

The photographic workflow process, from shoot to finished product.

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Photography

Many people question the need for professional photography. Due to their limited knowledge, it is perfectly reasonable to consider this need. From the non-professional's perspective, any individual is capable of making an image with today's advanced cameras. The cameras today are quite advanced. They are capable of adjusting exposure, focus and color very accurately. And in many cases they may produce an acceptably attractive photograph. However, once an individual delves deeper into the world of photography, they will realize that photography has inherent limitations. And these technological/physical limitations have yet to be overcome. In addition to these limitations, features and performance are graded according to the consumer and professional applications. My goal is to discuss the differences between consumer and professional quality equipment, and the application of this equipment in a professional photographer's routine.

Point and shoot cameras

Consumer quality equipment, at the most basic level today, is the camera phone. Camera-phones have replaced the point and shoot for many, which do not want to hassle with functions and features. In some ways, they are superior to point-and-shoots. There is a saying in photography (the best camera is the one that you have with you). After all, what good is a camera, if it sits in a closet? And this is the primary appeal of the camera-phone. Although it does not produce images, which are on par with a point-and-shoot, it provides a practicality in use, which far surpasses the utility of its larger cousin.

After the camera-phone, there's the classic point and shoot. This type of camera was in fact, the predecessor to the camera-phone. The P&S has significantly more features than a camera-phone, which allows for more creative freedom. This type of camera will

allow one to photograph in more diverse lighting conditions. Modern P&S cameras can be very advanced. Some are built robustly for professional use, as a backup camera. Or, for individuals like photojournalists, which want to be unobtrusive when capturing events. For many consumers, which desire quality, but do not want to sacrifice it for portability, the P&S is an ideal choice.

The next step in the camera hierarchy is the mirror-less camera. This name denotes the lack of a mirror, which is found in DSLR camera bodies. **Mirror-less or interchangeable lens cameras** share many traits with DSLR. The primary distinguishing feature which separates the two is the lack of a mirror. The lack of a mirror allows for a smaller form-factor. To match the smaller body size, manufactures have made lenses which are also equally proportionate. However, one can mount large lenses onto these bodies, through special adapters. As most people have experience, or have noticed, DSLRs have an optical viewfinder, to aid in composition. To incorporate such a feature, a significant amount of space must be allocated for it. This makes the DSLR larger than cameras which lack these viewfinders.

Another differentiating factor between DSLRs and mirror-less cameras, is sensor size. AS of 2013, there are only a handful of examples of this type of technology, incorporated into a 35mm (Full Frame) format. These options are relegated to the premium and ultra-premium market, and are priced into the professional range of equipment. There are numerous debates and mixed opinions about the viability of these types of cameras for professional use. It's fair to say, that these kinds of cameras can function adequately in some photographic applications. Specialized types of photography continue to require the flexibility of DSLRs, as these specialized situations tend to be more technically demanding. Perhaps, in the future, mirror-less cameras many catch up technologically, and ultimately replace the DSLR. But it is very difficult to predict, if science can overcome the physical obstacles of optics.

The DSLR

DSLR is an acronym for Digital Single Lens Reflex camera. This type of camera uses a mirror and prism to allow for a viewfinder to function through the lens. There is a historical significance to this label, but is not essential for the topic of this conversation. In one form or another, the SLR camera has been around since the early 19th century. It has evolved over time, but the basic functionality remains the same. This great length of time, has allowed the camera to evolve and become ever more refined and consistent in its performance. The DSLR today, is almost synonymous with the 35mm format. This is mostly due to the famous German Camera manufacturer (Leica). The idea behind this form factor came from Greek philosophy. The Greeks believed in a mathematical conception of beauty. That beauty can be expressed through proportions. It was termed the golden mean or spiral. Today, scientists continue to see this mathematical formulation expressed throughout nature. Leica adopted the approximation of this ratio and applied it to the dimensions of camera film. And this form-factor was carried over to the modern DSLR. There are, in fact, a number of exceptions to this camera system. However, discussing these differences is beyond the scope of this paper. But, I urge you to satisfy your curiosity through research.

