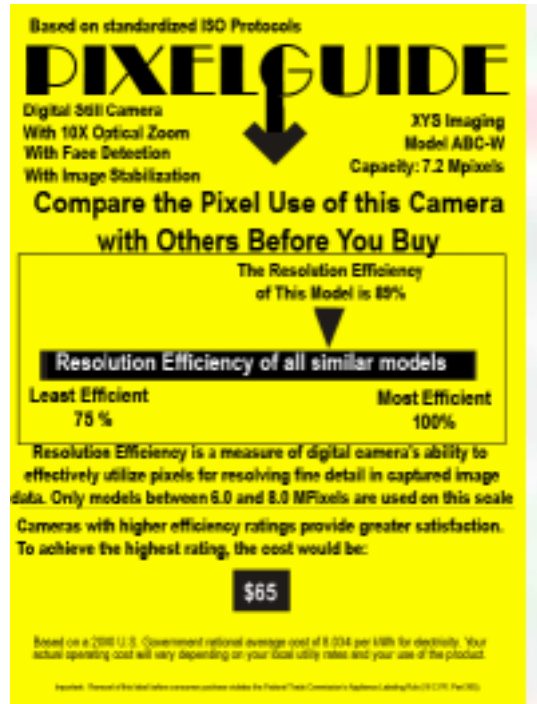
Since a DSC requires a minimum of 2 pixels per line pair, or cycle, in spatial frequency terms, this translates to a maximum spatial frequency of 1/2 cycle/pixel. Thus, the theoretical maximum resolution for a digital camera is 0.5 cycles/pixel. He reviewed the Rayleigh Optical Resolution Limit, which will generally correspond to the spatial frequency having a 0.10 modulation transfer value, and the Spatial Frequency Response (SFR) which is an objective indicator of contrast (i.e. modulation) loss as a function of spatial frequency. These could be applied to determine the effective resolution for DSCs through the following procedure:

- 1 Rayleigh Criteria - Find frequency of first 10% SFR occurrence in both vertical and horizontal directions. (clip at 0.5 cycles/pixel)
- 2 Efficiency - Normalize each by digital limit of 0.5 cycles/pixel.
- 3 Take product of vertical and horizontal components.
- 4 Multiply by camera's finished file size

Then, DSCs could be compared through a label similar to the EnergyGuide which shows the estimated energy used per year and compares it to the minimum and maximum usage for similar products. He offered Figure 3 as an example.

While the above examples are thought-provoking, the issue of how to truly offer consumers a way to realistically compare the image quality achieved by various DSCs remains unresolved.

Figure 3 - Suggested DSC Selection Guide



Gyro Based Image Stabilization Technology was the topic of *Kishore Moturi* from InvenSense (www.invensense.com), which has 45 employees. Image quality problems in high pixel cameras are compounded by low level indoor lighting, zoom which reduces field-of-view and amplifies blur, and sensor noise. In addition, hand jitter affects image quality. Typically, the hand shake frequency is 3–10 Hz, which causes serious problems in DSC and cameraphones, and software cannot predict real-time jitter. Hand jitter effects increase with pixel density, exposure time, and zoom ratios.

Image stabilization requires hand jitter to be compensated in real time, providing good performance in low light situations (with longer exposure times), fast & real time processing of images, and a high reliability. There are two approaches: Electronic Image Stabilization (EIS), although reduced exposure times reduce image quality, motion vectors are not effective with high Mpixels sensors, auto exposure does not produce image stabilization, and advanced techniques require higher memory, more processing power and increased shutter to shutter time. Optical Image Stabilization (OIS) involves the mechanical movement of the lens or sensor, but could result in a 16x increase in exposure time (up to 0.5 sec.) although it is the choice of most DSC makers.

Adopting a gyro-based EIS approach involves generating a Point Spread Function (PSF) which is a representation of hand shake while the image is being taken. This PSF contains all information necessary for processing - image evaluation, enhancement, alignment - and is independent of the image content (not influenced by lighting conditions, image sensor noise) while reducing the amount of data to be processed - 300-400 gyroscope data points are needed, which are independent of pixel density.

