

Introduction to Information Technology COSC2196

Assignment 2: Team Project

Group Fourteen



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Welcome to Group Fourteen



Who are we?

We're a small and focused team of individuals from a diverse range of backgrounds and from many walks of life. We all have one thing in common. We are passionate about technology and we have been since before it was cool. Meet the team and learn more about the talents that power this unique company.

Meet the team

Nicholas Young

RMIT Student # s3793515

[Assignment 1 Profile](#)

“Ever since I was old enough to understand how to use computers, I have been constantly attached to them in some way, shape or form...”



Young in name and in age, but don't let that deceive you. After completing high school Nicholas continued to pursue his interest in IT and studied both IT Networking and Level Design, and is currently studying his Bachelor of IT at RMIT. He discovered his natural affinity for all things IT while still young at high school, when he fixed a troublesome network issue using nothing but research and tenacity. Nicholas has self-taught himself many skills along the way through helping people with their own IT issues, which he then uses as an opportunity to further develop his own knowledge. In particular he has applied his self-learning ability to game level design, which he has pursued for a number of years, and has successfully designed his own levels for games. Aside from his pursuing further knowledge in game design he is also very interesting in developing his knowledge on IT networking.

Lee van den Blink

RMIT Student # s3792973

[Assignment 1 Profile](#)



“I'm incredibly inspired by the design and innovation that is continuously driving the games industry, which I feel runs in parallel with the IT industry and its technology...”

With a decade long history in the vocational education sector, Lee has worked with database management and server management in both small and medium businesses. She is passionate about ‘clean data’ and using data analysis to paint a picture of what is really happening in a company based on the database information. Lee has also rolled out numerous upgrades to IT infrastructure and been responsible for training staff in new applications and software. She was first exposed to computers through playing 80’s adventure games with friends in primary school, and as technology improved her curiosity and involvement with technology has only increased. Being a teenager when floppy discs and dial up internet were still a thing, Lee sees that the world of IT has evolved so vastly and there's so much more to learn, and she wants to learn as much about it as she can. Being that technology and computers have been a part of her life for so long, it's no great surprise that Lee is an avid gamer in her spare time, which is somewhat limited these days as she’s also looking after her young family while working part time. Alongside video games she also enjoys playing netball and learning more about the world through listening to any number of the shows in her massive podcast library.

Michael Seymour

RMIT Student # s3040138

[Assignment 1 Profile](#)

“My interest in IT comes from a life-long interest and curiosity in computers, although I am only now pursuing it with the goal to support myself professionally...”



After leaving Australia 7 years ago on a one-way ticket to travel the world, Michael currently calls Moscow his city of residence, where he teaches English. His main interest is the pursuit of knowledge. A Bachelor of Arts graduate, Michael has continued his education into the IT industry, with a keen interest in learning more about software engineering. Seldom does he have downtime, as when he is not at work, he is often studying university, or any number of other online education. You could say studying is his biggest hobby, as he has completed numerous online courses to further his own knowledge on subjects, including maths, computer science and programming languages. Like many members of Group Fourteen, his interest in IT was first piqued at a young age with the family computer. He has witnessed the speed of evolution of the industry, and now understands that the world of IT has the ability to influence society, seeing first hand the differences between countries that have supported infrastructure, and those that are lacking. A few years ago Michael decided to remove himself from all social media, feeling the intrusiveness and ambiguity of the services far outweighed any benefit. This directly links with his interest in cybersecurity and privacy issues, where he hopes to specialise in his future career.

Cory Atkinson

RMIT Student # s3775626

[Assignment 1 Profile](#)



“Even to this day I believe there is so much more potential in the current 3D art and design market that hasn't yet been explored...”

The seed for the idea of a career in IT was first planted in Cory at the young age of 10, by playing Halo: Combat Evolved on the XBOX. Unlike most other players at the time who just enjoyed the gameplay, Cory was intrigued by more than the game itself, but everything going on behind it: the hardware, the game mechanics, programming, the design. The seed took root and he pursued this interest further and while a teenager he learnt programming and even made his own “terrible 3d Games” to learn more about the craft around his passion. Fast forward to today and Cory passion about game design has only increased. Cory sees the potential for 3D art and design to be better and bolder, and he sees his current studies with RMIT as a big step towards learning more about his passion. His other main interests which he also approaches with passion and creativity are coffee and metal music.

Nathan Christos

RMIT Student # s3788418

[Assignment 1 Profile](#)

“A career in electronics has only fueled my desire to explore the fundamentals of computational processing and machine language...”



Currently based in sunny Queensland where he works with electronic security and surveillance issues, Nathan originally grew up in a farming community in NSW. He was home schooled from a young age and it seems his quest for learning and knowledge was present from his early youth, as he continuously scored well above the curriculum standards. Eventually his natural curiosity for learning crossed paths with IT in the form of his family's first computer. Nathan realised that computers were not magic, but machines, that could be understood and mastered. He has followed this curiosity with IT to a career in electronics, and plans to continue building on his insatiable quest for understanding by studying his Bachelor of Information Technology. Already being involved in electronics through his career, Nathan has many ideas for IT based projects and hope through further study he could bring these to fruition. His strong desire to always improve and master his skills has also been applied to his many and varied other interests which include archery, playing music professionally, being a Kung Fu Master, and being able to solve a Rubik's cube!

Harrison Williams

RMIT Student # s3791005

[Assignment 1 Profile](#)



“My interest in IT has been long running as my dad is very tech savvy, and introduced me to computers at a young age...”

Harrison currently resides in Melbourne, and after VCE completed a year of Bachelor of Psychology, before deciding to pursue his interest in Information Technology, while also working as a baker's apprentice. When he's not rolling dough he enjoys listening to and playing music, reading, and gaming online with friends. His interest in information technology was stirred from youth, and he learned a great deal from his father who was more tech savvy than most, learning about things like running from the command line to use dosbox. This interest grew more in primary and high school, where Harrison found himself being Mr.-fix-it for everyone else's IT issues, thus enabling him to delve deeper into his own understanding of computers and systems. He found a natural affinity with computers, and also learnt he really enjoyed being able to help others and fix their issues. He pursued this interest further and taught himself HTML coding and python language, however baker's hours don't currently allow him much chance to continue this interest. He has decided to undertake a Bachelor of IT, as he believes there is great potential for him to find employment in an area he thoroughly enjoys, with the longer term goals of finding work in areas such as coding, connectivity systems, and servers and networking.

Team profile

Test outcomes

	Myers Briggs	Learning Style	Creativity	Big 5	Problem solving
Lee	ISFJ - A "The Defender" Introverted 64% Observant 51% Feeling 64% Judging 61% Assertive 68%	Auditory/Visual Auditory 35% Visual 35% Tactile 30%	69.64 Strongest: Curiosity Complexity Paradox		
Michael	ISTP-T "The Virtuoso" Introverted 75% Observant 56% Thinking 61% Prospecting 64% Turbulent 71%	Tactile		Openness: 60% Conscientiousness: 42% Extraversion: 33% Agreeableness: 48% Neuroticism: 50%	
Nathan	ENFP "The Campaigner" Extraverted Intuitive Feeling Perceiving	Tactile/Visual			Confident. Approaches systematically, planned decisions
Cory	ISTJ "The Duty Fulfiller"	Auditory		Openness: 79% Conscientiousness: 44% Extraversion: 50% Agreeableness: 73% Neuroticism: 79%	
Nick	INFJ - T "The Advocate" Introverted: 89% Intuitive: 74% Feeling: 51% Judging: 51% Turbulent: 60%	Visual Auditory 15% Visual 60% Tactile 25%	42.69 Strongest: Complexity Persistence Abstraction		
Harry	ENFP - T "The Campaigner" Extraverted – 56%, Intuitive – 74%, Feeling – 90%, Prospecting – 72%, Turbulent – 60% Role: Diplomat Strategy: Social Engagement	Auditory Auditory 40% Visual: 25% Tactile: 35%	Creativity score of 66.43		

Impact of results

Of the 6 members of group fourteen, 4 received results of being introverted, and one of the extraverted members was only 56% on this scale. As we formed early in the process through a Discord chat group based around our shared interest in video games, the application has been pivotal in allowing team members to jump on and off as needed, and leave comments and messages for other team members, so communication may be interrupted but is not dropped. All members have traits that lend them to high and intense focus, so the most efficient way for us to complete the project is a divide and conquer approach. By using the Discord channel, we are able to bridge the obstacles of distance, and the need to meet face to face, provided that the communication continues.

The group will probably work efficiently enough without an outright 'project leader', but would benefit from one or more members stepping in as 'overseers', while still allowing individual a large sense of autonomy towards their own contribution. The team has a wide range of interests and background but also a lot in common, particularly in the areas of IT and video games, and ensuring that communication remains steady and open any issues that arise should be shared without fear of criticism.

Ideal Jobs

	Ideal job
<i>Cory</i>	Game Programmer
<i>Harrison</i>	Infrastructure Manager
<i>Lee</i>	Game Programmer
<i>Michael</i>	Software Engineer
<i>Nathan</i>	Technical Lead
<i>Nicolas</i>	Lead Technical Designer

As our group is made up of many gaming enthusiasts, it's not really that surprising that four of the six ideal jobs listed are linked to the games industry. The biggest overlap in experience requirements are knowledge and experience in development of software. There are many overlapping skills also focused around network administration and knowledge. Five of the six roles listed one or more programming skills, with the exception of the infrastructure manager. This was probably the biggest overall area of overlap of requirements.

Half of the jobs listed also required a formal education (specifically the two game programmer roles, and the software engineer role), whereas the other roles were more concerned with experience in the required skills ahead of listing a required formal qualification (although this could also be implied due to the nature of the previous experience required). Nathan's ideal job of Technical lead had many serverless technologies listed as desired knowledge and seems to be focused on working with the leading edge of the latest technology, which makes it unique in this aspect compared to the other roles. Harrison's role of Infrastructure Manager was the most heavily based in network, virtualization and security and these types of skills would be utilised in a wide number of businesses.

In the area related to personal attributes, the ability to work in a team, and having strong communication skills were paramount to all six roles, which clearly demonstrates that no matter which area of IT you want to be ultimately work in, having great communication and the ability to work effectively in a team are fundamental to your success, regardless of your individual specialisation.

Tools

For this project the main communication and sharing tools used were:

- GitHub
- Discord

Group Website Links

Group website:

<https://groupfourteen.github.io/assignment2/>

Group Git repository:

<https://github.com/groupfourteen/assignment2>

Reflection on GitHub History

Looking at the GitHub commit history does show that most of the group members have submitted work this way, but this isn't an entirely accurate representation of everyone's contribution to the overall project. For example, when the Group Fourteen GitHub website was initially set up all members were logging in as group fourteen, rather than submitting work through their own account as a commit to the master repository. This happened more at the start of the project as we were still learning the best way to use the repository.

