COSC2196 Assignment 2 – The IT Crowd

Team Profile

Ideal Jobs

The table below outlines the similarities and differences between the ideal jobs chosen by our team members.

|  |  |  |  |
| --- | --- | --- | --- |
| **Job Name** | Back End Software Engineer/Health | Data Scientist | Software Engineer |
| **Team Member** | Timothy Nancarrow | Vanessa Smair | Joshua Wagner |
| **Job Description** | Design, implement and maintain scalable backend services. | Extract, process, clean and triangulate between large and varied amounts of data. | Work in agile software development team |
|  | Build systems that integrate with healthcare standards (SMART, FHIR) | Build strong stakeholder relationships | Implement software solutions that meet/exceed customer expectations. |
|  | Participate in construction of DevOps infrastructure for these systems | Apply data analytics to drive critical business decisions | Develop high quality code that is aligned with current practices. |
|  |  | Build front-end models for technical stakeholders. |  |
|  | Continue to learn from and teach team about software engineering best practices. | Continue to stay up to date and research new data science technology/methodology | Continue to stay up to date, capacity to pivot |
|  |  | Identify commercially valuable opportunities |  |
| **Qualifications/ Experience** | BS Computer Science or 2 years professional SE experience | Relevant high level of experience | Minimum 5 years of SE experience |
| **Personal Qualities** | Strong Analytical and problem-solving skills | Strong Analytical and problem-solving skills | Strong Analytical and problem-solving skills |
|  | Aptitude and desire to learn independently | High levels of accuracy | Aptitude and desire to learn independently |
|  | Manage project to agreed deadlines | Manage project to agreed deadlines | Manage project to agreed deadlines |
|  | