

The Endless Possibilities of CGI



Introduction

My favourite painter is Matisse. I wonder if he were alive today, would he still paint with oil on canvas... or would he be quietly working away at his desk, listening to music on his Bluetooth Bose earphones, mouse at the ready to draw some dazzling graphics on a computer screen?

I went to Art School, and though I would never be able to come close to the talent that Matisse or any of the greats had, the computer can turn you into a reasonably competent, everyday artist all the same. You might be an architect or a web designer, a fashion student or scientist, creating graphics using a computer can make the work quicker, easier, and much more effective.

Computer Generated Imagery or CGI for short is used widely in the advertising world to create short masterpieces that can transform you to another world, or replicate things in real life, only better!

The quality of CGI now is stunning, but you know that already because you've seen it at the movies, watched Doctor Who or the plethora of amazing boxsets on Netflix, Amazon Prime, or Disney+.

I was always a Trekkie, and also a fan of Star Wars. In fact my son was named after George Lucas, so my passion for computers goes back to the early days of working in a Post Production house when the first Quantel Paintbox was released.

So putting this short paper on VFX was aimed at people who have to choose whether this is a good route to go for their advertising projects, and I have enlisted some assistance from my old friend Tom Horton.

Tom has a fantastic pedigree in both advertising VFX supervision for companies such as The Mill, Condor and SVC as well as for broadcast, having recently finished supervising the work on Brave New World for NBC / Amblin Entertainment.

Pat Murphy

Contents

- ◆ What is Computer Generated Imagery?
- ◆ Why CGI?
- ◆ Building blocks of CGI
- ◆ Simple & Complex CGI
- ◆ Cost of CGI
- ◆ Choosing Visual Effects (FX) supplier
- ◆ Global VFX market
- ◆ Global VFX costs & savings
- ◆ Top Tips
- ◆ Top Watchouts
- ◆ Examples



What is CGI?

Computer generated imagery or graphics means drawing pictures on a computer screen. That's basically it.

What's so good about that?

If you draw on a piece of paper, something like a house, what you have is a bit of analogue information. It's a likeness or representation of something in the real world.

However, depending on the materials you use, changing what you draw can be easy or hard: you can erase pencil or charcoal marks easily enough, and you can scrape off oils and redo them with no trouble; but altering a watercolour picture or permanent marker is very tricky.

That is the wonder of art; it captures the fresh dash of creativity and that's exactly what we love about it. But where everyday graphics are concerned, the immediacy of art is also a huge drawback. As a child will tell you, if you draw the first part of your picture too big, you'll struggle to squeeze other things on the page.... and what if you change your mind about where to put something or you want to swap red for orange or green for blue?

Ever had one of those days where you rip up sheets of spoiled paper and toss it in the bin?

That's the reason why so many artists, designers and architects have fallen in love with computer graphics. When you draw a picture on a computer screen you have some digital information.

It might even look like what you had originally, drawn on a piece of paper but inside the computer your picture is stored as a series of numbers. Change the numbers and you can change the picture, in the blink of an eye or even quicker. It's easy to shift your picture around the screen, scale it up or down, rotate it, swap the colours, and transform it in all kinds of other ways.

Once it's finished, you can save it, incorporate it into a text document, print it out, upload it to a web page, or email it to a work colleague all because it's digital information.

Why CGI?

CGI offers many advantages over live action:

1. The ability to create, control and art direct complex objects (including liquids) that interact in a physically complex way.
2. It allows for precise and impossible camera movements that are repeatable, and that can be adjusted in the post-production process to match unforeseen creative requirements.
3. CGI objects can be easily re-versioned and re-purposed for multiple campaigns and formats.



Building blocks of CGI

There is a misconception that because CGI is created on a computer that it is somehow an automated process; that artists can cut and paste their CGI creations together with relative ease and speed.

In reality the computer is no more functional than the hammers, saws, cranes, excavators and drills that a builder would use to build a house.

Everything that is created in CGI has to be built in a virtual world on a computer in a similar way as a builder would build a house.

There are many different types of CGI, but in assessing the appropriateness of CGI we can break them down into three general categories.

1. Hard physical objects - These are often man-made objects such as products, cars, buildings, furnishings, machinery, but can include some more natural phenomena such as rock and cliff faces.
2. Organic or nature-based objects or phenomena - These include water, mouthwash, trees and bushes, creatures, digital humans, hair, fur, fire and explosions.
3. Character or creature animation - These are fully CG animated characters that can have features that look photo real and human or could have more stylised simple toy like surfaces.