There was also a considerable amount of planning and constant discussion in our Discord channel, including sharing content and ideas with each other. As we all like to work autonomously the work was divided up very early on in a Discord chat, and each member then worked on their section. Additional content or ideas on this was usually discussed on Discord, which the author would then use in their write up of their section. This resulted in a close to finished section being submitted to the repository, which may then only require minor updates and collation into the final project website and report. The other thing to keep in mind when looking at the commit history is the thing changed can be minor (e.g. minor spelling corrections), or a submission or a well-researched and completed report or 1000+ words.

Refer to [Appendix 1: GitHub Repository History – Sample](#) for evidence of GitHub commit history.

Refer to [Appendix 2: Group Discord Discussion – Sample](#) for evidence of use of Discord.

Industry Data

Burning Glass Analysis

Nicholas Young

Nicholas' ideal job is to be a Scripter/Level designer for the organization Respawn entertainment, responsible for any successful AAA games such as the Titanfall series and most recently the F2P battleground fps Apex legends.

This job title is in quite high demand, as shown by data collected by Burning Glass Technologies, Graphic designers are among the highest sought after jobs in the IT industry, with just short of 900 listings in this last year alone, however the market for jobs solely in the field of video game design is very tight, as in 2015, it was found that only 6000 jobs were available for the whole year, and for these jobs 89% of them required a bachelor's or higher, and <5% were open to those without prior experience in the field.

For this job, many skills will be required, both generally and specific to the IT field. General skills that may be needed are communication, collaboration and planning as working in a team, especially for a large company working on AAA games, will be essential. Research, time management, detail orientation and analytical skills will be highly sought after by employers to provide a end product that will satisfy the customers. These general skills are good baseline skills to have when seeking a job in the IT sector, as they are all generally well sought after by most employers, however skills such as writing, mentoring and leadership may not be required as it is mostly visual and design based, and there will most likely be a team environment, reducing the need for a leadership position, as they may be better suited to a Laissez-faire style of management.

As for the IT skills required, it may include a knowledge of Scripting languages such as JavaScript, JAVA or python, graphic design and their video game based tools such as the unity or unreal engines or even something like SVG-Edit, as well as skills such as working with windows 10, as it the main operating system for most larger companies, project management and Microsoft Office. The same goes for the IT based skills, as JavaScript is one of the most highly used scripting languages used today. However this job may not require extensive knowledge on database languages and programs, as this job more entails the design aspect of the projects, so things such as knowledge in SQL, SAP and business management are not fully required.

Having looked at the Burning Glass data, has your opinion of your ideal job changed? Why or why not?

My opinion of my ideal job has not changed at all after viewing the Burning Glass data. This is more than likely because the skills required are not those typically required in I.T. focused jobs – though the selection process would be similar. In level design people are generally hired based on their demo reel and portfolio, showing they have the knowledge of the theories and practices of level design and the skills to apply them. Degrees are not necessary, and the tools used to actually build levels can be learned very quickly compared to the time it would take to learn another programming language or another I.T. related system at or to a professional level.

The most relevant things to a level design job in the Burning Glass data are the baseline skills in greatest demand and the experience required. Communication skills are extremely valuable in level design as you will be in constant communication with level designers and nearly every other department working on a game. AAA studios also value planning skills, organizational skills and problem-solving skills as they will all be as relevant to your job as they would be in any I.T. related occupation. Experience of around 3 to 5 years required is also applicable to level design as most AAA jobs prefer applicants who have shipped at least one AAA title, which typically takes around that amount of time to develop.

Lee Van Den Blink

Lee's dream job is to be a game programmer at Bethesda Game Studios, responsible for such AAA games as the Elder Scrolls series and the Fallout series RPGs.

In terms of demand from employers, this position is not very desired, due to how specific this position is and how considerably small the video games industry is comparatively to the entirety of the IT sector, however, comparatively programmers are among the best paid positions within the video game industry. "Available positions for game programmers are expected to grow by eight percent between now and 2026. Multimedia game options are an expectation of gamers, but international outsourcing could threaten the availability of domestic positions."(<https://work.chron.com/requirements-game-programmer-13788.html>)

For the job, many skills will be required by the employer, both general skills and skills specific to the IT field. General skills that may be needed are good communication, problem solving, planning and troubleshooting, for the coding that you are required may have problems that must be fixed, or designs/rules that must be followed, therefore quality assure and control is a good skill to have, as well as to be detail-oriented, have good time management and be adept at multitasking, as multiple projects may have to be undertaken at a single time, meaning durability under pressure

is also a good skill in this area. These skills are extremely useful in the IT industry, as they are in very high demand for many employers, however this job may not require skills such as team work/collaboration or presentation skills, as many programmers may work alone on single pieces of a larger project, as well as creativity, as you may not have the freedom you want to create anything, you may be confined to a specific design you must follow for the organization.

The skills needed that are specific to the IT field are knowledge in programming languages such as C++ or Java, specifically object-oriented programming, knowledge working on game consoles such as PS4 and Xbox One, as these will be the platforms many aim to work on, then also skills such as project management and business process to help in the aspects of game production and development, and services such as Git, to keep track and properly update your projects. These skills are excellent baseline skills for any IT position, as these languages are widely used throughout IT, especially services such as git that allow for a backup and retrieval of code, which will allow bugs and errors to be easily ironed out. This position, however, does not require business wide skills such as SQL or SAP, as you will be working within a project, or multiple projects, but are working within the company, and will not be responsible for any large scale data analysis or storage. Customer service is another skill that will not be needed as you deal with the back end of the game production, the creation of the product.

Having looked at the Burning Glass data, has your opinion of your ideal job changed? Why or why not?

To be honest I'm not 100% sure that my ideal job is fixed. There are a large range of roles in the IT industry that appeal to me, such as working in Software Development, Systems or Data Analysis, or working in Quality Assurance, however the dream of eventually working in the games industry in some capacity remains the same.

I am aware that I'm much more likely to find a role in software programming then specifically game programming, but this would be a great way to earn experience towards my end goal of working in the games industry. Currently I am more focused on learning and experience as I still have a long way to go in these areas. I think my Generic skills are already pretty solid from being in the workforce for 10 years, and I need to focus on acquiring specialised knowledge that will allow me to transfer these skills across into the IT sector.

Michael Seymour

Michael's dream job is a software engineer for GOG Galaxy, a digital distribution desktop application connected to GOG.com that specializes in classic and nostalgic games, while also distributing modern and other AAA games.

This position is moderately sought after by employees in the field, as there were around 540 job listings in the last year, putting it in the mid-range for IT job listings. For the job, many skills will be required by the employer, both general skills and skills specific to the IT field.

The general skills that may be needed are communication, written and verbal, as well as teamwork, as working in a team is essential when working on a big operation such a distribution software. Other skills may include analytical skills and creativity, as well as quality assurance and control, especially when concerned with the software testing and debugging. These skills are excellent to equip you for many IT jobs, as a team environment as well as working on debugging and testing are major parts of many IT roles. This job may not focus on skills such as meeting deadlines and time management, as it may more focus on when-needed fixing or upgrades, that may be more fitted to a "done-when-its-done" nature of work. Multitasking may be another aspect that may not be a main focus, as one main project may be needed to be completed before another can begin.

Skills specific to the IT field are knowledge of programming languages, such as Java or C++, specifically object-oriented design, and even more specifically .net programming and software engineering will be needed to improve, create and fix the websites and programs associated with GOG.com. Knowledge of data services such as SQL and SAP may be required as large database communication will occur with their large library of games, so learning the language around that interaction will be paramount. Technical support and customer service may also be required as you may need to assist customers experiences and/or receive feedback from them to implement into the design or output of your services. Many of these skills, especially the database communication tools such as SQL and SAP are in very high demand in the IT industry, so will be very good skills to have, while knowledge in object-oriented design and programming are also quite high in demand. This may not require use of any graphical design, as that may be left up to another person/ department, as the same may go for business management and business process, as you may just be in charge of the service and site alone, along with how well the service functions, not the business side of operations.

Having looked at the Burning Glass data, has your opinion of your ideal job changed? Why or why not?

Having looked at the Burning Glass data, my opinion of my idea job has changed somewhat. I didn't expect to see SQL so highly valued as a skill, although this does make a lot of sense as Big Data is big business. I would be content to work on SQL databases as much as on gaming projects. I would be satisfied in any role which focuses on software development in the background. I would hate to have to design fancy website landing pages. Anything coding quietly behind the scenes would be ideal for me.

I'm also a bit surprised to see Communication Skills so highly valued, but is it important to make a good impression in an interview as someone people want to work with. There are many people with technical skills, so it makes sense for an employer to seek out the ones who aren't too eccentric.

The desirability for 3 to 5 years' experience suggests to me that it can take this long working professionally in this industry to become proficient. Nevertheless, there is still a lot of demand for people with limited experience. It would seem that as long as you have some experience, you can find a foothold. This is an indication to me to find some IT-related job preferably while still attending Uni to develop as much experience as possible before graduating.

Cory Atkinson

Cory's dream job is a Gameplay, UI or AI Programmer at Obsidian Entertainment, a video game publisher known for the Fallout: New Vegas spin off and many RPGs, such as Tyranny and Pillars of eternity.

These job titles are in very high demand, as it is in the same vein as software developers, and software developers are in the top categories for demand and has the highest amount of people currently employed in the field. For this job, many skills will be highly sought, both general ability skills and skills that are specific to the IT field.

The general ability skills that will be needed are communication, team work and team building skills, as the main area that these positions require is in a team environment, therefore employers will be looking for people that are cohesive to this type of work. A successful candidate may have adept knowledge around problem solving, quality assurance and control and debugging, as a proficiency in fixing any mistakes that will inevitably be made will be very helpful for a productive work flow. These skills will also roll over into being very useful in the IT field in general as these are areas which most IT professionals must work with and around. Skills that may not be required in this title are things focusing on leadership roles, such as management skills and mentoring, as

you will most likely remain under a main supervisor, so major decision making and management will not be your priority, and will not be a necessity in the role.

IT specific skills that an employer may look for in a successful candidate are proficiency in coding languages such as C++ and Microsoft C#, on top of software engineering skills, along with knowledge and experience using game engines such as the Unreal and Unity engines, as these will be the main pieces of software that this role will be working with. The first few skills, programming languages and software engineering will be very useful and make you a very eligible candidate for many IT roles, however knowledge in video game software, such as engines and specific consoles are very niche and will very rarely impact a decision in many other IT fields. Other skills that will not affect eligibility in this specific role are knowledge in organization wide data software's or languages, such as SQL and SAP, and many other business wide related skills, as you will be working in a team environment underneath a leader or supervisor, and these areas will not affect your role.

Having looked at the Burning Glass data, has your opinion of your ideal job changed? Why or why not?

Initially I had believed my opinion of my ideal job would've changed somewhat but that's not the case. I have just become more aware of what skills, characteristics and experience are most sought after in the industry that would more likely result in a higher appreciation by employers and potentially better pay rates. Again, these statistics haven't altered my ideals. I'm infatuated with creativity and though I'd still be very content working for companies on code bases, given the choice, I'd always find myself working for a company developing video games in any aspect - assuming the pay is realistic.

