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Historical Developments

The Multimedia Industry has rapidly developed into one of history’s fastest growing industries; creating thousands of new jobs and aiding those of other industries in creating eminent multimedia presentations and highly functional interactive solutions. The rise of the World Wide Web, created by Tim Berners-Lee and Robert Cailliau in 1990, has caused inflation in work within the Multimedia Industry and has greatly increased the role of interactivity and web design, along with the rise in personal computers and consumer gaming systems in the home throughout the 1980s and 1990s.

3D computer graphics in the Multimedia Industry was initiated by research in the 1960s and 1970s. Martin Newell of The University of Utah created the Utah Teapot in 1974 which has become a standard testing object in 3D computer graphics and was one of the first complex 3D models to be created, and became popular because of the limited library of 3D models with complex topology - as there were no 3D modeling software packages available at the time. The development of 3D modeling software packages allowed graphics artists and architects to create models using a computing system, without physically modeling the object, calculating the positions of vertices in 3D space and entering them into a computer manually. This subsequently expanded the 3D computer graphics industry to advertising, architectural visualizations and film in 1976 with the release of Futureworld – a film that incorporates computer graphics and videography; illustrating the role of computer graphics in film.

The World Wide Web is the term used to describe the linking between documents on web servers over the internet using the principle of client-server communication and was created by Tim Berners-Lee and Robert Cailliau in mid-1990 to early 1991. A user agent (web browser) establishes a connection with a server at a specified address, which processes the client’s request and, in most cases, replies by delivering a web document over the HTTP protocol. Due to the expansion of the World Wide Web across the globe, Internet Service Providers (ISPs) have assumed the job of supplying a service that provides end users access to the World Wide Web, to which a user subscribes. A user is issued a connection to the local ISP exchange where their internet connection is multiplexed to be combined with other subscriber lines through a DSLAM (Digital Subscriber Line Access Multiplexer). The user’s requests are then routed to the ISP backbone through a series of network switches where the user is granted access to the World Wide Web.
The creation of the World Wide Web has subsequently created jobs in the Multimedia Industry for web development, graphics design and software programming. The Web is now at the forefront of the industry and involves many aspects of Multimedia; including: Graphics, programming, design, interactive presentations, digital storytelling / filmmaking and 3D computer graphics – combined to form what is called ‘hypermedia’. Hypermedia is multimedia content that is presented online – such as an online game, embedded video, or an image.

The 1990s initiated the boom in real-time 3D graphics rendering for games, visualizations, medical demonstrations and other Multimedia presentations. The Doom Engine (ID Tech 1) utilized a range of rendering technologies that would operate on most consumer computer systems at the time. In order to increase efficiency, the Doom Engine does not rasterize actual 3D geometry and instead renders ‘segs’ defined in a level file. Essentially, the renderer traverses a Binary Space Partition (BSP) Tree in order to subdivide wall segs so that they may be drawn using a vertical texture painting algorithm. The BSP tree ultimately works similarly to the modern culling technique known as ‘Z-Buffering’, but was designed to reduce memory usage. Due to its efficiency, the rendering engine has a number of flaws; for example, because of the vertical plane drawing algorithm, it is not possible to change the vertical view angle (look up and down) without distorting wall segments. Future developments in 3D rendering lead to the use of texture-baked lighting. This technology allows the producer to calculate the lighting of a scene and have such lighting be projected onto the 3D scene as a bitmap, or a series of bitmaps that can be culled to create shadows. This technique eliminates the requirement to calculate lighting when rendering in real time. This technology is used in many rendering engines today. A technique used heavily from the year 2000 named Ambient Occlusion creates realistic, yet inaccurate soft shadows per-pixel using a depth pass. Geometry with a sharp convex shape will cause the Ambient Occlusion pass to create a dark area. AO is used in many forms of 3D Multimedia presentations, and is not only limited to games, because of its ability to increase the realism of complex geometry at a low processing cost.