One method is the Super Resolution in which a series of short exposure frames are taken, such as 5 20 msec. frames, which are averages out the noise. However, this requires a 30/15 frames/sec. exposure capability. A second method is the Best Frame Selection, which automatically selects 2 frames from 5-6 in which the hand jitter is relatively stable (least amount of blur). The BlurFree algorithm reconstructs the images using one short exposure frame and one long exposure frame. This requires a processing time of 3-4 msec., but calculates the appropriate exposure time and gain required by continuously monitoring and collecting the PSF data and applying an algorithm to remove hand jitter blur and improve the overall image quality.

Moturi cited a Consumer Reports article (www.slrtoday.com/articles/281/1/Consumer-Reports-Top-Five-Complaints-About-Digital-Cameras/Page1.html) in which the top complaint was “missing the perfect shot because of slow shutter speed.” This was followed by “distant subjects are very dark, even with the flash,” “Shots are blurry when maximum zoom is in use,” “the batteries die too quickly,” and “the LCD screen is unreadable in bright sunlight.”

An associate, *Ram Kakarala* from Avago Technology (www.avagetech.com) presented some additional information. If the exposure time exceeds 6 msec. there is a risk of blur was a conclusion in a 2006 Motorola study “Camera Motion and Mobile Imaging” by Xiao, Feng et al. In the abstract of this paper, the authors stated “Film photographers have long used a rule-of-thumb that a hand held 35mm format film camera should have an exposure in seconds that is not longer than the inverse of the focal length in millimeters.” They also noted that with exposures as short as 20 msec. images become blurry and at 60 msec. every image is blurred. Image stabilization must function over a range of 20-600msec. The angular velocity of hand jitter motion rarely exceeds 15°/sec.

Nicolas Touchard from DxO Labs moderated a **Camera Phone Image Quality Panel, Subjective Evaluation** with *Jack Holm*, HP; *Paul Hubel*, Foveon; *Ping Wah Wong*, Nethra Imaging; and *Mats Wernersson*, Sony Ericsson. Mats Wernersson asked: how do you exit the “pixel race” alone? How do you build loyalty? If consumers want pixels, even though they may not be the sole factor influencing image quality, then give them pixels.

Ping Wong showed a slide with two identical pictures of small ships taken with a cameraphone, except in one a ship is green and in the other it is blue. Which one is correct?, he asked, saying that without a reference there may not be any way of discerning the true color. Could a color chart reference, taken before a critical shot, have predicted the true color? He spoke about software that provides edge enhancement and de-saturation for correcting artifacts introduced into digital images. In underexposed images, brightening may result in false colors. To illustrate the

difficulty with automatic image enhancement he showed an image of a night baseball game, taken from a passageway in the stands. In the foreground are several people, completely dark. If the image were corrected for these people, the game in the background would be completely washed out.

Paul Hubel discussed the color issues of ‘accuracy’, preference, uniformity, and white balance (Automatic White Balance). To illustrate the need for subjective evaluation, he showed two images: one of a studio scene illuminated with tungsten lights and the other a “low sun” picture outdoors. With a white balance of 3000°K, the tungsten shot appeared with the correct colors, but the outdoor scene was very blue. On the other hand, with a white balance of 5000°K the outdoor scene was the correct color while the studio shot was very yellow.

Evaluation of Color Reproduction in Digital Photographs was the topic of the presentation by Jack Holm. You cannot apply traditional metrics for processing digital images. Color rendering is proprietary, and produces different “looks” depending on scene characteristics. Truly accurate color reproduction is typically not desired in digital photographs. He illustrated this with three images taken under low (65:1), medium (215:1) and high (532:1) contrast situations. In each reproduction, the best “rendition” of the image was when a specific tone curve was applied. Photo paper supports a contrast of 200:1, and about half of all images fit within this contrast range. By comparison, motion picture film can provide a contrast as high as 2000:1.

He commented that 20-50% of all scenes require “local” rather than “global” color adjustment. Most people agree about a “good” picture, when the optimal image is reproduced. However, there is a difference between “exchange images” in which the viewer did not actually see the original scene and “memories” in which the viewer recalls the actual scene, even if it is not an optimal image.

He noted that there is a difference between professional and consumer tastes, with the latter preferring more saturated colors. And that the main difference in tastes for color reproduction is not “cultural” but rather by age/generation. He suggested that the industry should focus on producing colors that appeal to the main mobile imaging customers, namely “kids.” The primary aim in color correction is the skin tone, and blur can be used to reduce the yellow caste. Incorporating face detection into cameras will help as the exposure will be based upon the face (and could trigger a fill flash), and cameraphone makers are learning how to make better pictures.