Simple & Complex CGI



Simple CGI - Hard Physical Objects

The general rule of thumb is that the simpler the shape of an object, the simpler the build, which translates to less time and money to create it.

If the object is one that exists in the real world and can be photographed extensively, the CGI artists can use some of these real world surfaces to further reduce computing time and costs.

The majority of hard physical object CGI is quicker and cheaper to execute than the CGI of organic/real world phenomena or the CGI of character animation

Complex CGI - Organic/Real World Phenomena and Character animation

For CGI of organic/real world phenomena such as water, fire, clothing, hair and explosions, as well as for the creation of CGI characters or creatures, a more scientific approach to the CGI must be utilised.

The CGI artist has to use powerful computers and algorithms to recreate the complex interactivity and movement of these objects and phenomena.

These programmes are similar to those used by scientists to analyse the activity in black holes or on the Sun's surface, or that pharmaceutical companies use to simulate the effect of their drugs on human before they move to live trials.

As a consequence, the process requires specialist artists and complex computer programmes.

Cost of CGI

The cost of CGI is directly tied to the complexity of the object or physical phenomena you are trying to recreate and therefore the time it will take for the artist to build it, and to light it.

There are six levels of complexity to consider.

- VFX design, art and creative direction**
- Complexity of shapes**
- Complexity of surfaces**
- Complexity of movement**
- Complexity of interaction**
- Rendering time**

VFX Design, Pre-visualisation, Art & Creative Direction

CGI artistry is a heavily technical and sometimes scientific process, and as a consequence you will need to ensure that the CGI team has a strong VFX design, art and creative direction lead.

Investing time and feedback into upfront VFX design, pre-visualisation and planning will save time and money throughout the CGI creation process.

Pre-visualisations and look development are essential parts of this process. Pre-visualisations are animated grey versions of the full sequences that have not yet had realistic surfaces, or lighting added.

These pre-visualisations will be the blueprint of the sequence. Look development is the design of the final look of the CGI either through concept art of short CGI tests.

Complexity of Surfaces

Symmetrical surfaces are simpler than varied or random ones, because the computer can easily replicate the symmetry. If the shape or detail of a surface is random in nature the artist will have to manually build this detail.

Shiny reflective surfaces are more complex than matte ones because the computer will need to work out how the reflecting light will affect the look of the surface.

The same applies to the surfaces on a character animation. The more photo real you want the character to be the more complex the skin and hair surfaces.

The more complex the surface the more time and more money required to execute it.

Complexity of Shape

The more complex the object whether a static one or a character the more time it will take to model, to add surface detail, and to make it look photographically real.

For instance, the irregular exterior Gaudi buildings in Barcelona such as “Sagrada Familia” will take longer to create than a modern symmetrical flat concrete office block tower.

A CGI character that you want to look very human-like will be more complex than a character with more stylised and simpler body and facial features.

Complexity of Movement

As outlined above organic/real world-based objects and phenomena such as water being poured and character or creature animations will require complex scientific based programmes, as well as specialist artists and will therefore be more costly.

Objects that have a lot of interacting moving parts such as the internal mechanism of a watch, are also more complex to execute than static solid objects and therefore more expensive.

CGI characters are extremely complex given the intricate way the human body, cloth and hair all move interactively.

Complexity of Interaction

Objects colliding in CGI such as two streams of mouthwash, or CGI apples being dropped into a bowl will require physics-based computations that take into account the forces of gravity, momentum and friction that will affect them.

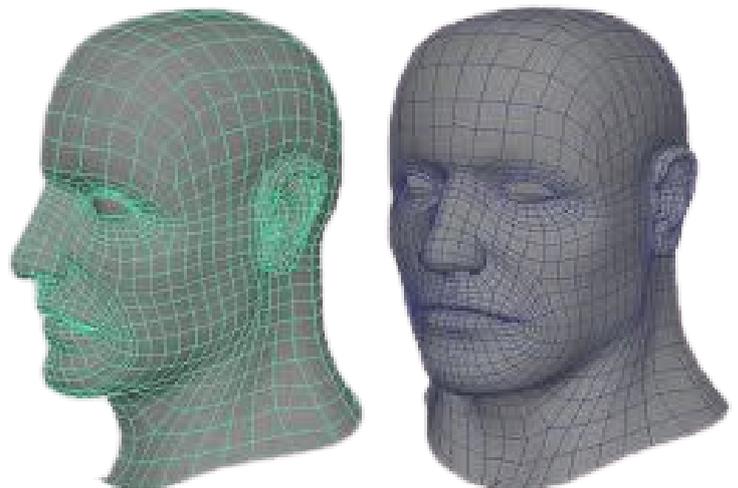
These complex computations will take time for the computer to calculate and may take many iterations (versions) to achieve the required creative result.