Voxels (Volumetric Pixels) are a new method of representing complex 3D geometry which utilize points in 3D space rather than vertices and polygons. Voxels are able to be modified in real-time, making accurate destructible environments possible; however, the use of this system requires significantly more computation power. Loosely, Voxel technology is being used in some modern engines, such as Minecraft which represents terrain with Voxels; however, these points are drawn using polygonal geometry. Rendering using Voxels may become a popular technique, providing that computer processors develop further.

2005 began the popularity of social media applications. It can be seen that YouTube was the first globally recognized social media website – a Web 2.0[1] video sharing community that allows users to upload, share, rate and comment on videos. YouTube was originally created by Chad Hurley, Steve Chen and Jawed Karim in early 2005 because of the difficulty they experienced when trying to share a video. MySpace – created in 2003 by eUniverse became popular shortly after YouTube when it was purchased for $580 million USD by Rupert Murdoch for Fox Interactive in July 2005. MySpace maintained a steady growth in popularity until the rise in popularity of Facebook in 2008. Social media has become a marketing tool for many industries, and a platform for the development and implementation of interactive presentations such as Flash games or presentations such as YouTube videos.

[1] Web 2.0 is a term coined by Darcy DiNucci in 1999 that describes a website that’s content is community-driven; such as a forum or image board.
The development of Third-Generation Computers (the period between 1960 and present) brings the Personal Computer to the home. Developments in graphical user interfaces and display systems, along with advanced computational abilities at high speeds have lead to the creation of multimedia tools such as NLEs (Non-Linear-Editors) and special effects packages for filmmakers, audio generation packages for sound engineers and visual 3D modeling tools, image manipulation tools and graphics design tools for visual artists.

From the implementation of third-generation computer systems in the home, consumer solutions for image manipulation and desktop publishing were soon released, and became popular in the 2000s. Applications such as iPhoto are capable of manipulating images and applying effects. These developments affected the Multimedia Industry negatively as consumers could now create their own Multimedia products without the need to hire a specialist.

The new markup language, HTML5, extends on the existing HTML4.1, adding Canvas and Video tags to name just a couple. This update to Hyper Text Markup Language enables Multimedia specialists / web designers to incorporate interactive presentations and videos without any knowledge of Flash. This could negatively affect the industry because of the redundancy of Flash developers; however, it is important to note that this could increase the possibilities of web development as now, not only has interactivity been implemented into HTML, but support is increased for these interactive presentations as the end user does not require the Adobe Flash plug-in.

Structural Considerations

There are several basic legal standings associated with all industries. These are:

- **Sole Trader**
- **Partnership**
- **Private Company**
- **Public Company**
- **Franchise**

A **Sole Trader** enterprise is a business run by an individual and is not a company. The owner has unlimited liability; meaning they are entitled to the entire profits of the business, but are also liable for losses caused by the business. This model is suitable for business ideas of low risk where a complex business structure is not required, and will only cost as much to set up as the owner can afford: a situation called ‘limited capital’.

A **Partnership** is a business that is run by two or more individuals. This model is usually suited for multiple individuals who specialize in particular fields that will form a part of the business. In some cases, there may be one or more dormant partners who invest in the business but do not contribute to the daily running of it. A partnership agreement defines how the profits / capital is shared among the partners, and how the business will deal with holidays, deaths, the purpose of each individual and other issues. Similarly to the **Sole Trader** model, a partnership has unlimited liability.

**Private Companies** are formed to create a new legal entity, comprised of two or more shareholders who own the company and have limited liability – liability of only the value of the company and not their personal debt. In the case that the company fails, the debt of the company is limited to the capital value of the company. In order to retain this structure, the company must comply with the rules defined in the state’s Companies Act (Corporations [New South Wales] Act of
Because of the shareholders’ contribution of the company, terminating a company is a complex operation that involves privately selling shares. This structure is suited to long term business ideas with multiple individuals involved.

Public Companies are listed on the global stock exchange and are typically suited to private company-like situations that are planned to be considerably larger and more profitable.

