COSC1078 - Assignment 2 - The IT World

Mohamed Mohamed - s3853896

John Huynh - s3840382

Tony Villani - s3968011

Haidar Al Khalkhali - s3472621

Mohamad Abdallah - s3886739

Terrence Taylor - s3909238

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Team Profile

Personal Information

Mohamed Mohamed - s3853896

Mohamed lives in Melbourne with his parents. Mohamed speaks Somali at home as both his parents were born in Somalia. He has a great interest in writing poems which began in high school when he joined the poem program. He also enjoys playing video games, listening to hip hop music and watching animated movies.

Mohamed recognised his interest in IT when he attended a technology event that differentiated between internet speeds depending on connection and location. His experience includes creating a website on Wix.com and multiple databases on Microsoft Access.

John Huynh - s3840382

John is of Vietnamese background and lives in Australia. He enjoys catching up with his friends, eating out and playing video games.

John has had an interest in IT since he was very young, specifically how programs and applications run with code. He has some experience in python but is keen to develop his knowledge in order to make his own programs.

Tony Villani - s3968011

Tony lives in Melbourne and is of an Italian background. A hobby outside of his education is to make silver rings for his friends. His other interests include playing table tennis, going to the cinema and going out for a few drinks with friends.

Tony has always had an interest in IT and how IT is utilised in today's world. Specifically, he has an interest in the way that artificial intelligence is implemented into technology. Tony does not have a large array of previous experience but is eager to further develop his skills.

Haidar ALkhalkhali - s3472621

Fluent in Arabic and English and possess a BSC in Biomedical Science. Interests include Anime, heavy metal music, football and IT. Possess basic knowledge of Python, Java and HTML. Haidar also has a background in sales and ecommerce.

Mohamad Abdallah - s3886739.

I am of Lebanese origin. I was a second year Bachelor of Project Management Student at RMIT. I also work at Optus as a part timer while I'm studying. Whilst studying and working for a massive company, I realised how powerful, vital and important Information Technology has on the progress and survival of organisations. This showed me how vital it was to gain Information Technology experience and leverage that in the business/ corporate world. Mohamad is mostly interested in Python and Java Script Coding.

Terrence Taylor - s3909238

Terrence was first intrigued by IT when he was young due to watching his father and uncle build his own computers. This was beneficial for him as he developed his knowledge by getting himself involved and interacting with his family who were able to teach him. The process of diagnosing technical problems in computer hardware and software interests Terrence in which he has experience with. He completed a work experience program in high school at an IT solution company where he was responsible for a file migration to a new management system.

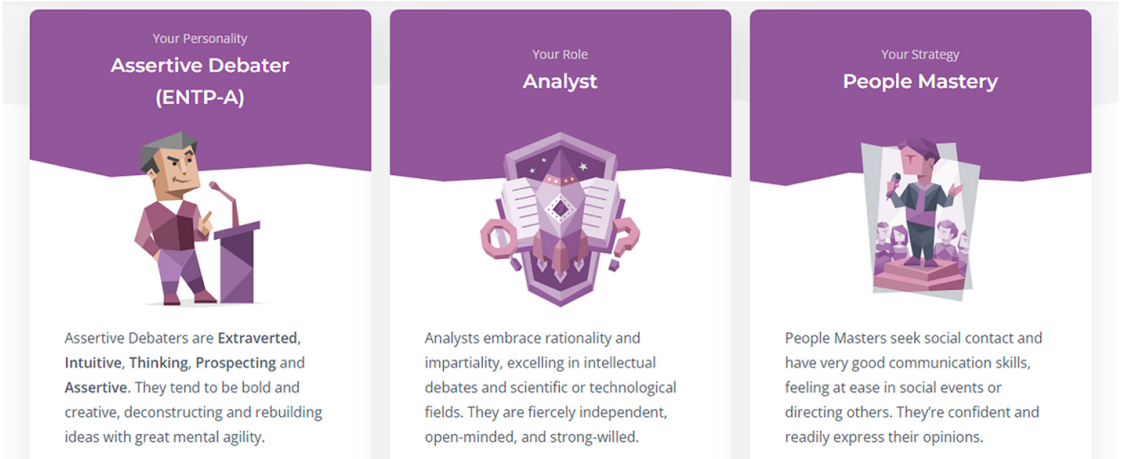
Test Outcomes

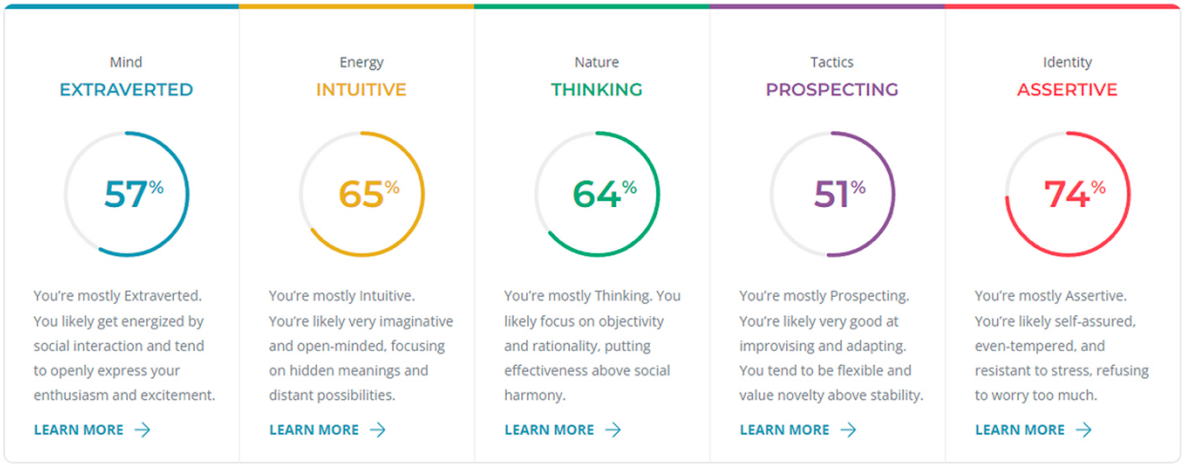
Haidar Alkhalkhali

Debater

Personality

ENTP-A / ENTP-T





http://www.educationplanner.org/

Your scores:

Auditory: 25%

Visual: 40%

Tactile: 35%

https://www.123test.com/logical-reasoning-test/

A logic-based test displays an individual's ability to find logical solutions based on patterns and reasoning skills

- 7 out of 10
- Logical reasoning
- Ability to distinguish patterns
- Lack of ability to see logic

Haidar is mostly extraverted, so he is able to be sociable and outgoing. This will greatly benefit the outcome of this group assignment as great communication is essential when working in a team. Being able to easily describe his thoughts and ideas will allow a constant flow of productive engagement. He is also intuitive with a Debater personality. Haidar can give great insight to discussion being helpful during the selection of our project idea and if/how we will be able to create it.

Terrence Taylor

Myers Brigg Type Indicator

- Logician Personality INTP-A
- Dissatisfied and seeking perfection

Learning Preferences Test Result

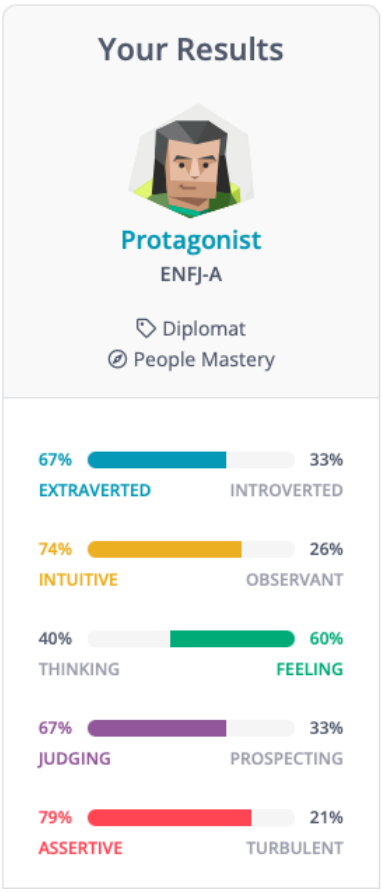
- Mild Kinesthetic
- Utilises practical exercises/experiences

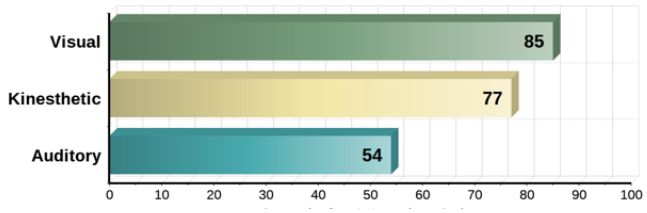
Big Five Personality Test

- Openness 81
- Conscientiousness 25
- Extraversion 42
- Agreeableness 52
- Neuroticism 69

Terrence's personality type describes him to seek perfection and is easily dissatisfied. Judging from his personality type results, he will be able to determine whether the project idea that we decide to choose has achievable goals when beginning to create it. Terrence's Learning Preference result was 'Mild Kinesthetic' meaning that he works well in a practical setting. This will be greatly beneficial in the next assignment when we are required to create our project idea.

Tony Villani





Big Five Personality Test

- Openness 58
- Conscientiousness 52
- Extraversion 42
- Agreeableness 100
- Neuroticism 37.5
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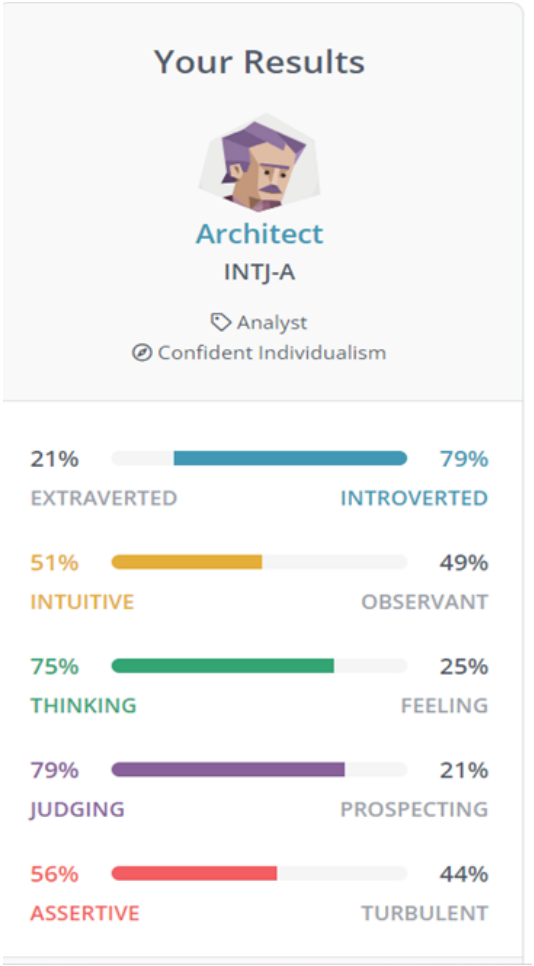
Tony's test outcomes displayed that he has high 'agreeableness'. He would rather work together as a team rather than compete with team members. The 'Neuroticism' result was somewhat low meaning he is able to be resilient when issues arise and try to move onto complete the desired goal.

Mohamed Mohamed



What's Your Learning Style? The Results

Your Scores:

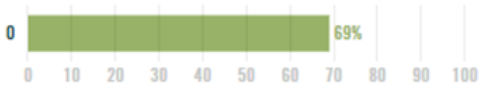
Printer F

- Auditory: 60%
- Visual: 30%
- Tactile: 10%

You are an **Auditory** learner! Check out the information below, or view all of the learning styles.

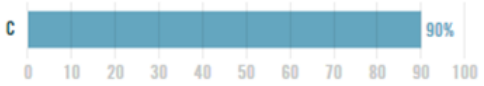
Openness

Openness describes a person's tendency to think in abstract, complex ways. High scorers tend to be creative, adventurous, and intellectual. They enjoy playing with ideas and discovering novel experiences. Low scorers tend to be practical, conventional, and focused on the concrete. They tend to avoid the unknown and follow traditional ways.



Conscientiousness

Conscientiousness describes a person's ability to exercise self-discipline and control in order to pursue their goals. High scorers are organized and determined, and are able to forego immediate gratification for the sake of long-term achievement. Low scorers are impulsive and easily sidetracked.

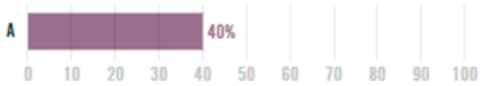


Extraversion

Extraversion describes a person's inclination to seek stimulation from the outside world, especially in the form of attention from other people. Extraverts engage actively with others to earn friendship, admiration, power, status, excitement, and romance. Introverts, on the other hand, conserve their energy, and do not work as hard to earn these social rewards.