There are a number of reasons that the DSLR is the primary tool for “most” professional photographers. The reason I say “most”, is because there are a number of situations, where a DSLR will simply not perform highly specialized functions. For example, most billboards are photographed with medium or large format cameras. These cameras have enough resolution, to be enlarged to massive sizes, while retaining more quality.

Another example is for precise architectural photography. This type of photography requires the utmost accuracy in representing structures proportionately. These cameras have very specialized optics, to eliminate lens induced distortions. They also require a high degree of proficiency to operate.

Furthermore, the individuals trained in using these cameras command a premium for their services.

Six reasons why you need a professional DSLR

Sensor size matters

The camera sensor is the component that captures the light and creates the photograph. And since photography is the action of capturing and rendering an image through light, this makes the function of the sensor indispensable. What does this mean for the photographer? Well, we are going to give a brief technical explanation of the properties of a sensor to make (sense) of it (pun intended).

The sensor of a camera is the single most expensive component of the camera. The sensor is fabricated under high quality control standards, similar to that of computer processors. This precision and quality control, lead to high production cost. These high costs, naturally becomes prohibitive for many consumers to adopt. Thus, these sensors are placed in the premium and professional quality equipment. This consumer demographic justifies these premiums, for their application-specific needs. Up until 2012 there were no full-frame options, less than 3,000 US dollars. Keep in mind, that I have not included the costs of lenses and other essential equipment into this total cost of adoption.

- 1.** Sensors impact focal length. In an attempt to make this information comprehension friendly, I will minimize the use of technical language. A larger sensor allows for a larger image footprint. The image footprint is related to the size of the lens and its distance to the sensor. The larger a sensor and lens can get, the less extreme the curvature of the lens needs to be, to bend the light and project it onto the sensor. Thus, cameras with larger sensors can accommodate lenses which retain significantly greater quality at ultra-wide angles. This is why

“most” smaller form-factor cameras do not have ultra-wide lenses made for them. And when they do, they distort images for too much to be of use to a professional.

2. The sensor has tiny microscopic spots on it, called photo-sites. We measure the number of these photo-sites in megapixels. At one time in digital camera evolution, megapixels were the gold standard for measuring the quality of a digital image. But this was a misunderstanding of optics propagated by marketing and the current technological limitations of that era. Today, we have camera-phones that have more megapixels than DSLRs of the early 21st century.

3. Once we attained the resolution that would satisfy the consumer and professional market, (something that would provide an approximate equivalent of 35mm film), the megapixel race was ended. Consumers became more educated, and realized that more pixels do not equate to better images. In fact, as you squeeze in more pixels within a limited space, the sensitivity (signal to noise ratio decreases) of those pixels decreases. This means that higher resolution (megapixel) cameras have more difficulty sensing things in low light conditions. This is the reason your camera-phone can take decent images in well-lit conditions, but fails in challenging ones. And this is why one notices grainy and color-speckled photographs, made in low light conditions. This is also the reason professional photographers use large sensor cameras. Professionals must make the photos they are paid for. They generally can't make compromises on quality. Furthermore, the better the quality of the image, the more latitude or (headroom) the individual has in the editing process AKA (pixel-pushing). Software examples include Adobe Photoshop and a plethora of other editing applications. Essentially, a professional needs this flexibility to make potential changes to a photograph, to meet their client's needs.

4. In many ways, cameras are inferior to our eyes. They simply cannot visually represent the tonal range that our eyes are accustomed to observing. As I pointed out in reason #4, large sensors with lower pixel density, will have higher sensitivity to light, and therefore excel at low light photography. Furthermore, these larger pixels can absorb more of the tonal range than a lesser camera. For example, a good point-and-shoot can capture approximately five (stops) of light, whereas, a full frame DSLR can capture up to 12. To put this in perspective, our eyes can perceive approximately 24 (stops) of tonal range. One caveat, the eye functions very differently from a camera. The eye gradually builds an image through continuous sensation called (saccades). In some ways, it's not a fair comparison. But, the point is to show the limitations of current equipment to represent what we see in the world.

Professional equipment is built to last

5. Just like any profession, there is equipment that is made for continuous use. Not only are these tools designed robustly, to resist abuse, they also function reliably. A professional simply cannot afford to have a piece of equipment fail. In many cases, a professional will also have a backup of lesser quality, as insurance. The end result is that all of the qualities of professional equipment contribute to a premium cost.

6. Professional equipment is designed to be very ergonomic and functional. Although these cameras can be feature-rich, their menus and functionality is designed to be easily accessible for routine use. For example, pro cameras have more buttons and dials than their consumer level counterparts. These buttons are much more readily accessible than functions buried within display menus.

Photographing architecture

Although real estate photography is a sub-genre of its architectural heritage, there are significant differences between them. As pointed out earlier, in the gear section of this article, architectural photography has the explicit goal of capturing the aesthetic and structural components of a building. This type of photography also aims to document the traits of these structures. In essence, the representation should be as true and accurate as possible to reality. Distortions induced by the lens; either need to be optically corrected during the photography, or corrected with software during the post-processing stage. It is generally understood, that images tend to retain a greater fidelity, when problems are corrected during the capturing process. Although, software has made significant strides in its capacity to make realistic corrections, it has yet to surpass preventative measures.

On the other hand, real estate photography is less stringent about protocols. The goal of property photography is to give the viewer an immersive experience. The photographer straddles the line between aesthetics and accuracy of the space. They often convey an emotional sensation of a lived-in perspective i.e., sitting in close proximity to a fireplace. And to aid in this immersive experience, the photographer will emulate a low and wide angle of view, through the use of lenses and equipment which compromise the peripheral perspectives in the frame. To reiterate, we take for granted, the ability of our eyes to work in tandem, to produce a very wide field of view (180 degrees). Furthermore, our brain corrects for these optical distortions continuously.

Understanding our capacity for vision, allows us to appreciate the significant disadvantages that a camera has. It only has a single lens, it's made out of rigid materials, which are inferior to the eye and has a tiny processor, in comparison to the human brain. But once we grasp the limitations of photography, we can work within those boundaries more effectively.

Framing and composition

Naturally, photography lends itself to a highly selective visual representation of a subject or space. The camera and lens capture what they are pointed at. It is the sole discretion of the photographer, to include and exclude elements in the image. Their goal is to compose an image which expresses the subject in its best possible aesthetic state. "Best", being a subjective term to fulfill the desires of those which the photography is intended for. Thus, the photographer may adopt a macro or micro level of visual disclosure, contingent upon the particular traits of the subject. For example, the photographer may photograph a portion of the kitchen to highlight special features, or they may shoot it, in entirety, to provide an impression of special relationships between its various elements. i.e., proximity of the gas stove to the kitchen and entryway.

Lens orientation

Maintaining a critical degree of horizontal orientation is essential for architectural spaces. This is especially true for ultra-wide angle lenses, as they distort dramatically, once they deviate from this orientation. Even rectilinear lenses are prone to heavy distortion, when they are not laterally leveled. Thus, a photographer must utilize tools such as bubble levels and leveling features, built into most professional cameras. This is practiced routinely, for each and every image taken. Ultra-wide angle lenses and even premium models have some degree of vignetting, pincushion and barrel distortion. Therefore, to produce a commercially acceptable image, the photographer requires further correction through software. If

these artifacts are not corrected; images will show light falloff at the periphery of the frame and vertically oriented objects will acquire converging or leaning lines. These types of distortions are aesthetically unpleasant, due to psycho-visual cueing that lends to our impression of coherent three dimensional spaces.

