Big Potato

Team Big Potato

Presents World First Orchid Identifier App

Orch.ID

COSC2196 Assignment 2

Cameron Bell	Group 04 SP 2 2020	Kylie Davies
Angelyn Quilaquil	Matthew Lomas	Dylan Palmer

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Introduction to Team and Profile – Team Big Potato

We are Team Big Potato: a team of five RMIT students who have come together to examine some key questions around opportunities and threats in today and the future's IT industry. We have completed studies of facets of the IT industry over the last few weeks including tools, technologies and specific niches within IT. We enjoyed the opportunity to interview Dr Mel Griffiths, PhD, a knowledgeable Cybersecurity expert and Security Operations Manager at Sapien Cybersecurity.

Together we are developing a Project Idea, to launch an engaging, informative Orchid Identification app, Orch.I.D.

This comprehensive report starts with some detail around us as a team and individually. It then details the results of our collective deep dive into IT issues. Towards the latter end of the report we will elaborate on some detail of the features, required technologies and skillsets required for our project idea. Note: To see our individual photos please visit our website.
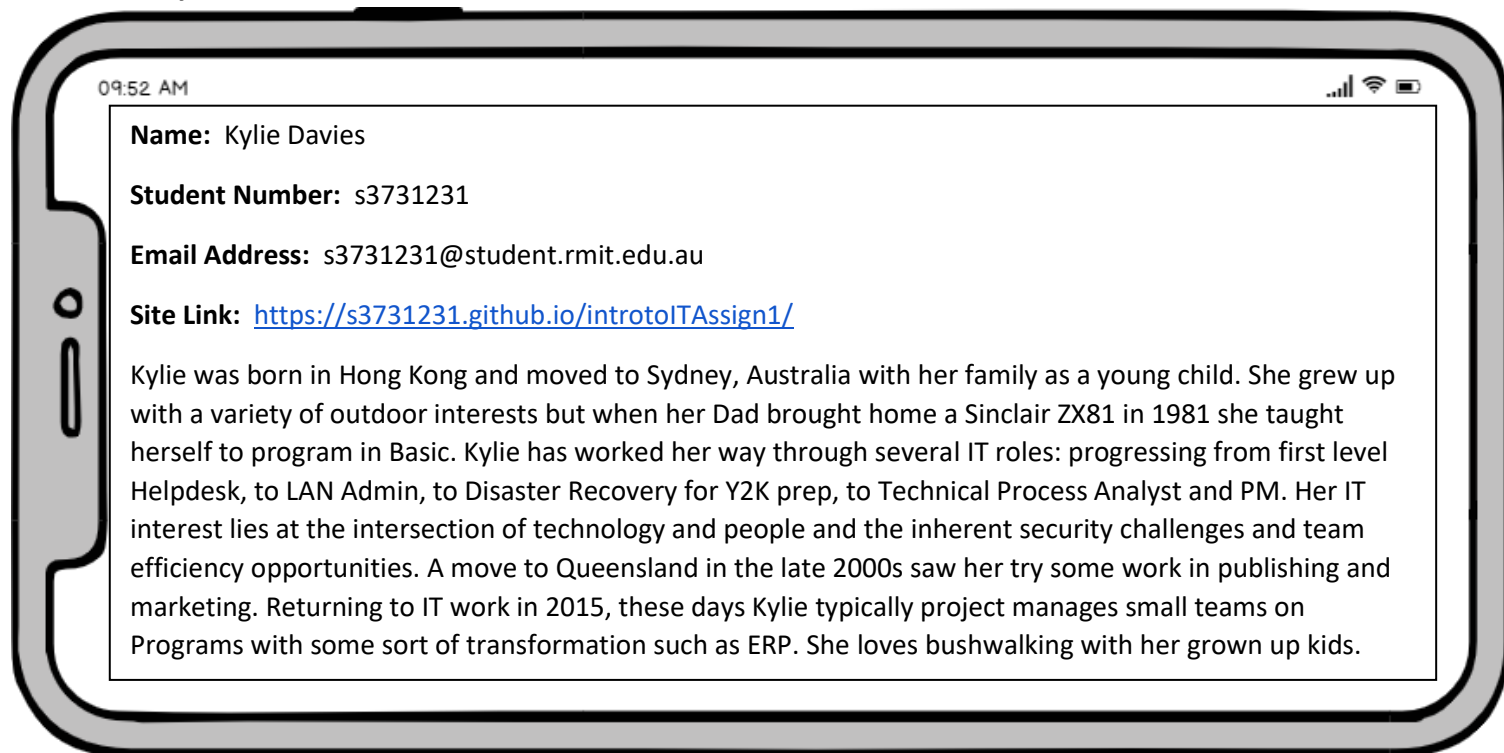
Team Members:

1. **Cameron**

09:52 AM

Name: Cameron Bell

Student Number: s3862773

Email Address: s3862773@student.rmit.edu.au

Site Link: https://suzmot.github.io

Cameron was born in 1980 in Brisbane, Australia. He lived most of his life in Queensland and just recently (end of 2018) moved to Tasmania to open a business in the beauty industry. Prior to that, Cameron was in the IT industry, having worked for over a decade as an executive on a Domain Name Registrar, a Drop Catcher, A PPC search engine and an Affiliate Network. During this role, he picked up some technical skill in mySQL and basic front-end Development, however he would like to expand this and become a real, technical expert. Besides work, you can find Cameron hiking, camping, renovating, riding his motorbike or exercising with his dogs. Cameron suggested the team name idea for "Big Potato" and can't wait to see it become a household name across the world.
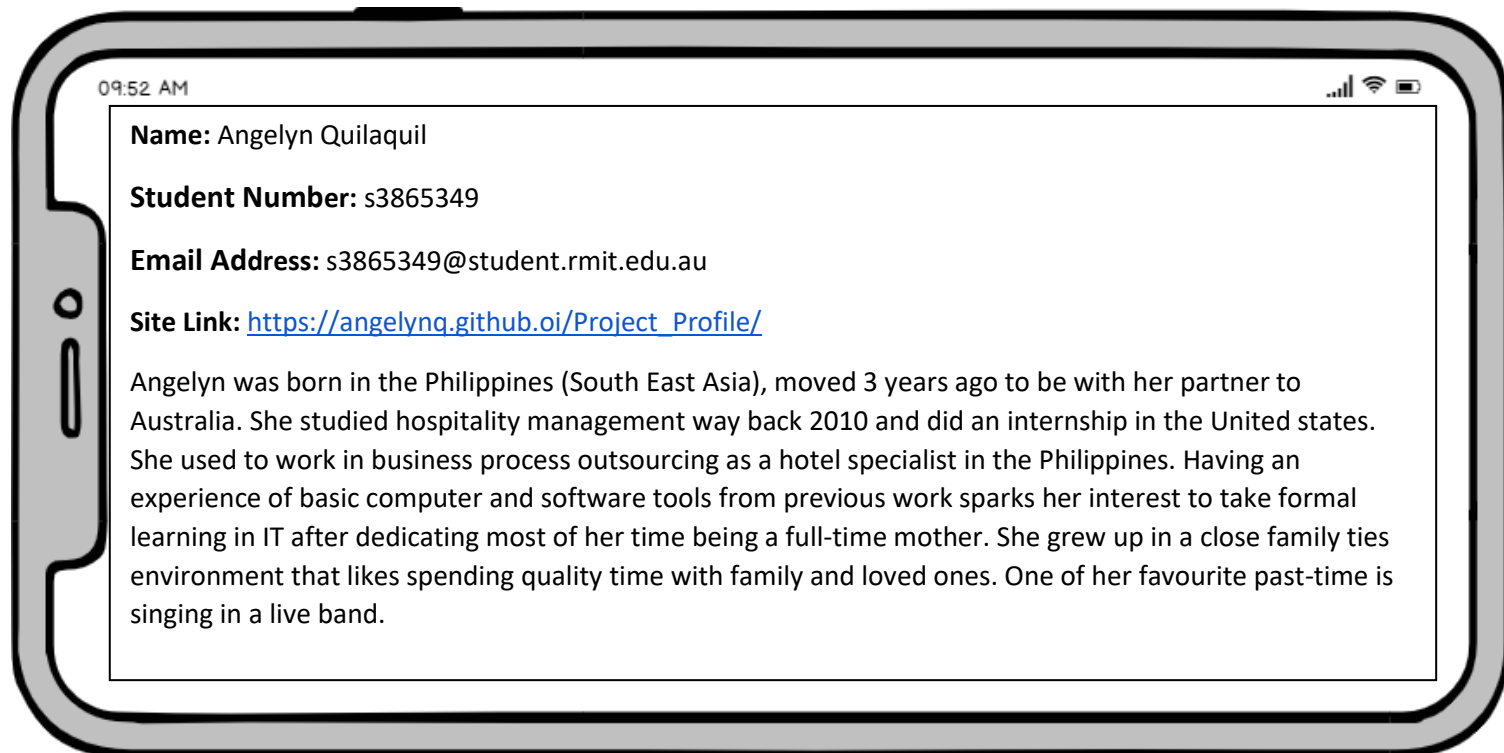
2. Kylie

Name: Kylie Davies

Student Number: s3731231

Email Address: s3731231@student.rmit.edu.au

Site Link: https://s3731231.github.io/introtoITAssign1/

Kylie was born in Hong Kong and moved to Sydney, Australia with her family as a young child. She grew up with a variety of outdoor interests but when her Dad brought home a Sinclair ZX81 in 1981 she taught herself to program in Basic. Kylie has worked her way through several IT roles: progressing from first level Helpdesk, to LAN Admin, to Disaster Recovery for Y2K prep, to Technical Process Analyst and PM. Her IT interest lies at the intersection of technology and people and the inherent security challenges and team efficiency opportunities. A move to Queensland in the late 2000s saw her try some work in publishing and marketing. Returning to IT work in 2015, these days Kylie typically project manages small teams on Programs with some sort of transformation such as ERP. She loves bushwalking with her grown up kids.

3. Angelyn

Name: Angelyn Quilaquil

Student Number: s3865349

Email Address: s3865349@student.rmit.edu.au

Site Link: https://angelynq.github.oi/Project_Profile/

Angelyn was born in the Philippines (South East Asia), moved 3 years ago to be with her partner to Australia. She studied hospitality management way back 2010 and did an internship in the United states. She used to work in business process outsourcing as a hotel specialist in the Philippines. Having an experience of basic computer and software tools from previous work sparks her interest to take formal learning in IT after dedicating most of her time being a full-time mother. She grew up in a close family ties environment that likes spending quality time with family and loved ones. One of her favourite past-time is singing in a live band.

4. Dylan

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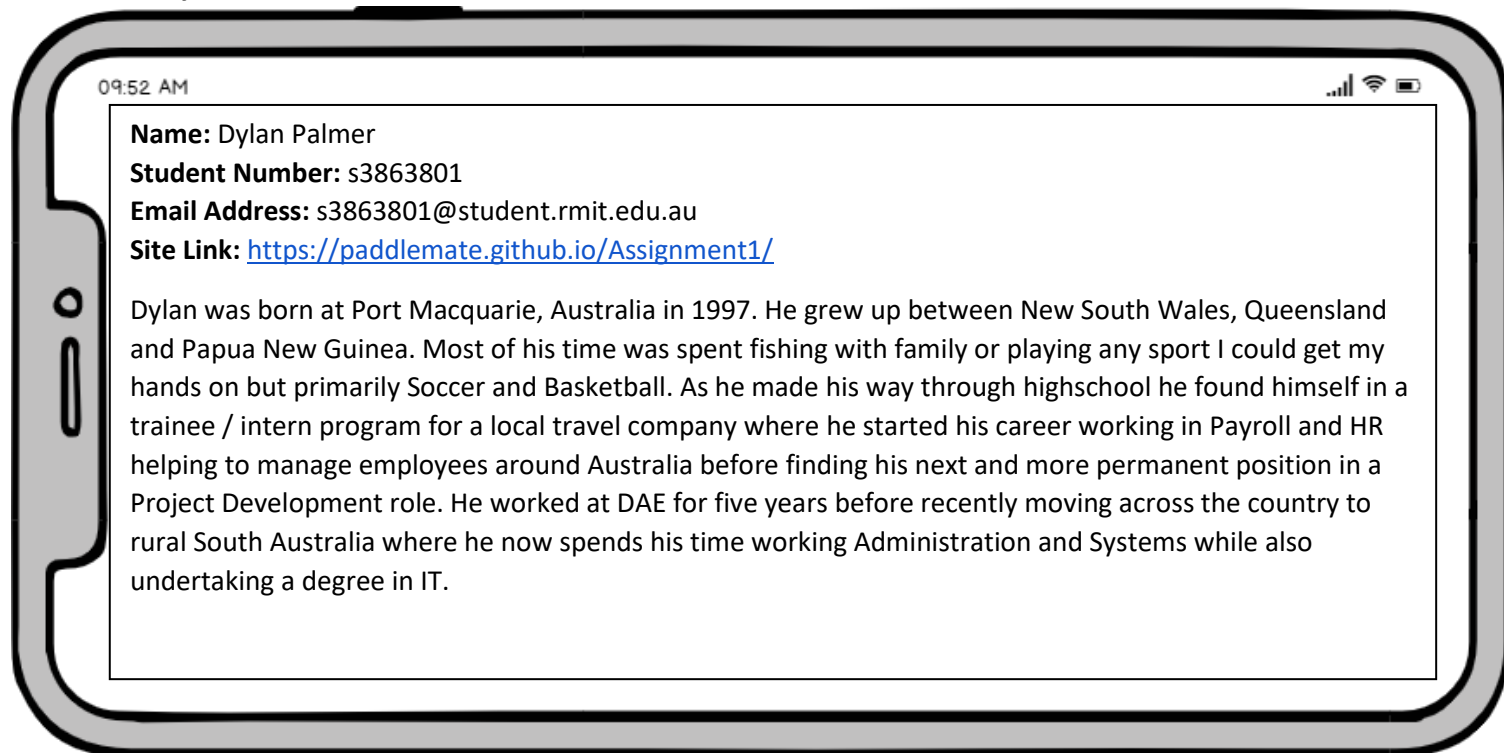
Name: Dylan Palmer
Student Number: s3863801
Email Address: s3863801@student.rmit.edu.au
Site Link: https://paddlemate.github.io/Assignment1/

Dylan was born at Port Macquarie, Australia in 1997. He grew up between New South Wales, Queensland and Papua New Guinea. Most of his time was spent fishing with family or playing any sport I could get my hands on but primarily Soccer and Basketball. As he made his way through highschool he found himself in a trainee / intern program for a local travel company where he started his career working in Payroll and HR helping to manage employees around Australia before finding his next and more permanent position in a Project Development role. He worked at DAE for five years before recently moving across the country to rural South Australia where he now spends his time working Administration and Systems while also undertaking a degree in IT.