Rendering Time

Rendering is the time it takes the computer hardware to physically calculate and complete the animation computing tasks.

The more complex the CGI requirement the longer the render times and therefore the longer it will take for the artists and in turn the recipient to see the fruits of their labour.

If render times are long and a lot of creative changes are required, the delivery time and costs will increase.



Choosing a VFX supplier

Choosing the right supplier for the project is critical. It's not as easy as saying let's go to Post House X because they did a good job for me on my last job.

Agencies in general have very little direct experience of who to choose for the right job, and therefore tend to revert to one of the handful of top end companies they know or nowadays put it through their in-house production agency.

That is very unlikely to be the right route creatively or more importantly financially. There are numerous factors to consider.

A strong well established senior full-time CGI team

Ultimately the quality of the work will be determined by the quality of the CGI artists, however most facilities only retain a handful of senior staff (often one or two) and use specialist freelancers to supplement their team's skills on a project to project basis.

Therefore, the quality and experience of a company's senior artists is critical as they will be overseeing the VFX design, art and creative direction, as well as ensuring that you have the right talent working on the project.

Attracting the best CGI talent

The top freelance CGI artists are in high demand and can pick and choose where they work.

Well managed companies that have a track record of treating staff well are in an excellent position to attract top talent whether full time or freelance. It is often said that a VFX company is only as good as its artists, but as most artists are on short term contacts it is truer to say that VFX companies are only as good as the artists who want to work with them.

Obviously, this is why the bigger and more established companies attract the most work, but it is true to say that there are a variety of smaller facilities in most markets who have globally recognised reputations with artists, and therefore are capable of cost effective international standard work.

The right technology

As CGI creation is heavily reliant on technology, it is important that the supplier has access to the right technology.

Thankfully due to the ease of access of technology via the Cloud (working on software and servers that exist on the internet) even small companies can access additional resources quickly and cost effectively if the project requires it. With the global pandemic forcing artists to work from home, all the major CGI companies now have access to these additional online resources.

Although it's not for you to know what is the right tech set up for the project, it is most definitely appropriate for the production advisor to ask questions about resources: how many full time staff are there, where will the work be done and most importantly who is in charge of QC?

The right talent for the right job

In most companies the senior lead artists are what we call "Generalist" CGI artists which means that they have experience executing a broad range of types of CGI.

Whilst this general skill will be adequate for a lot of projects the more complex organic/nature-based CGI and as well as character animation CGI may need specialised talent.

You should ensure that the CGI company is assigning the right artists with the right skills for the project. If you are unsure about a supplier, ask to see the show-reels of the specific artists on the project. Its amazing how often show-reels are never presented by the creative agency.



The Global VFX market

The level of CGI expertise is generally extremely high across the world.

Most countries will have within their borders all the CGI talent they would require to execute most CGI requirements though there will be some variations as to the depth of that talent.

CGI of hard body (mostly man made) objects can be well executed at a high standard anywhere in the world as it is the most common type of CGI across a wide range of industries including architecture, product design, web applications, gaming, film and TV VFX and commercials.

As a consequence, there is a healthy pool of artists with a reasonable depth of talent and experience in most markets.

The skills and talent required to execute CGI of organic/real world phenomena as well as character animation will vary from country to country due to a smaller talent pool and less experience in smaller markets.

In larger markets there are more opportunities to work on this type of CGI and as a consequence the talent pool is larger and more experienced.

That said there is talent to be found in every market and given enough time, strong project management, co-operative and collaborative supplier working relationship, international standard work can be executed in a lot of the major markets.

As mentioned previously VFX design, art and creative direction skills are critical for CGI success and these skills vary significantly from market to market and company to company.

The main challenge of working with companies in different countries is that these skills can be culturally specific.

Design aesthetics, composition, colour and even the benchmark of photo-realism will vary from country to country.

Having a VFX design lead who understands the target market's design aesthetics is essential.

On top of this, cultural and language barriers, even if they are subtle can also significantly affect creative communication which at the best of time can be challenging to manage.

These issues can of course be overcome in a number of ways, by ensuring the company you are working with has a VFX design lead with international experience, hiring a VFX design lead in the main market to oversee the international CGI work or asking a local market branch or office to execute the work.

Some companies in smaller countries have managed to develop highly specialised skills due to their monopolisation of certain types of work in their market.

Companies such as "Goodbye Kansas" and "Important Looking Pirates" in Sweden are two such companies, the first specialising in creatures and the later in complex organic and nature-based CGI such as water.