A Franchise is a business model that allows an individual to instantiate a business from an existing firm’s company – allowing the owner to benefit from the franchise’s existing success, advertising and reputation. A portion of the profits will go to the owner of the franchise.

Virtuocity is a Partnership that specializes in 3D architectural visualizations and is based in Sydney’s St. Leonards. The roles of both partners are defined in the business’ partnership agreement, where the Creative Director manages employees and directs the creation of 3D visualizations, website, ... , and the Business Director manages the business as a whole, and marketing. The following diagram illustrates the consultative and diverse management structure of Virtuocity International.

```
LS = Lighting Specialist
FS = Flash Specialist
WP = Web Programmer
DP = Desktop Programmer
3D = 3D Modeler
COS = Financial Management
PRO = Promotion
CLI = Clients
H/S = Hardware & Software Purchases
```

![Virtuocity International Management Structure Diagram]
Expanding causes the restructuring of a business to greater increase the efficiency of manufacturing processes by either creating new divisions in the event that the business will expand to a far greater market, and my hiring more employees. As a business expands, its structure will become more dictatorial, increasing the number of layers of authority. The following diagram illustrates the structure of the Australian Broadcasting Corporation which utilizes a highly modularized structure of divisions and a board of directors.

Quality control is the review of the production contributing to a final product. Virtuocity International utilizes Peer Checking when evaluating the quality of a product, whereas a larger and more divisional company will utilize a Quality Control division to perform this checking. Quality control may also refer to the assessment of the quality of services such as customer support or sales.

Marketing & Advertising

Advertising is the act of promoting a product or service via means of broadcast or providing information about the goods on a website or social media page. Advertising generally involves first researching the target market in order to find who may be interested in the product, where they look for their information and effectively, where to post information about the product.

Telemarketing is where the marketing sector of a business uses telecommunications technologies / telephone to persuade the customer to purchase their product. Cold Calling is when there has been no previous marketing done to promote the product and the customer is considered to be unaware of it. This method is considerably difficult as the salesperson must persuade the customer entirely over one phone call. Telemarketing in the area of consumers is generally not
appropriate for the Multimedia industry; however, contacting businesses, such as an architectural visualization company contacting an architecture agent, may prove to be successful.

Expanding the company’s services overseas can greatly increase sales as there is a far larger target market. However, successfully expanding to other countries will require the business to offer a superior service to compete with existing worldwide businesses within the same industry.

Virtuocity utilizes product placement in their services by displaying their company logo in presentations. This form of advertising works successfully as the business trades a specialty service which would likely be of interest to those viewing the presentation.

Advertising on the web is particularly useful within the Multimedia industry as it is possible to utilize a range of multimedia technologies when advertising the service / product. Using an advertising agent such as Google AdSense makes the advert visible only to potential clients, which greatly reduces advertising costs. A service such as a Google AdWords can display the business as a ‘Sponsor’ in Google search results which can greatly increase traffic to the business’ website.

The cost at which the product is offered is influential of the market. A smaller business such as Virtuocity may have difficulty competing with a larger organizations such as the ABC.

Technical Considerations

Repetitive, tasks that may be dangerous for a human to complete and other manual operations are often performed by machines. Mechanisation is where a machine repeats a specific task without dynamically making decisions. Automation is where a mechanical system is implemented which can be used to complete various tasks, and may change its operation based on a set of criteria which is determined by a microprocessor, microcontroller or computer; known as ‘process control’. These systems are implemented to replace humans in performing a particular operation. An operator with specialized knowledge of the machinery may be required to operate these systems. This integration will likely cause the business to be restructured and will cause the job descriptions of many existing employees to be changed.

Mechanical systems can also work to increase the efficiency of a business or to increase the quality of a product through a machine’s ability to repeat a task with a high degree of accuracy. The manager of a business should consider the ramifications and benefits of implementing a mechanical system in their business, assessing productivity, efficiency, OHS and staff morale.

ABC has implemented Robotic Camera Pedestals in their television studios which are used to electronically navigate studio cameras. Similarly, Robotic Panning Pedestals are used by ABC News 24 and Channel 7 for repetitive broadcasts from remote locations, such as weather forecasts, which can be controlled from the Production Control Room. The use of these systems increases the quality of production as actions can be repeated precisely, and reduces the number of personnel required on set, reducing safety hazards.

The implementation of mechanised systems can cause depreciation in work ethic, just as any major change in the structure of a workplace would. Employees will need to be retrained and / or multiskilled in order to operate the new machinery, which they should view as a positive aspect of mechanical integration, as this broadens the employees’ knowledge, increasing the variety of jobs they can perform. In the case that this integration causes the need for some workers to be made
redundant, a retrenchment package must be offered to the employee and / or their union representative with consideration to the employee’s length of service to the business.

Within the Multimedia Industry, rendering a complex 3D image or presentation using a Render Farm may be considered as automation. A render farm is a parallelized network of high performance computers which can be used to render an image more rapidly than a single computer system. The parallelized nature of a render farm allows a client on the network to submit a job to the Distributed Render Spawner which organizes source files to be used by render nodes. In most setups, render nodes will be assigned ‘buckets’ of a defined size. In this way, the network of computers renders its own set of buckets individually (with the number of buckets each machine renders dependant on the number of CPU cores). In the case of real-time rendering, this system may be used to have each computer system contribute to a Light Cache or Final Gather which can allow a visual artist to be given real-time feedback on lighting and other render elements.

Environmental & Sociological Considerations

It is important for any enterprise within the industry to comply with the environmental and sociological standards defined by the business’ local, state and federal government. A business may establish their production building within an Industrial Park, so that they only need to comply with laws set up for that particular zone. If a business is unable to comply with these terms, they will be subject to a large fine issued by one of the three levels of government defined above or by the Environmental Protection Authority (NSW EPA).

Within the Multimedia Industry, the following environmental and sociological issues should be considered:

- **As in all industries, the ramifications associated with Health and Hygiene** are important to consider to ensure the wellbeing of the business’ employees, clients and neighboring businesses. Careful consideration should be taken to ensure that construction of Multimedia computer systems is hygienic, and that materials such as thermal paste are handled correctly.

- **Mostly applicable to businesses nearby a residential zone, Light Pollution** must be considered when operations occur within the business at night and that unnecessary lights do not remain on when the building is vacated. This closely links to power conservation and recycling.

- **Noise Pollution** may occur within the Multimedia industry when a large network of servers operate to perform a task, or when operating power generation / transformer equipment. After discussing the issue with a former Telstra Australia Senior Technical Officer, it was discovered that Telstra has implemented a large array of DC step-down transformers in order to convert an AC power source to the 50vDC carrier signal required for the operation of telephone systems, in all exchanges – creating a considerable amount of continuous noise pollution. Furthermore, in the event that a power outage occurs, large diesel generators greatly increase the level of noise.

- **Access / Transport Issues** are the issues associated with staff / client transport to and from the workplace. In order to reduce emission of toxic fumes, a car pooling plan could be implemented by employees, or if the place of work is close to a bus or train station, public
transport should be considered. It is important for a Multimedia business to be accessible and easy to find by clients; therefore, setting up the business within the Central Business District will greatly reduce transport issues and will likely contribute positively to marketing.

- **Garbage Handling** is an important aspect to consider in the Multimedia industry. Disposal of compact discs, computer parts, electronic storage devices and other electronic media can usually be recycled as long as they do not contain any confidential data. Incorrect handling of hazardous materials may result in a fine which could be detrimental to the future operation of the business.

- **Sediment Control** is the action taken to prevent materials from exiting a site and polluting nearby water sources. This section applies to the construction of a Multimedia business. Failing to prevent runoff pollution may result in a fine issued by EPA.

- **Visual Aesthetics** is a sociological implication that may not only form a negative perspective of the business by the local society, but will impact marketing. Virtuocity has explained that subsequent to relocating, the business experienced a depreciation in new customers, likely due to the aesthetics of the new building. The visual aesthetics of a building affects the overall appeal of an entire area or zone.

- **Height Restrictions** When constructing a Multimedia building such as a studio, the height of such a building must comply with the local height restriction laws.

- **Privacy Invasion** must be considered when constructing a Multimedia building.

- **In a particular zone**, the **Hours of Operation** may be appropriate to consider.

- **Signage Pollution** is not only an environmental and sociological factor. Using a minimal amount of signage increases the likelihood that potential customers will observe the sign and consider its message.

Large and sometimes medium / small projects that may have a considerable impact on the environment or sociological stance of an area will be required to complete an Environmental Impact Statement / Study (EIS). In some situations, specialists may be required to conduct various investigations to assess the environmental impact of the proposed project. It is possible to outsource an EIS to an external business.

Relocation should be considered in detail before the business decides to proceed with this operation. Relocation involves assessing transport issues, available materials / resources, the market and how relocation will affect existing clients, workplace culture / staff morale and so on. Prior to relocating, the business should assess how moving to the new location will affect the employees’ ability to transport themselves to the new workplace. Relocation may involve retrenching some employees, for which they should be granted appropriate redundancy packages, or retirement packages if it may be difficult for the employee to locate new work. The resources available at the new location should be considered. A Multimedia business may need to consider the availability of high-speed DSL, or three-phase power to operate a large number of computer systems. If a certain

An ergonomic and aesthetic workplace that contributes to marketing and advertising, positive staff morale and hence, increased production and quality.
Relocating could cause a loss in returning customers to the business, and/or an increase in new customers. The demographic of the new location should be studied in order to assess whether relocating will damage or improve the sales of the business. Relocating to a larger building may boost staff morale, and inversely. However, if the business expands too greatly, a sense of community may be lost, leading to shaping of the workplace culture, and therefore, the current employees’ morale.

Expansion is when a business builds upon itself to become larger, and may be linked with relocation. Similarly to relocation, the ramifications associated with expansion should first be considered. Upon expanding, a business should consider how this may affect the existing workplace culture, the affects this change may have on the efficiency and production of the business, and the environmental and sociological factors associated with the proposed expanded building. Expanding may cause the company to be restructured. The number of workers and supervising staff will need to be increased, or possibly a new divisional structure will be set-up in order to manage the company’s increased productivity. An expansion due to a success in marketing / advertising will cause a company to expand their marketing / sales division.

A multimedia company may consider one or more of the following aspects when developing to become a more environmentally friendly enterprise:

- Paper usage can be reduced by almost 50% through the use of duplex printers. Staff should consider using white space sparingly when printing large documents. Paper usage can be further reduced by requesting paper usage reports from the supplier to encourage employees to contribute to the paper reduction effort.
- In situations where water usage is a threat to the surrounding environment, restriction filters and water recycling systems may be implemented. Utilizing waste water from a sink that's drain routs to a cistern can help to reduce water usage.
- Waste management can be improved by implementing recycling bins in many locations throughout a workplace. Battery recycling schemes can be implemented to greatly improve recycling in a technology-oriented multimedia business.
- Video conferencing systems can be implemented to reduce carbon emissions due to unnecessary transport.
Personnel Issues

Personnel issues involve industrial relations, Equal Employment Opportunity (EEO), discrimination, unfair dismissal, redundancy and unions. The NSW state government has implemented a range of laws that aid disadvantaged individuals who may otherwise experience difficulty in finding work. Women, members of other races and/or religions, people with a disability and young people may experience difficulty when finding work, which the NSW and commonwealth government attempts to overcome.

Discrimination in hiring employees is protected by Equal Employment Opportunity. On hiring an employee, the employer must consider the applicant’s skills, work ethic and how they will contribute to the business. In the case that the employer is biased by the applicant’s ethical differences, race or religion, they can be subject to discrimination laws.

A business may intentionally employ those who would otherwise find employment difficult. Harvard Law School implies that hiring persons with a disability can improve the performance, work ethic and quality of a business as disabled individuals are described by HLS as generally more focused, highly motivated, have many developed intellectual talents and will increase the staff morale as employees will be motivated by the inclusion of disabled individuals.