5. Matt

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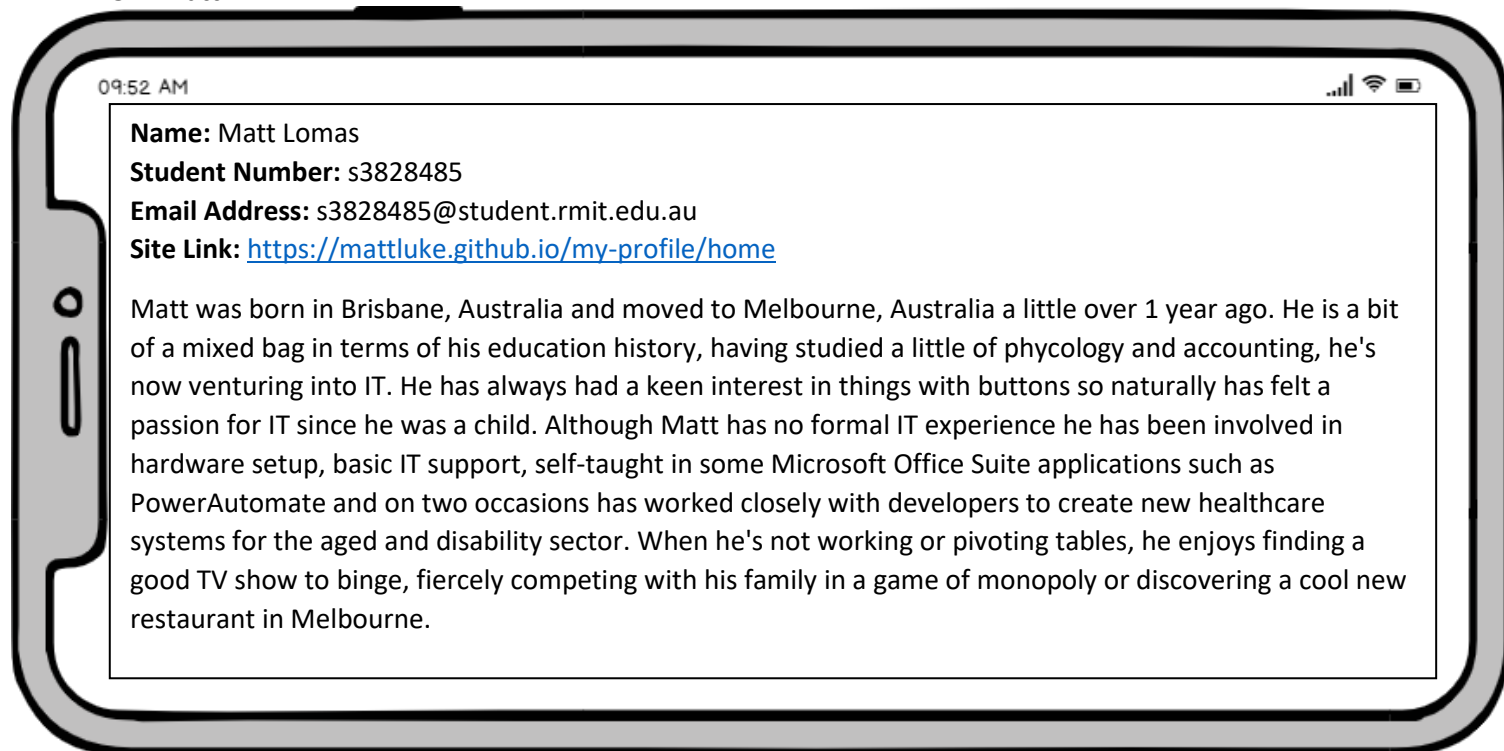
Name: Matt Lomas
Student Number: s3828485
Email Address: s3828485@student.rmit.edu.au
Site Link: https://mattluke.github.io/my-profile/home

Matt was born in Brisbane, Australia and moved to Melbourne, Australia a little over 1 year ago. He is a bit of a mixed bag in terms of his education history, having studied a little of phycology and accounting, he's now venturing into IT. He has always had a keen interest in things with buttons so naturally has felt a passion for IT since he was a child. Although Matt has no formal IT experience he has been involved in hardware setup, basic IT support, self-taught in some Microsoft Office Suite applications such as PowerAutomate and on two occasions has worked closely with developers to create new healthcare systems for the aged and disability sector. When he's not working or pivoting tables, he enjoys finding a good TV show to binge, fiercely competing with his family in a game of monopoly or discovering a cool new restaurant in Melbourne.

Personality Profiles and Tests Results Team Comparison

Having reflected on our various test results and compared them we considered how this may give insight into how we will work together as a team. First, here are our results tabulated:

Team Member	Myers Briggs Results	Learning Style Results	Other Test Detail and Results
Cameron Bell	ISTP Introversion, Sensing, Thinking, Perceiving	Kinaesthetic	DISC Behavioural Test – Directive, decisive, driven and interactive.
Angelyn Quilaquil	ESFJ-T Extroversion Sensing Feeling Judging: The Sentinel	Visual	Verbal Reasoning – ability to sieve through verbal data – Result: High ability.
Dylan Palmer	INTP - Introversion, Intuition, Thinking and Perceiving	Visual/Tactile	Creativity 64.28 just above average but felt the result's detail did not reflect him.
Matt Lomas	ISTP-T Introversion Sensing Thinking Perceiving and Turbulent	Tactile	Big 5 Personality Test – Highly conscientious and agreeable but felt results could differ on a different day.
Kylie Davies	ENTJ-P Extroversion Intuition Thinking Judging/Perceiving	Visual	Creativity Test 55 below average creativity – I did not feel this reflected me accurately.

Links to Test Result pages:

Cameron Bell https://suzmot.github.io/personality.html

Angelyn Quilaquil https://angelynq.github.io/Project_Profile/#work

Dylan Palmer https://paddlemate.github.io/Assignment1/

Matthew Lomas https://mattluke.github.io/my-profile/about.html

Kylie Davies https://s3731231.github.io/introtoITAssign1/myersbriggs.html

Team Test Results Discussion:

We have a mix of personality types on our team – three of us tend towards Introversion (Cam, Dylan and Matt) and two to Extroversion (Angelyn and Kylie). This is probably a strength we can leverage from our different approaches. Cam's DISC results reveal him to be a ready leader and, having completed our first team meeting, this appears to be the role he will assume and our group appears comfortable with that so far. Angelyn's Myers Briggs test revealed that her strategy would be social engagement and this fits with her personal history having been a singer/drummer in a live band and is also reflected in her friendly approach to the team so far, as she is quick to seek feedback. Dylan is INTP so will probably prefer to be an independent worker, contributing activity and not needing too much external motivation.
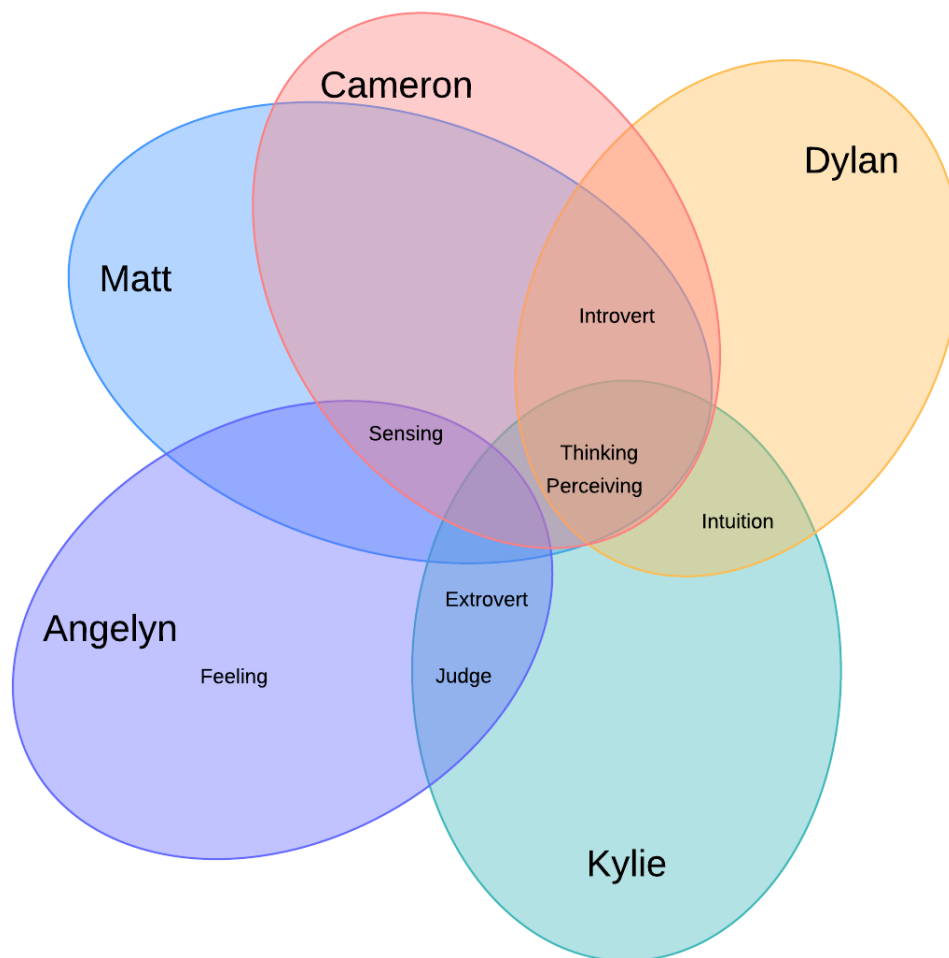
Figure 1 Our Myers Briggs Personality Team Venn Diagram (created in LucidChart)

Matt's Big 5 Personality test revealed that he is highly conscientious and agreeable and he has cracked on with our basic web design early so this seems to gel with those results. He has shown himself already to be a great source of technical knowhow and is helping us get our details into html. As a tactile learner he will probably enjoy learning through exploration. Kylie's Myers Briggs results ENTJ-P reveal she may have a tendency to "marshal and direct" and as she initiated MS Teams and laid out the meeting times and dates, she will probably be a suitable group "secretary".

Ideal Jobs

Dylan Palmer: Software Engineer/ Senior Software Engineer

Matt Lomas: IT Manager

Kylie Davies: Security Governance and Assurance Manager

Cameron Bell: Cyberspace Warfare Officer

Angelyn Quilaquil: Cyber Specialists - Defensive and Offensive Technologists

The common elements in the group's ideal jobs are:
- Strong analytical and Problem-solving skills
- Strong communication skills
- Requires Teamwork or team leadership
- Technological skills
- Majority of the group's ideal jobs focus on defence and security
- Manager/senior role

Differences:
- Public /Private Sector
- Some require management skills/qualification
- Some internal data management, others managing interface with outside organisations
- Some focussed on data /network security, others general IT

Software Engineer:
- Employer: The Onset
- Focuses on Artificial Intelligence and Machine Learning and Requires strong mathematical skills.

IT Manager:
- Employer: The Hassett Group
- Provide strong vendor management and negotiation expertise and experience implementing and delivering an ICT roadmap/ Strategy.

Security Governance and Assurance Manager:
- Employer: Transurban Group.
- Covering both Information and Operational Technology.
- Risk assurance and governance and access controls for IT security.

Cyber Warfare Officer:
- Requires extensive training e.g. 18 weeks- officer training and 20 weeks for employment training.
- Focus on supporting Air Force operational and strategic information systems.
- Cyber Security Specialists= Defensive and Offensive Technologist:
- Works for The Australian Signals Directorate (ASD) a member of Australia's national intelligence community.
- Generally Protecting Australian economy and system or Australia's critical assets and information.
- Has a License to Hack.

Career plans of each member have a lot of similarities rather than differences as the majority focuses on security, and the rest are also taking part of the ongoing innovation and development in this cyber age, all requires technical skills involving analysis making it a common goal on every individual working in IT industry and Providing a high standard input and output in every task.

Tools and Collaboration

As a group we decided early into our formation that it would be appropriate to use Microsoft Teams as our main form of communication. Microsoft Teams was already accessible to all of us for free as part of our Microsoft Office account with RMIT and it allowed us to easily chat to each other as a group or individually, have video web meetings as a group, interview an IT professional, set and assign tasks, and share documents easily between each other.