While it is not possible to evaluate the desirability of a “look” objectively, once an intended look is decided, it may be possible to objectively measure deviations from it (manufacturing quality control).

Sally Grotta commented that each digital camera company has its own imaging science, with everyone striving for the “ideal”. This presents a dilemma of achieving a “standard” color rendition in contrast to offering users the opportunity to make an “artistic” color rendition.

This year, I3A had more emphasis on output than in the past. **Online Photo Services: Dead or Alive?** was moderated by *Kristy Holch*, with panelists *Sang Hung*, Sprint; *Chris Klingebiel*, HP Snapfish; *Amy McDonough*, Webshots; and *Craig McGowan*, Kodak. The U.S. industry has undergone consolidation, with a big decline from the more than 150 sites available only two years ago.

Craig McGowan, who is the Director of Product Marketing, Consumer Imaging Systems, at Kodak said that online services are deploying intelligent, intuitive data analysis that learns how consumers share their images. Face detection is a recognition technology that detects your subjects and stores and classifies them by their name and face. Technology will take metadata to a new level to interactively let you work with your images and data in a relevant manner. This includes automatic scene classification and orientation along with automatic zoom and crop. Pictures keep assembling in new groups needing less and less correction over time as the “self-learning” system detects your subjects and classifies them based upon your previous preferences.

By abstracting from the perceptual to the conceptual, it’s possible to develop an understanding of the significance of a consumer’s digital assets, and how to help them best organize, express and share those assets. The analysis includes scene types and materials to identify “what” and “why”, faces to identify “who”, location to identify “where”, sharpness and contrast to create groupings. The progression in analysis is: Raw Data --

Simple Concepts -- Abstract Concepts

Chris Klingebiel showed how the number of registered users at Snapfish has risen steadily with key years (the company has been profitable since 2002) being 2003 (5 million), 2004 (8 million), 2005 (14.5 million), 2006 (26.5 million) and projected 2007 (40 million). Key metrics for Snapfish.com include: triple-digit print growth every year since inception; new users upload and print more every year; sites in 18 countries; 1 million new users per month; 2 billion unique images stored online; and 90% of users have recommended Snapfish.

For the Snapfish Network (Snapfish powers Websites for many companies), there are sites for over 2 dozen retailers, ISPs, and consumer brands representing more than 50% of the US retail photo processing market and generating more than 50% of US web-originated print orders - almost 1 billion prints in 2006, a year in which analysts projected the entire online segment to represent less than 700 million prints.

According to NNR, Sept. 2006, US Home/Work Panel, 50 million people in the U.S. use photography sites, said Amy McDonough. From Webshots internal logs (September 2006), she said that for every 100,000 uploaded photos, fewer than 1,000 are printed but more than 50,000 are downloaded. Thus, active sharing is 5-10x more prevalent than printing.

Figure 5 - Total Monthly Unique Users at Webshots (x1,000) *Source: ComScore Media Metrix, U.S.*

<u>Sep-06</u>	<u>Oct-06</u>	<u>Nov-06</u>	<u>Dec-06</u>	<u>Jan-07</u>	<u>Feb-07</u>	<u>Mar-07</u>	<u>Apr-07</u>
5,790	5,938	6,152	6,739	7,267	6,678	7,063	7,500

The average monthly growth is 4% and overall growth is 29.5%. As we reported in our review of 6Sight, the Webshots study found there are three major motivators for content sharing: telling their stories; connecting with others who share their interests; and social altruism.

Discussing different ways of sharing photos, the panel agreed that there is room for blogs, which are another way of telling life stories. 85% of the albums on Webshots are public.

Which model seems to be most effective for revenue generation? For Webshots, the primary source of income is display advertising, followed by premium membership, prints and other items, and mobile. Snapfish learned early that ads didn't work when people were looking at photos, so its revenue is derived from products and subscriptions for video services). Sprint obtains its revenue primarily from the \$5 fee it charges for using PictureMail, although it enables its customers to output images however they wish, without any restrictions. Sprint gets less than 1% of its images loaded from PCs, and feels that the main problem is image quality. Photobucket derives its revenue from storage/hosting fees.