My experience is limited and there is a lot of knowledge I will need to accumulate during my time in the industry before my skills and experience are deemed useful to any developing studios but that is something I'd accepted when I had initially enrolled into RMIT.

Nathan Christos

Nathan's dream job title is a Technical lead at Seventwenty, a consultancy organization that aims to improve the overall effectiveness of businesses by tapping into new and existing talent pools. This job in particular is not in exceptionally high demand from employers, as there would be one tech lead looking over a whole team of designers or developers, which explains why their demand is quite low, however comparatively their need is unmeasurable, as they are the sounding board for their developers, the voice of engineering to other business functions, and make critical technical decisions that can make or break a project.

For this job, many skills will prove useful for the candidate, both general ability skills and skills that are specific to the IT field.

General skills useful for this position include communication, which is almost a requirement in this field, along with decision making and leadership, as your ability to communicate and lead your team effectively and make the correct decisions for the right times will make an insurmountable difference to work flow and productivity. Other useful skills may include planning and building effective relationships, as these skills will be very favourable to the employer. Leadership roles and the skills that entail for them are very highly sought after within the IT sector, as the environments of very many IT roles are quite similar, therefore these skills are among the highest in demand by employers. For this role however, skills such as creativity, research and organizational skills are not as needed as you are mainly in control of personnel and communication between the different teams of the projects, therefore you will rarely be in charge of the creation of code or designs, leaving these skills out of the necessary skill list.

Skills specific the IT field are things like Project management and business analysis, analysis and management, as you will need to accurately and productively control and communicate with your teams within the projects to run smoothly and efficiently. Git and SAP, as you may need to be knowledgeable with the inter-personnel data communication tools for your project to communicate and run effectively. These communication and leadership based skills are highly sought after, as many employers will look for a person that has these skills ALONG with lower based skills like the programming languages and design, as it would allow them to become a higher role if the situation arises, however business related skills, are less highly desirable, and more of an asset based skill to have, as it would not only apply to the field of IT. This being said, knowledge of the actual baseline of data creation through possibly C++, Java or even web design may not be a huge factor for an employer as these would be required of the others within the team on the projects.

Having looked at the Burning Glass data, has your opinion of your ideal job changed? Why or why not?

Reviewing the burning glass data was very thought provoking. I am pleased to see that most of the highly sought-after “generic skills” are areas that I excel in and will also endeavor to refine as I pursue my career within the IT industry. My ideal job aspirations have not wavered as the chosen field is one which could harness my abilities and keep me challenged constantly. Having said this, I can also see similar options in high-demand fields that would suit me perfectly. My long-term goal is to harness my experience in electronics and security and combine this with my eventual degree in Information Technology.

One area I see a huge potential for my future is in machine learning, as I believe this will be in ever-increasing demand; however, this is an area I have no experience in to date but look forward to gaining the required skills needed to experiment in this field. Although my previous career has seen me tinkering in many IT related fields, I feel I am somewhat ignorant to the greater industry and inept at making an accurate assumption regarding my goals for future employment. This fact has become quite clear in my first semester at RMIT, where upon delving into the Java programming course, I have found I am actually quite fond of programming. This has come as quite a surprise and I look forward to finding the other facets I love in this industry.

Harrison Williams

Harrison’s Dream job an Infrastructure Manager at a private advertiser, however the job title is the main attention point as this position would be relatively similar wherever the application was for. This job title is quite highly requested, as many organisations require a person to look over, improve, update and fix problems with their internal infrastructure, and possibly its interaction to a national or even global network. For the job, many skills will be required or sought by the employer, both general skills and skills specific to the IT field.

General skills that will be required for this job will include communication, problem solving, troubleshooting and planning, as this job will entail working with a whole network of devices and if the candidate is not well versed with communicating within a network of people, many problems may go unresolved, or even unspoken, as well as with planning and troubleshooting, as this will improve ability to design and apply enhancements or support of the infrastructure, where creativity may also play a helpful role. All of the skills that would be required for this kind of role are among the highest desired skills for working in the IT field, so having these skills will greatly improve the likelihood of being chosen by employers to achieve the position. Skills that are not within this skill set that are wanted by employers are time management, deadlines and self-starting, as you will be working in a team mainly, and most improvements will be made in an effort to stay ahead and may not be required at a certain time frame.

IT specific skills that are required with this position are project management, systems engineering and software engineering, as these would be essential for managing, improving, updating and planning operations within the infrastructure, with effectiveness and efficiency. SQL and SAP knowledge would be very desirable as well as it would require working around data bases and systems. These skills are also very desirable as many organisations use SQL and SAP for organisation and efficiency, as well as the ability to manage projects and systems. Skills such knowledge with programming languages and web design may be less needed by the employer, depending on where the application is from, as some will not need to use some aspects of these skills, however highly desirable they are to the employers.

Having looked at the Burning Glass data, has your opinion of your ideal job changed? Why or why not?

Having looked through the data collected by Burning Glass, my ideal job has not changed, as the job I liked entails a lot of the skills that are in high demand by employers, and the job itself is also highly valued in-and-of itself. I also believe this role will be sufficiently challenging, engaging and enjoyable, which are much more applicable to me than how desirable the actual job title is. I believe that if my dream position were to change it would come at the end of the learning experience I am undertaking with university, and even as I enter the field, open up doors for myself and view the industry as it comes to me.

Skills Matrix for Group Fourteen

Group 14: Skills Matrix		Game Programmer	Infrastructure Manager	Game Programmer	Software Engineer	Technical Lead	Lead Technical Designer	Skills Requirements Overlap
	Skill Requirements	Cory	Harrison	Lee	Michael	Nathan	Nick	
Qualifications	Bachelors Degree (IT, Computer Science or Engineering)	R		R				2
	Tertiary qualification in IT		R					1
	Cisco, Microsoft, Citrix certifications		X					1
Experience/ Knowledge	Programming in C/C++, JavaScript, Object Oriented	R		R	R	D		4
	Programming in C#	D						1
	Programming AI (Unreal engine, Unity3D)	R			D		R	3
	Programming in shell scripting language	D						1
	Programming in Python				R	D		2
	Programming for mobile (iOS/Android)				D			1
	Programming for consoles (PlayStation 4, XBOX ONE)				D			1
	Programming for Mac OS				D			1
	Debugging skills	R					R	2
	Game/Software development Experience	R		R	R	R	R	5
	Development Portfolio	(implied)		(implied)	(implied)		R	4
	Contribute innovative ideas towards production/development of a project			R			R	2
	Multiplayer game development	D			D			2
	Cross platform development	D			D	D		3
	Specialising engines (networking, physics rendering, level design etc.)	D					R	2
	Modifying/implementing systems	D		(implied)		R		3
	IT Infrastructure Management and admin		R			D		2

	Datacentre Operation		R					1
	Server Virtualization		R			D		2
	Network Engineering and security		R		R			2
	Network protocols and communication (TCP, UDP, HTTP)				R			1
	Linux platform				R			1
	Client-server architecture				R			1
	Web application development					R		1
	API development and software					R		1
	AWS Serverless experience					D		1
Skills	Project Management		D					1
	Work within a team	R	D	<i>(implied)</i>		<i>(implied)</i>	R	5
	Self-Motivated/Strong work ethic	R					R	2
	Excellent Communication skills	R	D	R	R	<i>(implied)</i>	R	6
	Problem Solving Skills	R				<i>(implied)</i>	R	3
	Passion for Games, game services	R		R	R		R	4
	Strong organisational skills			R			R	2
	Ability to work under pressure and prioritise tasks			R				1
	Strong attention to detail						R	1
		Key:		R = Required Skills	D = Desired Skills			

IT Work

The name is Smith. Richard Smith.



When Richard Smith was fifteen years old, he hacked into his school's computer network so he could download movies and games. Richard recalls that he had always been "captivated and mystified by the hacker" and admits that he was "a little bit devious and attracted to the idea of breaking rules".

If subverting the IT controls in his school wasn't devious enough, Richard naïvely downloaded a copy of a text called *The Anarchist's Cookbook* through the school server. Perhaps it might have gone unnoticed by authorities in an earlier age, but this was shortly after the events of 9/11, and Richard remembers that the section titled *How to Blow up your School* "didn't go down too well".

The police were called, and Richard received some "very stern warnings". As penance, he was put to work by his Principal in the school's IT department. The intention was to embrace Richard's obvious talent and put him in the right direction. And it might have done so, had the IT Manager not refused to let the astute schoolboy near the network. Instead, Richard spent a month cleaning dusty computer equipment and lamenting his punishment.

He studied the two available IT subjects at school, and built computers in his spare time, but for the most part found the classroom instruction and text books "quite dry and uninteresting". So, when he was 17 and offered a job in the construction industry paying over \$1000 a week, Richard didn't hesitate. He remembers thinking: "I don't need to go to university for three years; I can go straight to work and earn heaps of money."

Though he now looks back at his choice “with some regret”, Richard also acknowledges that his career path may have been quite different had he made another decision as a teenager. Richard says that the IT industry today is a vastly different—and more exciting—landscape than it was ten years ago. Where he may have once been relegated to the IT Help Desk, Richard is now the very mystical thing he was so captivated by as a young, devious schoolboy. Richard Smith is now a hacker.

Q&A

How did you get into the IT industry?

I was a form worker doing carpentry work at Bond University. Due to the Global Financial Crisis, I was struggling with getting work and getting paid, not to mention the hard nature of the work. I remember observing the older tradesmen and how wrecked their war-torn bodies were; it was Summer, and we were all sweating our guts out. I was looking over the fence into the beautiful green Bond Uni campus at the nice shady pine trees, and I guess I was inspired. Prior to this, I had thought of pursuing a career as a dogman rigger, working with cranes and using my brain a little bit more or possibly even something with computers. The economic downturn and instability with my job was the motivation I needed to make a change, so I enrolled in TAFE to pass the time until work picked back up. After completing my Certificate III, I was less inclined to get back to construction, so I completed a Diploma of Networking and then started a Bachelor of Information Technology. My thought process at the time was aiming to get into cyber security as I always had an interest in this area.

What kind of work do you do?

I am a Senior Consultant and Security Tester for KPMG. Penetration testing is a large part of my job and a very lucrative service our company provides. Usually this testing is a requirement of the end of year financial review. When conducting a penetration test, we will go to the organisation and test their security in terms of their IT environment—rather than their process of people—and look for vulnerabilities or “low hanging fruit”, as we call it. This exercise regularly has a time constraint in which we have to test their protocols, network, servers, and wi-fi, and look for weaknesses in order to break in and get domain administrator access. After the tests are complete, we write two reviews, one summarising the integrity of their security and risks aimed at either the board or audit committee, and the second for the IT manager of the team advising on fixes to made.

Who do you interact with in your role?

Internally within my company, we have Consultants; Senior Consultants; Managers executing a particular engagement; an Associate Director doing client relationships and making sure things are running smoothly; and a Partner at the firm who signs off and checks everything. We will typically have an Audit Committee or a Board of Executives that will engage us to do a particular piece of work, as most audit requests come from higher up the chain than the IT team. This being said, we spend a lot of time interacting with people less knowledgeable in IT such as the Chief Financial Officer, Chief Operating Office, Chief Information Officer, Chief Risk Officer and the Audit Committee, whose goal it is to protect the shareholders' interests.