Our group website is hosted on GitHub Pages via this URL:

https://iit-group-4.github.io/team-site/index.html

Our group GitHub Repository can be found via this URL:

https://github.com/IIT-Group-4/team-site

Looking at the audit trail (Appendix A) of commits in our GitHub repository there is a disproportionate amount of commits for each team member, with some team members making minimal commits to the repository, however this is not reflective of our individual contributions as some team members were not allocated tasks that involved uploading or modifying anything major in GitHub.

Using data from Microsoft Teams and Planner (below and multiple screenshots also Appendix A) gives a more accurate reflection on the contributions and involvement each member of the team had and you can see a more equal distribution of work.
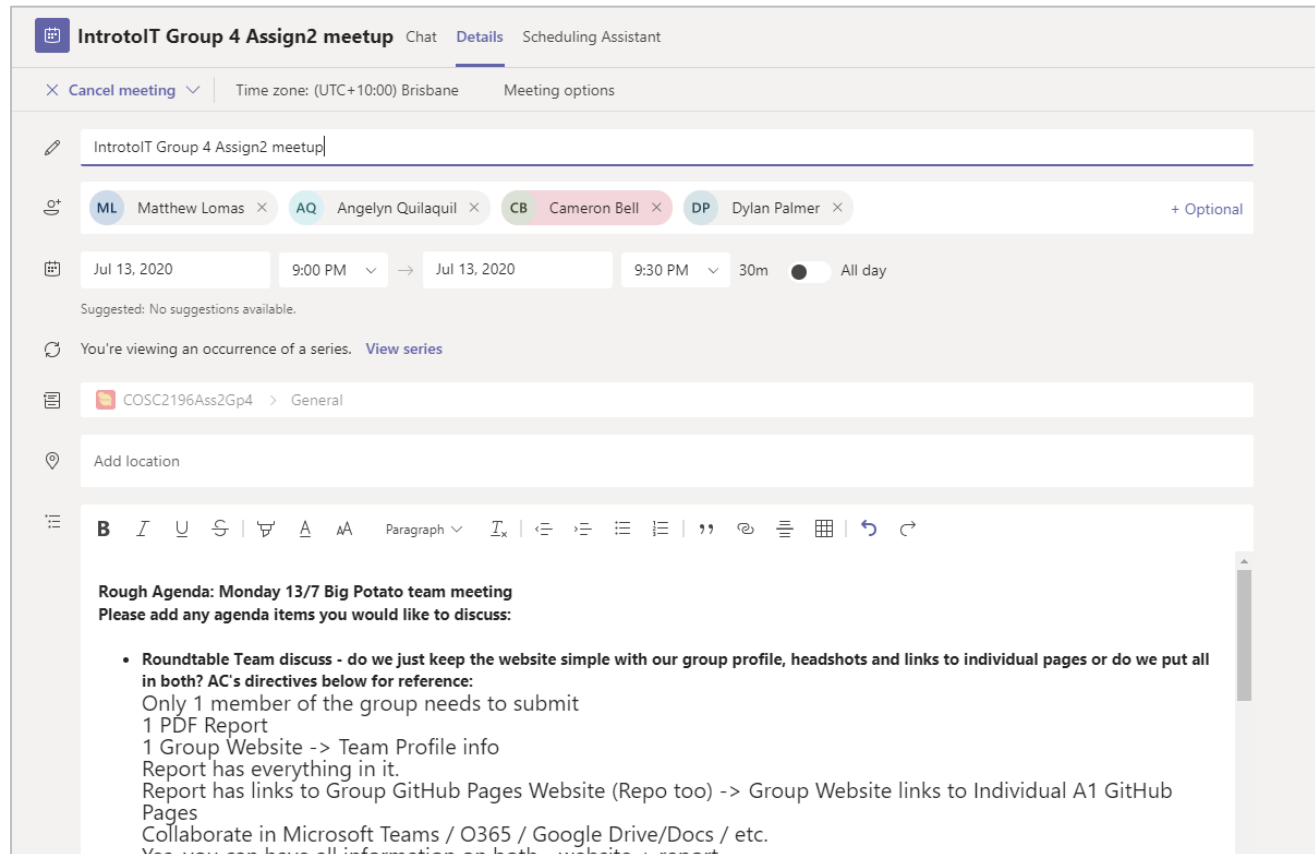

Figure 2 Our main collaboration tool was Microsoft Teams - see Appendix A

Industry Data

Jobs by Demand

Based on the Burning Glass Data (Burning Glass Technologies, 2018) each team members "Ideal Job" has been ranked in order of most to least number of job postings:

1	Dylan	Software Engineer
2	Matt	IT Manager
3	Kylie	Security Governance and Assurance Manager
5	Angelique	Defence: Cyber Specialist - Defensive and Offensive Technologist
6	Cameron	Defence: Cyberspace Warfare Officer

Skills we Need

How do the general skills in your required skill set rank in terms of demand from employers?

The skills we all need rank very highly. Some Big Potatoes are very technically focused like Dylan and Matt, while others are the more general IT skillset like Kylie who will be focusing on policies, processes and governance.

Cameron and Angelique's required skillsets are a little bit unique. As Cameron and Angelique are looking towards Defence roles, their requirements are typically an IT degree and the rest is taught on the job. The skills taught on the job for cyber warfare / defence / offense aren't specifically listed, however you can assume they are mostly some combination of networking / databases / cyber security related, all which rank highly in other areas of IT.

IT Specific Skills

What are the three highest ranked IT-specific skills which are not in your required skill set?

1	Javascript
2	SAP
3	HTML5

 I have chosen these three as Javascript & HTML5 are web development tools and no one in our group has specifically chosen that path. SAP is both a software product and the company name. It's Enterprise Resource Planning software and the only person in our group that may touch on it is Matt as an IT Manager, but that's only taking into account the possibility that his role could potentially go that way, though unlikely.

General Skills

What are the three highest ranked general skills which are not in your required skill set?

1	Business Management
2	Tech Support
3	Customer Service

I chose these three skills as no one explicitly chose Tech Support or Customer Service roles. Again, with these two, it may be that Matt or Dylan could get some exposure to it, but it wouldn't necessarily be in line with their ideal job.

Business Management is tricky as it can be a broad subject. Strictly speaking, though this might apply to Kylie or Matt, I don't believe it's in line with their ideal job.

Issues with the Data

One potential issue I found with the Burning Glass data is that it simply shows the number of job postings over a period with certain keywords in them.   For example, there were 539 postings for "Software Developer" over that period. However, that does not give any insight into how easily a job seeker will get one of those roles.   Over the same period there were 66 postings looking for a "Hadoop Developer".   This is a pretty rare skillset, so even though there are far less job postings over the same period, it might just be the case that you're much more employable with a niche skillset than something generic.

To improve the data, you might also look at how long the job postings are active before they come down, or other industry data to find out how long on average someone is looking for work if their job title is X.

Ideal Job Changes?

Having looked at the Burning Glass data, has your opinion of your ideal job changed? Why or why not?
Cameron: For me personally, my ideal job has not changed based on the Burning Glass data. However, other elements of this assessment have made me consider giving more weighting to AI in my studies as that seems to have some of the strongest potential with regards to careers.

As I mentioned earlier in this report, I do not believe the Burning Glass data can accurately reflect how useful or in demand the skills of a Cyber War Officer really are, I suspect once you get into the industry and you're competent, you'll have a successful, interesting ride.

 Dylan: Dylan says that since reading through the Burning Glass data, his idea of an ideal job being a Software Engineer has become more concrete and, in his mind, has become more of an achievable goal rather than the great struggle he originally thought it would be.

In his words: "My first reason for this comes down to job demand, the role of Software Engineer is ranked somewhere in the middle of Top Titles according to the burning glass data which means the role itself is a lot less saturated then I initially thought, with this knowledge in mind I believe the demand for Software Engineers is going to be much higher than something like a Solutions Architect or a .Net Developer.

The second reason my opinion has changed for the better comes down to the Burning Glass data for Skills in Greatest Demand, specifically the skill for Problem Solving which I believe is one of my strongest suits. A Software Engineer has to weave through problems and jump over hurdles consistently to achieve a desired outcome, this is where I believe the ability to quickly and effectively problem solve truly shines."

Angelyn: Angelyn says that after examining the Burning Glass data her ideal job opinion hasn't changed, as cyber specialist as it has always been her primary interest. She goes on to say, "Even though it is not in the top demand categories of IT Professionals I believe cyber security specialists represents one of the most important jobs in the field of IT as all industry needs security. Without enough people performing this role all technological innovations will be unreliable and at risk.

 Kylie: Kylie reports that having read through the Burning Glass Data, her opinion of her ideal job has not changed. She continues with: "Although Security and Risk Assurance Governance Manager was not listed, I am comfortable with that as it is not a common position and I would not expect it to appear in a list of jobs by frequency. I also found it reassuring that a few of the most sought-after general IT skills are those I am experienced in (Project Management, Business Analysis, Java) and that the "soft skills" aligned with those I value and work to develop already - communication skills and problem solving. As Angelyn has said, Cyber Security is one of the most important jobs in the IT industry and I think Security will continue to grow in demand over the next decade."

Matt: Matt feels that after reading through the Burning Glass Data, his opinion of his ideal job has not changed. In fact, he feels this data solidifies his long-term career goal as it is proven to be a position in great demand.

Although, Matt does feel that the frequency of job posting could be an indication that the job is less in demand than it seems to be. Having worked in recruitment he feels that seeing a lot of jobs advertisements can on occasion mean that there are a lot of applicants, whereas positions that require a very niche set of skills will often not be advertised as those candidates are far more likely to be headhunted. Regardless of the demand of the role, Matt is eager to pursue an IT Management position as he believes that it represents a crucial part of a business and with his experience, soft skills, and values, it is still the role he is aligned with the most.

IT Work Interview – Dr Mel Griffiths, PhD, Cybersecurity Expert

For a full transcript of this interview please refer to as we asked several questions in addition to the brief.

Dr Mel Griffiths, PhD is the Security Operations Manager at Sapien Cybersecurity in Perth. We interviewed him as a team on 2 July via MS Teams video meeting. This was an extraordinary opportunity to gain insight into the strategy behind his activities and what they involved in detail and his motivations.

Dr Mel introduced himself and explained a little of his career and education history before we commenced formal questions and, because a few of our team members are interested in Cybersecurity for a future career, this was useful, and it sparked some additional questions. In short, after working in Security Science for Local Government, Mel completed a Bachelor of Counter Terrorism and Security Intelligence, then did Honours in Security Science. After completing a PhD in Risk Perception, in 2018 he completed a Graduate Diploma in Cyber Security and made the career pivot into Cyber Security.

Mel explained more about the company he works for and the market in which they specialise:

"Sapien is a small start-up company, with less than 30 people currently employed. We install and manage Threat Management and Vulnerability Management Systems aimed at the Operation Technology (OT) Sector: The OT Sector is anywhere in the real world where Operational Technology meets the real world e.g. mining trucks, water utilities, power and oil and gas...I run the Security Operations Centre (we call it the SOC) and also complete a lot of development and research on the companies we work for and the ones we want to work for."

Mel then explained his role in detail and the activities of the team under his management; his role is a 50/50 split between product development and client service. He spends most of his time in the SOC. He gives daily instruction to the SOC Team and they directly monitor the client's businesses using security tools, looking for IOCs (Indicators of Compromise) – Sapien's researchers will look at a file and "hash it" (one way encrypt to get a specific encrypted result) to get a fingerprint and then compare it with any file that has an Indicator of Compromise to see if the hashes match.

One of the types of tools they monitor with is an Intrusion Detection and Protection System: it sits with the firewall. It monitors traffic going through and takes a mirror image of the system frequently and via machine learning, grows its "understanding" of what that client's normal traffic looks like. Mel himself also needs to regularly interact with the Executive Team who manage the entire company, the head of Development for research, and clients to give updates, product training, and prospective clients for product demonstrations.
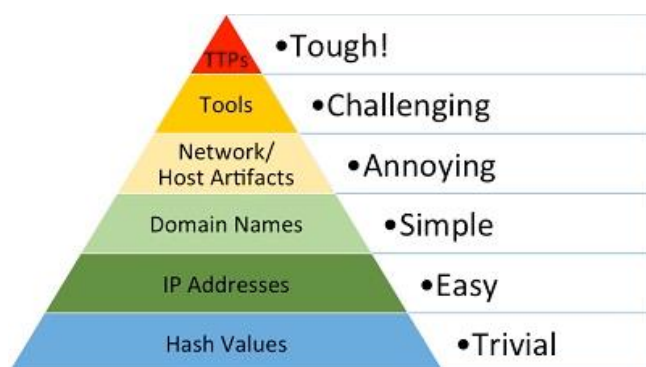

Figure 1 - David J Bianco's Pyramid of Pain (Version 2) stratifies the effectiveness of denying hackers access to their tools according to how easy it is for them to regroup.

(Enterprise Detection & Response blog, 2 March 2013, para.4).

Dr Mel finds the product development part of his role the most challenging as hackers are always changing and are always going to be more agile. He elaborated that:

"The biggest vulnerability in Security is Layer 8 – people – particularly the people within an organisation creating vulnerabilities for attackers (mostly unintentionally but also intentionally). Phishing attacks are huge now and people are definitely the weakest link. Ransomware is growing with hostile states (one in particular) employing it to raise capital. I emphasise with our clients and advise all to invest in their staff and in staff security education."

We asked Dr Mel about what toolkits ethical and unethical hackers might favour and he explained that **Kalilinux** is a version of Linux loaded up with a large suite of hacking tools, and gave us a tip to use VMWare to set up separate virtual machines on our own PCs if we wanted to study what hacking looks like from the attacker and victim's perspectives. He reassured us that the Cybersecurity job market is still growing; to get some work experience and industry qualifications because it is hard to find enough experienced qualified staff. He also described David J Bianco's Pyramid of Pain and encouraged us to investigate that (refer image above, found by team after interview).

Dr Mel agreed that his role captured the essence of the IT industry because as he said "***The evolution and ubiquity of computing in the information age means that IT is interwoven into every aspect of life"*** and his role played a part in protecting non-IT related industries such as oil and gas.

Again, please visit Appendix B to view the full transcript as we asked several questions in addition to the brief.

Autonomous Vehicles - by Angelyn Quilaquil

What is an autonomous vehicle and what does it do?

Generally, by definition, an Autonomous vehicle or also known as a driverless car can guide itself or safely operate the vehicle without human control, in other words, computers finally taking over the art of driving. It is operated on robotic technology combined with sensors and software to navigate, drive and control the vehicle. It is basically designed to carry passengers from point A to point B without human manoeuvre. Fully Automated vehicles can respond to external conditions that a human driver would manage. To qualify as fully autonomous, a vehicle must be able to navigate without human intervention, it's the one where you sit in it and does the driving for you. All you have to do is enter the destination and you'll reach there.

By doing Autopilot mode, the vehicle can drive itself from starting point to fixed destination using various technologies (Gartner, 2020):

- Adaptive cruise control
- Sensors including active steering (Steer by wire)
- Anti- lock braking system
- GPS navigation technology
- Lasers and Radar

Autonomous cars rely on sensor, actuator, complex algorithms, machine learning systems and powerful processors to execute software (Synopsys, 2020). What autonomous vehicles can do is mainly maintain a map of surroundings based on sensors situated in different parts of the vehicle. Example: Video cameras detect traffic lights, track other vehicles, look for pedestrians and read road signs. Lidar (Light detection and ranging) sensors bounce pulses of light off the car's surroundings to identify lane markings, detect road edges and measure distances. It is designed to make Intelligent decisions by storing maps of its environment. Autonomous vehicles use this combination of systems to decrease accidents and give convenience to society.

Autonomous vehicles use technology like ACC or adaptive cruise control. This will allow the system to adjust speed automatically and maintain safety distance from the vehicle in front of it. It uses a sensor that allows the car to perform tasks like brake if there is an approaching vehicle ahead. Highly Automated Vehicles can respond to signals from traffic lights and non-vehicular activities. Like all human drivers could do it can also use brakes/swerves to avoid collision, detect speed limit signs, check roads for obstacles, obey traffic and many more, using the said sensors, such as camera, Lidar, Radar etc. and Routes are guided using GPS.

Top 5 Autonomous Vehicle Companies (TWI-Global, 2020):

Waymo

GM Cruise

Argo AI

Tesla

Baidu

Driverless cars stand to solve all sorts of problems, like traffic delays and traffic collisions caused by driver error, but it doesn't stop there: autonomous vehicles will bring to market all sorts of new and exciting applications for a variety of industries, like shipping, transportation, and emergency transportation.

There are 5 distinct levels of automation (Harner, I., 2020):

Understanding Distinct Levels of Automation:

0 level No Automation, driver performs all operating tasks like steering, braking, accelerating or slowing down.

1 level Driver Assistance, vehicle can assist with some functions, but the driver still handles all accelerating, braking, and monitoring of the surrounding environment.

2 level Partial Automation, vehicle can assist with steering or acceleration functions and allow drivers to disengage from some tasks.

3 level Conditional Automation, vehicle itself controls all monitoring of the environment (using sensors like LiDAR).

4 level High Automation vehicle is capable of accelerating, braking, steering, monitoring the vehicle and roadway like responding to events, use signals, turn and determine when to change lanes.

5 level No driver required. no need for brakes, pedals or steering wheel as vehicle control all tasks including monitoring environment and identification of driving conditions like traffic jams.

Impact:

Positive Impact of the Autonomous Vehicle:

Autonomous Vehicle has a huge impact in society as it creates economic benefits and more opportunities for all people.

Could Provide Safety on the road, by decreasing vehicular accidents. Many accidents on the road happen because of Human error, like poor concentration due to fatigue or alcohol etc. A decreased number of accidents can reduce traffic congestion (blockage on the road).

It helps eliminate fatigue to drivers specially for long driving, drivers can just rest or sleep while the car is in autopilot mode. It saves time from stopping over to rest and money for accommodation.

Using a fully Autonomous vehicle helps people who don't have a license or don't want to drive, disabled, aged or people who generally aren't fit to drive a car can independently go somewhere they wished without any hassle. Fully Autonomous vehicle creates more job as there are some people who doesn't like driving cars and don't have any driver's license and disabled individual who wish to travel on their respective jobs or destination in general will become more independent as it creates easier transportation for everyone. This also means, more people will have more job opportunities for having convenient transportation and lastly it will reduce pollution and emission as it uses electric power.

Negative Impacts:

1. While creating autonomous vehicles proposed to reduce accidents, there will still be safety issues as it is like all computers at risk from being hacked or crashed due to system failure. For example, if the system had glitches some system would malfunction and this would be a terrifying situation to those people using a fully autonomous vehicle

that is completely driverless and no human can take over. Another huge problem about Autonomous vehicles is being hacked. Imagine all autonomous cars would be hacked at the same time, this would create a total chaos or disaster due to cyberthreats.

2. People who rely on driving would lose their jobs and be forced to switch to other jobs.

3. Autonomous cars are still expensive and not all people can afford them.

4. Lastly it kills the fun of driving. In the future if people would rely mostly on autonomous cars, car manufacturers would be forced to supply more demand on this type of vehicle and would gradually reduce the production of manual cars.

Personal Impact:

In this cyber age, innovation is inevitable and already a pervasive part of our lives. Currently there is no mass - production of autonomous vehicles, we may not yet feel the effect of this whole new level of transportation technology, thus as an individual, embracing a new kind of innovation will always have pros and cons. Personally, in a positive aspect, there will be a huge effect of autonomous cars in the near future as for example:

1. Being a Mother of an infant dealing with fatigue from lack of sleep and needing to do occasional drive in the morning can be quite dangerous, autonomous vehicles would be a solution to every person who will experience the same burden.

2. It will save time and maximise work as it is able to multi -task while on the trip and reduce traffic and congestion on roads, this means people will be more productive and will have more time with their families and loved ones instead of being stuck in traffic and too busy catching up work.

3. Autonomous vehicles will give an advantage for employment, being interested in the field of IT, mass-production of autonomous vehicles means more job options for IT professionals, and an opportunity for individuals as transportation will become easier.

I see the major issue would be a risk of cyber threat causing unreliability of the vehicle due to system failure. This could create anxiety for some people who prefer to take control in case of emergency. Although there will be progress to fix technical issues, car companies should consider the balance of autonomy as there will always be a tug-of-war between hackers or terrorists wanting to create chaos and individual choice on the level of system autonomy. This will be a challenge for the car industries to create a high level of safety in order to gain consumer trust. Perhaps, this would be a great opportunity for me in the future to show my skills and knowledge to maintain a high level of stability and safety to autonomous vehicles.

Robots – by Cameron Bell

A Robot is defined as any automatically operated machine that replaces human effort, though it may not resemble human beings in appearance or perform functions in a humanlike manner. (Hans Peter Moravec, 2020)

The term comes from a Slavic root, *robot-*, with meanings associated with labour. The word 'robot' was first used to denote a fictional humanoid in a 1920 Czech-language play *R.U.R. (Rossumovi Univerzální Roboti - Rossum's Universal Robots)*('R.U.R.', 2020)

Interestingly, in the play the robots were heartlessly exploited by factory owners until they revolted and ultimately destroyed humanity. In a later science fiction piece by Isaac Asimov (Erik Gregersen, 2020) the famous "Three Laws of Robotics" (Mark Robert Anderson, 2017) were created:

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm
2. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws

As the robotics industry has grown, these suggested laws have been largely ignored. For example, there are robotic airborne drones being used in warzones that violate these laws.

What can be done now?

Creating and working with robots is the field of Robotics.   Currently, this industry is booming with robots springing up in almost every industry on earth and displacing a lot of human work and human jobs. Some you might be familiar with in everyday life but have not recognised as actually being robots include self-checkouts at the grocery store, ATM's, self-service kiosk's at fast food restaurants, automatic ticketing machines at parking lots, airline check-in booths and even food and drink vending machines. All these machines fit the robot definition in that they are automatically operated machines that replace human effort.

Figure 3 - Vending Machines (Zoheb, 2014)

What is the state of the art of this new technology?

Most of these types of robots have been around for a long time. The latest robotics technology is much more impressive.

Some of the things modern robots can do include:

- **Robot Assisted Surgery (Mayo Clinic, 2020)**

- **Partial Self Driving Vehicles. E.g. Tesla Autopilot (Tesla, 2020)**

- **Landing on, investigating and reporting back on asteroids in space (Serrels, 2017)**

- **Harvesting fruit and vegetables (IntoRobotics, 2017)**

- **Thought controlled prosthetics (Rossow, 2020)**

The range of things that robots can now do is huge and growing exponentially.

What is likely to be able to be done soon?

Within the next few years, robotics will make even further strides. Within three years you can expect fully autonomous vehicles, cancer and disease detecting robots, domestic robots, full-process agricultural robots (plant to harvest) and autonomous military robots that we'll likely never fully hear about.

What technological or other developments make this possible?

The advances in robotics are made possible by a combination of things. First, the area of advanced robotics is still burgeoning which means there are no monopolistic companies creating barriers to entry. This encourages new start-ups which drives innovation. Secondly, other technology improvements in areas like hardware and software helps robotics developers use new techniques to innovate. Lastly, money: In business, often the cost of wages is the highest line item. If a developer can create a robot which significantly reduces the wages cost to a business, they will be richly rewarded. However, this can create problems of its own, which brings me to the next section:

What is the potential impact of Robotics development?

Advances in robotics already have and will continue to have a huge impact on people and employment. The debate (and there is debate!) is about whether the net effect of improvements in robotics and AI will be more, or less jobs.

What is likely to change?

The World Economic Forum "predicts that robots will displace 75 million jobs globally by 2022 but create 133 million new ones - a "net positive". (BBC Business, 2018)

They argue that advances in robotics and other technology will improve the productivity of existing jobs and free up workers to do other jobs. The types of jobs they think we'll see a lot more of are data analysts, software developers and social media specialists, as well as job roles based on "distinctively human traits" such as customer service workers and teachers.

There are however, plenty of dissenting opinions backed by real statistics. Oxford Economics (Oxford Economics, 2020) tells us that 1.7 million jobs have been lost to robots since 2000 and that the number of robots in the workforce is expected to increase ten-fold to 20 million robots by 2030.

Which people will be most affected and how?

The McKinsey Global Institute (McKinsey Global Institute, 2017) suggests that as much as 33% of the 2030 workforce may have to pursue new professions in different sectors.

The types of jobs that are the highest risk of displacement due to robots are those that have mundane, repetitive tasks, such as:

- Food preparation
- Machine operation
- Data collection
- Data processing
- Cleaners
- Administration / Office Support
- Timber Loggers
- Drivers
- Accountants
- Lawyers

Although, there is even debate amongst these. With some groups suggesting those in the accounting / legal field will have increased work instead of being displaced.

Will this create, replace or make redundant any current jobs or technologies?

Robots are a powerful disruptive force and at this early stage no one is quite sure how it's going to end up. The theories and statistics thus far suggest it will do all three: create, replace and make redundant.

As an individual, all you can do is try to choose work in industries that are least susceptible to automation.

Which brings me to myself and some speculation:

Advances in robots are likely to influence both my daily life and my career. In daily life I imagine I won't need to drive my car myself anymore and I can use the time in the car to work, rest or play.

I won't need to visit the grocery store as I'll be able to order online and a robot will deliver it to my house, the same goes with almost anything I need. I'll probably be able to send my dogs out to get walked by a robot and the lawn will be kept neat and tidy by a robot too.

As the Coronavirus lockdowns have shown us, working from home is a very viable alternative for a lot of people and as I pursue a career in IT, I expect that to be more and more the case.

In terms of my IT career, my "ideal job" is a Cyberspace Warfare Officer. I believe this role is largely immune to automation and should be in high demand moving forwards. It also seems that working in AI will also be one of the big winning sectors to come from advances in robots and automation. This area is of great interest to me and I will also endeavour to focus my studies in that direction.

The problem I see with these advances in robots are that we might increasingly become disconnected physically from family, friends, colleagues and other humans in general.

I think humans as a whole, moving into the future with robots and automation will need to pay particular attention to ensure we maintain physical and mental health, fitness and actual face to face socialization.

Machine Learning - by Dylan Palmer

What does it do?

Machine learning is a form of Artificial Intelligence that uses algorithms and neural network models to learn from its mistakes and improve upon them from past attempts without having to be manually programmed each time, a similar but more primitive comparison to the human brain, always learning from mistakes in order to progress in life. This is also an important aspect of the modern IT world and is used everywhere.

Machine Learning uses libraries of data constantly weighing up all options to provide an optimal outcome, if an outcome is wrong, the AI will learn from that mistake and apply its newly found knowledge to the next attempt.

Machine Learning has become so entangled in our everyday lives most people don't even realise how much it's relied on in our day to day lives, some practical examples where Machine Learning is applied are,

Virtual Assistants like Siri, Alexa & Bixby

Siri, Alexa and Bixby (to name a few) are voice controlled personal assistants that have been designed to help improve our everyday life. Because these personal assistants have access to personal user data, they are able to apply Machine Learning to find trends and make recommendations. Every time you use vocal commands that information is being sent off for interpretation and returned to your device to trigger an action like making a call, managing contacts and calendars or even shutting off appliances in your smart home.

Predictions while Commuting i.e. Google / Apple maps

Now-a-days thousands of people are using smart devices, most of which are loaded with a navigation tool of some sort, whether it be Google maps, Apple maps or Waze. These applications and companies are able to use the massive amounts of data received by their patrons to form a huge database ever evolving which can be queried upon using Machine Learning to provide the user with intelligent and often time saving route changes and updates.

Advertising

Traditional advertising and data analytics are becoming more and more obsolete due to the sheer amount and high volume of data readily available to marketers and businesses. In order for an ad to be effective in the modern world it needs to be highly personalised and relevant to the person / group of people being targeted. Machine Learning can be used to quickly follow Google search trends, social media trends etc. and use that information to provide more accurate and higher converting advertising material. It is becoming much more commonplace for our devices to listen in on conversations and target advertising based on frequent conversation topics – the perfect example of Machine Learning

Email Spam and Malware Filtering

Another more useful and very practical function of Machine Learning is the ability to target and mark to spam any malicious content, spam or unwanted material from our email inboxes. Each time a piece of material is marked as spam or set to junk the email tool will use that information in an attempt to capture any similar emails that might appear in the future and mark them to their relevant folders. This same information is used to target emails that may appear malicious or emails that might not appear harmful at first such as a phishing attack. Machine Learning is the front line of defence for our inboxes and a silent worker forever learning from its past.

What is the likely impact?

As the world grows, so does our digital footprint. I believe that Machine Learning can and will have an extremely positive outcome for things like digital assistants, maps, advertising, email protection and cyber security to name a few.

These are all tools and applications that are used every day that we benefit from massively whether it directly or indirectly. The ability to simply ask a voice assistant for directions to the nearest fuel station is a massive leap from having to look at a physical map or ask for directions and I feel we've only just scratched the surface of endless future possibilities. A world where cars can drive and navigate themselves has become a reality rather than a dream all thanks to Machine Learning and pattern recognition, I believe that soon enough it will be a rare sight to see a person driving a vehicle rather than an AI using Machine Learning. In addition to the fun exciting promises, we can also consider the possible physical and cyber security threat protection, tools used to find the patterns and behaviours of criminals or people that would intentionally cause mass harm and hysteria may be thwarted by Machine Learning and it's trend recognition capabilities, it's like having a team of millions of people all working together for the exact same cause and purpose but all in fractions of the time.

On the other hand, like anything I believe Machine Learning also has some downsides. One major concern people are already facing is an "Invasion of Privacy", it's never a good feeling to be sitting and having a conversation with someone on a holiday to Thailand when suddenly your device starts sending targeted advertising featuring that same holiday destination right to your phone. If Machine Learning is already being used in email threat detection, what's to stop someone creating an AI that used Machine Learning in an attempt to make more "real" looking malware or spyware?

How will this affect you?

Who knows what the future holds, I feel that we have only just scraped the surface of Machine Learning, in 50 years' time we could have an AI so intelligent from years of Machine Learning we could cure diseases and economic struggle instantly, I believe that the advancements will be so great that it almost raises the concern of the human race becoming redundant – ever seen terminator? We are already living in a reality where our handheld devices can learn our patterns and daily calendars to provide helpful insight, provide useful navigation and actively listen to and interpret our conversation, give that same Machine another 50 years and see what It will be able to achieve, whether for the better or the worse.

IT Technologies – Cybersecurity – by Kylie Davies

What does it do?

As RMIT's Security and Computing in IT course explains (RMIT COSC2651 Week 1 p.1 2020) Security is "freedom from danger and risk" and good security and the protection of assets has several stages both in the physical world and the digital world: Deterrence, Prevention, Detection and Reaction. In IT, computers, networks, machines (IoT), cloud computing, email and the web (collectively cyberspace) the aim is similar but the tools are different. Cyberspace is inhabited by real people like the real world, so the threats mirror those in the physical world: theft, invasion of privacy, stalking, destruction of property. Cybersecurity is the study of vulnerabilities and threats, and the protection of information and data, for people and organisations, in cyberspace, using various tools, techniques, tactics and practices.

What is the state of the art of this new technology?

For clarity, to answer the above question I have used four categories of **Organisation and People, Systems and Components, Encryption Algorithms, Education:**

1. Organisation and People:

The latest approach is managing threats via the deployment of a dedicated 24/7 Security Operations Centre. These Security Operations Centres may be housed within an organisation, or externally, offering contracts to protect several clients. They are staffed by teams of Security Engineers aimed at both protecting encrypting information and detecting Indicators of Compromise through the use of specialised systems. Security Engineers and Analysts will have experience in security and industry certification. They will spend much of their time monitoring but they can also be split into teams for **ethical hacking**. These "Red Hat/Blue Hat" teams pose as hackers and defenders for the client system, working against each other to search for and highlight vulnerabilities and defend and foil those posing the threat, then reporting the results and making recommendations to the client.

2. Systems and Components:

a) Firewalls - Sitting between an internal network and the internet, these hardware/software combined devices monitor and control/filter incoming and outgoing traffic based on parameters – the best for small business in 2020 includes Fortinet Security Fabric, partly because Fortinet manufacture their own ASIC chips for the hardware (Martindale, J. Digital Trends 9 May 2020, para. 4).

b) Proxy servers - Along with the firewall, and sometimes forming part of the firewall, most organisations these days will employ the use of a proxy server, a dedicated intermediary server. Its purpose is when users within the organisation pass requests to the web, the requests go through and return to the proxy server – so that external parties cannot determine which machine in an organisation is communicating with the web, or any details of that machine or user.

c) Intrusion Detection and Prevention Systems (IDPS) – In our interview with Dr Mel Griffiths (Big Potato Assignment 2 2020, Q. 6) we learned about IDPS. These typically work alongside the firewall and like, proxy servers, sometimes can be included in the firewall. IDPS are proactive in warding off attacks. The latest technique, rather than looking for attacks with signatures similar to those in previously detected attacks (the old antivirus signature method), is to monitor and record the patterns of regular network traffic and look for anomalies. Drew Robb of eSecurity Planet asserts that good IDPS systems will use both signature and anomaly-based detection (Robb, D. 2018 para. 7). IDPS uses artificial intelligence and machine learning algorithms to establish the baseline of normal activity. When an IDPS suspects an attack, it will block network traffic, drop suspected malicious packets and alert security administrators. An example of a highly capable IDPS solution today would be Cisco's Firepower 4100 Enterprise Appliance series (with price tags around US$100,000). With the FBI estimating phishing attacks as a USD$9 billion industry in 2018 (Robb, D. 2018 para. 1) the investment in IDPS will only grow.

3. *Encryption Algorithms:*

Today's encryption is often based on hashing algorithms. Hashing is a one-way process that encrypts data and produces a unique (long) number. In layman's terms information is sent using the hash, as is the hash itself, and then at the receiver end the information received is decrypted then hashed and the hash results compared to ensure they match (if they don't the information has been changed in transit). The aim is for the encryption to be practically unbreakable at a minimum. *In theory* it may be able to be broken, but it takes so long that in practical terms it is impossible. The latest standard in hashing algorithms in SHA is SHA3 with more data costly but stronger offerings through to bcrypt which takes 3 years to decrypt. SHA is the standard behind digital signatures and certificates that are used to encrypt information across the internet, with individual organisations publishing a public key and retaining a secret private key. These keys must work together to decrypt information.
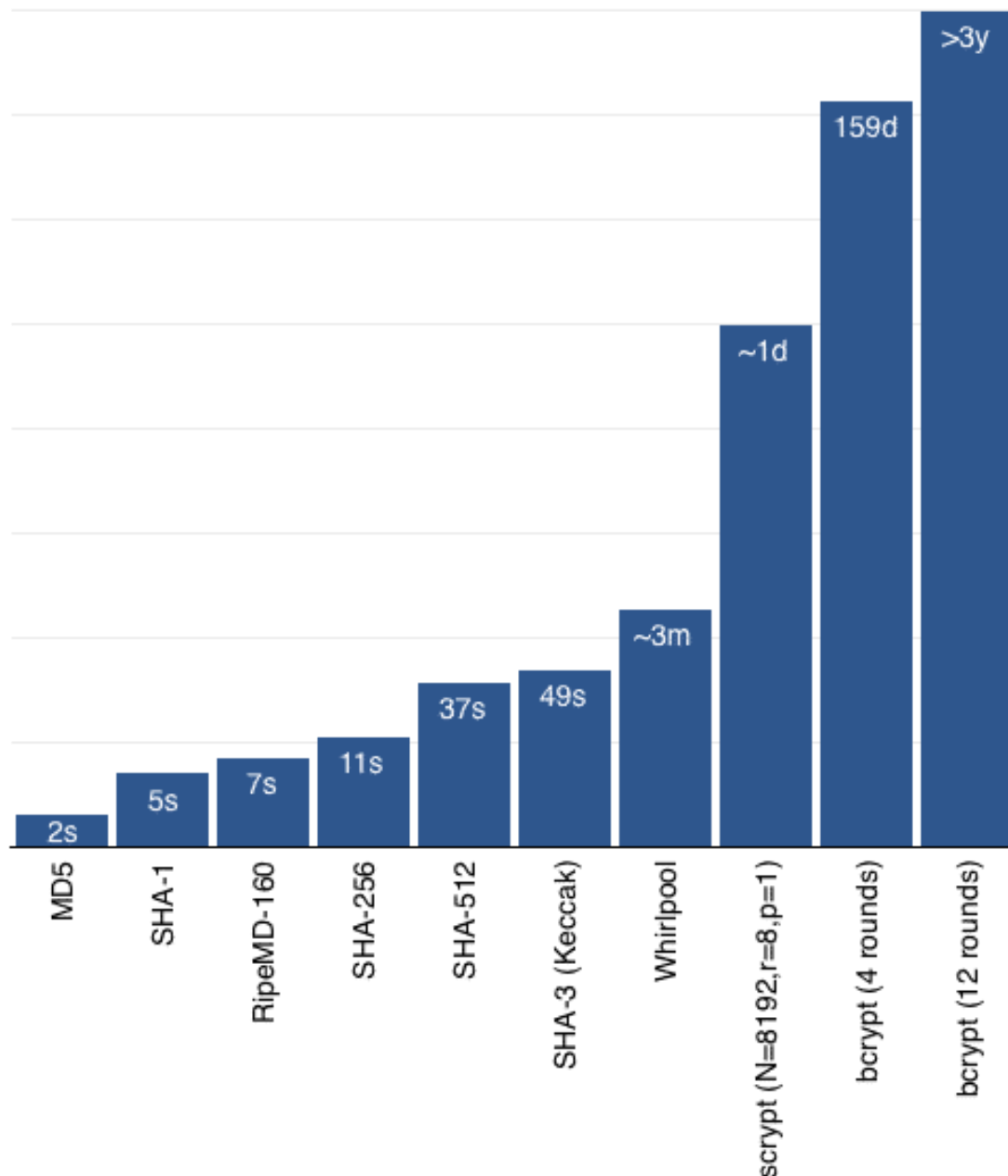

Figure 4 Time to brute force the clear text password "Pw#1!" hashed by a specific hashing algorithm on a NVIDIA Quadro

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4. Education:

According to Dr Mel Griffiths (Big Potato Assignment 2 2020, Q. 7) an organisation's greatest vulnerability is its people, who either unintentionally or intentionally create vulnerabilities or are lured into revealing details via social engineering. Staff education and protocols have been recognised as a critical and growing pillar of cybersecurity.

What can be done now? What is likely to be done soon? What developments make this possible?

Because the capability of computers is ever increasing, an encryption or hashing algorithm that is effective one year, will be obsolete the next. The length of number produced by today's best SHA-256 and SHA-512 hashing algorithms, is so significant, that to decrypt it using today's computing power is practically impossible (RMIT COSC2651 Week 3 Lecture 2020). However, if the technological development of **Quantum Computing** becomes more widespread, the speed at which attackers can decrypt information (and therefore the number of combinations they can quickly try) will exponentially grow and better algorithms will need to be developed. However, the cybersecurity sector will also then be able to harness that same power to better deliver and encrypt information. Increasingly governments will require organisations to use minimum standards to protect information (see "What is Likely to Change?" below). Dr Mel Griffiths also advised us that the growth of Ransomware is huge so better preventions will need to be developed and user education will need to be better implemented.

What is the potential impact of this development?

As more and more personal and valuable information moves online, the incentives heighten for hackers to obtain and exploit that lucrative data. The resultant rise in the need for cybersecurity has created an enormous and growing sector of the IT industry. According to PR Newswire "the global security market is expected to grow from $149.46 billion in 2019 to $152.21 billion in 2020" (PR Newswire Jun 2020 para. 4).

What is likely to change?

John Shin, MD of RSI Security (Disruptor Daily, June 2019 para. 3) states:

"The future of cybersecurity will be largely determined by what hackers will be after. And I think this will primarily be in two areas: Health and Wealth. More specifically, this means private healthcare-related data and sensitive payment information. Private health records can be worth a fortune. Credit card data can be used for fraud or sold on the black market."

In response, governments and regulators are moving to protect people's privacy with the European Union's 2017 General Data Protection Regulation (GDPR) laws being the first large scale example. In the corporate space, companies will increasingly assess their security from the hacker's point of view according to Matan Or-El, co-founder and CEO of Panorays (Disruptor Daily, June 2019 para. 4).

Which people will be most affected and how?

The risk of exposure of health and wealth data affects everyone, from individuals, to corporations and states. Probably because of better access and uptake of technology, I surmise that currently, individuals in developed nations are more exposed. However, as developing countries embrace digital technology their citizens will be equally exposed.

Will this create, replace or make redundant any current jobs or technologies?

In the future, technologies such as encryption algorithms will need to be lengthened and strengthened continuously and perhaps digital certificates and public/private key encryption will be superseded. As to jobs becoming redundant, I am senior enough to remember hand delivered sensitive documentation through the use of couriers and this fell away over a decade ago, so certainly physical data management jobs will be lost. I can see a future where building concierges and receptionists are replaced by AI greeters who check credentials without any of the human susceptibility to fraud or undue influence. Conversely, jobs will be created as there will almost certainly continue to be growth in the need for cybersecurity specialists and engineers.

In your daily life, how will this affect you? What will be different for you? How might this affect members of your family or your friends?

In my daily life, the increase in phishing attacks, spam and a rudimentary awareness of the Cambridge Analytica scandal have already combined to change my behaviour online. I have closed down two of my former three social media accounts. I now use Multi-Factor Authentication (MFA) and biometrics to log on to commonly used apps and I am in the process of ditching an old, way too public email address and adopting an email address I rarely share. Career-wise I am hoping that cybersecurity might afford me the capability to specialise in my IT career and play a small part in defending companies against data exfiltration. My history is in Defect Management and Project Management so I hope to transfer those skills and add cybersecurity skills through a Graduate Certificate in Cyber Security at RMIT and CompTIA Industry training, to make me an employable prospect. For my family and friends, it is my fervent hope they will adopt some of the technologies such as MFA or biometrics. I hope they stop writing their passwords into notebooks at work and take advantage of the tools and education available to secure their privacy. Broader education aimed at the non-technical technology user will be essential.

Project Idea – Orch. I.D

Motivation and Market

As there are 30,000 orchid species in the world and 70,000 hybrids, even seasoned orchid enthusiasts can find it difficult to identify an unlabelled or wild orchid. With the amount of man-made (cross-bred) species only growing, for those who are interested in orchids and yet a bit time poor it is only becoming increasingly difficult to try and identify an orchid's genus. It often happens that there are no identifying marks or labels and you must make a guess as to what species you are seeing.

What does it do?

Orch.I.D will enable its user to quickly and easily identify any species of orchid from a photo they take in real time, upload from their device or features they input. Orch.I.D will scan the user's photo and compare it with an expansive orchid database to deliver the closest possible match.

The app will take into account key forms of the orchid, if it is monopodial or sympodial and the colours of the petals; the app will return a shortlist of likely species with corresponding photographs and species' details. Other members will be able to assist in identification. Orch.I.D will also have a social media capacity where registered members will be able to follow each other, upload their photos of orchids and like photos of other users. However, the main motivation for joining will be the unique capacity of the app to name the orchid you have photographed.

Figure 6 Snapping and Entering an Orchid

Find My Orchid – by Photo

The primary method of input Orch.I.D will utilise will be photo recognition algorithms so that it can read and analyse photos. This feature will enable the user to take a photo in real time or upload a photo from the camera roll and submit it to the app for cross-referencing against already identified orchid species. The user can submit field notes or a short description of the find and Location Services will pin their current location, or they can manually set.

Orchid Analysis by Vote

When submitting a photo to be analysed, there will be an additional option where a user can also select for the picture to be visible to users of the app who have the ability to comment and/or vote on what type of orchid they believe it is. The votes will be shown so the user can see if there's a strong consensus or a couple of front runners. This data might also be able to be used to train the algorithm that automatically analyses the orchids so that it gets more accurate over time. A section will exist on the app that a user can enter to simply swipe through the public images submitted for vote analysis and comment/vote. This will be an engaging part of the app, as using your expertise to analyse orchids and compare / contrast with other people and the algorithm is quite enjoyable.

Select Subtype: The user will select an orchid subtype if they are able. Different orchid types have quite distinct forms and shapes. Help will be available (see image at right).

How does it do it?

In essence, Orch.I.D will compare the user input with an expansive database of orchid images that have a known genus and return a shortlist of images and species for the user to make a final selection from.

When the user selects one species, they click and further details on that species will be revealed, including links to any retailers who will **pay a fee** to be plugged in to the site.
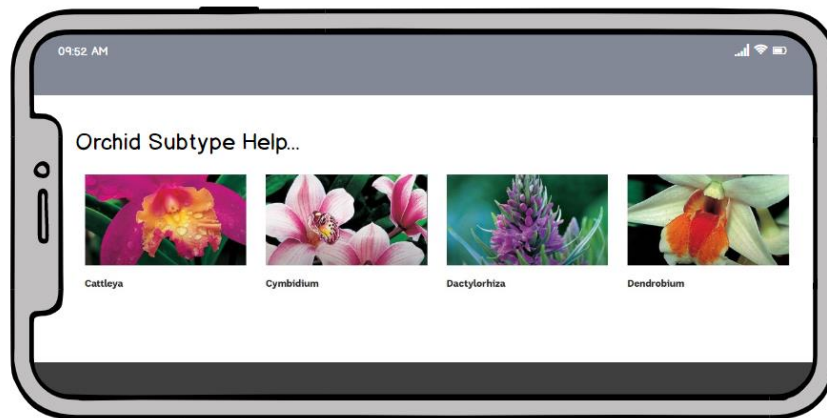
Figure 7 Orchid Subtype Help (orchid images from Gardening Australia)

Social Connectivity and Private and Public Content

Apart from orchid identification, the app will also attempt to build an online orchid enthusiast community through several social media type features. Users can build galleries or video libraries of any orchids they grow or find and share with the community. They can choose to (or not to) GPS mark the location of the orchid they have photographed. They can add a description of their "orchid adventure" whether it be a wild one they have found, the country, terrain and microclimate, or the travails of their orchid growing challenges. All users should be able to mark their images private or public. They may wish to keep certain finds to themselves and use the app as their personal record. All users should be able to follow other users and their (public) images and videos and add applause or likes. When a user initially downloads the app, they set their favourite orchid subtypes or terrains. Then each time they return to the app the latest "finds" in those types and locations will be available. In-Real-Life Meetups can be created.

Tips and plant disease help: Part of the social media aspect will be an illness forum where users can submit images of pests or disease on their orchids and ask for advice. Users who contribute answers will be ranked Contributor, Expert and Guru (Guru being the highest rank) as they contribute answers which are endorsed by the community.

Content from Orch.I.D. **will be protected and not shareable to other broadscale social media sites such as Facebook or Instagram**. Orchid growers and enthusiasts jealously guard their collections and their intellectual property such as photography and so users should undergo a vetting process to join the app community.

Required Tools and Resources:

1. **Image Analysis:** We need access to excellent image processing, which transforms digital images using algorithms. As we are in pre-development, we are reviewing the following options (Uni-Weimar, 2020):

- Standard Filter examples from Coding GestaltGPU Filters
- Self-implement filters using OpenGL pixelshaders.
- Processing comes loaded with a bunch of filters that are commonly used in Image processing programs such as Photoshop or the Gimp. These harness the power of the GPU.
- OpenCV Filters - OpenCV offers all kinds of algorithms from basic image processing to advanced computer vision.
- Python ToolsPIL - The Python Imaging Library provides you with the power to handle and process images.
- SciKit-Image - Scikit-image is a collection of algorithms for image processing.
- SimpleCV is a python wrapper for OpenCV (and a couple of other tools) that makes image processing really easy.
- FilterForge is a commercial application that lets you create filters using a node-based dataflow programming language.

2. **Database of orchid images:** Access to an extensive database of orchid images. Currently the most famous example of this would be Jay Phalin's Orchid Species Photo Encyclopedia (Phalin, J. 2020)

Observations: Jay is an incredibly knowledgeable and well-travelled orchid expert, collecting images of orchids on his adventures all over the world. His dataset is incredible but the website design is a little archaic and so these photos are not represented in their best light. He is also incredibly (and understandably) protective of his suite of rare orchid images. Gaining his co-operation would probably be essential, and may prove very challenging (his website is full of warnings that he will prosecute parties who use his images). However, perhaps negotiation with Jay could involve the offering to him the GPS Marks users provide when they find a wild orchid. This, of course would need to be made clear to the users as part of the terms and conditions of user signup.

3. **Platforms and associated tools:** The app will be built on both iOS and Android mobile platforms. To build on iOS it is necessary to get Apple Xcode 11 for development. (Apple, 2020). Also, adding in the Swift UI makes building the app much easier. (Apple, 2020)

To develop an Android app, you need Android Studio. (Android, 2020) The code editor that comes with Android Studio provides code completion for Kotlin, Java, and C/C++ languages so it would be important to be fluent in at least one of these.

We have also found that there is a cross platform solution called the "Multi-OS Engine" which enables you to write the code once in Java and it will modify it to work on both iOS and Android platforms. (Medium.com, 2017)   This would be a great time saver and avoid having to build in Java for Android and then again in C for iOS.

If the Multi-OS Engine turns out not to be a perfect solution as these can sometimes not be as good as developing in native languages, it will be necessary to learn both Objective-C and Java to develop on both platforms.

4. **Human Capital Skills:**

Coding: We will recruit a software engineer with the following skills for coding: Software Engineer with mandatory skills to include high competency in C/C++/Python, Image Processing, OpenCV/ Matlab, Algorithms and Data Structures (Angel.co Flixstock 2020)

User Experience: User Centred Design skills and consideration of the user experience so that the app is super easy to use and friendly and responsive.

Business Development: Business development or industry partnership development skills to bring retailers on board to assist with funding through advertising or supplier network membership. Negotiation skills to gain the cooperation of the world's foremost orchid expert and his collection of highly desirable photographs (see "Jay Phalin" in required software and hardware above).

Security Specialist: Authentication and image security, especially to prevent users stealing images or sharing onto more broadscale social media.

Outcomes
1. Users form an online well-informed orchid appreciation community.
2. Industry partners gain access to the enthusiasts.
3. Orchids are protected and appreciated more in their natural environments and through growing them in gardens.
4. Income for Team Big Potato, derived from advertising or community events.

Group Reflection

Considering the challenges our group faced, including losing two members who dropped out of this subject, we feel Team Big Potato has done very well together. Shortly after our first team loss, we were joined by Dylan who says that he was surprised how readily Big Potato was able to bring him in and keep powering forward. Dylan says that even after the loss of a second team member, "morale was kept high and everyone pulled together to get their parts done and have managed to deliver what is turning out to be a terrific project and final result!"

When we first formed the group, we immediately created a Microsoft Teams group and Matt points out that we started getting to know each other, forging relationships and learning how we communicate before it was time to start on the assessment, this really helped build a solid foundation for our team.   When it was time to start, we had our first official meeting, then began creating tasks in Teams with due dates and assigned team members. This worked really well.   Angelyn says she was surprised to see that most team members took initiative to create and execute tasks on Microsoft Planner rather than just leaving it to one or two other people.

Something Cameron thinks we could improve in future is to find a way to submit partially complete task information instead of waiting to submit the final product, this can help everyone else contribute or help if the timeline is getting short. Kylie and Matt both suggested more use of Google Drive/Docs a bit more as it is very handy for report collaboration and would solve the issue Cameron raised.

An important element of effective group team work is communication. We touched earlier on how our primary method for communication was Microsoft Teams and later, shared Google docs.   However we also had another method: Bi-weekly video chats.   Angelyn points out how difficult a thing this is to manage for mature adults with other commitments, however all team members managed to devote time and effort to get to as many of these meetings as possible, or to make sure they reviewed the meeting minutes and any new tasks assigned to them afterwards.   Matt adds that setting tasks early and having regular meetings helps keeps team members accountable to each other and is something he learned about effective team work.

Kylie also points out that one thing she has learned about groups is that good will and contribution is what counts and this group is better than most.   This sentiment is echoed by Angelyn who points out that it is her first time studying in Australia and the group showed respect and willingness to help which she identifies as the most important element of a productive team.

Conclusion

Team Big Potato collaborated effectively to examine several facets of the IT industry. This helped us gain some insight which will be valuable as we further work our project idea for Orch.I.D.