Both these smaller companies offer complex CGI that you would normally expect from bigger CGI companies in the major markets such as the US, UK and Canada at rates that are extremely cost effective.

Also, companies in South America and Asia have developed highly developed animation skills for Pixar style CG character animation.



Global VFX costs & savings

A broader study of VFX cost would need to be undertaken to assess the exact like for like cost differences.

As outlined above however these cost differences need to be weighed carefully against each job's specific requirement.

Complex organic/nature based, and character animation CGI may be much cheaper in some markets but the creative issues due to cultural differences, the time it takes, the resources required to manage the process and potential risk of working with less experienced artists, could outweigh the savings.

It would be safe to say for instance, that for complex creative work India and China may be problematic if the work is required for the UK, US and Canada.

Conversely, as outlined above, there are some specific companies in some local markets who have broken out into the international market often due to some specialisation.

Some good examples of ballpark savings are:

UK, US and Canada are the leading VFX markets and their costs are much the same however can vary according to fluctuations in exchange rates.

| | |
|-----------------------|---------|
| Sweden | 20-30% |
| Czech Republic | 20-30% |
| Spain | 10-20% |
| India | 45-55%* |
| China | 50-60%* |
| Ukraine | 40-50%* |
| Mexico | 40-50% |
| Brasil | 35-45% |
| Argentina | 30-40% |
| Chile | 35-45%* |

*You may incur additional international supervision costs.



Top Tips

Invest upfront on detailed concept art or look development. As CGI is a long and slow process it is not very cost-effective to finalise the design and look development as you are executing the work.

For CGI that requires a lot of art direction and design work, it is worthwhile investing in the creation of single frame highly finished design images for the key moments that can be approved prior to starting moving image CGI.

Invest time and resources in visualisation. These pre-visualisations will be the blueprint of the sequence. It is important to completely sign off on the animation and movement of the CGI before making them look realistic as changes animation later on in the CGI process will add more time and possibly more costs.

Ask for a clear approval schedule. It is critical that you know when and what you can change to certain elements of the CGI. The process of building something in CGI is similar to building something in the real world.

Letting builders complete a house renovation and then asking them to move the position of the kitchen is just as expensive in CGI as it would be in the real world. The CGI artist like the builder will need to restart the whole process.

Be aware that some seemingly simple changes to CGI could have a massive time and cost implication.

You may find yourself asking the CGI artists to spend a large amount of time on a low priority small change that could inhibit them from making a more important bigger change for you later on in the process.

Ask the CGI company to help you to carefully prioritise the changes you want to make so that they can invest their CGI artists valuable time into the areas that will help you achieve the requirements.

Good CGI takes time. Forcing artists to deliver work within fixed schedules can yield results, but often to the detriment of quality.

Ask the CGI company for their realistic requirements and then negotiate with them how they might compress this schedule into the deadline without compromising the quality.

You may find that by simplifying certain aspects of the sequence, agreeing to a maximum amount of changes, or increasing the budget marginally to enable more artists to work on the sequence simultaneously, will enable you to make the deadline.

Top Watchouts

◆ ***Organic or interacting CGI such as water or objects that collide into each other, are governed by the forces of nature***

Be aware that if changes defy how these objects would react in the natural world, they may look inherently unreal in CGI.

◆ ***The cheapest quote is not always the most cost effective***

The cost of CGI is directly proportional to the time it takes, but the time it will take is heavily dependent on the experience of the CGI artists and the strength of their design, management and technical skills. More experienced artists can cost more but could work out more cost and time effective if the sequence you require is a complex one.

◆ ***Keep perspective. Be wary of assessing the CGI frame by frame***

It is easy to get stuck on small details that in reality will not make a major impact to the audience's experience or the marketing message of the sequence. Always watch the CGI in context ideally with an audio/music mix even if it is temporary.

◆ ***The bidding of CGI is notoriously difficult***

Besides the fact that different companies use different computer systems and have artists with varying levels of experience that might affect timings and costs, there are also many unpredictable creative factors that CGI bidding needs to account for. CGI companies therefore make a lot of upfront assumptions on aspects of their bid such as the amount of changes you will want to make, or how much complexity or detail you require in certain areas. All of these assumptions will be reflected in their bid. Ask the CGI company to clearly outline the assumptions that they have made in their bid so that you are aware of any constraints and/or limitations you will have to work within, but also so that you can compare one companies costs to another.

◆ ***Choosing the right company***

When looking at a company show-reel it's important that you look at the depth of experience they have had over a number of years executing the type of CGI you are looking for. In this way you can be assured that regardless of the high turnover or CGI artists in the industry, the company will have a deep understanding of what is creatively and technically required to execute the project and can acquire the appropriate resources.