Photo Archiving/Storage: Snapfish offers storage at no charge, while Webshots has a premium storage option, commenting that "it's hard to get people to pay for something they don't think they need." Kodak Gallery also offers a premium service with more storage, and Sprint has an integration issue as customers change telephones.

File sizes. Kodak Gallery accepts any size image files, but noted that older images don't generate much revenue. Sprint accepts any size image, noting that cameraphone images are limited in size. Webshots typically gets 6-7 MP files and accepts JPEG and TIFF formats, with over 30% of "traffic" being international, although there is little printing by international members, primarily because Webshots does not offer international shipping. Snapfish accepts all file sizes, although not in RAW format. Klingebiel noted that more prints are being ordered than in the past, with about 50% of all images now being printed, even with the greater number of images being uploaded. Usage in the U.S. varies by region and demographics.

Metadata: The Elusive Grail of Imaging was the final panel moderated by *Eugene Mopsik*, ASMP, and featuring *Richard Anderson*, Freelance Photographer; *Bryan Calkins*, CogniSign; *Dan James*, Digimarc; *George John*, Motorola; and *Nelson Nunes*, PLUS. While industry-wide adoption of metadata is desired, it is underused and undersupported. There is little adherence to standards and technology solutions that support metadata use

and preservation. Image creators have no control over metadata once the files are circulated - metadata can be easily removed and there is no readily available way to create permanent or protected metadata.

Metadata is essential to identify and track digital images/assets. 1. Ownership metadata must never be removed. 2. Metadata must be written in formats that are understood by all. 3. Metadata is essential to express technical characteristics of photographs in an interoperable way across technical systems.

Richard Anderson discussed UPDIG (Universal Photographic Digital Imaging Guidelines) [<http://www.UPDIG.org>], which does research on and makes reports about Best Practices for digital imaging workflows. Although numerous software options are available, many photographers don't make adding metadata part of their workflow. It's best to add metadata at the earliest possible workflow stage so that all derivative files will have the same core metadata. However, adding metadata to proprietary RAW is risky since each proprietary RAW format is structured differently and embedding metadata can corrupt the RAW file. It can also interfere with other software reading/writing metadata.

The DNG file format is designed to contain metadata safely, and the DNG RAW format is the only RAW format that allows safe embedding of metadata. Converting proprietary RAW to DNG safely embeds the .XMP sidecar files into the DNG. Metadata is much less vulnerable to loss when embedded in the file.

Anderson recommended avoiding programs and procedures that strip metadata. 1. Adobe Photoshop "Save For Web" strips all metadata by default. 2. Photoshop CS2 has a bug, so that the setting "include copyright" doesn't keep the Copyright status to "Copyrighted." 3. Photoshop CS3 has the same Copyright Status bug, with a new function "include metadata" that has a bug and does not save all metadata. 4. Web scripting tools such as PHP make it very easy to work with images via built-in tools, but unless you take extra steps, these tools will strip out all metadata.

Bryan Calkins said exploding image and video content requires better search tools. Flickr uses tagging. xcavator (www.xcavator.net) enables new visual search, providing superior visual search performance, including augmentation of text based methods, solutions for video and scalable architecture. CogniSign has a Beta test underway with Rights-Managed Photovault (300,000+ images) and launched Royalty-Free inventory with Getty's iStockphoto.com (1.8 Million images from 38,000 contributors)

Metadata is still incredibly important for the stock photo business. Visual search tools take some pressure off of metadata because color descriptors can be eliminated, subject descriptors can be more finite, and semantic techniques are not as critical.

Dan James commented that, in closed or controlled ecosystems, metadata has a higher probability of being used and persisting as it flows through the value chain. Market forces and aligned goals encourage good behavior for such applications as insurance claims processing, but metadata still gets lost.

The Internet is an uncontrolled, open ecosystem enabling non-linear distribution of images. Metadata is lost, or loses the original context, but images find new audiences and usages

Metadata enables: copyright communication and compliance; tracking and monitoring; asset management & horizontal workflows; new business models such as license revenue via new re-sellers and associated services and merchandising.

Content ID is survivable, machine readable, unique identifier coupled with directory and routing services that span existing metadata standards and persistent metadata repositories. It allows late binding of metadata to trigger business rules at any stage in the value chain. Some usages of Content ID will enable: CID + PLUS License Registry enable identification of current copyright owners (which may change over time) as required by proposed Orphan Works legislation; Album cover art or concert photos on fan sites dynamically present links to purchase music or T-Shirts; "Unauthorized" posting of new product collateral can be tracked and analyzed for demographic interest; all images uploaded to public UGC sites to become stock photos; and print ads to become interactive when users point their cameraphones at them.