Perspective

Generally, the average eye-level perspective (between 5'4"-5'10"), lacks visual impact. The photographer attempts to avoid these perspectives when possible. Exceptions are made for interior elements, where visibility of a feature, outweighs the goal of visual impact. Examples include kitchen cabinetry, washrooms and other features, which are not readily visible, at such viewing angles. Oppositely, the photographer may wish to render certain unattractive elements of a space invisible, for example, the under portion of kitchen and laundry cabinets.

Types of Lighting

There are essentially three lighting approaches to creating images. There is natural, artificial and a combination of both. Each of these techniques has its merits and will yield different results. The choice to utilize one over another relies on the balance of the ideal situation verses what is pragmatically feasible, within a given amount of time.

Natural light can provide us with a very intimate representation of a space. It shows light and the directionality of the illumination. Direction light has an air of drama, and master painters, such as Rembrandt, used lighting techniques so frequently, that certain portrait lighting was named after him. However, what we gain in dramatic effect, we lose in obscurity. Due to the limited dynamic range of camera sensors, the photographer must be selective of which portion of the tonal

spectrum they wish to capture. For example, they can either expose for the brightness of the sun flowing through the window, or the shadowy interior space. If they choose to expose the image for the window-light, they will retain details in the clouds and other exterior objects. However, the interior will be bathed in darkness. On the other hand, if they expose for the interior, the brightness of the window region will obliterate any exterior details. Using ambient lighting though from windows and light-fixtures, will create highly directional light, casting competing colors and shadows in various directions. This outcome may be acceptable as art, but from a commercial perspective it does not portray a welcoming, descriptive and immersive experience of the property.

Artificial light can be produced by various means. From continuous incandescent lights to powerful strobes, there are numerous options to consider. However, most of these options do not yield the best results. Most interior spaces have artificial lighting, but these lights are both insufficient and uncomplimentary to the aesthetic effect the photographer is seeking to achieve. Not only do various types of light fixtures have different color casts, but they also produce highly directional illumination. This results in lighting, which is a kaleidoscope of contrast, shadow and competing colors. To overcome these obstacles, the photographer supplies their own controllable and portable light-source, (usually a strobe/flash). This type of lighting produces a consistent and controllable illumination. Furthermore, it provides the essential intensity to overcome powerful light, such as the sun. This is the prevailing method of interior photography, due to the numerous advantages it conveys. Without this type of illumination, it is virtually impossible to create uniformity within an interior space.

There is only one exception to this claim, and from many professional perspectives, the alternative of HDR (High Dynamic Range photography), does not yield the ideal results, without significant post-processing, manipulation and correction through software. Sometimes photographers that are intent on producing quantity over quality will rely on this process. Because HDR is less intensive

photographically, the photographer can utilize this process to photograph in volume. However, what they gain in shooting time, they lose in editing time at the computer. Furthermore, as is very common with this technique, if the images are not handled with care, they will look unnatural, illustrated and saturated. In some cases, this type of photographer may produce passable work, by standards of an individual, not well versed in quality photography. This type of photographer will be the ideal candidate, when low price and fast turnover are the principle concerns of the client. In the scheme of photography, this style is considered the (Wal-Mart) or fast-food of the photographic space. In the end, I'm convinced that one gets what one pays for.

Lastly, the photographer may use a combination of both artificial and ambient light. This process can potentially produce excellent results; however, it requires more labor in the photographic and post-processing stages of the image creation process.