Where do you spend most of your time?

We have our office on Eagle Street in Brisbane City overlooking the river, which has an agile environment so you can sit wherever you want on the six different floors. We are encouraged to spend time with the client, however this isn't always necessary as I can VPN to the Melbourne lab and test a client's security from my lounge room if I choose. The reason we use the Melbourne lab is so we can nominate an IP address that will be attempting intrusions, plus it has useful tools and processing power available. I work for a national team, so a lot of the engagements will be for example in say Gladstone, Melbourne, Sydney or even Lismore where I was last week, so this usually means getting on a plane and spending a week in a hotel.

What part of your job do you find challenging?

There are a couple of things I find challenging, one being when you have spent days trying to break into a network without succeeding, and you just have to try harder. There is actually a Certificate called the OSCP, which is a penetration testing exam where you are given 24 hours to hack into five different boxes and the motto is "just try harder". That mentality relates to my job because you can't just shrug and say you didn't get in, because the client spends significant funds on hiring you, so you have to give them value for money. The other challenge I face is reporting, which involves mostly articulating the data you have obtained into a language the client can understand. Also, an obvious challenge is completing a thorough test and reporting on the engagement within the time allocated to the job.

Has there been a moment in your career that you rate as most significant?

The work I did in Sydney recently was an important moment in my career as an IT professional. My company's relationship with the client had seen some damage and straight off the bat I experienced hostility with the client's CIO. Until then, I had only assisted with client engagements, shadowing a senior colleague, and now I was left to make good of the bad situation. I was able to exploit numerous holes in their security, gain domain administrator, and demonstrate to the audit committee and the CIO the value of our company all on my own, which was a great feeling. I started with KPMG in the IT auditing division and it has been a slow transition for me working my way into the cyber security division and penetration

testing. Not only the successful completion of this engagement but also the relationship management, has very much solidified my existence within this new position.

How do you see the future of cybersecurity?

This is an interesting question. Members of my team are a little bit concerned as the overall security presence is improving and Microsoft and its competitors are pushing things out that are making it easier to optimise security. Years ago, everyone would have their own third-party security software but nowadays we are pretty much advising people to ditch that and just use integrated OS security, so that's good I suppose. We are actually testing system security much less than we used to in exchange for testing the people and processes through what we call Red Team engagements; that being using methods like phishing, trying to get them to use a compromised USB, or even physically break into a building. I hope it doesn't go that way because I love this role, but at the same time the purpose of what we're doing is to protect. It's interesting that because of cryptocurrency and online trading, everyone wants to get into cybersecurity as well, but at the same time I think it will improve in leaps and bounds. For instance, we're moving towards Azura Cloud, which is cloud-based servers instead of physical servers at a client's premises, and the security is far more advanced than what is available in a localised server.

Aside from what you do, what do you think the best role in IT is, all things considered?

I've got a lot of friends who pursued the developer path; one is working for Telstra now and another for Suncorp, and they have great futures ahead based around their skills. If I had to put cybersecurity aside, I guess I wouldn't go wrong getting into this side of things. I've found that you can really get a job anywhere if you specialise in software development. I'm actually really glad when I hear that kids are learning software development from quite a young age; they can be really creative and build something new and I do believe it is the second language of the future.

What can the average user do to better protect themselves online and secure their information?

It really depends what you are worried about. Disk encryption is a big one; Apple do it, Microsoft do it. Basically, this means that if your machine gets stolen, anything that is in it is safe—unless the thieves are extremely motivated, they won't be able to access what is in there. You can go to the next level and add a PIN to your disk encryption, so when you first turn your computer on you put the PIN in, which hampers people because they don't want to be bothered with that sort of thing. You can run a Password Manager; I have one on my own phone and work machine to protect my personal files.

With regards to being a human in the modern world, how much security do we have?

Google and bank websites are for the most part secure. The communication channel is encrypted, and you know you are talking to, say, the bank server. It is pretty rare with these large organisations for your information to be accessible.

However, every website you visit, every search you make, is monitorable. With DNS requests, those messages are getting sent out to a DNS server and they aren't encrypted; they are plain text. Your Internet Service Provider can basically see everything you are doing. Cookies can also be used to connect the same person as looking at, say, ten different things. So, there is not as much anonymity on the internet as people might like to think.

I know that Malcolm Turnbull set up a metadata program and built data warehouses to actually monitor the online activity of Australians on the internet and stored this data constantly. In December last year, the Five Eyes organisation got together, and they were saying: look, WhatsApp and Facebook etc. are encrypted and we are losing our ability to do our intelligence work. This is not good. So, Australia turned around and said: well we are going to make legislation changes and force these organisations and give us a back door. I haven't heard whether the organisations are complying, but the law was passed so chances are it is underway. Basically, the Government wants to be able to access Facebook and these other encrypted applications if they need to. It is said to be a matter of security, but of course, it also raises questions of ethics.

What are your preferences for operating systems?

I had always used Windows, but when I was at university, I thought I would ask the lecturers what they recommended. They suggested the MacBook, mostly due to usability for coding and because it ran on Unix. Combined also with the fact that Windows Vista and Windows 8 were pretty bad in terms of operating systems, I jumped across to Mac and stayed over there for years, but I am only just now coming back to Windows 10.

Historically, Windows has been renowned for its lack of security compared to Apple – is this because most of the corporate environments are Windows, most of the hackers are targeting these systems?

Yes, that, and because of the price point of Mac as well. I don't want to say anything out of line, but people who are in the countries where the trends of attacks are statistically coming from, don't have the money to afford Mac computers. Mac has also been such a small market share historically, so they haven't been attacked. Because of the widespread usage of the Microsoft platform, they have borne the brunt of attacks, but fortunately this has meant that they now they have defenses to stand up against it.

It has been said that sometimes the security problem is the user, rather than the system. To what extent is this true?

Yes, we do find that often the people operating the technology can be the issue. In my line of work, once we have tested the technology enough and it isn't so easy to get into, we begin testing the process and the people. We do what is called the Red Team exercises—much like a secret shopper—where we try to test physical security. So an example might be where we try to clone access cards; we will put cloning technology in a bag we are carrying and try to get next to someone in a line who has an access card hooked to themselves; we will brush up against them and get it to clone their card and use that to gain physical access to the building.

We also conduct social engineering tests, so we might try to talk our way into a company and test if the security guards will allow us to walk into the building. If I tailgate someone into an elevator or through a glass door that is letting me into their office, or if I was to sit in a meeting room for a week when I wasn't mean to be there, would somebody actually raise the question and stop me? While this itself isn't so much cybersecurity, the idea is to 'hack the humans' so I can then go and plug in a network tap that has a 4G sim card that connects to their network and gives me secure access to their infrastructure. Obviously, this needs to all be done within the boundaries of Statutory Law.

In your opinion, how valuable is information as a resource in today's world?

Very valuable. The basis of my job is to protect and make sure that there are adequate controls around information. I'm not checking the security of these organisations for a vault; there isn't money sitting on the premises. It is 100 percent that they have valuable information that needs to be protected, whether that is trade secrets or databases with confidential details. There are various reasons why it has to be kept secure, but it always comes back to the protection of information.

What advice do you have for someone getting into the IT field?

I think typically you are passionate about this stuff anyway if you are considering a career in IT; it isn't something that you just decide to study one day. But it is constantly changing and evolving; I have done four and a half years of undergraduate study, and postgrad work, and I still just don't stop. You have to continuously learn; technologies are constantly changing, and you can learn stuff one day that you have to let go of the next when something better comes out. You have to be prepared to be dynamic. It is like being in school for the rest of your life; if you have an issue with that, it might not be the right industry for you.

IT Technologies

Small Computing Devices

The Impact of Single-Board Computers, Microcontrollers, and the Internet of Things

With the microprocessor revolution of the early 1970s came increasingly smaller computer technology. Moore's Law predicted a future of computer sizes which must have been unimaginable for early computer scientists working with punch cards on mainframe installations a mere decade or two previously. The world's first single-board computer, that is, a computer built onto a single printed circuit board, was produced in 1976. The MMD-1 boasted a 2MHz processor with 2Kb of RAM. While extremely slow and primitive by today's standards, it was a major milestone in the evolution of computer technology, and a glimpse of what was to come in the following decades.

What does it do?

The current state of single-board computers makes the high-end models almost indistinguishable from laptop computers, at least when compared on technical specifications. Minus a keyboard, monitor, and case, models such as the Udoo x86 Ultra and the LattePanda4G/64GB nevertheless rival the computing power of many laptop computers in a device which can easily fit in one's hand. Current state-of-the-art single-board computers have enough processing power to run Windows 10 and GPUs which can output 4K resolution.

While the highest-end single-board computers are in many ways the equal of laptop computers, they are atypical. The most well-known single-board computer, and one of the most popular computers in the world, is the Raspberry Pi. The most recent model, the Raspberry Pi B+, includes a quad-core 1.4 GHz processor, 1 GB of RAM, four USB 2.0 ports, and HDMI output. Neither overpriced nor overpowered, it is a typical example of the current generation of single-board computers.

Single-board computers are not typically used as desktop/laptop replacements; they are primarily designed to be utilitarian learning tools for computer science and engineering, particularly for students and children to learn programming and develop simple IT applications. They can also be used to function as home media servers, games consoles (running Android or Linux), simple web servers, or mini-PCs.

Another small computing device in a similar vein is the Arduino single-board microcontroller. While not a full computer, it contains many essential components for use in IT projects. Similar to the Raspberry Pi, the Arduino is also primarily used as a learning tool for students and hobbyists. Because of the sensors and actuators featured on the Arduino board, they are commonly used in small projects for detecting temperature, motion sensing, and controlling simple robots. However, they can be used in a large range of other applications. They can be used to upload data to the Internet, or to receive data from sites such as Twitter to display different output.

As time passes, and the technology advances, we can expect to see small computing devices becoming even smaller, more powerful, and cheaper. Smaller sizes of the devices themselves means we can expect to see greater proliferation, and more and more "dumb" household objects becoming absorbed into the Internet of Things. Therefore, we can expect that most ordinary people will own and operate more of these embedded "smart" devices as they become more and more commonplace, especially around the home. Cleaning robots will become cheaper as the market grows, voice-activated doors and other objects will become easier to build and install, and it may become more common to see otherwise ordinary objects, such as houseplants and furniture, with social media pages advising their owners about their condition.

The continually-decreasing size and increasing power of electronic components which drives the laptop industry will likewise impact the small computing device industry. Moore's law predicts that the number of transistors in an integrated circuit doubles approximately every two years; this has held relatively true since the 1970s. Devices can be expected to become smaller, more powerful, and more affordable.

What is the likely impact?

The increase of connectivity and automation in parallel with the increase in the computing power of small computing devices, combined with advances in mobile communications such as 5G, will lead to more information from more sources being delivered to the end user in faster times.