In mobile imaging, George John said it helps improve image quality, helps communicate more efficiently (GPS tags tell where you are and users can add keywords) and helps organize images for easy retrieval. Metadata fields can be used to render images better at the output device, and post processing based on metadata either during or after transfer from the capture device can improve quality.

Nelson Nunes discussed PLUS (Picture Licensing Universal System) [<http://www.useplus.org>], a non-profit coalition with members from 25 countries and a narrowly focused mission to: simplify & facilitate image licensing by creating image licensing standards and tools, offering balanced industry representation from both picture licensors & licensees. Technical specifications may be viewed at <http://ns.useplus.org>.

Next year, the I3A annual meeting will be held June 5-6 2008 at the Marriott Vancouver Pinnacle Downtown in Vancouver, Canada.

Brief News of the Photofinishing Industry

- In conjunction with the decision of the **Agfa-Gevaert group to demerger into three independently listed companies**, each of which will operate with a dedicated management team, Marc Olivié, President and CEO has resigned from his positions.

- **Iford.com is the new Web portal of Iford Imaging.** Packed with the very latest product news and hints and tips on how to achieve stunning prints, the site will help visitors old and new to stay abreast of important company developments. Plans to launch the site in French, German and Spanish are underway for the end of the year.

- The **Dimatix Technology Integration** unit (DTI) of FUJIFILM Dimatix (www.dimatix.com) has **developed a technique that employs the latest digital jetting technology in decorating dark or light nonporous foods with white text, graphics and geometric patterns.** DTI's new process uses FDA and kosher certified, jettable compound coatings to enhance the visual appeal of food without affecting its shape, flavor or shelf life. The noncontact process is also production friendly. It can be used to decorate food that's hot, cool, soft, hard, wet, dry - even oily - thereby enabling food processors to insert it into their manufacturing line at the point that's most advantageous, without sacrificing production speed or efficiency.

DTI will market the new process under its MerlinT and TapestryT products that the company originally pioneered in helping Procter & Gamble bring Pringle Prints® to market. The new technique will complement DTI's current line of dye-based Tapestry colorants, which are used by food processors internationally in decorating porous foods from cookies and snacks to pet products.

The entire Merlin FG system is FDA compliant and features a modular architecture that can be configured for single or multi-lane decorating and narrow or wide imaging widths. All Merlin FG configurations can operate at linear speeds in excess of 500 feet per minute and can be easily mounted on existing manufacturing lines. The Merlin system can be configured with one to 32 jetting modules to handle applications from test marketing to mass production. Fully configured, a DTI Merlin FG system can easily decorate up to 65,000 food items per minute. Image data can be provided to the system through a network interface or via CD, allowing each item to be decorated differently if desired.

- Photochemical Specialist **Champion Photochemistry** (www.championphotochemistry.com) **has transferred its production in Spain to the large and highly efficient factory in Chalon-sur-Saone, France.** Other changes include several appointments: Barcelona-based *Rae Finlayson* to Managing Director, Europe and member of the Global Management Board with responsibility for customer relationship management and world wide purchasing and *Stefan Johnston* to Global Finance Director and member of the Global Management Board with responsibility for global banking relationships, insurance, taxation and acquisitions; Chelmsford UK-based *Peter Smart* to General Sales Manager, Europe with responsibility for relationships with Authorized Distributors throughout the region. Rochester, NY-based *Diane Hook* to Global Corporate Controller and member of the Global Management Board with responsibility for world wide financial reporting and cost

management, and *John Shear* is appointed Global Products and R&D Director with responsibility for marketing Champion and Russell brands, product development and research laboratory projects; Barcelona-based ; Chalon-sur-Saone-based *Patrick Laugerette* to Global Information Systems Director with responsibility for world wide information technology architecture and systems security; and Toronto-based *Mike Visciano* to Controller, Americas with responsibility for financial reporting and cost management at Champion Photochemistry Inc. Mike will also continue as Site Manager for Champion Photochemistry, Ltd.