As mentioned earlier in (lighting Methods), there are three types of approaches; natural, artificial and hybrid. Our philosophy is that artificial and hybrid methods produce the best results. These are the methods used in popular architectural and interior design magazines. We use these techniques interchangeably, when appropriate. However, in uncommon situations, we may defer to ambient artificial light, such as built-in fixtures. Bathrooms and any other room which has numerous reflective surfaces, becomes a good candidate for this type of lighting. We use this technique, because it does not contaminate the space with foreign light, which is very visually distracting. We also use ambient light (during the day), when photographing exteriors. In rare situations, where the property may benefit from stylized images, or when dusk or night photography is requested, we may use a technique called light painting. Light-painting is a subtle and unobtrusive form of artificial lighting. The photographer will use a powerful flashlight to slightly bring up the exposure of the property, to reveal important details. This is a labor intensive process, and is used very conservatively.

The lighting process

We light interiors by using multiple strobes, fitted with wireless controllers. This system allows us to strategically place our lighting to properly illuminate the interior, while emphasizing its important features. The learning curve for light placement is significant. It requires hands-on experience to understand the behavior of light in various conditions. Even so, we occasionally confront challenging lighting situations. However, an aptitude for problem solving is a requisite of photography. And photographers thrive from technical challenges. And I believe that the motive to solve problems like these is derived from the passion that photographers have for their craft.

There is a time and place for dramatic lighting. Generally, homes and commercial spaces benefit from accentuating their features and furnishings. The directional light creates the contrast, essential to produce the sensation of depth. Without highlights and shadows, foreground and background elements tend to blend together. Our eyes require these visual cues to perceive depth. Keep in mind that we are using a flat medium, to convey the idea of a three dimensional spaces. Furthermore, our eyes work in tandem to produce the sensation of depth. A single lensed camera cannot simulate that effect. Therefore, the power of an image resides in the ability to leverage psycho-visual cues. These cues are rendered through the orientation of light in relation to the object/subject. Thus, the photographer needs to be cognizant of these principles, when artificially lighting the space and utilizing software to introduce illumination.

If you've viewed illustrated or computer generated images, you may have noticed that they do not look realistic. Part to this impression, is due to the unnatural illumination. The light seems to emanate from an indeterminable space. Furthermore, it is perfectly uniform and has no orientation. Given that humans are highly sensitive to visual cues; our minds find these lighting discrepancies unnatural.

Color casts and dark interiors

Due to the veritable aesthetic tastes of individuals, photographers encounter an array of colors in interior and exterior spaces. Various color schemas can ease or complicate the photographic process. Any pigment other than pure white or black, will affect the natural color ambiance of a space. As colors deviate from these primary polar opposites, color accuracy becomes compromised. Light has a tendency to pick up colors from objects which it rebounds from. As photographers, we take steps to correct or minimize these problems, in various ways. The first approach is to bounce artificial lighting into a white ceiling to avoid contaminating the light. The second method is to use a diffusion material, such as a shoot-through umbrella to disperse the light directly into the space.

The first approach is to bounce artificial lighting into a white ceiling. This avoids contaminating the light from colored surfaces. The second method is to use a diffusion material, such as a shoot-through umbrella to disperse the light directly into the space.

Spaces which have very dark colors, either due to furnishings or walls, tend to be very challenging to photograph. This is due the inherently high, light-absorbing properties of dark objects. This light-absorbing characteristic is taken advantage of in movie theatres. A dark and non-distracting environment immerses the viewer in the film, by eliminating reflected light from the projected image.

A photographer has three potential options to tackle this type of obstacle.

The first option is to increase the intensity of the light. This necessitates the use of multiple or more powerful more powerful light-sources. But this approach can be impractical for large spaces, as the sheer cumulative power required, lacks mobility, and is costly.

The second approach is to disperse the light through a diffusion material, rather than bouncing the light. This approach may yield increased efficiency, but may pose

other problems. One common complication is the variance in reflectance of objects occupying the space. Thus, the highly reflective objects will reflect the light disproportionately in relation to the light absorbent objects.

The last and most viable choice is to take advantage of ambient light from fixtures and daylight, while augmenting it with strobe illumination. This approach allows the ambient light to do the heavy lifting of illumination, and the photographer supplements it with controlled artificial light. This controlled artificial light has the secondary benefit of overpowering the ambient light to reduce competing color temperatures (color casts) from the varying light sources.