We are likely to see changes inside the home, where home security data could be readily and easily accessible by anyone with a smartphone. Information such as temperature control or home surveillance footage will be available with greater accuracy. Other automation such as remote or RFID-based light control may also become more commonplace.

The most obviously-affected users will be the hobbyists and creators. As the market for small computing devices increases, demand increases and so prices will fall. IT can be expected that the field for creating and producing projects with these devices will also increase.

Other people likely to be affected by these developments will be users with disabilities. Increased sensor-based computing and automation will have a huge variety of applications for users who are unable to walk, type, or access certain areas of the home. While actuated doors, storage ages and movement-activated lights may be a fun toy for most users, they may be essential to comfortable, autonomous living for users who are, for example, confined to wheelchairs. There is always a fear that with greater automation comes job redundancy. While this may be true to some extent, however I don't believe it will be a great concern with regards to small computing devices. Small computing devices primarily operate on very small scales, such as uploading small amounts of data at intervals, or opening and closing doors. The increased demand for small computing devices is far more likely to create jobs, as we can expect to see an increased demand for workers in building the devices, logistics, and tech support in this industry.

How will this affect you?

Day to day, the visible effects of this advance in small computing devices wouldn't be obvious: the embedded nature of these devices keeps them "out of sight, out of mind". The way it is most likely to affect me, and other technology enthusiasts, is in the growing affordability of using these devices as learning tools. As a hobby, developing smart devices with small computing devices seems like the world of science fiction come to life. The main barrier to beginning any new hobby is typically the financial cost; as the cost decreases, the temptation to purchase, tinker with, and create smart objects around the home will become more appealing. The educational value of experimenting with these devices would be a great feature to put on any CV.

Apart from the clear benefit of having experience with small computing device projects, I would benefit by having the completed projects themselves. There are any number of possibilities for projects to create: home surveillance with real-time security footage accessible by smartphone; home weather stations to check the temperature in my home neighbourhood; emergency assistance tools for my parents in their retirement; a voice-activated home media system. With enough imagination, and some assistance from blueprints and guides from the Internet, anyone with the motivation will be able to create an endless variety of projects.

The essential purpose of small computing devices is to increase connectivity in many different contexts; the possibility of greater connectedness with family and friends is undoubtedly a great benefit to all involved. Emergency assistance devices becoming easier to develop and install in order to aid elderly relatives would seem to be an obvious effect of this technology.

The future of small computing devices may represent the next great advance of technology. From fun but frivolous projects to life-changing tools of assistance, the development of small computing devices heralds an exciting, customisable future of technology.

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Cyber Security

In the modern age, society has built up an incredible reliance on technology. People use it to work, shop and communicate with others while Businesses rely on it to operate effectively. Business or otherwise, almost all of our most important and sensitive information is now stored somewhere online. Bank details, addresses, emails – all of it is stored somewhere on the internet, managed by companies that we trust to protect it from people with malicious intentions. This is where cyber security comes into play. Just as locks, vaults, alarms and armed guards protect the physical premises of a building – cyber security has become a crucial aspect of the effective operation and safety of all businesses and organisations with a network or online presence.

What Does It Do?

Cyber security refers to the practice of defending the systems, networks and programs that hold that sensitive information from people looking to gain access to it for nefarious purposes. These offenders who perform attacks on systems are generally out to achieve such goals such as gaining access to information, extortion, identity theft or general disruptive behaviour to whatever degree. There are various means for these offenders to gain access to systems or to extract information out of these systems or even people.

Ransomware and malware for example are types of malicious software also known as a “virus” which allows an attacker access to your computer, though in this case for different means. Ransomware is designed to extract money from victims by preventing their access to certain files or entire computer until the ransom is paid. Malware is software designed to gain access to your computer in order to carry out malicious actions. While possibly the most commonly known, malicious software downloaded to your computer is not the only type of threat users can experience. Offenders can employ a practice known as social engineering – which through deception and trickery, allows them to gain money or access to sensitive information from unsuspecting victims. Similarly, a tactic called “phishing” – the act of sending false emails disguised as emails sent from sources the recipient would generally trust – can be used to gain sensitive information such as bank details or user passwords, generally for the services the phishing email is attempting to emulate.

While practices such as using anti-virus software is effective for the common user, it is not an adequate security measure for businesses and organisations. These entities constantly face much larger and more direct threats from individuals looking to attack their networks for malicious purposes. They must be prepared to detect and prevent threats looking for access to their networks in order to perform actions that could be anywhere from damaging to catastrophic. Currently, there are multiple types of cyber security measures which can be employed by businesses and organisations to mitigate threats and keep their networks secure. These measures include but are not limited to:

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- **Network Security** – Controls incoming and outgoing connections to protect network traffic, preventing threats from entering the network or spreading throughout the network.
 - **Data Loss Prevention** – Classifies and protects important information in order to prevent the accidental or purposeful sharing of said information.
 - **Cloud Security** – A set of security measures that work together to protect cloud-based information and systems.
 - **Intrusion Detection Systems / Intrusion Prevention Systems** – Identifies activities that could be classified as malicious. There are two types of Intrusion Detection Systems, one host based, and one network based. Host based Intrusion Detection Systems are installed on every computer in order to monitor traffic that travels between nodes in a network – such as file access, use and transferral. Network Intrusion Detection Systems are capable of monitoring networks on a larger scale with the purpose of detecting suspicious behaviours and stopping them before any damage can occur.
 - **Identity and Access Management use** – Limits and tracks user activity and access through authentication services in order to protect important systems from malicious activity.

Another security measure which is extremely popular with businesses and organisations in the modern age are Security Information and Event Management systems (SIEM). SIEM systems are important to network and system security as most cyber-attacks are not obvious and are more effectively detected via the log files gathered by the SIEM systems. SIEM could be considered more effective than other types of cyber security such as Intrusion Detection Systems, as while Intrusion Detection Systems are effective at monitoring packets and IP addresses and creating service logs based off of user activity, SIEM combines multiple systems for a broader and more complete overview of cyber security via real time log analysis. Information collected by an SIEM is processed and transferred to management consoles where data can be analysed, and the overall process improved based off of feedback by data analysts.

Artificial Intelligence and Machine Learning also have huge potential for cyber security. Automation will help address the general shortage of cyber security professionals, as they can effectively manage the data gathered by security tools in use by professionals. As for the cloud, businesses who host their services on the cloud can expect the effectiveness of certain types of Distributed Denial of Service (DDoS) attacks to be lessened due to the availability of a Cloud Service Provider's bandwidth and processing capabilities.

The future of SIEM systems may also be on the cloud. The backend of Security Information and Event Management systems could shift to the public cloud infrastructure from on-premises servers. This could be done to account for the massive growth in various types of security data that businesses collect and analyse. This growth in the amount of security data collected means more infrastructure, personnel and operational tasks will be required. Currently, on site Security Information and Event Management system software is priced around the amount of data managed. With the growing amount of data being collected this has caused the price of SIEM software to raise significantly costing businesses more – and not just in money. Not paying for a sufficient capacity can cause valuable security data such as the logs gathered by the SIEM systems to be lost or purged in order to keep the SIEM within capacity.

What is the likely impact?

The future of cyber security is linked tightly with cloud-based technology and artificial intelligence/machine learning. The shift of SIEM systems from being on-site software to cloud based software could mean that it would cost less for businesses and organisations to utilise this technology as it would allow them to effortlessly scale up as required without a need for more on-site infrastructure and personnel. The potential for higher capacity SIEM systems would mean no logs gathered by the SIEM systems would need to be purged – meaning better security for the client. Cloud service providers are also investing heavily in artificial intelligence and machine learning. These developments will naturally be of great use to cyber security practices such as analytics relating to logs gathered by security systems and software.

The impact of these developments is essentially overall improved cyber security for businesses and organisations. More affordable security capabilities for businesses through a cloud based SIEM system combined with artificial intelligence and machine learning analysing data collected by these systems as well as actively tracking and preventing threats on networks should lead to a more secure future. The downside of this development is some in the already barren field of cyber security may find it harder to gain employment – as businesses and organisations will require less personnel to oversee and maintain their security measures.

Other security measures will also evolve to combat those with malicious intentions – though it is important to remember that those who are behind these threats will also evolve to combat security measures as they grow. Businesses should regularly employ penetration testers – ethical hackers who are hired to find weaknesses in security that could be exploited by genuine attackers.

How will this affect you?

Developments and progress in the field of cyber security can only serve to put the mind of the average person to ease. The security of the sensitive information that we provide to various businesses online should be something that people are seriously concerned about, especially considering fairly recent data breaches such as that of Yahoo in 2013, where the personal information contained in 3 billion Yahoo accounts was exposed. Or more recently in 2018, where the personal information of 500 million guests was accessed and copied by a hacker.

Cyber security is an important practice which everyone should pay attention to and participate in, even if only rudimentarily. The average computer user can make themselves safe by using anti-virus software, designed to detect and contain risks to alleviate the threats of malicious software and activity on their computer. Education in cyber safety goes a long way, knowledge on what to do and what not to do online can help prevent users from downloading potentially malicious content from un reputable sources or falling into common traps such as phishing schemes.

Conclusion

Cyber security is now a crucial part of how society in the modern age operates. The vast majority of sensitive information belonging to people, businesses and other entities is now located online in various networks throughout the world. Maintaining data privacy, confidentiality and network security is of the utmost importance and a high standard for cyber security should be upheld by all who have the responsibility of protecting their network – potentially their entire business, as well as their client's data. Current, state of the art and developing technologies should be utilised to ensure that this data remains secure and a watchful eye should be kept on those with malicious intentions to ensure that their security always remains one step ahead.

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Machine Learning

Machine learning is a category of algorithm globally used in the technology industry that allows software to become more accurate in predicting outcomes without explicitly being programmed to do so. Machine learning today is used nearly everywhere; from social media and marketing to more complex areas like autonomous vehicles and quantum machine learning – an algorithm that analyses quantum states rather than classical data.

What does it do?

Machine learning is a form of data training in which software references existing data to produce the most successful results possible for the task assigned while simultaneously improving the model with new results for further accuracy. Machine learning is used in nearly all aspects of the modern world from data analysis for money saving measures and preventing fraud/identity theft to helping the health care industry monitor their patients and identify common trends to potentially improve future diagnoses and treatment.

For machine learning to be implemented a model must first be created using a collection of data which is fed into the relevant learning algorithm to be categorised. This process is called training and forms the foundation of the model. A model is a collection of categorised data that influences the predictions of a program, and as the program continues to make these predictions the model is updated to accommodate more accurate outputs.

It does this by comparing the output (i.e. result) with training data; if the output does not match the intended output, the algorithm is adjusted automatically in attempt to make a more accurate prediction next time. This process repeats as the accuracy increases. Once training is complete, the model created is then tested against data it has not yet seen to evaluate its accuracy

An important part of the process is choosing the right algorithm to create your model as not all are equal; the data set and the intended use will heavily influence the decision.

There are four primary machine learning algorithms today, each with their own characteristics and use cases. These four algorithms are:

- **Supervised** – A model is trained using user input data with a desired outcome already defined. The algorithm must then process any further incoming data, comparing it to the desired outcome and modifying the model accordingly be there any errors or deviations from that outcome. This model can be used for analysing and filtering spam emails, scoring credit and speech recognition.

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- **Semi-supervised** – An algorithm which shares a similar use case to its supervised counterpart. Where it varies is how much initial data the model is fed. A semi-supervised learning algorithm relies more on incoming data to make its predictions and is therefore cheaper to initialise as there is less effort required to produce an initial data set. However, this can result in inaccurate predictions and re-enforced mistakes if left to “self-train” without the necessary supervision.
 - **Unsupervised** – As the name implies, an unsupervised learning algorithm is left to make predictions on its own without training (i.e. It is not given a defined outcome or any input data to work with). As this leaves the algorithm with only incoming data to process, it’s main use is to identify hidden patterns or intrinsic structures within that data. This is useful in applications such as neural networks.
 - **Reinforced** – This type of algorithm interacts with its environment by producing actions and discovering either errors or rewards. The reward in this case would be a positive signal – or feedback – from the environment and the goal for a reinforced learning algorithm is to maximise the cumulative ‘reward’ while ideally minimising punishment. This model is commonly seen in the AI of video games; it helps train them to respond to stimuli and perform certain tasks in game.

As of today, it is commonly agreed among those in the industry that deep learning is state-of-the-art and will remain so until more advances are made. Deep learning is a subset of machine learning that focuses on using neural networks. These networks can take in data inputs, such as images and audio files, and learn from what is being labelled. It is considered state of the art as it is the closest machine learning process resembling how a human brain functions; as a result of significantly improved understanding of the brain and nervous system.

What is the likely impact?

Machine learning and AI has brought many commodities to the public that many could not live without from self-parking cars and personal assistants to advanced photo editing and putting a dancing John Travolta in your living room in augmented reality (AR). But these are only small snippets of the current capabilities of machine learning, and to an extension, deep learning. There is much more to come.

Autonomous transportation is among the most reviewed aspects of advanced AI and machine learning. These vehicles, while not widely available to the average person right now, showcase both the capabilities of current software and its potential growth. The impact autonomous vehicles will have on society will be profound given that the novelty dwindles and prices settle into a reasonable bracket for the general public.

Another aspect that has a heavy impact is health care analysis software. In the past health professionals had to review data manually before making a diagnosis or treating a patient. Now that we have high-performance computing GPUs, provided by companies such as Nvidia, operating as tools for deep learning, real-time insights can be produced which allows healthcare professionals to provide faster and more accurate diagnoses, reduce medical errors, predict adverse reactions, and generally lower the costs of healthcare for both providers and patients.

Lastly, advances in machine learning technologies can help prevent injury in extremely high-risk occupations such as bomb disposal and welding. While both are highly paid, they are both life threatening in their own way. Bomb disposal because of potentially volatile explosives and welding because of the intense heat, noise and toxic fumes emitted from any substances used during the process. Robots are already being implemented in both workplaces but with the progress of machine learning these robots can become much more intelligent and entirely remove the need to put oneself at risk.

These are only a few examples as to what AI and machine learning can do for us as a society.

How does this affect you?

As of right now, machine learning and the AI associated affects almost everyone with some form of modern device. However, some people rely on it more day to day. Some use semi-autonomous vehicles to park themselves when they lack time or patience, some use the personal assistant on their phone or tablet to take care of tasks when their hands are full and some just like the commodities machine learning can offer like smart home security.

Life with these novelties will become very simple. Transport will inevitably become so advanced that cars will be more like personal cabs; eradicating the need for public transport systems. Phones and handheld devices will become powerful enough to perform operations previously thought to be impossible without human supervision, like bookkeeping and automatic schedule updating based on constant audio input. In future the replication of emotions is not impossible, becoming companions with a device that exhibits very life like characteristics; a personality for instance, predetermined by the software or not.

However, these are but concepts. I believe that until it is required to use new technology day to day, it will not have any effects on the way that we live. The exception being the healthcare industry. I intentionally don't make use of the features supported by machine learning outside of movie and TV show recommendations and spam filters so the affect that future applications will have on my life will most likely be insignificant until I see the need to adapt to new technologies because in the context that learning models are used, it affects businesses more than the individual.

Conclusion

Machine learning, deep learning, neural networks and other forms of artificial intelligence have already carved a hole in the industry that continues to grow and evolve as the industry forms a deeper understanding of the human nervous system and advanced algorithms. New milestones are continuously being reached and these achievements mark a new age of technology that will inevitably arrive in the hands of the general public.

With time this process of evolution can radically change the way we live and shape a new future many great minds in the past thought to be a dream.

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Autonomous Vehicles

Self-Driving cars have long been a concept that one could categorize as futuristic. The idea that technology could exist which would allow a person to transport themselves to and from locations without having pay attention to the road at all may seem far off, but in reality, this technology is already well under development - with the ideal product potentially right around the corner. Companies such as Tesla, Uber and Google have been actively developing prototypes of self-driving vehicles and testing them on public roads, in real situations – paving the way for the inevitable presence of autonomous vehicles in our society. It is important to understand just what this technology is, and the impact it may have on society overall.

What Does It Do?

Autonomous vehicles are vehicles capable of self-operating without the intervention of human drivers. They use various types of sensors and software contained within the vehicle to control and navigate the vehicle as it travels to its destination. Current prototype vehicles use sensors such as radar, lasers, high-powered cameras or sonar to actively build and maintain a map of their immediate surroundings – these are the eyes of the autonomous components of the car.

The software counterpart extracts and processes the information gathered by the sensors to determine how the car should operate. This software controls navigation, plotting paths and relaying instructions to the vehicle's actuators which are in control of the car's acceleration, breaking and steering functions which work in tandem with the software's hard coded rules to calculate algorithms that allow for object avoidance predictive modelling. The hard-coded rules also give the car the ability to discriminate between similar looking objects such as bicycles and motorcycles, allowing the car to act accordingly on the road.

There are currently 6 different levels of autonomy when classifying the self-driving capabilities of a vehicle. These levels are:

- **Level 0** – The human driver is in total control of the vehicle. No autonomous functions whatsoever are present in the vehicle.
- **Level 1** – The vehicle is capable of performing some autonomous functions such as breaking and cruise control, however they are only capable of performing these actions one at a time and not simultaneously.
- **Level 2** – The vehicle is capable of performing multiple autonomous functions simultaneously such as acceleration and steering – however, a human is still required to be in a position of control in order for the vehicle to be safely operated.
- **Level 3** – The vehicle is capable of performing all functions for the vehicle to be autonomously operated safely under certain conditions, however a human is still

required to be in a position of control in order to take control in situations where the vehicle is unable to autonomously operate in a safe manner.

- **Level 4** – The vehicle is capable of performing all functions required to self-operate in most conditions. The human driver is not required to be present at the steering wheel while the vehicle is self-operating in these conditions, but they must be able to take over if the situation requires it. The vehicle will attempt to self-park if they can not.
- **Level 5** – Fully autonomous. The vehicle is capable of performing all functions required to self-operate in all conditions, regardless of driver presence or not. This is the ideal level of automation, where features such as steering wheels are optional, and the driver's presence is not required for any driving related operation whatsoever.

Currently state of the art autonomous vehicle technology would be classified as level 2, although a classification of level 3 is estimated to be achieved within the next year, with a level 4 classification following early in the next decade.

What is the likely impact?

The impact of autonomous vehicles on society – both positive and negative – will become more severe as higher levels of autonomy are achieved. Currently at an autonomy level of 2, the impact on society could be described as minimal with the only real impact being speculation on what further impacts autonomous technology could bring. Autonomy levels of 3 and above are where the true impacts of this technology will make themselves known to society.

Laws will need to be made regarding what actions are legal for the designated driver to take while the vehicle is operating autonomously, as driver attentiveness may be key to preventing an accident whether it is caused by the vehicle or another party. It will also need to be legally defined who is at fault when or if the autonomous vehicle gets into an accident that can not be blamed on a third party. Is it the driver's fault for inattentiveness or the vehicle's and therefore the manufactures fault for faulty design? Insurance rules will also be likely to change as the definition of risky driving will be altered, likely to – as mentioned above – driver inattentiveness or something similar.

As the autonomy level increases to the point where drivers in vehicles are wholly optional, self-driving technology will almost assuredly impact the job market as companies will no longer require regular drivers for public transport (taxis, Ubers, busses), and trucks. These people will be made redundant by self-driving technology.

On a more positive side, self-driving technology will allow the regular drivers (or in this case, passengers) in their own vehicles to relax or work at their own leisure while their vehicle transports them from point A to B. It will allow those unable to operate vehicles due to factors

such as disability to be fully mobile and independent without having to rely on public transport or others. It will also reduce the opportunity for accidents caused by human error to occur. The downside of this is more gasoline powered cars on the road will result in more pollution, and more cars in general will see an increase in traffic and a decrease in parking availability at popular locations.

How will this affect you?

The current state of self-driving technology has almost no notable impact on the average person, however this is likely to change as the level of autonomy increases. For me personally, I can not see self-driving cars affecting my life in any notable way until the level of autonomy reaches 5. At that point, my daily life will be impacted primarily by the activities I perform in my car while travelling to and from my destinations.

Assuming a fully autonomous self-driving car is affordable for the average person, I would be able to sleep, eat or work at my own leisure while travelling to and from destinations. Assuming the laws allow autonomous vehicles to operate with no human presence inside the vehicle – I would no longer have to take public transport to locations in the inner city as I could use my own vehicle as a personal taxi, having it drop me off and self-park nearby while I attended to tasks. It could then be called to retrieve me and take me home later on.

A fully autonomous vehicle would also influence my relations with friends and family. Giving lifts to stranded friends would be easier than ever, especially during unfavourable times of day. Designated drivers would also no longer be necessary as a self-driving car could safely take you home regardless of your level of inebriation. My parents could use a fully autonomous vehicle to stay mobile when they are older and no longer able to operate a vehicle at an ideal level, safely giving them a method of transportation that they can use at their leisure.

Conclusion

Self-Driving vehicles will fundamentally alter the way people see road travel. The potential impact that these vehicles have on society should not be underestimated, as current progress on autonomous technology makes achieving a high level of vehicular autonomy essentially inevitable. It is important that focus be put on laws created by people who understand the technology to ensure that safety standards for the operation of these vehicles be held in the highest regard.

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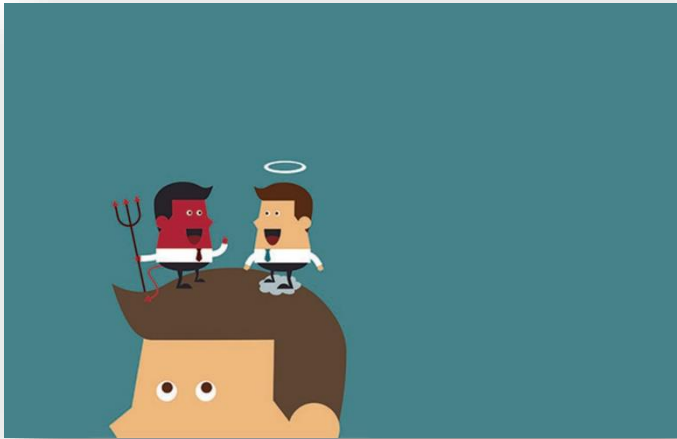
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Project Idea

Open Your Eyes: A proposal for moral choice frameworks in gaming



Moral Choice Systems (MCSs) are by no means a new concept in gaming. A staple especially of role-playing games, MCSs serve to immerse the player in the game world, to add depth to characters, to add replay value, and to facilitate multiple endings. But like all game mechanics, MCSs can be implemented well, or badly. The purpose of this essay is to explore what separates a good MCS from a poor one, and proposes a game with an ideal MCS in place.

Where there is interaction with non-player characters (NPCs), there is an opportunity to bring a MCS into a game. Commonly, moral choices are presented as dialogue options. Alternatively, moral choices may be presented as voluntary actions for the player to perform or choose not to perform. The player might have more than one way to solve a quest. Or, the moral choice may be a factor in how the player behaves in the game world. MCSs seek to add depth and characterisation to NPCs, to add an element of realism, and to trigger emotional investment in a game.

What makes a good or bad MCS?

Rather than adding depth, a poorly-implemented MCS can make a game feel shallow. This commonly occurs when the MCS ultimately leads the player towards only one of two options: "good" and "evil". This black and white approach renders any morally grey choices, or inconsistent behaviour from the player, effectively meaningless: the player will either be rewarded as the great saviour, or maligned as an incarnation of evil, despite any actions or choices they made during the game contrary to the end result.

Worse still, this black and white approach can be taken to an even more shallow extreme when, of the moral choices presented, one is obviously preferred over another. Typically, this leads to the player being punished for freely choosing the "wrong" (evil) option over the "right" (virtuous)

one. Another common problem with poorly-implemented MCS is where the choices a player makes during the game carry little to no weight on the game's ending. What appears to be branching paths and depth of characters is revealed to be an illusion in the final act, and the game's endings are restricted to choices which are made in the final moments.

A poorly-designed MCS detracts from the game experience, and in many cases games with poor examples such as those mentioned above would mostly likely have been better off with cutscenes rather than token attempts at player choice.

A good MCS should affect the outcome of the game in such a way that the player feels like the choices they made during the game carried weight: choices should make the player feel conflicted; there should be no 'obviously correct' path to take to fulfil the game designer's vision of the plot. Alternatively, the player could be confronted with decisions which do not seem to alter the plot significantly, but which add incremental changes to the game experience of the unaware player. In either case, it is generally ideal for the results of the player's actions not to be immediately obvious.

It could be thought that the less intrusive the moral choices are, the stronger the overall effect. An amalgamation of player choices throughout the game, creating subtle changes in the way NPCs react and respond to the player, is far more effective in immersing the player in the game world than an NPC reacting, predictably, badly to an obviously "wrong" dialogue option.

Good MCSs and bad MCSs: some examples

Telltale Games's *The Walking Dead* series are notable examples of games where moral choices affect the outcome of certain situations. However, in many cases these fall victim to the flaw of player choices being rendered meaningless in the interest of plot continuity: where there are sequels in production, there is limited variety in endings so as to avoid a long episodic series becoming fractally complicated. Instead, players may be faced with options which produce little to no difference to the scene but provide an illusion of player control, such as the infamous "[NPC] will remember that" subtext which often appears on screen but rarely seems to carry a strong influence on the plot.



On the other hand, *The Walking Dead* series also features some good examples of moral choice dilemmas: in one scene, the player must choose between saving an NPC from zombies and

sacrificing supplies, or sacrificing an NPC and supplies¹. If the player chooses to sacrifice the NPC, the player then hears that character screaming and dying in the background. It is a good example of a decision carrying weight, and the player being forced to confront the result of their decision. Here, the immediate result of their decision is used in a purposeful way: it is designed to trigger an emotional response of regret and guilt from the player, but also produces invisible results as that NPC can no longer interact with the player for the rest of the game.

The controversy around the ending of *Mass Effect 3* is remembered as a particularly egregious example of player choices throughout the game being rendered meaningless in the last scene². The *Mass Effect* series had established itself as games which incorporated a lot of player freedom of choice and multiple endings. In *Mass Effect 3* however, the fate of the entire universe is decided by dialogue trees in the final scene. All choices the player made up to this point in the game were suddenly revealed to have had no impact on the plot, to the chagrin of the game's fanbase.

An example of a game with a well-executed MCS is the 1999 game *Planescape: Torment*. An isometric role-playing game, *Planescape: Torment's* plot is primarily dialogue-driven, and the player develops the main character's alignment (good, chaotic, lawful, neutral and other variations), and develops the plot primarily through dialogue, although the weight of these



Planescape: Torment. What can change the nature of a man?

choices is rarely apparent. The results of player choices may not become apparent until much later in the game. In many cases, branching paths are not clearly delineated, and the player may be unaware that the plot path they are following is not predetermined³.

¹ Lee Leaves a Woman as a Live Bait for Walkers (The Walking Dead | Telltale Games). (2019). [video] Available at: <https://www.youtube.com/watch?v=H2OgM31qUYU> [Accessed 10 Apr. 2019].

² IGN. (2019). *Controversies - Mass Effect 3 Wiki Guide - IGN*. [online] Available at: <https://www.ign.com/wikis/mass-effect-3/Controversies> [Accessed 10 Apr. 2019].

³ En.wikipedia.org. (2019). *Planescape: Torment*. [online] Available at: https://en.wikipedia.org/wiki/Planescape:_Torment [Accessed 10 Apr. 2019].

In this way, the personality of the main character is malleable, and therefore the reactions and interactions with NPCs also differs with each playthrough. It also means that seeking alternative endings requires more than saving the game in the last room: alternative paths are created by playing the entire game differently, thus the game retains a lot of replay value.

Another example of a good MCS is *Spec Ops: The Line* which, on first appearance, is a typical first-person war shooter. Nevertheless, it implements moral choices and branching paths where the results are not immediately obvious to the player. The player typically will play the game as one would with any typical first-person shooter, but later in the game the player is confronted with the consequences of their earlier actions, thus subverting the player's expectations about the nature of the genre⁴.

Before it became a AAA title, early entries in the *Fallout* franchise, particularly *Fallout 2*, were notable examples of games which encouraged player choice with few restrictions. In *Fallout 2*, the player could play the game in virtually any manner they desired. The player could role play as a purely virtuous character, or a genocidal maniac; *Fallout 3* and further sequels were noted for the inability to kill child NPCs,



Fallout 2. Choose your path wisely.

but no such restrictions exist in the early games. Furthermore, the player could become a slaver, or a pimp, or a variety of other morally questionable occupations in line with the principle of player freedom of choice. These choices, however, all impacted permanently on how NPCs would interact with the player⁵.

⁴ YouTube. (2019). *SPEC OPS: THE LINE (Zero Punctuation)*. [online] Available at: <https://www.youtube.com/watch?v=HNhPMjbgkXA> [Accessed 10 Apr. 2019].

⁵ Gamestudies.org. (2019). *Game Studies - Moral Decision Making in Fallout*. [online] Available at: <http://www.gamestudies.org/0902/articles/schulzke> [Accessed 10 Apr. 2019].

In *Grand Theft Auto V*, by contrast, the player can act morally questionably towards NPCs but the results are not long-lasting: they expire when the player dies, is arrested, or successfully evades police contact for an arbitrary amount of time. Although fun and cathartic, the temporary nature of the MCS in *Grand Theft Auto V* is tokenistic, and does not impact on, or develop, the plot or the characters⁶.

Based on the above examples and others, some criteria elevate a moral choice above others, in terms of player immersion and replay value. These criteria include:

Distinct endings require distinct playthroughs:

Alternative endings should not, for example, be simple variations on one “main” ending with variations of flavour text. A player ought to develop their character differently throughout the course of the game in order to discover significant variations in the plot.

Avoid "good/evil" dichotomies:

NPCs should be written with pathos, and stereotypes of virtue and evil should be strictly avoided. Immersion develops when players feel connected to multifaceted character who possess depth and complexity, as people connect to and sympathise with other people.

All decisions should carry weight:

All decisions and actions the player makes should impact the game in some way: whether it adjusts a background statistic or alters the entire course of the plot, every interaction should carry some weight. The consequences of actions should carry short-term and long-term effects, and these effects may (and often should) conflict with each other: for example, a player may make a pragmatic decision for the short-term benefit but create a long-term detriment. To this end, immediate consequences should be obvious, whereas long-term effects should be subtle. The player should not necessarily be aware that any particular decision has definitively altered the game.

The player must care about consequences:

Moral choices should make the player feel a moral conflict: the player should feel that there are no “correct” options, but rather “actions with consequences”.

⁶ GTA Wiki. (2019). *Wasted*. [online] Available at: <https://gta.fandom.com/wiki/Wasted> [Accessed 10 Apr. 2019].

Saving the game state should be limited:

By restricting the ability to save in the middle of a scene, the player is forced to commit to, and confront, the consequences of their decisions. An alternative option would be to skip to beginning of game chapters (as they are unlocked), and also to maintain a persistent state of autosave (in the style of GTA V). In this way, the player can skip to specific points in the story to investigate branching paths without returning to the very start of the game, while still maintaining the emphasis on living with decision made within these phases on the game. As long as the player is not forced into an unwinnable state (i.e. "dead man walking"), this should produce a suitable balance of player control, and gravitas on player decisions.

With this in mind, we would like to propose a game concept which aims to encompass all of the above points.

The Batavia Mutiny

The 1629 mutiny of the VOC vessel Batavia has been overshadowed by numerous other extraordinary events of the Age of Sail: while it lacks the familiarity of the 1789 mutiny of HMS Bounty, it lacks none of the drama and intrigue. In fact, it dwarfs it in terms of historical significance, and in bloodiness⁷.



A modern replica of Batavia

In designing a game around a true historical event, the shortcomings of artificial MCSs become immediately apparent. Convincing depictions of NPC personalities demand complexity to mirror the people they represent. Even the main antagonist, Jeronimus Cornelisz, had a deep and complex history which saw him develop from a privileged childhood into a man who enthusiastically ordered the deaths of around 100 people.

⁷ En.wikipedia.org. (2019). *Batavia (ship)*. [online] Available at: [https://en.wikipedia.org/wiki/Batavia_\(ship\)](https://en.wikipedia.org/wiki/Batavia_(ship)) [Accessed 10 Apr. 2019].

Even for a man like that, depicting him as a stereotypical evil character would be a mistake; purely evil personalities repel, yet Cornelisz could irresistibly attract people to follow his commands.