Assignment 3 will see us collaborate further to flesh out the detailed plans for our world first orchid identification app. Watch this space.
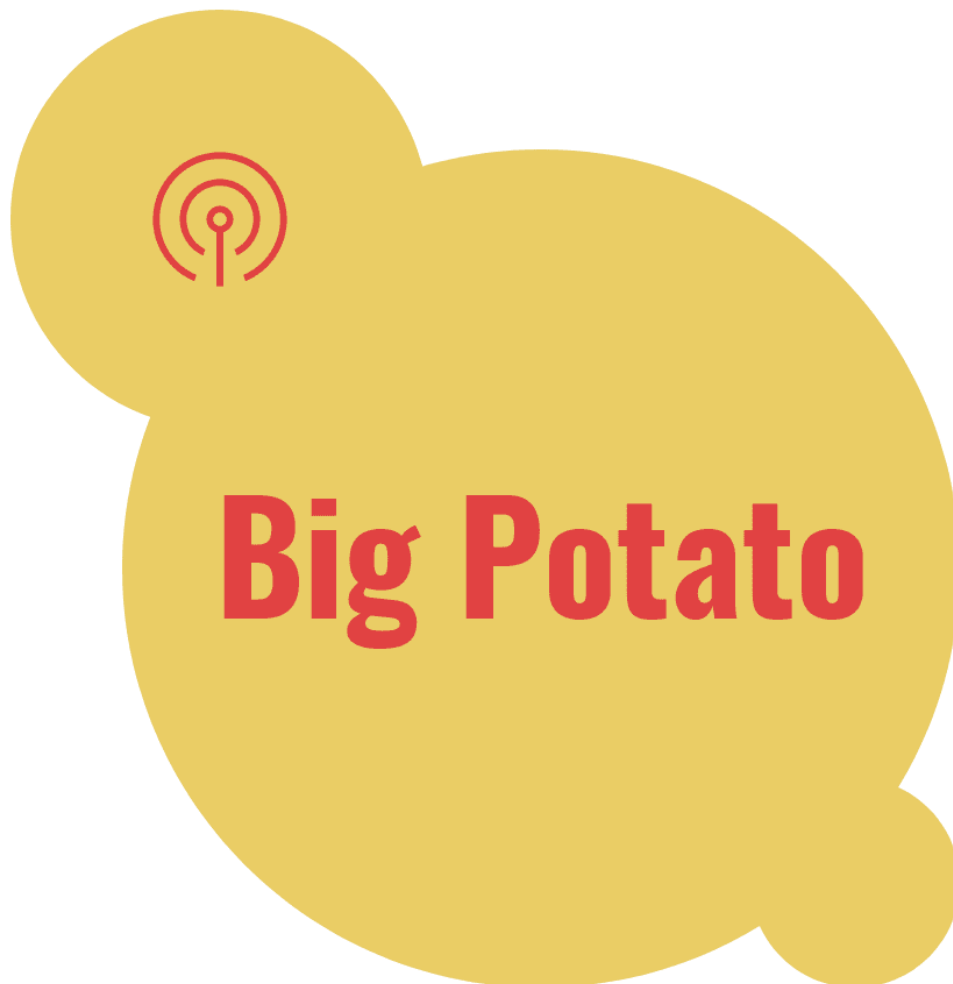
Appendix A – Log of Group Contribution and Team Process Activity

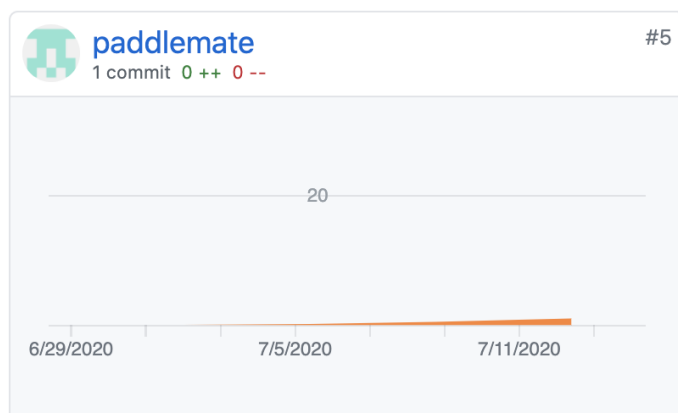**GitHub analytics displaying amount of GitHub contributions per contributor**

AngelynQ - Angelyn Quilaquil

MattLuke - Matthew Lomas

Suzmot - Cameron Bell

s3731231 - Kylie Davies

paddlemate - Dylan Palmer

AngelynQ #1
32 commits 1,136 ++ 932 --

MattLuke #2
19 commits 32,643 ++ 16,702 --

Suzmot #3
9 commits 1,054 ++ 760 --

s3731231 #4
8 commits 278 ++ 141 --

paddlemate #5
1 commit 0 ++ 0 --

Microsoft Team Used to Meet Face-to-Face, Record Meeting Minutes and Set tasks

Kylie Davies Yesterday 21:49
Everyone: into the google doc Kylie will share: 1. write 100 to 200 words reflection on how it went. 2. Do an intro paragraph re yourself 3. Look at the roughed out Project idea section of doc and contribute your ideas words if you have them re tools required (this by Wednesday morning). 4. Put your references in the references list (I will take them from references list doc into shared doc) - please have 1, 2 and 4 done by Thursday afternoon (3. by Wed am) so we can talk final details Thursday night

↵ Reply

Kylie Davies Yesterday 21:50
Matthew Lomas 1. add dylan's headshot in to website 2. make a google form for anonymous contribution estimates.

↵ Reply

Kylie Davies Yesterday 21:52
Cameron Bell 1. get your headshot to Matt 2. add in the smarts for app programming languages from your A1 into Orch.ID Project idea and your good idea re peeps voting if scan cannot decide. 3. Do the final review and submit

↵ Reply

Kylie Davies Yesterday 21:54
Me - 1. get favicon file for Orch.I.D to Matt for website 2. make skeleton doc for final asssembled doc and put on google drive. 3. Spend Friday reviewing report layout (final secretarial / layout check - table of contents with styles linked to headings, references in alpha order, Exec summary intro and conclusion in place - title page etc and send to Cam.

↵ Reply

Microsoft Teams used to Share Documents amongst the team

Dylan Palmer 02/07 22:05   ♥ 2
Here is a link to the notes I took during that meeting, hope someone finds it of some use 🙂
https://docs.google.com/document/d/1O8fxFFTA-nYgAKalixBFCSs_S9R6OdkgRie9A9-YUaQ/edit?usp=sharing

▾ Collapse all

   Heath Griffiths 02/07 22:07
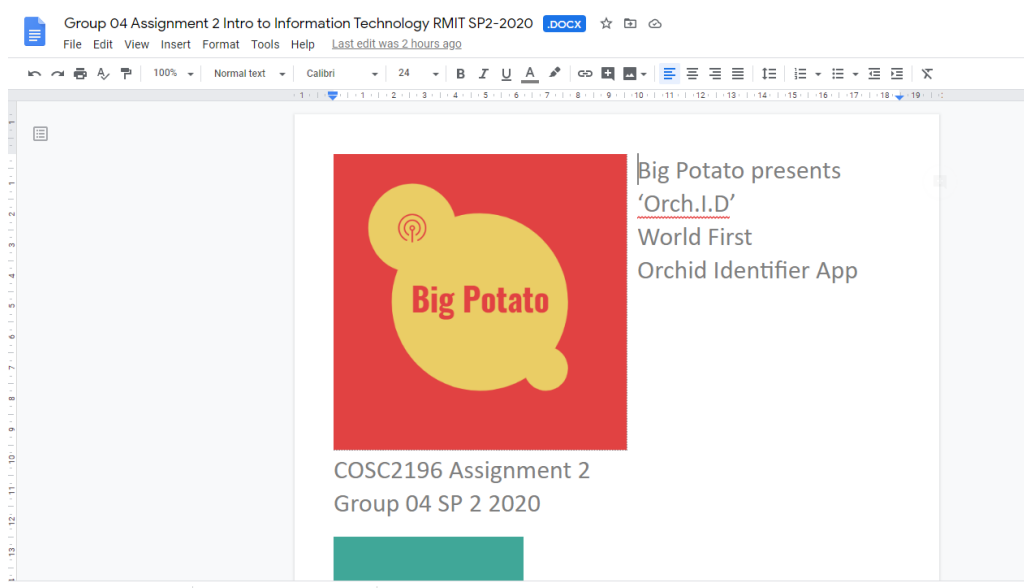   OMG Dylan. These notes r super-professional! Awesome job 😄

   Dylan Palmer 02/07 22:10   ♥ 1
   Hopefully my fingers kept up with my ears enough for it to make sense 🙂

↵ Reply

Google Drive used to share Report Document for Group Contributions

Microsoft Team used to broadcast information across the team
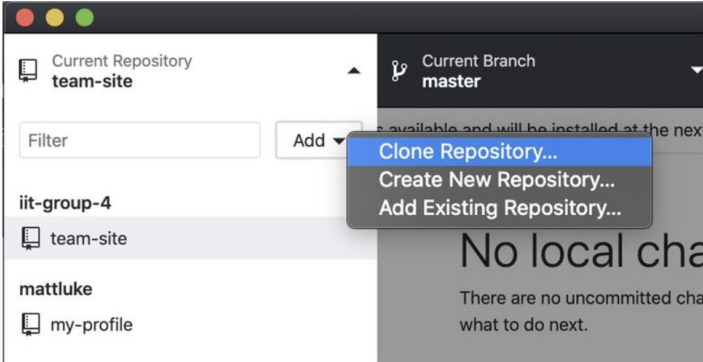
Matthew Lomas 01/07 21:57 Edited
Team GitHub: Repo and Pages
Hi Everyone, I've set up the team repo (https://github.com/IIT-Group-4/team-site) and invited you all to it (please let me know if it hasn't come through to your email).
The GitHub Pages is: https://iit-group-4.github.io/team-site/index
I've added a HTML5 UP! template to the repo that I was using for my A1 but we can easily change it to another template or no template if you want (will just need to make the change before we start making any commits).
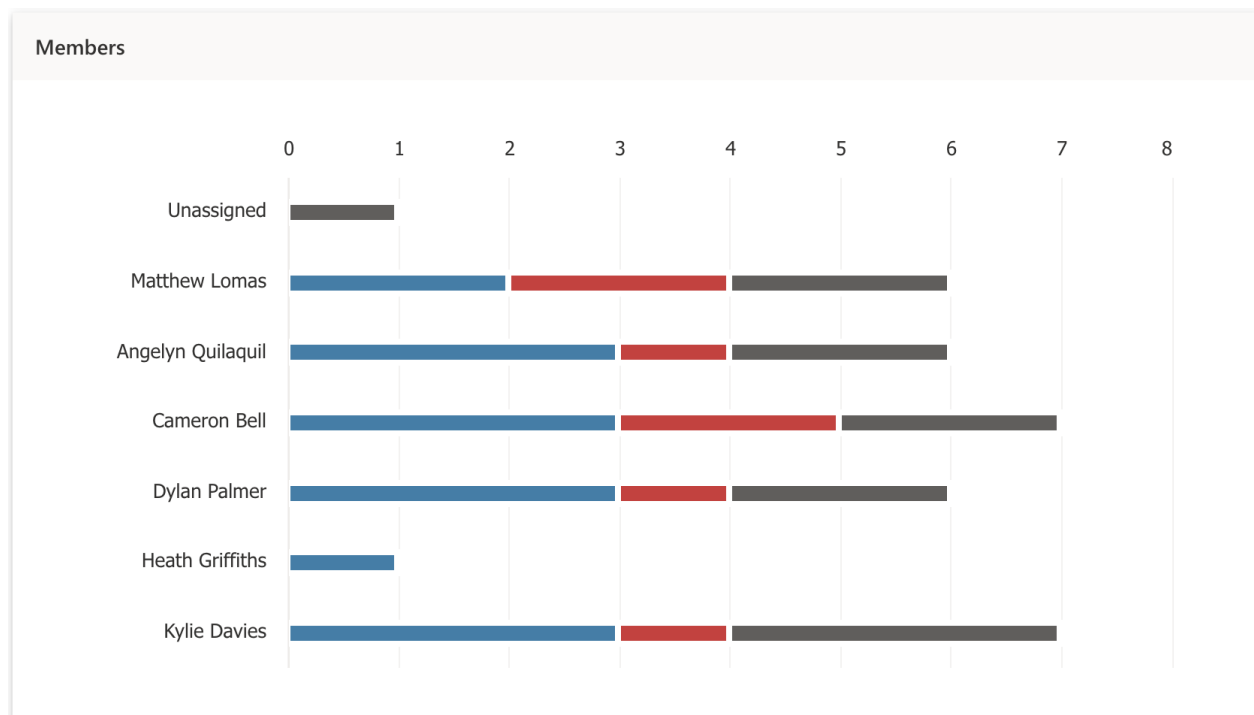
To add this repo to the GUI (if you're using it) click on add>clone repository>and then paste in "https://github.com/IIT-Group-4/team-site"

Thanks & looking forward to tomorrow night 🙂

Edit: I've also made everyone in our group an Admin (highest level) of the github

Microsoft Planner shows Allocation of Tasks as at 8:20PM 14/07/2020

Balsamiq used to begin some simple wireframes and Hatchful for logos

Appendix B - Full Transcript - Interview with Dr Mel Griffiths Cybersecurity Expert

Team Interview 2 July 9pm to 9:55pm AEST via MS Teams Video Meeting

Dr Mel introduced himself and explained a little of his career and education history before we commenced the questions:

Started off my career in Security Science working for Local Government. Completed a Bachelor of Counter Terrorism and Security Intelligence, then did Honours in Security Science. Completed a PhD in Security Risk Perception – How we perceive risk and our emotional response to risk. For example, some things of equal risk are considered by an individual differently according to when they occur. People may be willing to buy a home near an electricity substation; however, if a proposed electricity substation is to be built near existing homes there will typically be a huge outcry. In 2018 completed a Graduate Diploma in Cyber Security and made the career pivot into Cyber Security.