Examples

Here's some examples we've seen recently which demonstrate the varying styles that we love:

◆ **Carlsberg**

<http://astatica.com/portfolio/voronaya-2/>

Prod Co: Astatica Malaysia

Artist: Shi KAI

◆ **Lenovo**

https://www.arsthanea.com/work/lenovo_different_is_better

Prod Co: Ars Thanea Poland

Director: Lukasz Zablocki

◆ **Airwick**

<https://www.youtube.com/watch?v=XvEJfJ9jJ0I>

Prod Co: Builders Club

◆ **Playstation**

<https://www.youtube.com/watch?v=Cj6AUuRs1A4>

Director: Dan DiFelice

Prod Co: Biscuit Filmworks

CGI: Time Based Arts

◆ **SSE Ireland**

<https://www.youtube.com/watch?v=7yLT2odhh6E>

Prod Co: The Mill

◆ **McDonalds**

<https://nikopicto.com/animation-tvc-mc-donalds>

Prod Co: Nicopicto

◆ **Star Sports - Airport**

<https://www.youtube.com/watch?v=4P-zEOX8y4g>

Prod Co: Studio Eeksaurus

VFX Production Companies:

Digital Domain - <https://wdrv.it/72a28d419>

Framestone - <https://www.framestore.com/work/Immersive-showreel>

MPC - <https://www.youtube.com/watch?v=o35luHdrNKY>

The Mill - <http://archive.themill.com/portfolio/2330/house-reel>

Industrial Light and Magic - <https://www.youtube.com/watch?v=19F7fPJenEc>

Biography

Tom Horton

Tom began his career as a Producer and Editor moving into producing music video credits for Sony and Warner Music in Australia. During this time he joined Red Ink Film as Executive Producer and then Co-owner/MD. He then joined VFX House, where he became MD of VHQ; with a move to Singapore for two years for them.

Following, he moved to London to join Post Production Facility SVC, which was later bought by Ascent Media. Next was Saatchi & Saatchi London where he re-launched Triangle Post Production and won Best Music Video at the British Music Awards as well as several D&AD awards.

After several years in roles at Condor Post Production and The Mill he left for Feature films and TV, joining BAFTA and Emmy-Nominated VFX house Men-from-Mars. There he oversaw Academy/BAFTA winning "The Kings Speech" before launching Academy Award winning VFX company Digital Domain (in partnership with Reliance Media Works).

In 2013 he moved full time into production as the Series VFX Supervisor/Producer of "DaVinci's Demons" for which he received an Emmy Nomination and won a Royal Television Society Award.

He has since been nominated for two BAFTA Awards, and a Producer Guild Association Award. His recent projects include "Emerald City" for NBC Universal, Barry Sonnenfeld's "A Series of Unfortunate Events" for Netflix, and "Brave New World" for Steven Spielberg's Amblin Entertainment and Peacock (NBC)



Biography

Pat Murphy

Having successfully graduated with an(Hons) degree in Fine art, Film and Television, Pat started out as a runner in post-production at Molinare in 1984. He then joined the TV Department at Saatchi & Saatchi London working on acclaimed ad campaigns for British Airways, Cadbury Schweppes, & Pilkington Glass.

Pat headed up Radio for the agency before moving to gain experience as a TV Producer for JWT London, JWT Paris, then Leo Burnett Frankfurt working on clients such as Berliner Morgenpost, Kelloggs, Philip Morris, United Airlines and Cathay Pacific.



He joined BDDH as Director of Broadcast Production winning Gold at the British Ad TV Awards and Cannes for clients such as Harley Davidson, Co-op Bank and Emirates. Pat then made the leap to client side where he was responsible for Procter &Gamble's Global (Beauty Care) Advertising Production. He re-joined Leo Burnett as Director of TV in London before leaving to start up Adstream in Europe in 2003.

In 2005 he set up MurphyCobb with inaugural clients PepsiCo, Cadbury and Scottish and Newcastle, all brands of which are still with us today. Pat has also been a pundit for TV and Radio stations such as LBC, BBC, Sky, and he has been asked to speak at major conferences around the world.

Pats major passion is for Radio and he still presents a weekly oldies radio show. He recently was awarded a long service award for charity having been CEO of Whitechapel AM the hospital radio station for the Royal London Hospital and was awarded 'Best Station' in the BT awards in 1998. His other radio stints included Radio Jackie, WinFM, Thames Radio, AFN Europe, BBC Sussex, Chiltern Radio and Ocean Sound.