Agreeableness

Agreeableness describes a person's tendency to put others' needs ahead of their own, and to cooperate rather than compete with others. People who are high in Agreeableness experience a great deal of empathy and tend to get pleasure out of serving and taking care of others. They are usually trusting and forgiving. People who are low in Agreeableness tend to experience less empathy and put their own concerns ahead of others.



Neuroticism

Neuroticism describes a person's tendency to experience negative emotions, including fear, sadness, anxiety, guilt, and shame. While everyone experiences these emotions from time to time, some people are more prone to them than others. High Neuroticism scorers are more likely to react to a situation with fear, anger, sadness, and the like. Low Neuroticism scorers are more likely to brush off their misfortune and move on.

Mohamed's test outcome displayed him having a high 'conscientiousness' result. In a group setting, this will be greatly beneficial as he sets high standards in his work and is organised.

This assignment requires the group to set and meet deadlines in order to do their best work. Mohamed also scored low in ‘neuroticism’ where he is likely to move past issues that arise and find suitable solutions if required.

Ideal Jobs

	John Huynh	Haidar Alkhalkhali	Terrence Taylor	Tony Villani	Mohamed Mohamed	Mohamad Abdallah
Ideal job	**Business Analyst**	**Machine learning engineer**	**Sys admin / IT manager**	**IT system administrator**	**IT network administrator**	**Home automation business**
Description	**Analyse business statistics and data to better understand how the business is performing and to help with the business decisions making process.**	**Build and develop a machine learning platform. Building cloud-based platforms experimenting with data.**	**Keeping a business’ network and servers updated and functioning as intended.**	**Manage computer systems and networks and to let them run efficiently. Monitoring the system and reporting faults.**	**Keeping a business’ network and servers updated and functioning as intended.**	**Founding and creation of a home automation business. Entrepreneurship by innovating with a self-built home automation device that is more effective and cheaper than regular home automation devices.**
Current skills	**SQL skills, data sorting experience, IT lingo, presentation skills.**	**Communication and stakeholder management skills**	**Knowledge of database and computer systems.**	**Communication skills and willingness to learn and gain IT qualifications**	**Create and manage functioning databases. Programming experience.**	**Marketing and sales experience. Managing and mentoring experience.**
Skills needed	**SQL and**	**Experience in python,**	**Stronger knowled**	**Communications**	**Relevant IT tertiary**	**SQL**

	python skills, further improved presentation skills, more analysis strategies and programs.	**SQL, and machine learning.**	**ge of compute r systems, system administ ration, network security and database experien ce.**	**skills, attention to detail, IT backgroun d with experienc e is network equipment , virtualisati on and network infrastruct ure**	**background, IT networks and infrastructure experience and knowledge and skills in Cisco switches.**	**experience, website building skills, marketing and sales experience.**
Learning plan	**Finish university course and gain relevant experience in internships**	**Focus on university subjects, informational videos and STEM learning programs.**	**Going through universit y course and taking networki ng classes and co-curric ular learning.**	**Finish bachelors of IT and start an occupatio n to gain experienc e**	**Complete undergradu ate degree in IT and do industry placements to gain experience**	**Finish bachelors of information technology and find jobs related to the ideal job and gain experience for it.**

In general, all our group members' ideal jobs relate to the IT field and are very similar. Apart from John Huynh who is pursuing a career of being a business analyst. Everybody else in the group is pursuing a very IT dependent career that will require strong foundations and advanced learning in coding, IT infrastructure and computer systems. Terrence and Mohamed are both pursuing careers that are very similar being system admin and IT manager. Mohamed Abdallah is also pursuing a path of entrepreneurship and innovating his own product of a home automation device. Most of our members have communication skills and a basic understanding of IT coding. However, all our members need to improve and further advance their knowledge and skills in IT infrastructures and coding. The learning plan for our group members mainly consists of going through with their university courses and modules to learn the necessary skills needed for their ideal job and then getting themselves into the industry with placements or internships.

Tools

MS Team link

https://teams.microsoft.com/l/team/19%3aNZxppLxdEDjLqIqrO9Cj2xjHIH-eD3gMuXWOoLFAqNc1%40thread.tacv2/conversations?groupId=b64a35e3-3628-45e8-8bde-983da9c699f6&tenantId=d1323671-cdbe-4417-b4d4-bdb24b51316b

Github Repository: S3968011/COSC1078-ASSIGNMENT2 (github.com)

Group website: https://s3968011.github.io/COSC1078-ASSIGNMENT2/

Group meeting 6/9/22

- Created Github repository
- Shared Github links from Assignment 1
- Established and delegated roles
- Created Google Docs

Group meeting 8/9/22

- Established roles with new team members

Industry Data

Job titles and demands:

Tony Villani (S3968011)

Tony's ideal position is the role of IT systems administrator. Providing technical support for general-purpose IT systems and networks could be categorised as a system administrator's job. The field of IT system administration is an expanding profession. The Bureau of Labour and Statistics (BLS) projects that between 2018 and 2028, there will be a 5% growth in the number of people employed in the field of IT system administration [1]. Over a ten-year period, that represents a rise of more than 18,000 employment. This figure excludes occupations created to replace the more than 383,000 sysadmin positions that are currently in existence [1].

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Terrence Taylor (S3909238)

Terrence also desires to work as a System Admin/IT Manager position, which handles a variety of duties. A system administrators' job is to provide technical support for generic IT systems and networks might be used to classify these duties. Employers are looking for a qualified professional that can handle a range of duties. Employers want someone who can provide general IT technical assistance and maintain a company's current software process. With strong emphasis on three software's: WHMCS, Xero, and WorkFlowMax. On the network side, employers require the potential applicants to maintain a VMware server that hosts unique websites. This is to guarantee the safety of the network's backup systems. The Bureau of Labour and Statistics (BLS) expects," a five percent increase in system administrator jobs between 2018 and 2028"[1].

Mohamed Mohamed (S3853896)

Mohamed's preferred position is to work for the position as the IT Network Administrator. A network administrator's job is to maintain and make sure that an organisation's IT systems are working properly. It's a challenging job that involves working with people, from many different departments. This position requires individuals to identify issues that affect many different pieces of hardware or software. Local-area networks (LANs), wide-area networks (WANs), and other forms of networks are the responsibility of network administrators. Employers insist on employees who have strong communication, interpersonal and leadership skills. Employers want someone who could help the company adopt advanced systems for data storage and other operations. Also, this profession is "expected to grow by about 6% from 2016 through 2026", from the Bureau of Labour statistics report[5].

Haider Alkhalkhali (S3472621)

Haider Alkhalkhali's desirable position is to work as a machine learning engineer. This position would give him the opportunity to develop his skills in this area. In this field, machine learning engineers utilise pre-existing algorithms and statistical techniques to either classify already-existing massive amounts of information or anticipate how a set of data will look in the future. This domain would give him the opportunity to develop his skills in this area, because he would receive training for duties that will demand such expertise in the future. This through the usage of Python, SQL, and machine learning. The need for both Artificial Intelligence (AI) and Machine Learning (ML) talents will increase at a compounded pace of "71% through 2025", according to the Top 10 Tech Job Skills Predicted to Grow the Fastest in 2021 report [6].

Mohamad Abdallah (S3886739)

Mohamed Abdallah wants to work as a home automation business owner. This job will require him to have advanced proficiency in creating a business website (marketing purposes). Employers demand the ability to collaborate with other corporations, as well as superior marketing abilities. He will also need to have an advanced understanding of SQL database configuration and programming. Employers also require the skill to create a website for the company, so that the business could run smoothly. The report by Fortune Business Insights indicates a "compound annual growth rate of 12.3% [7]".Therefore, there

is going to be a huge investment in the future for devices that are connected to IoT (Internet of Things).

Skills required for jobs:

Both Network administrators and IT system administrators are very similar, because they must be able to use a wide range of skills and experience to carry out their daily job. In our group, we have Terrence Taylor, Tony Villani, and Mohamed Mohamed who want to work as both these professional roles. IT system administrators and Network administrators will generally need to have; great writing and communication abilities, the ability to perform well under pressure and be able to overcome challenges [3]. Additionally, you will need to have previous experience and knowledge of IT-related abilities to work as an IT system administrator. For this job, networking, cloud, and SQL management expertise are essential [2]. Other technical skills employers demand include troubleshooting techniques, computer hardware, and addressing software issues that the company may have. Haider would hopefully want to work as a machine learning engineer. He will need technical expertise in programming and machine learning techniques. He needs these abilities because they will enable him to create software components with less need for human oversight. To perform more effectively, a machine learning engineer also needs good communication skills. For you to effectively communicate these insights to a non-technical staff, your shareholders, or clients, you'll need good communication skills. Mohamed Abdallah's ideal position is to become a business owner in the home automation industry. He will need strong skills in troubleshooting and programming many different software and equipment. He will work with many different equipment-like computers, applications, and remote controls. For this reason, he must possess extraordinary technical abilities to install the systems in a way that meets the needs of the client. Along with his job-related talents, he will also need interpersonal skills. These abilities include anything from attitude and empathy to listening and communication.

How do these skills rank in terms of the current demand?

Network administrators require many different skills that are demanded from employers. These skills include IT-specific knowledge of network and systems management, software, and hardware. A desire to always push yourself to learn, adapt, and develop are general skills required for the position of network administrator. Also, employers look for applicants that have excellent written and verbal communication abilities.

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

The top three IT-related qualities that are desired by employers but are not requirements are machine learning, cloud computing, and mobile application expertise. Although not necessary, these abilities are nevertheless valuable. The fact that new technology is constantly being introduced in business, means that you will need to stay up to date on the latest technological developments, which means you will also acquire new skills to learn.

Having a strong work ethic, being able to perform well in a team atmosphere, and having a pleasant attitude at work are the top three general qualities that are desirable but not required. These general skills are transferable soft skills that influence how well you interact with and relate to different people in the workplace, these skills are highly desired by employers.

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

The Burning Glass data displays on a bar graph the highly sought-after skills. Employers are looking for applicants with outstanding communication, problem-solving, and troubleshooting abilities. Since a network administrator position requires all the aforementioned skills, my preferred career path hasn't altered. In 2021, adaptability, communication, and creative problem-solving skills were the most in-demand abilities [4]. My ideal career requires all these qualities, and companies are constantly on the lookout for those who have the similar skillset.

IT Work / IT Professional

IT Professional 1 - Information systems technician

https://www.youtube.com/watch?v=om8AygYdrto&ab_channel=I.T.CareerQuestions

What kind of work is done by the IT professional?

- Computer imaging (Microsoft deployment too for imaging)
- Answering phones
- User account creation, create email accounts, manage users (days vary)

What kinds of people does the IT professional interact with? Are they other IT professionals?

- Clients? Investors? The general public?
- answering phones,
- going into field and fixing any user and system issues
- Clients (Medical practices)

Where does the IT professional spend most of their time?

- Ticketing (service desk) keeps track of priority and time management
- At desk is where majority of time is spent (Windows environment)
- active directory exchange.

What aspect of their position is most challenging?

- putting out fires.
- Never go into work expecting 1 thing to happen.

IT Professional 2 - Data Analyst

https://www.youtube.com/watch?v=r0vLQvJ3piE&ab_channel=Stefanovic

What kind of work is done by the IT professional?

- Majority of day Developing new dashboards, modding existing ones, debugging
- YouTube video editing (Youtuber)

What kinds of people does the IT professional interact with? Are they other IT professionals? Clients? Investors? The general public?

- 8:45am – 5pm answering emails from team and clients
- 9am Daily stand up with team
- Meeting with stakeholders about dashboards and new features requested for existing
- Meeting with colleague about debugging

Where does the IT professional spend most of their time?

- Work from home, at desk
- In meetings with other staff

What aspect of their position is most challenging?

- explaining issue is with data quality (dashboard only displaying that data)

IT Professional 3 - Software Engineer

Justin Hammond

https://www.youtube.com/watch?v=j1fc0FlCjyI&ab_channel=JustinHammond

What kind of work is done by the IT professional?

- Work done includes (features, bug fixes, scripts, databases, internal tools, documentation)
- Coding – Some days its customer facing features, others backend.
- Anyone can contribute to a project, they must leave notes of items that need to be fixed.

What kinds of people does the IT professional interact with? Are they other IT professionals?

Clients? Investors? The general public?

- Emails mainly about code, some from vendors
- Meeting with co-workers daily to plan tasks and discuss any issues which have come up.
- Meetings can be trainings, hangouts or presentations
- Pair programming – pair up with team member and watch and learn – crucial

Where does the IT professional spend most of their time?

- Checking GitHub activity
- Start day with simpler tasks or enabling features for customers –scripts are built to assist with mundane tasks – automation is key
- Code review (look over co-workers code and leave feedback, ensure best code gets production) – once feedback is received its address and resubmitted for another review
- Check boards to see what tasks are open
- See if anyone starred and projects of relevance
- end of day, double check messages, submit code reviews and close finished task

What aspect of their position is most challenging?

- Project fails – worst thing

IT Professional 4 - Software Engineer

Kenny Gunderman

https://www.youtube.com/watch?v=Wc2keUXLQdE&ab_channel=KennyGunderman

What kind of work is done by the IT professional?

- Software Engineer
- spend day fixing bugs, work through tech deck (fix code), fix bugs, update features and allow code to reviewed by other programmers

What kinds of people does the IT professional interact with? Are they other IT professionals?

Clients? Investors? The general public?

- Product owner
- Business analyst – cx facing

- Dev team – feature req, what to code
- UI designer – Interface and mock-up
- Programmer – spend day fixing bugs, work through tech deck (fix code), fix bugs, update features and allow code to reviewed by other programmers
- After approved – tested and verified (Uni testing, code test code written)
- Quality Assurance test code
- Features demoed to stakeholders, packaged up in new version and shipped to customer

Where does the IT professional spend most of their time?

- Work from home – Flexible schedule - People don't care if your late
- Daily stand-up meeting – intended to be short (plan and bring up issues, unblock co-workers)
- Ceremonies – Multiple recurring meetings plan, refine code and reflect on work
- Look through emails, review code and write your own code
- Majority of day is coding (not just writing code)

What aspect of their position is most challenging?

- Senior dev will scrutinise code and whilst important, it can be very heavy handed

IT Technologies

1 - Machine Learning

What does it do?

Machine learning (ML) is a subset of AI which uses data to make predictions given an input. Whilst the basis of ML has been around for decades, a recent surge in enthusiasm towards the tech can be attributed to AI forming the basis of many modern-day applications. Some of the biggest names in tech such as Google, Amazon and Microsoft regularly utilise deep learning models for some of the most advanced AI applications in use today.

This can be utilised in recommendation engines, fraud detection, spam filtering, malware threat detection, business process automation (BPA) and Predictive maintenance. In present day society, ML is involved in wide ranging applications from predicting customer behaviour to building the foundation and operating system of self-driving cars. Through the process of trial and error, ML can learn to predict outcomes and provide solutions based on data analysis of existing results.

Breakthroughs in computer vision and natural language processing are enabling us to utilise facial recognition in smartphones, language translation, autonomous driving in cars and so much more.

Developments in the field are further emphasised when factoring in the power of quantum computing to accelerate the learning potential of AI via the simultaneous multi-state operations to enable faster data processing. Whilst not commercially viable today, quantum computing in AI has seen one of the greatest levels of investment in the tech industry with potential huge rewards to follow.

AutoML (automated Machine learning) is also experiencing a surge of investment due to its ability to automate the process of ML to complete real-life tasks. It can simplify the process of complex ML models and techniques for businesses in order to process information without any background in ML. It can be used to simplify the task of data processing by:

- Data Processing: Data pre-processing to improve quality of data, cleaning via by transforming unstructured data into structured data and data reduction and so much more.

- Feature engineering: Utilising algorithms in order to use input data for the purpose of creating algorithms to assist in creating more adaptable features.

- Feature Extraction: The ability to create new features and instigate a reduction in size via the use of different datasets.

- Feature Selection: Isolate useful features or datasets for the purpose of intelligently selecting useful features.

- Hyperparameter Optimisation and Algorithm Selection: Automatically select optimal hyperparameters and algorithms.

- Model Deployment and Monitoring: Utilises system dashboards to monitor system performance and deploy systems based on the framework.

The pharmaceutical and healthcare sector has experienced firsthand the effects of AI on the industry. The pharmaceutical industry generates an exorbitant amount of data which are sorted and optimised via the use of ML processes. This can include the ability to streamline administrative processes in hospitals, personalise medical treatments and the ability to map and treat infectious diseases such as the world changing COVID-19 outbreak. Due to the ever-evolving nature of the industry with new diseases and variants appearing at an incredible rate, ML has assisted in the ability to identify, diagnose and streamline possible outcomes and management processes earlier than believed possible before the use of AI.

What is the likely impact?

Throughout history, as the precipice of new technology is realised and thrust into the limelight, an immediate fear factor ensues among the general public at the prospect of intelligent machines displacing human jobs. Manufacturing is one sector which has witnessed such displacement in the past and the inevitable rise of AI strokes fears into the hearts of and minds of society.

However, in its present early adoption into the industry, ML is proving to be more of a compatriot to humans in the field than a replacement. Rather than simply using AI to take over the entire manufacturing process, companies like Microsoft, GE, Bosch, Siemens, NVIDIA Fanuc, and Kuka among other industry giants, are utilising AI with machine learning approaches to boost every part of manufacturing. This includes using predictive algorithms to plan machine maintenance adaptively rather than on a fixed schedule, reduce overhead costs, improve quality control and manage supply chain bottlenecks efficiently.

An immediate useful impact of ML in AI can be seen in the January 2022 implementation of the tech by the Cadbury corporation. Using machine learning and AI technology, Cadbury were able to reconstruct actor Shah Rukh Khan's face and voice and allow customers to create custom advertisements featuring the star to promote their local stores. A partnership with Rephrase.ai allowed small businesses in India to create studio quality video from scratch which is different from simply creating deepfakes.

Meanwhile the leading recipient of investment in ML is expected to be none other than the healthcare sector by 2030. Robot-assisted surgery, dosage error reduction, virtual nursing assistants, clinical trial participant identifier, hospital workflow management, preliminary diagnosis, and automated image diagnosis are aspects of the sector where AI is believed to greatly improve the current standards. A case study in the possibility of ML to assist in this sector can be seen in the April 2020 implementation of the technology by Google LLC in the launch of a Rapid Response Virtual Agent for call centres. The chatbot was built with the purpose of responding to issues customers might be experiencing due to the coronavirus (COVID-19) outbreak over voice, chat, and other social channels. During times where social distancing was essential to keep transmission of COVID-19 low in society and a severe shortage of staff due to isolation was becoming problematic, ML proved to be an essential ally in the battle against the pandemic.

How will this affect you?

Virtual assistants such as Siri and Alexa are some of the most prominent examples of how ML and AI have been integrated into our day-to-day life. From telling us the weather, setting our alarms, reading us a news article or making a restaurant recommendation, virtual assistance has become an integral part of many of our day-to-day lives. Gone are the days of Siri being a novelty to share at parties, ML has progressively proven that as adoption increased, so has the benefit from the AI.

Friends and family often rave of the prowess of navigation apps such as Google and Apple maps and their ability to predict traffic jams and navigate them towards a more time efficient detour. A feat not previously possible without the use of ML and its ability to learn from our human mistakes.

Even mundane day to day tasks such as Spotify's ability to provide me with a personally curated playlist of music I may like, RACV's ability to predict my future insurance premium price, Google's ability to predict I may need a new phone case and countless other interactions with the digital world, they all bear the hallmarks of intelligent AI learning from my behaviour an optimising my online experience.

With such promising results from early applications of the tech, one can only envision the endless possibilities of future application which will affect our day to day lives. Once the fear and xenophobia are gone, advances in Autonomous driving vehicles, medical and pharmaceutical applications, social and commercial integration and virtually every aspect of our society will be improved with the help of ML.

2 - Autonomous vehicles

What does it do?
An autonomous vehicle can have a broad range of definitions however the Society of Automotive Engineers (SAE), a globally recognized and active organisation that works on developing automotive standards, defines a 0 - 5 level scale of automatic vehicles ranging from fully manual to fully automatic vehicles. The SAE in fact uses the term automatic vehicles instead of autonomous for the majority of use cases and vehicles within the 0 - 5 range, as autonomous would suggest the vehicle could create and undertake its own decisions and actions whereas automatic vehicles would still follow orders. (Synopsis, 2022)

To define and understand automatic vehicles it would be necessary to touch on these different levels defined by the SAE. Specifically levels 3 - 5 categorised as being the levels in which the system monitors the driving environment with varying levels of control. First in level 3 the vehicle's system will handle the majority of driving and only call on manual intervention for an urgent response, like emergency braking. This level of automation is often pictured as a co-driver or co-pilot that's ready to alert the driver in an orderly fashion when swapping their turn to drive. Level 4 is much broader where the vehicle would be able to execute all driving actions without the user, they could be asleep etc, but with certain limitations like only working within geographical boundaries (known as geo-fencing). Level 5 describes level 4 without the limitations; virtually this would indicate a vehicle that works on all areas, all over the world, all year around without a driver. (Stayton, 2020)

At the moment commercial level 2 is the most widely adopted level that the general population is used to, this level of autonomy is found in Tesla's Full Self Driving Mode, Audi's Traffic Jam Assist mode, Nissan's ProPILOT Assist mode etc. Level 3 autonomous vehicles are also available and are considered the peak level of autonomy available right now, such as Mercedes new Drive Pilot AI driving mode. (Harley, 2022)

So how this autonomous driving mode works in the real world, using the Mercedes Drive Pilot mode as the cutting edge example. Is the driver will be prompted to be put into Drive Pilot mode, which when activated will take over steering and acceleration allowing the driver to take their feet off the pedals and hands off the wheel and the car will then control itself to its destination, making turns and will only prompt the driver to take control if something outside normal driving conditions occur.

This new technology is the culmination of many different advancements in technology. Specifically a major player in the rise of autonomous vehicles is the use of new Light Detection and Ranging sensors (otherwise known as LiDAR). LiDAR sensing units fire hundreds of thousands of laser light waves in a wide range of directions each second. These light waves bounce off objects and return to the LiDAR sensor. The sensor uses the time it takes for each pulse to return to calculate distance (time of flight). Each of these pulsed laser

measurements, or returns, can be processed into a 3D visualisation allowing a central controller to interpret the 3d environment around them, to navigate etc.(Haj-Assad, 2021) Alongside new LiDAR sensors most autonomous vehicle applications use this in conjunction with many other sensors to allow the central controlling system to not know the environmental conditions in which it can drive accordingly but also means these systems have multiple redundancies, where discrepancies in one sensor can be filled in with data from another. These other sensors found in autonomous vehicles include Radar, which acts in a similar way but with electromagnetic waves instead of light waves as well as high resolution optical cameras (Nidec, 2022). With all the information from these sensors obtained, the system, using advanced image and pattern recognition, is able to detect road signs, road markings, pedestrians etc.

What is the likely impact?

A relevant topic when determining the impact of autonomous vehicles is looking at the overall infrastructures that humans as a society have cultivated, since the industrial revolution cities (especially of western influence) have evolved to be more car-centric, designed with car transportation as one of the highest priorities. This is evident when looking at North American cities such as Los Angeles, where parking spaces take up more land area than housing (Chester, 2015). Even in Australia, cities are still being designed for cars.(Giles-Corti, 2018). As such any large technological change when it comes to vehicles may ultimately affect our cities. A report '*The Impact of Autonomous Vehicles on Cities: A Review'* has determined that 'millions of square kilometres' currently used for parking areas may be able to be freed for other use as autonomous vehicles may introduce well-adopted sharing-mobility systems (Duarte, 2018). It was also suggested that free from the negative stressor associated with driving in traffic, people may search for homes farther from cities or their workplaces, increasing urban sprawl. However this point was contested that with city centres being freed from congestion and pollution from the potential decrease in overall vehicles and aforementioned infrastructure liberation that this would attract more people to them. Overall in terms the way society designs cities and settlements may be largely impacted by autonomous vehicles and therefore will likely impact most of the population.

In terms of certain job security when it comes with autonomous vehicles a number of differing points can be discussed. First, automotive mechanics would have to learn the new skills or otherwise outsource a whole new job for someone who may diagnose issues with the autonomous control systems. Or this could otherwise change the dynamics between a car owner and a traditional mechanic, where the car manufacturer may require the car be repaired by the manufacturer themselves, not allowing independent or third party repairs. This dynamic shift can already be seens as Tesla has notably been fighting laws requiring them to provide repair materials to independent repairers (Lambert, 2020). Secondly, a change in ride-share employment would be expected where a world with full adoption of autonomous vehicles would utilise driverless cars to move people, as this would be more cost effective and consistent then the current driver-based systems of Uber for example. This impact is quite evident through Lyft already announcing and testing this.(Intelligent Transport, 2022). However, relating to the IT field as a whole, autonomous vehicles would probably see an uptick in IT related roles in terms of the automotive industry. As all these new artificial intelligence systems and imaging technologies are put into every new vehicle, someone will have to maintain and update systems that run this.

How will this affect you?
In the current short term basis autonomous vehicles are not a major impact. Despite having many consumer vehicles with aspects of autonomy right now, they are still either low enough on the autonomy level to not have a recognisable impact on my lifestyle indirectly, or are just inaccessible to me and the majority population in terms of price. However foreseeably I could see autonomous vehicles play a role deeply into the lives of people I know or myself. My parents for example drive most days for work, a truly autonomous vehicle would change how 4+ hours of their day is spent combined. Whether this may reduce overall stress of not having to drive, or even further this may subsequently affect where they live or where they choose to work. I feel with a full-scale adoption of truly autonomous cars would have me go places I would otherwise be discouraged to, avoiding the negative traits of traffic, also it would highly increase the independence of my partner who relies on myself to drive us places. However accrediting these lifestyle changes to a distant utopia of autonomous vehicles may be stretch, where many of these personal impacts could be achieved with existing and already implemented solutions found in other parts of the world such as a better public transport system or the overall abolishment of car-centric city design in lieu of walkable neighbourhoods and cities.