° In Japan, **Plaza Create** (www.plazacreate.co.jp) **launched photobook service at its 1,230 outlets**, including Palette Plaza, 55 Station and Armu Station. Orders are accepted via ordering machines PDS (PalettePlaza Digital Station) II installed at each store, and the data are to be sent to its Production Development Center opened last August, according to *PEN Weekly*. Produced on Fuji Xerox digital printers, the photobooks are delivered in about ten days.

Two configurations are being offered: 24- and 40- 210x210mm pages priced at ¥2,500 (\$20.80) and ¥2,980 (\$24.80), respectively, plus ¥300 (\$2.50) for a title on the cover. Six color variations are available for the cover. The company aims to sell 150K units by the end of March 2008. An industry watcher estimates the photobook market in Japan has yet to come to one million units, probably staying at around ¥1.5 billion.

Upcoming Conventions/Meetings

Sep. 9-12 +1-703-264-7200	GASC Fax: +1-703-620-9187	GRAPH EXPO 2007 (http://graphexpo.gasc.org/index.cfm)	McCormick Place South Chicago, IL
Sep. 9-13 +1-805-659-2298	ISCST/The Tiara Group Fax: +1-805-659-1493	14th Int'l Coating Science and	Marina del Rey Marriott Marina del Rey, CA USA
Sep. 18-20 +1-401-766-4142	MemoryTrends Fax: +1-401-765-6677	Memorytrends Conference & Expo (www.memorytrendsexpo.com)	Sands Expo Center Las Vegas, NV
Sep. 19-20 +1-781-616-2100	InfoTrends/CAPV Fax: +1-781-616-2121	Digital Imaging '07 (www.infotrends.com)	Hyatt Regency SF Airport Burlingame, CA
Sep. 20-22 +49-211-90191	Reed Exhibitions Deutschland Fax: 49-211-90193	Viscom	Düsseldorf Fairgrounds Düsseldorf, Germany
Sep. 23-25 +1-517-788-8100	PMA Fax: +1-517-788-8371	PMA Canada Exposition 2007 (www.pmai.org)	Toronto Congress Centre Toronto, Canada
Sep. 26-29 +86-21-6390 6161	Koelnmesse Int'l Fax: +49-221-821-3089	Imaging Expo China/Interphoto Shanghai (www.imaging-expo.com)	Everbright Convention Center Shanghai, China
Sep. 28-30 +91-44-28353739	Buysell Interactions Fax: +91-44 28350839	Image Today-Sri Lanka	Bandaranaike Mem. Int'l Conf. Colombo, Sri Lanka
Oct. 3-7 +33 1 43 95 37 00	Secession Fax: +33 1 43 95 30 31	Salon de la Photo (www.mondial-image-photo-son.com)	Hall 4, Porte de Versailles Paris, France
Oct. 3-6 +54-11-47787070	Expotrade Argentina Fax: +54-11-47787070	Exposign & Serigrafia (www.expoimagen2006.com.ar)	Costa SalgueroExhibition Ctr. Buenos Aires, Argentina
Oct. 3-7 +34-93-902 233 200	Fira Barcelona Fax: +34 93 233 20 00	SonImagFoto (www.sonimagfoto.com)	Venue Mont juic Barcelona, Spain
Oct. 4-7 +54-11-4812-3893	CACIEIFE Fax: +54-11-4812-2751	ExpoImagen 2007 (www.expoimagen2006.com.ar)	Centro de Exposiciones Buenos Aires, Argentina
Oct. 4-7 +7-812-717-6089	Real IVC Fax: +7-812-717-6446	Photofair 2007 (www.real-fair.ru/PhotoFairSPb/index_e.php)	Manege Central Exhibition Hall St. Petersburg, Russia
Oct. 15-16 +1-207-235-2225	IMI Fax: +1-207-235-2226	3rd Ann. Ink Jet Technology Integration Symposium (www.imiconf.com)	Crowne Plaza Hotel Mid-Peninsula Foster City (San Fransisco), CA
Oct.23-24 +1-203-371-6322	KioskCom	Self Service Expo (www.selfserviceexpo.com)	Jacob Javits Convention Center New York, NY
Oct. 24-27 +1-703.385.1335	SGIA Fax: +1-703.273.0456	SGIA 2007 (www.sgia.org)	Orange County Conventkion Center Orlando, FL
Nov. 1-3 +1-703-488-2742	VNU Expo Fax:1-703-488-2725	Photo Plus Expo (www.photoplusexo.com)	Jacob Javits Convention Center New York, NY
Nov. 2-4 +65 6396 7187	Koelnmesse International Fax: +65 6396 8403	Imaging Expo Singapore (www.imaging-expo-singapore.com)	Suntec Int'l Convention Centre Singapore
Nov. 7-9 +44 1223 236920	IMI Europe	15th Annual european Ink Jet Conference (www.imieurope.com)	Sheraton Lisboa Hotel & Spa Lisbon, Portugal

Business News

Fujifilm Holdings Corp., Tokyo, Japan (www.fujifilmholdings.com) ...