It is precisely this paradoxical quality of people which leaves so much potential for exploration in a MCS, if it extends beyond the good/evil dichotomy. The title of this project, *Open Your Eyes*, is based on the etymology of the word *abrolhos*: a corruption of Portuguese for “open your eyes”, or “keep your eyes open”. Appropriate, considering the difficulty in sighting a low-lying reef at sea, but in this case it is also connected to the principle of keeping one’s eyes open to the consequences of one’s actions as well as to the physical danger which the player, along with the other NPCs, will find themselves in during the course of the game. Keeping one’s eyes open to all characters and events is the key to story progression.

Considering the aspects which benefit a MCS, together with this historical event in context, we propose the following features of a MCS in our game based on the Batavia mutiny:

Two distinct Acts	The first Act takes place on board Batavia during the outward journey and ends with the ship running aground. The second Act takes place in the Houtman Abrolhos, primarily on Batavia’s Graveyard (today knows as Beacon Island), but also on Traitor’s Island, Long Island, and East & West Wallabi Islands depending on player choices.
Multiple Stages within the two Acts	Each act to contain multiple branching paths which directly impact on the next Stage. Autosaving at the beginning of every Stage and Act; no saving within a Stage. The player may replay a stage but may not save within a Stage with the aim of immediately backtracking to see the alternative option. In this way, the player is given the change to retrace their steps but must still commit to any choices they make within the game.
Limited Save Points	With this save policy, it is vital to limit or remove any “dead man walking” scenarios where the player becomes trapped in an unwinnable situation. There should always be at least one branching path which can lead the player to the end of the game, and not to a death scene regardless of choice. Although they may not reach the end scene they wanted, it should always, at least in theory, be possible to “escape the room”.
NPCs must be relatable	As all the NPCs are based on real people it should become easier to empathise with them. Based on historical records, we can make good estimations as to the temperament of most of the significant characters in the game, and they should be programmed accordingly. By taking this approach, all NPCs should seem more realistic, leading the player to become concerned for their well-being and feel moral conflicts about the impact of their choices.

Decisions Matter	<p>Decisions the player makes must impact the course of the game on the micro and macro level; as the game is split into two distinct Acts, decisions the player makes in the first Act, i.e. on board Batavia, performing tasks and generating relationships with various NPCs, will directly impact the second Act when the player is stranded on the island. For example, if the player performs routine tasks for the Overmerchant in the first Act, the player may begin the second Act with a reduced standing among the mutineers, possibly putting him or her in danger. However, not performing routine tasks as ordered may place the player in reduced standing with the Overmerchant, and they may miss opportunities to gather important information about mutineers (and opportunities to form bonds with them) which may increase their prospects of survival in the second Act.</p>
NPCs have Intelligence	<p>NPCs should possess some AI which leads them to interact organically with the player and other NPCs. Ideally, this will be based on something similar to the Big Five personality traits, with individual characteristics increasing or decreasing in strength throughout the course of the game as they are influenced by game events and player actions.</p>
Multiple Distinct Endings, including:	<ul style="list-style-type: none"> ▪ The player is murdered (although this must be signposted); ▪ The player survives without joining any faction; ▪ The player joins the mutineers and is ultimately hanged on the island after the rescue ship arrives (as the most serious offenders historically were); ▪ The player joins the mutineers but avoids punishment (as, historically, some did); ▪ The player joins a faction of marooned soldiers on another island and defeats the mutineers after the rescue ship arrives; ▪ The player joins the marooned soldiers but is defeated by the mutineers; ▪ Finally, as an alternate-history 'Easter egg ending': the player joins the mutineers, defeats the soldiers, commandeers the rescue ship on arrival, and survives to become a pirate. This ending, however, should be extremely difficult to achieve as indeed it would be, fighting off two larger factions simultaneously.

It is our belief that, with the right story, characters and setting, a MCS can elevate a game dramatically. In basing a game on a historical event, natural humanity comes into the game as one surely wants to treat the memory of those involved in such a traumatic event with respect.

With the knowledge that real, ordinary people experienced this event, it brings the event to life once more through the game: placed in the same situation, would you do everything it takes to survive?



One of several mass graves of the Batavia mutiny. Beacon Island, WA.

Citations & Acknowledgements:

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Reflections

Refer to [Appendix 1: GitHub Repository History – Sample](#) for evidence of GitHub commit history.

Refer to [Appendix 2: Group Discord Discussion – Sample](#) for evidence of use of Discord.

Individual reflections

Nicholas Young

During this group project I felt that our group's organization skills and work output was very good with little in the way of ways to improve outside of possibly some minor ways we could have had structured our communication a little better – though this was no issue in our group as our communication overall was generally on point. I was surprised by the fact that we ran into no major problems as my experience with group work in the past has been somewhat negative. Any potential issues were avoided thanks to our communication which was assisted greatly by Discord which gave us an always-open line of communication to each other which we could use to talk or ask questions at any time.

Something I learned from this group project was how a good communication tool could make things a lot easier. Prior to this assignment the last group assignment I did was done almost completely through organized skype sessions, and we had barely any ways of communicating with each other out side of those sessions which inevitably lead to problems. Good communication tools let you tackle problems and get work done with others whenever and where ever, leading to a more effective group overall.

Lee van den Blink

Personally, I feel that as our group came together around the start of the course (just after week 1), we had time to get to know each other early, and we all shared a common interest and passion for video games. Well before assignment 1 was due we'd had discussion on ideas for our group project. By the time we were sharing our profiles we were already pretty familiar and supportive of each other.

The dividing up of tasks was really seamless and the project started moving early. It was really fortuitous that each person was confident enough to take a section and work on it independently, and any additional collaboration required was done through Discord.

If I had to say one thing that could be improved it would probably be as a group we all were unfamiliar with GitHub, and it's possible we didn't use this application as effectively as we could, mainly through a lack of familiarity.

Overall I've really enjoyed the project, and getting to know my team through the group chats on Discord. We had people in different states and countries, and people working all sorts of different hours with different life commitments, but having the Discord chat as a landing point for everyone made the communication pretty easy as it made it easy to get up to speed on where things were at. Honestly I was surprised we were so cohesive as a group considering all communication was purely Discord. I'm excited to work on the next task with my team, and I think we've put together a great assignment!

Michael Seymour

I've been very happy with the way we've worked as a team. There are six of us, all scattered around different places and in different time zones, and we've kept in touch almost daily for updates on the project, or simply to have a friendly chat on unrelated things. Everyone has made regular submissions to our Github page, although finding this information hasn't always been easy. Nevertheless, I am confident that everyone has been pulling their weight.

Our group is spread across time zones, myself being the furthest away, so I've often woken up to find long conversations have occurred and I've had to spend some time piecing together what I've missed. Ideally, the group would be more cohesive if we were all geographically closer together. Overall I still think we have communicated well.

What's surprising is that even without a clear leader, everyone has, at different times, spoken up during one conversation or another to guide the conversation. The group has a good dynamic and I believe that everyone feels they can speak their mind without feeling restricted or embarrassed.

I've always preferred working independently on projects, mostly out of concern of dealing with group members who didn't contribute adequately. However, I've learned that a friendly group with a good dynamic and strong work ethic is a great benefit. Writing a lot of text is an exhausting process and everyone has been of great assistance to everyone else in proof-reading and editing. It has been a pleasant surprise and a great experience to feel like part of an efficient and successful team.

Cory Atkinson

Throughout this group project I've seen great form in organisation and cooperation between members. There were no substantial indifferences with one another making it very easy to communicate while sharing ideas and concepts, and making group decisions. I feel there weren't any tertiary issues as a group either; though there are time zone differences between some members we have had no issues with completing work and keeping in touch thanks to the ease of use with Discord. Being able to drop into chat at any point in time really mitigates the issue of falling behind topic or losing past conversations; it's all semi-permanently logged in server chats.

As such this experience as a group has really shown me how important communication and a good medium for communication really is. Without it organisation would be extremely difficult and would be detrimental to work flow.

I feel there is still more room for improvement for myself. Learning to use Github has been my greatest hurdle and had I initially shown more interest in its use and application I may have had less issues with it. This will be something I keep in mind in future when I'm presented with different obstacles or scenarios I don't fully understand.

Nathan Christos

The two words that are enough to strike fear into the heart of every university student: group work. Scarier still, group work with people who live in different time zones, and with different work/life schedules. Despite my cynicism, the semester clock waits for no one, and so I was quick to initiate myself into a partly-formed group. Fortunately, said group welcomed me, and we were soon underway with discussing the assignment and distributing tasks. This prompt and smooth beginning gave us a comfortable time frame for the assignment's completion, assisted by our shared keenness to get started.

We found that there was no real need for an official leader (other than Lee's great administrative coordination); every group member was self-motivated and contributed their designated share to the assignment. Phew! The pessimist in me relaxed slightly. The group greatly benefitted from the use of the Discord chat, which enabled us to communicate effectively despite our varied locations. This technology eased my earlier concerns around coordinating schedules, and I came to more fully appreciate the benefit of several minds working together on a shared goal. More so, I found great value in being able to discuss the course, and broader degree generally, with fellow students. While online study is great for access and flexibility, there is the danger of isolation. This group assignment has given me the opportunity to connect with others, and for us to share our questions/concerns/achievements with one another.

























Harrison Williams

For the group project for the assignment 2, group 14, I felt that we had very good communication and team work skills overall, and produced a great work ethic throughout. As we all had the same interest coming into the project, I believe this greatly improved our communication abilities and improved our team work ability. I felt that no major problems were met in our group during our work, due to our communication through Discord, and always keeping each other informed and up to date on where we were and how everything was going, along with everyone's roles and what needed to be done and when.

This group project has shown me that a good open-line of communication can make all the difference when it comes to a groups effectiveness and work flow, and that when everyone has a mutual interest it can also improve the groups cohesion and work effectiveness, especially on a creative endeavor, as it can reduce clashes and speed up work efficiency. Due to my work I feel I could have been slightly more communicative and have more input, which I will have to work on and improve in further work.

Appendices

Appendix 1: GitHub Repository History (Sample)

Branch: master ▾		
Commits on Apr 9, 2019		
Draft Up For Machine Learning Report Attikins committed 4 days ago ✓	 a9da6b2	
Update cory.html ... Leevdb committed 4 days ago ✓	Verified  09504b2	
Update mike.html ... Leevdb committed 4 days ago ✓	Verified  e6ef015	
Update nick.html ... Leevdb committed 4 days ago ✓	Verified  40949e3	
Update project-moralchoicesystem.html mdncb committed 4 days ago ✓	 e920f40	
Merge branch 'master' of https://github.com/groupfourteen/assignment2 mdncb committed 4 days ago ✓	 d537e85	
Create project-moralchoicesystem.html mdncb committed 4 days ago	 03865fa	
Update Ideal_jobs_comparison.docx ... Leevdb committed 4 days ago ✓	 a3110dc	
Update Interview.docx Leevdb committed 4 days ago ✓	 1393b06	
Commits on Apr 8, 2019		
modify-interview atamosmusic committed 5 days ago ✓	 4839dcf	
add-interview atamosmusic committed 5 days ago ✓	 0789255	
webpage-modify2 groupfourteen committed 5 days ago ✓	Verified  8837e2c	

Appendix 2: Group Discord Discussions (Sample)