3 – Cloud computing

What does it do?
Cloud services and cloud infrastructure accounted for one third of the global IT spending in 2017-2018 (McLennan, 2017) so as a prominent aspect of the modern IT industry it is important to be able to understand what it is. Cloud computing broadly refers to the migration of typical computing resources over the internet. Using servers, which are network attached computer systems, a traditional computer's resources are not only multiplied by the opportunity to culminate many server performances but are also not dependent on the computer (or server's) physical location. By using the internet this allows computing services to be accessed easily and virtually anywhere hence the 'cloud' moniker. With more prevalent use of OS-virtualization and in the last decade this allows multiple different users and processes being run from one hardware server (Bhatti, 2022). Virtualization refers to how the software on these servers are able to emulate different working conditions of a computer system, for example running multiple *virtual machines* that act like completely different computers.

The foundation of all cloud computing services would be a network attached server, which in professional and industry settings are generally specialised computer hardware designed fit for purpose in an individual server rack environment or large datacenter of many server racks.

Cloud computing can be privately hosted or publicly, examples of well-known publicly hosted cloud services include Google Drive, where Google will have large scale data-centres hosting thousands of dedicated servers for storage, similarly DropBox or iCloud offers the same systems. While private hosted cloud computing would typically involve an individual,

group, or business utilising servers that are a *single-tenant environment*, meaning it does not share resources with any outside users, while the actual server could still be outsourced, the individual, group, or business may opt to create their own network attached data centres or servers for their cloud computing needs. (Brook, 2020)

Some servers which will be used to remotely render large video files for example may have high-performance video graphics cards. Other servers which will be used mainly to backup and store large amounts of data may instead opt for large arrays of harddrives. In practice then this would allow any person connected to the internet, (and have access to whatever cloud server they need) to utilise these intense graphical computing power, or copious amounts of storage, even with minimal or lacking physical hardware.

While already touching on some popular use cases, such as storage, it is important to look at some more specific or nuanced applications of cloud computing. The animation or 3d visualisation industry often rely on 'render farms' for their complex workflows. As these groups often create 3d environments or render with millions of complex models, effects, images etc, an artist would be handicapped if having to use a traditional consumer computer hence the need for these render farms. Render farms are data centres with a multitude of servers built with high graphical computing performance. These servers are then used by the company to outsource the rendering performance of a 3d scene or animation. *Weta FX*, a visual effects company based in New Zealand, hosts many high-density servers to be able to have enough computing power to create, update, and render the high fidelity CGI and visual effects (J.R, 2009) that were found in blockbuster movies such as Avatar, Lord of the Rings, and the Avengers.

The main technological advancement that has made cloud computing such a viable and used service is the uptick in overall internet capability globally. With the advancement and widespread adoption of fibre-optic internet infrastructure (commonly known as just fibre) (OECD, 2022) , internet speeds around the world has become fast enough to justify cloud based workflows for many people and businesses as this may not have been possible on older copper or DSL-based internet infrastructure due to low speeds. Fibre-optic specifically describes how internet data is transferred throughout the population, fibre-optic makes use of fibre-optic cables which sends high pulses of light through the cable which can then be interpreted as internet signals. Fibre-optic provides more overall bandwidth compared to older forms due to the high speed nature of light as well as the energy efficiency of the overall system as energy loss through heat for example is mitigated compared to copper. (Freudenreich, 2001).

What is the likely impact?

There may be a fundamental impact on the need for powerful consumer hardware for each individual. Especially in developed areas where each person has access to consistent and fast internet, with the continuing trend of outsourcing performance using cloud computing, people soon may not have to buy their own expensive hardware for taxing workflows like 3d work, gaming, video editing, instead a simple machine to handle the user's input and interface that will then connect to a data centre to handle the performance taxing activities. As such traditional high-end desktop components for consumers may become redundant following this trend of lower latency connections. This is already being seen with the aforementioned 'render farms' but similarly services like PS Now by Playstation already have

gaming oriented consumers stream high fidelity games on relatively low performance machines where an external server processes the game.(Rubin, 2019)

The subsequent impact of accessible high performance equipment would also mean that initial start-up costs of businesses who need these types of services would be lower, as they don't have to buy the actual hardware outright. These public cloud computing services often take payment as they are used. As such a decrease in-house labour could also be expected as the external parties who control these data centres would be the ones who maintain and service the actual hardware. As such this decrease in in-house labour would be off balance for the need for network engineers and related cloud based developers at these external cloud vendors will only increase as cloud computing becomes even more prevalent. (Ohri, 2021)

How will this affect you?
Personally the usage of cloud based storage services has been integrated into my normal technology based life. Where traditionally I may have had to buy additional harddrives to back up my files, I now use google drive. Just recently I backed up all my photos on my phone to Google drive to avoid having them lost under a factory reset of the device. This shows the accessibility of cloud based services, and shows the increased redundancy of buying physical storage devices as a consumer. The consequences of these advancements however means that I am reliant on a stable and quick internet service. As such this becomes a main consideration when deciding where I will live. This consideration also becomes one of the financial implications where I, and the people around me, are more likely to increase internet service spending due the ever increasing reliance on cloud based services. I know families that are planning to move far away from their workplaces always have to consider the internet connection as their jobs and therefore their livelihoods are tied to these network based computing services.

4 - Cybersecurity

Project Idea

With obesity rates reaching an all-time high, especially after the whole world had been shut down for almost 2 years. Our group has decided to take initiative and work on a platform that would drive individuals towards exercise and living a fit and healthy lifestyle. The idea features a platform that would gather data about all the parks, stadiums, fields and other various sports grounds based on information and statistics gathered from the local cities and personal opinions and ratings of individuals that visit these facilities. The facility/ location would be rated on a star-based system (up to 5 stars). The rating would be based on certain factors such as space, availability of sporting equipment (soccer equipment, basketball hoops, etc…) , quality of grass (for fields), quality of trails (for national hiking parks), compatibility, and whether the facility is family friendly or not. In a similar notion these features could be available to filter when the user is searching so they can determine the important factors when finding and choosing a location. This will allow the users to choose the facilities around them that suit their physical activity needs and their situations, such as if they are bringing along their children. We believe that this platform would encourage individuals to exercise more if they have a facility around them that meets their needs. We also believe the platform would give users another option of discovering other facilities in their cities and states that would make them more excited and driven to exercise or otherwise partake in fun activities.