Unfair dismissal is a law that protects employees from being dismissed because of an employer’s bias, or due to an unsatisfactory attribute of the employee as an individual. Laying off an employee requires justification to ensure the process is not unfair. Upon considering removing an employee, the employer must formally discuss the issue(s) with the employee through a series of meetings where the employee will be given a chance to improve their performance. The employee will be given assistance in order to improve to the company's standards. An employee is granted a notice period if they are working under a Union Award. In some cases, an employee can not apply for Unfair Dismissal. These cases include:

- Apprentices, trainees, independent contractors.
- Persons on probation.
- Casual employees (in some cases) or employees on a contract.
- Stated by the NSW Industrial Relations Commission: "Employees of private sector employers if dismissed after 1 January 2010"[12].

Redundancy is the dismissal of a worker when their position becomes irrelevant, or if the business is undergoing restructuring / contraction. The employee's responsibilities and status within the business, their length of service, contribution and commitment to the business, how their age will affect the possibility of the employee finding a new job, and their attendance record should be considered in determining an appropriate redundancy package. Workers who may have difficulty finding work in a similar position due to their age should be considered to be issued an early retirement package.

Individual workers / contractors who are not members of unions engage in enterprise bargaining to negotiate working conditions, pay and the like with their employer. Some employers will offer above award conditions (for example, higher pay than defined in a union award) in order to attract potential employees to their business.
Multi-skilling involves an employee learning a set of new skills in order to operate, for example, a new software program as part of their current job. Multi-skilling should not involve an increase in work, and instead should be offered as a greater variety of work. A 3D artist working in a game development company may be required to learn how to operate an in-house tool in order to export their models for implementation by the level designer. Specialization is the utilization of an employee’s strongest talents in a particular field where they will only perform this task.

**Unions**

Since the Industrial Revolution, trade unions have been used to create a common link between workers of any particular industry which aim to carry out the interests of its members such as higher pay, improved working conditions, an increase in employees, OH&S and other topics mentioned above. Unions negotiate these concerns with an employer which empowers union members to be able to acquire their needs within their workplace.

The period between the 1900s and 1920s was when unions grew to act as the voice for employees working in a particular trade; however, not all workers can, or choose to belong to a union, such as business owners, who may belong to their own peak body instead. Contractors are not covered by unions as they will negotiate conditions directly with the employer through enterprise bargaining. Workers who will not benefit from negotiations made by a union may choose not to be a member. Unions within the multimedia industry, such as the Australian Interactive Media Industry Association (AIMIA) offer services to find work for its members.

The terms and conditions defined by a union are negotiated with employer groups in an industrial court where a union award is formed which bounds employers and employees to the rules agreed on by the employers and the union, such as increased pay at the expense of increased working hours. Employees and employers must abide by these terms until the award expires and a new one is formed.

**Occupational Health And Safety**

OHS is a set of guidelines to be followed by employees and employers which aims to improve working conditions by ensuring operations are performed safely and is backed up by a set of fines and legal requirements. OHS was implemented in Australia in 1956\(^{[17]}\) to protect workers from unnecessary danger in the workplace. Workers or families of workers who were injured or died due to practices carried out by their employer would seek great compensation to the point where employers were unable to supply such a resource which caused a reform in the late 1990s.

Workcover is a body that enforces the guidelines detailed in the NSW OHS Act of 2000 through fines and the authority to shut down incompliant workplaces.

Medium and large businesses are required to have a division within the business dedicated to ensuring OHS is being followed correctly by workers, first aid is in place, a correct evacuation procedure has been developed and that the work environment is safe. A business may also contract an OHS consultant who can assess the work environment and state which sections of the OHS Act of 2000 are being breached. These businesses must also employ a trained first aid officer and appropriate first aid equipment on-site.
One of the most accountable elements to injury in the multimedia workplace, alongside ergonomics, is materials handling. In ensuring workers follow materials handling practices / transport of equipment appropriately, these workers must be trained, supervised and provided signage where required. Staff manuals may also be presented to workers to detail the implications of various aspects of the job. This section of OHS is especially relevant to location audio and video recordists within the multimedia industry who must be appropriately trained to handle substantially heavy equipment. Videomaker Magazine has created a video that outlines correct handling of video equipment when producing handheld shots[18].