The end result is an even natural illumination, without intense highlights and shadows.

There is one other option that is generally used a last resort, which is (HDR) photography. HDR photography merges multiple images photographed at various exposures, to create a composite image that will capture a wider tonal range than what the camera is capable of. The problem with this technique as mentioned is twofold. Firstly, the software used as of now, does not do an excellent job of merging these images. It creates saturated and noisy images that look illustrated. Even in the hands of a very skilled photographer, the labor required for this type of photography, does not lend itself to large volumes of work, which is a routine expectation for real estate photographer.

Post-processing

We take for granted, what our eyes are capable of seeing. No camera today has the ability to show us what our eye sees. Photographers employ various tools and techniques to simulate as closely as possible, what our eyes perceive. What take only a few milliseconds for our eyes and brains to do, take hours of work to accomplish through photographic technique. Thus, few photographs leave the camera directly, as a finished product. Even

in the days of film, the photographer would stylistically make exposure and tonal changes to the negatives, during the developing process. Today, that process is done on a computer, rather than a darkroom. Technology gives a photographer numerous tools to work with, much more than what traditional photography had. However, this increase in creative choice requires extensive knowledge in utilizing these tools. I will discuss the average workflow process of a professional photographer. Some of these actions can be performed out of sequence. But generally, this is how many photographers work. Keep in mind that different Genres of photography have different workflows.

1. Once the photographer has obtained the photographs, he uploads them to a computer.
2. The photographer imports the images into an editing application. At this point, the images are modified to a different format if desired. Only, when all the editing is done, does the photographer create a JPEG/TIFF/PSD image file, to be sent to the client.
3. The photographer uses an application, in which they can apply a culling process. They review and rate the quality of the photograph, especially when there are redundancies.
4. Once they are reviewed and rated. The sub-par images are deleted.
5. Now that the photographer has determined which photographs to keep, the editing process can begin.
6. The photographer begins, by white-balancing the photographs. This is a complex and in-depth process, and is contingent upon natural and artificial lighting conditions. For our purposes, we will explain this process, under artificial lighting conditions (flash/strobe) photography. When we use artificial lighting, it bounces off of objects and picks up their color. This contaminates the image with various color casts,

which are unnatural and unattractive. An obvious and extreme example would be of a room that is painting green.

7. The next step is to eliminate camera lens distortions. All camera lenses distort images, and these distortions can be exaggerated by tilting the lens out of a perfectly horizontal plane. Even when the photographer uses a bubble level while photographing, there are minor corrections that must be made. Regardless, the lenses themselves have optical imperfections. These imperfections are corrected through specialized software that has a database consisting of these problems.
8. Now that the photographer has a base-line for their photographs, they can begin to make secondary changes to the photograph. These changes may consist of; brightness, contrast, saturation, sharpening, noise reduction, color fringe reduction and detailed brush-strokes to evenly illuminate the photograph. The ultimate goal of the photographer, in real estate/architectural photography, is to create an image that is most like its original state.
9. Lastly, photographers will use powerful software to overcome technical/practical limitations of the equipment or style of photography. Two common limitations are time weather, (overcast or lack of cloud texture in the sky) and reflections of the photographer and their equipment in mirrors or other reflective surfaces. In these particular cases, the photographer will replace the sky with one that is more aesthetically pleasing, or will wait for more favorable weather conditions (time permitting). In the case of reflections, there are very few alternatives to circumvent these types of obstacles. Sometimes the photographer may compromise the framing and aesthetics of the photograph, to avoid having a reflection. In these cases, they will use their best discretion, as to which approach will yield the best results. And in very unique circumstances, the photographer has no option, but to use software to remove their image from the photograph. Generally, images edited in this way, do not look perfectly natural, but it is a compromise that needs to be made. The photographer usually uses this technique as a last resort.