Physical exercise has several various benefits that would not only improve the physical appearance of individuals, but it also works to provide a better quality of life in general in our societies. Physical exercise works on improving a person's mental health and builds character, self-confidence, and self-esteem. These are the main building blocks of a healthy generation of men and women in a society that is trying to push people to become lazy and accept themselves the way they are. This was the main motivation behind the project, aiming to create healthier and stronger generations. Thus why we believe our project is revolutionary and life changing as it creates a solution towards a brighter future, for a young generation that would much rather stick to a screen the whole day than work on living better. This is especially relevant in the current social climate at the tail-end of a pandemic in which people had to stay inside where physical and social well being of the population suffered.

The platform will also target and aid every age group helping them stay motivated and disciplined. We are taking the extra step to keeping the users accountable as the platform will start recommending certain facilities based on the person's recently visited facilities and the answers of a small survey undertaken when the individual first signs into the app. The app will also track how much exercise the individual has done on a certain date and will send

a notification reminding the person to exercise.

Digging deeper into the rating metric, it would be based on a 5-star system that would be based off two factors. The first factor that would affect the rating of the facility would be the data gathered from the local council and the state governments about the facility. Data such as the size of the facility, it's capacity, family friendliness and other data that would be beneficial for locals and tourists while picking an adventure for the day would be the main contributors as to the rating provided by our research team. The other factor would be the input of users that have been to the facility. The users would be able to give the please a total rating of up to 5 stars and leave a comment after they have rated the please. These ratings and comments would get reviewed and audited every 2 months to prevent any spam ratings that aim to cheat the ratings for the place.

The 2 factors would then be combined and form the average rating of the place that would show as the user is trying to scroll through the nearby facilities or trying to discover some facilities in a certain place. The listing of the facility would show with the main photo of the facility, the name and the total average rating of the place.

The platform would have several methods that reduce comments that are aimed to cheat the ratings and the numbers. Manual reviews would be one of the methods as explained before. Another method that we would use is GPS tracking technology as the individual utilising the platform would need to enable their location. When the program recognises the location of the individual and matches it with the facility's data, it would allow the user to rate the facility. If a location had not been correctly identified by the GPS technology, the user would then be able to add a new location/ facility, upload photos and write the first review about it.

Our project aims to solve a real-life issue and as part of our commitment to provide reliable and trust-worthy information to our users, we need to make sure that every public location that appears on the platform exists. Therefore, the information submitted by users about the new facility would get referred to our research team to investigate the location and make sure it exists. Once the location/ facility is verified, the user's post would go public. The post would, however, have a warning message that certain data about the location is to still be gathered and that the rating provided is solely based on user input feedback. This would give a degree of trust between the user and the platform and provide a sense of security for the user whilst visiting the different locations.

A social aspect will be incorporated into the app where users can make posts of what sport they have been playing and where they have been playing using their location. Posts would only be visible once you click on the facility and scroll through the page. This is where the users would be able to view other people's past posts. Some facilities such as AFL, soccer and basketball courts and fields would also have a section for organised events. This section would let people that like to discover the different facilities have easy access to the different events held at that field/ court. The platform would also feature certain locals that normally plan these events and give them the ability to create boosted posts to promote activities on the facility's page. The program would also allow individuals to create break-out rooms for a specific location to organise an event or gathering either via messaging or via group and private voice calls. This feature is expected to expand and bring together communities around our nation.

We strongly believe in our project as a group. We also aim to bring this idea into fruition, however, to do so talent, skills and tools are required. The hardware that is required to successfully create this project is a PC and a smartphone to use the app. The smartphone is to be able to download apps from its application store being the app store or the Google play store. The app will be coded using python to make the features such as the social feed, messaging and review system. Kivy will be used to create the user interface. Google maps API is incorporated so users can access the map function. The team would also need talent to code the software and make it a user-friendly application that can be accessed and utilised by individuals.

The success of the project would be measured in different metrics. One of the metrics that we would use to measure success would be user engagement. The more users that download, utilise and post on the platform, the more the indication that the application is successful. The other metric is popularity between the public and whether or not the application is being featured on magazines and news articles. This would push more people to sign up and would tell us that the service is popular and catching everyone's attention. The last and final metric is that we see more people driven to exercise as we measure an increase in foot traffic especially in the most popular locations and facilities. Another metric that would help us understand the success of the project is seeing more organised events in the fields and courts, especially community events. All in all, the aim is to have reviews about sports grounds being entered into the application frequently by users to allow other locals to know where the best sports ground categorised by sport is located. We also aim to increase the rate of physical activity, thus, leading to great improvements in health, decreasing risks of various diseases such as obesity.

Group Reflection

Tony Villani

The members in the group were able to set objectives and delegate roles each time we had a meeting even though we had many issues that delayed the commencement of this assignment. The number of meetings could have been improved which would have enabled us to be more organised and on the same page. We also could have improved on planning and setting deadlines which would have allowed us to properly edit our work to the best of our ability.
I have learned that it is very important to have constant strong communication when working in a team so it can be clear that all members are trying to achieve the same goals. It also allows team members to feel they can easily ask for help if they're struggling. I have established what I need to work on in order to have a positive experience working in a team.

Terry Taylor

The delegation and assignment of responsibilities went smoothly and I believe all members knew the sections of the report that they were assigned. This could be accredited to efficient and effective communication through MS Teams especially early on where there were complications in the group formation. With conflicting meeting times the textual MS team conversations were a major part of each person's contribution. However after the whole group was formed having clear and concise goals from everyone early on set everyone up initially. Having clearer deadlines is something that we would have benefitted from so everyone was on the same page and so we were not all at different parts of the project. Having clear deadlines would alleviate some of the down time waiting for other sections to be completed before having everything migrated to the HTML website for example. A surprising aspect of the group work was the ease in choosing a project, it was expected there may be an amalgamation of ideas or friction choosing one but it was pretty unanimously decided.

Mohamed Mohamed

We were able to clearly define the dates of our meetings, and everyone was aware of their own section of the project they needed to complete.As a result, we are able to efficiently assign tasks to each team member.We were able to check on everyone's progress during our meetings on the MS calls and talk about any other areas that need group input.Everyone knew what to accomplish, but since there was no set deadline, we all worked at our own pace in the group. A deadline is something our group needed, because it would keep us organised and ensure that no time is wasted.I discovered how important effective communication is when working in a team. It enables you to talk about your problems and receive honest feedback. This enables other people to understand the challenges that a different group member is encountering while working on this assignment.

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