... reported consolidated 1st quarter (30 Jun.) **net revenues of ¥688,293 million** [**\$5.7 billion**] (2006 - ¥656,848 million), with a **gross profit of ¥287,625 million** (2006 - ¥273,689 million), an **operating income of ¥59,817 million** (2006 - ¥15,743 million), **income before taxes of ¥70,025 million** (2006 - ¥17,990 million) and a **net income of ¥40,968 million** (2006 - ¥4,811 million), or **¥79.36/share** diluted (2006 - ¥9.34/share).

Imaging Solutions - Sales of ¥144,233 million (2006 - ¥149,925 million) **produced an operating income of ¥10,237 million** (2006 - loss of ¥15,917 million). Color paper sales increased, reflecting market share growth in principal countries as well as the continued robust performance of the digital camera print business. The color films market continued to shrink, and Fujifilm's sales of color films decreased. However, the company was able to increase its market share due to the effectiveness of its marketing promotion activities undertaken in response to the discontinuation of color film business by competitors.

In the digital still camera business, high market evaluations were earned by such products as the FinePix F40fd compact digital camera and the slim-bodied FinePix Z5fd model, both incorporating the fast Face Detection technology, as well as the newly launched 9 MPixel FinePix A900 with 4X optical zoom, and sales of digital products were strong, particularly overseas.

Although sales of photofinishing equipment have been affected by a temporary cyclical weakening of demand for new installations from major customers, Fujifilm and Noritsu Koki moved forward with the development of their business alliance that has enabled the cooperative development of the Frontier 700 series of compact digital minilabs. On July 1, 2007, Fujifilm and Noritsu Koki cooperatively established N&F Techno Service Co. Ltd. to unify the two companies' domestic photofinishing equipment units and build a more efficient maintenance and support system.

Information Solutions - Sales of ¥262,202 million (2006 - ¥233,631 million) **produced an operating profit of ¥33,722 million** (2006 - ¥15,692 million). Fujifilm recorded higher sales of such products as the FCR (Fuji computed Radiography) systems, dry films and endoscope products. Strong performance was also achieved in office and industrial operation, reflecting growth in sales of lens units for cameraphones.

In the medical imaging business, higher sales were recorded for such equipment and materials as FCR (Fuji Computed Radiography) and dry films, and sales of SYNAPSE equipment also grew. In addition, the FCR mammography system became the first CR system in the world to receive premarket approval from the U.S. Food and Drug Administration. This made it possible for Fujifilm to begin marketing these FCR systems in the U.S.A., resulting in an increase in medical system product sales.

Also contributing to the rise in sales was Fujifilm RI Pharma Co., Ltd., which has been accounted for as a consolidated subsidiary since the latter half of the previous fiscal year.

In the graphic arts business, Fujifilm's efforts to augment its manufacturing capacity in response to the increasing use of CTP products contributed to a continued rise in its sales in this business. Fujifilm also expanded the scope of its graphic systems business through the April 2007 launch in the North American market of industrial-use inkjet printers that are designed to use the consumables of Fujifilm Sericol, including UV and solvent inks.

Fujifilm's sales of flat panel display (FPD) materials grew, reflecting a sharp recovery in demand centered on materials used in LCD televisions and monitors, as the company's mainstay FUJITAC and WV Film products continued, and additional contributions were made by rises in such high-value-added film product as those for VA-mode and IPS-mode LCDs.

Regarding recording media, although intensifying price competition impacted operations in the mid-range data storage media market, Fujifilm responded to rapidly growing data backup needs through such initiatives as the April 2007 launch of 4th generation LTO (Linear Tape-Open) Ultrium 4 products capable of storing up to 1.6 terabytes of data in compressed form, and efforts to promote the sales of these and other products.