Team Question	Dr Mel's response
Why did you make the career pivot (to Cyber Security)?	**It was hard to find tenure in Academia due to long tenure of people already in the positions who had no intention to leave or plans to retire. The move to Cyber Security seemed like a more relevant and more accessible role to attain in the 21st century.**
What kind of work do you do?	**I am Head of Security Operations Centre (SOC) at Sapien Cybersecurity in Perth. Sapien is a small start-up company, with less than 30 people currently employed.** **Sapien Cyber Security installs and manages Threat Management and Vulnerability Management Systems aimed at the Operation Technology (OT) Sector: The OT Sector is anywhere in the real world where Operational Technology meets the real world e.g. mining trucks, water utilities, power and oil and gas.** **Sapien Cybersecurity currently look after clients in oil, gas, mining, chemicals. Sapien is looking to work with the Department of Defence; specifically, their OT fuel farms.** **I complete a lot of development and research on the companies we work for and the ones we want to work for.**

Where do you spend most of your time?	**Spend most of my time in the Security Operations Centre because I manage Security Analysts in the aspect of the business where we actually deploy the Cyber Security products/systems.**
	The structure of Sapien is such that there is an Executive Team and underneath that Head of Security Operations (me) and the Head of Development.
	We both manage the Operations Team and within that I manage the Security Operations Team.
	I would summarise my work time as a 50/50 split between product development and client service.
A fair cohort of our class is interested in Cyber: do you think this industry is flooded or do you think there is ample room and how can we succeed?	**There is ample room as it's a growing industry.**
	Finding people with a sufficient skillset is the hardest part.
	We find Recruitment Advertising returns hundreds of applications, but none are near the experience / certification levels expected.
	Once you're able to get your foot in the door, you are usually set and, on your way, to landing a good job in the industry.
	Industry Certifications are valued as is work experience. Recommend you tailor your resume and even volunteer to do unpaid work experience.
	To train I set up multiple virtual machines at home and used the tools to hack one virtual machine from the other so I could see what the impact was and test ways to avoid the hack.
What other tools are used in industry and would be good for training?	**The best operating system is Kali Linux which is a version of Linux kitted up with a huge suite of penetration testing and hacking tools for ethical hacking. You should also check out the Mitre Attack Framework – this is like a large table of attack vectors and methods and what are the advanced persistent threats (Getting Started with Attack, Pennington et. al 2019).**

What kinds of people do you interact with: Other IT professionals? Clients? Investors? The general public?	**I interact with three major areas: Security Operations Centre (SOC) team, Operations team, Development team.**

I report to the Overarching Executive Team so I meet with them.

I give instructions daily to the SOC team. The SOC team monitors the client's businesses using security products and looks for IOCs (Indicators of Compromise) – our researchers will look at a file and "hash it" (one way encrypt to get a specific encrypted result) to get a fingerprint and then compare it with any file that has an Indicator of Compromise to see if the hashes match.

One of the types of tools we monitor with is an Intrusion Detection System: it sits with the firewall. It monitors traffic going through and takes a mirror image of the system frequently and via machine learning, grows its "understanding" of what that client's normal traffic looks like; therefore, becoming better at finding anomalies or IOCs.

I connect with the Development team for Research and Development.

I liaise with clients to report security events, monthly reporting, establishing processes, client training.

I also liaise with prospective clients by providing product demonstrations. |
| What aspect of your work do you find most challenging? | **The product development part of the role is the most challenging. The biggest vulnerability in Security is Layer 8 – people – particularly the people within an organisation creating vulnerabilities for attackers (mostly unintentionally but also intentionally).**

Phishing attacks are huge now and people are definitely the weakest link, Ransomware is growing with hostile states (one in particular) employing it to raise capital. I emphasise with our clients and advise all to invest in their staff and in staff security education.

Hackers are always changing and are always going to be more agile. The best hackers use your own network's access and tools against the network itself. Many hackers are in the system just watching and learning for a long time, even years, before they launch an attack. |

Are there ever any cultural or language indications left in hacking attempts that may give an indication of the country of origin of the hacker?	**Well different keyboards would be a possible indication. For example, the Russian keyboard layout will show in the network traffic. However of course this can be faked to make it look like a certain state-based actor was the perpetrator. Sometimes state based hackers will leave a subtle calling card because they want the target to know who hacked them. And Security Analysts can often tell if it was a particular state by the type of information they are stealing.**
	Hackers will sometimes leave traces of their tactics. If you can observe and learn a hacker's behaviours, their tactics and procedures and deny access to those you are most effective fighting off that hacker because they have to make the hardest change, which is learn new behaviours. You should Google "Pyramid of Pain" (we did see *Figure 1* below) as it gives a good indication of the most effective threats to a hacker (at the top: Tactics, Techniques and Procedures)
	But it's important to remember that most hacking attempts are financially motivated (theft or industrial espionage).
Finally, can you share an example of the work that you do that captures the essence of the IT industry?	**The essence of the IT industry is that it is a constantly and rapidly evolving field. The evolution and ubiquity of computing in the information age means that IT is interwoven into every aspect of life.**
	An example of the work that I do that captures the essence of the IT industry is my company's interest in protecting the security interests of Operational Technologies that operate utilities, oil and gas, and many other industries.

Reference List

Adext Blog, 2018, *Why Machine Learning Is Changing The Advertising Industry*, viewed 14/7/2020, <https://blog.adext.com/machine-learning-changing-digital-advertising-industry/.>.

Anderson, M 2017 *'Isaac Asimov's Three Laws of Robotics need updating'*, The Conversation, 17 March, viewed 10 July 2020, <https://theconversation.com/after-75-years-isaac-asimovs-three-laws-of-robotics-need-updating-74501>

Android.com 2020, *'Android Studio'*, Available at: https://developer.android.com/studio (accessed, 10 July 2020)
Angel.co 2020, *Flixstock Software Engineer – Image Processing (job vacancy)*, viewed 14/7/2020 <https://angel.co/company/flixstock/jobs/304874-%20software-engineer-image-processing-1-3-yrs >.

Apple.com 2020, *'Xcode 11'*, accessed 10 July 2020, <https://developer.apple.com/xcode/>.
Bartos, M (2017) *'Write iOS apps in Java along with Android'*, 2017, Available at: https://medium.com/@mateusz_bartos/write-ios-apps-in-java-along-with-android-900d6013f83f (accessed, 10 July 2020)
Bianco, D J 2013, *The Pyramid of Pain*, Enterprise Detection and Response, viewed 8 July 2020, <https://detect-respond.blogspot.com/2013/03/the-pyramid-of-pain.html retrieved 8//7/2020>.

BBC Business, 2018, *WEF: Robots 'will create more jobs than they displace*, BBC Business, 17 September, Available at: https://www.bbc.com/news/business-45545228 (Accessed 10 July, 2020)

Burning Glass Technologies, 2018, *'Top Job Titles'*, (accessed, 10 July 2020): <https://iit-group-4.github.io/team-site/1.pdf >.

Burning Glass Technologies, 2018, *'Top Generic Skills'*, (accessed, 10 July 2020): <https://iit-group-4.github.io/team-site/2.pdf >.

Burning Glass Technologies, 2018, *'Top IT Skills'*, accessed, 10 July 2020, https://iit-group-4.github.io/team-site/3.pdf>.

Clauss, B 2017, *Choosing the right hashing algorithm - it's all about slowness,* viewed 15/7/2020 <https://www.novatec-gmbh.de/en/blog/choosing-right-hashing-algorithm-slowness/>.

Dada, E.G., Bassi, J.S., Chiroma, H., Abdulhamid, S.M., Adetunmbi, A.O. and Ajibuwa, O.E. (2019), *Machine learning for email spam filtering: review, approaches and open research problems,* Heliyon, 5(6), p.e01802.

Daffodil Software, 2017, *9 Applications of Machine Learning from Day-to-Day Life.* Published via Medium, viewed 13/7/2020, <https://medium.com/app-affairs/9-applications-of-machine-learning-from-day-to-day-life-112a47a429d0.>.

DATAVERSITY, 2019, *A Brief History of Machine Learning -DATAVERSITY.* viewed 13/7/2020, <https://www.dataversity.net/a-brief-history-of-machine-learning/.>.

DISC Profile 2020, *DISC Overview*, <https://www.discprofile.com/what-is-disc/overview/>.
DIY Network 2020, Orchid image used in Balsamiq wireframes, accessed 22 June 2020, <https://www.diynetwork.com/made-and-remade/learn-it/How-to-keep-your-orchid-looking-great.>.

Education Planner (.org) *Learning Styles Quiz*, viewed 18/6/2020 <http://www.educationplanner.org/students/self-assessments/learning-styles-quiz.shtml>.

Expert System, 2017, *What is Machine Learning? A definition -Expert System,* viewed 13/7/2020, <https://expertsystem.com/machine-learning-definition/.>.

Gardening Australia 2020, Plant Finder image used in Balsamiq wireframes, accessed 17/6/2020 <https://www.abc.net.au/gardening/plant-finder/>.

Gartner 2020, *Autonomous Vehicles - Gartner Glossary,* Google, viewed 11, July 2020<https://www.gartner.com/en/information-technology/glossary/autonomous-vehicles>.

Gregersen, E 2020 '*Isaac Asimov*', Encyclopaedia Brittanica, 2 April, accessed 10 July, 2020, <https://www.britannica.com/biography/Isaac-Asimov >.

Human Metrics, *Carl Jung and I Myers Briggs Personality Test,* viewed 18/6/2020, <http://www.humanmetrics.com/cgi-win/jtypes2.asp.>

I Harner, Jan 21, 2020, *The 5 autonomous Driving levels Explained*, Google, viewed 11 July 2020,<https://www.iotforall.com/5-autonomous-driving-levels-explained/>.

Intorobots, 2017 *Fruit Picking Robots, Intorobotics, 21 August 2017*, viewed 10 July 2020 <https://www.intorobotics.com/fruit-harvesting-robots/.>

Lambert S./Granath, Feb. 3, 2020 , *Autonomous driving: 5 top Autonomous Vehicle to watch in 2020,* viewed 11 July 2020, <https://www.mes-insights.com/5-top-autonomous-vehicle-companies-to-watch-in-2020-a-910825/>. Martindale, J. 9 May 2020, *The best firewalls for small businesses in 2020*, viewed 9 July 2020 <https://www.digitaltrends.com/computing/best-firewalls-for-small-businesses/>.

Mayo Clinic 2020, *'Robotic Surgery'*, Mayo Clinic, Available at: https://www.mayoclinic.org/tests-procedures/robotic-surgery/about/pac-20394974 (Accessed 10 July, 2020)

McKinsey Global 2017, *'JOBS LOST, JOBS GAINED: WORKFORCE TRANSITIONS IN A TIME OF AUTOMATION'*, McKinsey Global Institute, Available at: McKinsey Institute Report (Accessed 10 July, 2020) Moravec, H (2020) 'Robot', Encyclopaedia Brittanica, 3 June, Available at: https://www.britannica.com/technology/robot-technology (Accessed 10 July, 2020)

Oxford Economics, 2020, *'How Robots Change the World'*, Oxford Economics, Available at: http://resources.oxfordeconomics.com/how-robots-change-the-world (Accessed 10 July, 2020)

Pennington, A., Applebaum, A., Nickels, K., Schultz, T., Strom, B., Wunder, J. 2019, *Getting Started with Att&ck*, viewed 8 July 2020 <https://www.mitre.org/sites/default/files/publications/mitre-getting-started-with-attack-october-2019.pdf>.

Phalin, J. 2020, *Jay Phalin's Orchid Encyclopedia,* viewed 8 June 2020<http://www.orchidspecies.com/indexde.htm.>

Pohorecka, K., 2019, *SIRI and Alexa technologies: benefits and downsides in the modern world.* Published via Medium. viewed 13/7/2020, <https://medium.com/designstudies1/siri-and-alexa-technologies-benefits-and-downsides-in-the-modern-world-fe1ab476da6b.>.

RMIT, *COSC2651 Security and Computing in IT*, course notes Module 1, Week 1, 2020, viewed 9 July 2020, <https://rmit.instructure.com/courses/70695/pages/week-1-cybersecurity-and-physical-security?module_item_id=2324469>.

RMIT, *COSC2651 Security and Computing in IT*, lecture notes Module 3, Week 3, p. 1 2020, viewed 9 July 2020, <https://rmit.instructure.com/courses/70695/pages/week-3-lecture?module_item_id=2324480>.

Robb, D 2018, *9 Top Intrusion Detection and Prevention Systems,* viewed 9 July 2020, <https://www.esecurityplanet.com/products/top-intrusion-detection-prevention-systems.html>.

Roberts, Adam 2006, The History of Science Fiction, "R.U.R" New York: PALGRAVE MACMILLAN (Accessed portal 10 July, 2020)

Rossow, A (2020) *'A thought-controlled prosthetic arm?'*, GritDaily, 16 January, Available at: https://gritdaily.com/thought-controlled-prosthetic-arm-ces-2020/ (Accessed 10 July, 2020)

Serrels, M., 2018, '*Japanese space robots just landed on an asteroid'*, Cnet, 23 SeptemberAvailable at: https://www.cnet.com/news/japanese-space-robots-just-landed-on-an-asteroid-and-took-incredible-photos/ (Accessed 10 July, 2020)

Simply Psychology 2020, The Big 5 Personality Traits, viewed 18/6/2020, <https://www.simplypsychology.org/big-five-personality.html >.

Synopsis 2020, *What is an Autonomous Car? -* Definition, viewed 11 July 2020, <https://www.synopsys.com/automotive/what-is-autonomous-car.html>.

Tesla 2020, '*Autopilot'*, 'Tesla', Available at: https://www.tesla.com/autopilot

Test My Creativity 2020, *Test My Creativity*, viewed 18/6/2020 < http://www.testmycreativity.com/ >.
Zoheb 2014, '*Japanese Vending Machines'*, photograph*,* accessed 10 July 2020, < http://halal-guide.com/activity/295/ >.

TWI 2020 , *What is an Autonomous vehicle - FAQs*, Google, viewed 11, July 2020, <https://www.twi-global.com/technical-knowledge/faqs/what-is-an-autonomous-vehicle>.

University of Weimar, 2020, *School of Media Art and Design,* viewed 10 July, 2020 < https://www.uni-weimar.de/kunst-und-gestaltung/wiki/Main_Page.>