Multimedia workers in an office or computer lab environment are protected by OHS from poor air quality, eye injury cause from strain or poor lighting and hearing injuries due to loud noise. Sufficient lighting and monitor brightness is especially important for regular users of computer systems.

Management staff should complete a risk assessment when proposing an activity that could potentially be dangerous to workers. A risk assessment points out the risk level of a set of tasks that contribute to an activity, determined by the likelihood a potential hazard will occur, and how serious the hazard is. A hazard of moderate consequence and moderate likelihood will be given a medium risk rating; however, a high consequence hazard of low likelihood will be assigned a high risk rating due to the serious outcome if the hazard does occur. A risk assessment is also completed when new equipment is implemented in the workplace.

Incident reports apply to all trades and are used to document issues that have taken place at work. Accident reports document injuries and are used to prevent future occurrences, aid in insurance and Workcover claims. An accident report details information relating to the incident and is completed as soon as possible after the incident has occurred and should only be delayed a maximum of 24 hours.
The Multimedia Industry
And You

A common aspect of how Multimedia professionals work is the use of stock footage and other elements that can be implemented as a part of a multimedia presentation, to be modified or used as-is in a part of a compilation of video. This stock content is distributed under a license that allows the composer to include the element in their own works, generally while attributing the original author of the content. If a particular Multimedia producer has limited knowledge of 2D illustration, they may consider purchasing an existing stock image, or contracting another Multimedia professional to complete the job; known as outsourcing. Outsourcing involves explicitly hiring an individual to complete a component of a piece of work for the composer of the final presentation. For example, an advertising company may outsource the job of modeling a 3D stadium for a Rugby advertisement. Outsourcing is required when the tools, materials or expertise to compose an element are not available within the production company.

In the production of the major project, I feel that outsourcing components would be irrelevant as these features of the project would not have been completed by the student, therefore disallowing marks to be granted for such components; however, utilizing stock footage could be useful as it would aid in demonstrating skills in working with the content to produce the desired result, such as image manipulation. Some outsourced elements of the major project could not possibly be created by myself, such as the Milky Way HDRI image which would require a year to be spent to photograph the Milky Way across a full revolution of Earth.

Virtuocity have offered to provide their render farm to aid in completing complex animated renders for the major project. This type of outsourcing was considered as the company has not been contracted to develop any particular component of the project, and instead, it is their equipment that is effectively being outsourced. Utilizing Virtuocity’s render farm for renders that could otherwise impact productivity was considered to increase the quality of the Major Project.

In relation to the website: consulting online forums or Q&A websites could be considered as outsourcing after receiving a specific code snippet that would resolve an issue. I see such outsourcing to be closely related to the use of stock content as no specific individual would have been contracted to create such a solution, and the solution would be available publicly. The use of this, or other stock code, could be useful to demonstrate skills in one area, while the stock element manages another area; such as an image resizing script used within a user account system. Similarly, research was done on specific components of the minigame.

CGTextures is a European stock image website that provides an extensive library of orthographic projected textures intended for use in 2D and 3D works. In contrast from a paid stock supplier such as iStock, images are provided under the Creative Commons license – allowing producers to modify / include them freely in their works while attributing the original author.

Hiring audio and video equipment was also considered throughout the planning phase of the major project, especially for lighting equipment. A number of suppliers of lighting equipment were researched over the planning phase, such as Videoguys Australia, John Barry Sales, Ted’s Camera House and Tubetape; however, these solutions exceeded the projected budget. Dragon Image Australia is an AV equipment hire company considered for the Major Project. Dragon Image’s continuous LED video lighting kits were considered for fill and keylighting on chromakey sets.
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