Amid the trend of rising resolutions and other sophisticated needs, Fujifilm's cameraphone lens units were highly evaluated in the market for their compactness, lightness, high image quality ...continued on page 12

and autofocus and zoom capabilities, and sales of these lens units grew considerably.

Document Solutions - Sales of ¥281,858 million (2006 - ¥273,292 million) **produced an operating profit of ¥16,518 million** (2006 - ¥15,903 million). Strong sales of color digital multifunction devices and on-demand-publishing systems in the Asia-pacific region, including China, were primary factors contributing to a 3.1% increase in consolidated revenues.

In the Office Products business, Fujifilm expanded its sales in Japan of the ApeosPort-II Series of medium- and high-speed color multifunction devices, which meet needs regarding integration with main corporate computer systems and improved document security functions.

The company recorded higher sales volumes in Japan of the DocuCentre C2100 color multifunctional device. Overseas, considerable increases in sales of color devices were recorded in the Asia-Pacific region, including China, and a continuous rise in multifunctional device export shipments to North America and Europe was accompanied by an increase in consumables shipments.

Continuing inventory adjustments by domestic OEM office printer customers reduced OEM shipment volume, although the sales volume of own-brand office printers has experienced smooth growth, particularly of the DocuPrint C3050. In the Asia-Pacific region, including China, the sales volume of color and monochrome own-brand printers increased.

In the Production Services business, sales of color on-demand publishing systems in Japan's digital printing market were slightly weak, but the volume of export shipments to Europe and North America rose, reflecting strong performance of the color entry-level DocuColor 5000 Digital Press. In the Asia-Pacific countries, including China, sales volume increased for color entry models as well as the monochrome DocuCentre f1100GA

In the Global Services business, Fujifilm sustained growth in domestic and overseas consulting and outsourcing business designed to help customers enhance their operational processes. In addition, amid rising corporate needs for strengthening internal control systems, the company created an internal control system advisory center, began providing internal control system project promotion support services of companies introducing Apeos PEmaster software, and took other steps to broaden the scope of service business.

Shutterfly, Inc. Redwood City CA (www.shutterfly.com) ...

... reported 2nd quarter (Jun. 30, 2007) **net revenues of \$29,877,000** (2006 - \$19,637,000), with a **gross profit of \$15,045,000** (2006 - \$9,881,000), **loss from operations of \$5,536,000** (2006 - loss of \$3,195,000), a **loss before taxes of \$4,160,000** (2006 - \$3,216,000) and a **net loss of \$2,439,000** (2006 - \$2,093,000), or - \$0.10/share (2006 - -\$0.54/share). Total operating expenses were \$20.6 million, as compared to \$13.1 million for 2Q 2006, and adjusted EBITDA was a loss of \$584,000, as compared to a 2Q 2006 loss of \$285,000.

Sales of personalized photo products and services, including photobooks, folded greeting cards, calendars and photo-based merchandizing, were \$15.6 million, an increase of 88% from 2Q 2006, representing 52% of total revenue. Revenues from existing customers represented 78% of total revenues for the quarter, compared to 79% in 2Q 2006. Orders for the quarter totaled 1,461,804 (2006 - 1,041,129), representing an average order per customer of 2.0 (same as 2006), and the number of transacting customers totaled 731,384 (2006 - 517,518), with an average order value of \$20.44 (2006 - \$18.86). The average number of orders per day were 16,064, (2006 - 11,441). Shutterfly entered into a non-exclusive agreement with Target to co-promote Shutterfly photo services through www.targetphoto.shutterfly.com, www.target.com/photo and in select Target stores, and a strategic partnership with David's Bridal extends Shutterfly's ability to access bridal customers, and also acquired Make it About Me!, a publisher of the Sesame Street book, My Adventure on Sesame Street and My Amazing Alphabet Adventures.

For six months, **net revenues of \$56,582,000** (2006 - \$36,520,000) produced a **gross profit of \$28,716,000** (2006 - \$18,015,000), **loss from operations of \$8,823,000** (2006 - loss of \$6,134,000), a **loss before taxes of \$6,014,000** (2006 - \$5,728,000) and a **net loss of \$3,500,000** (2006 - \$4,658,000), or -\$0.15/share (2006 - -\$0.95/share).

Photo Imaging News - International Edition

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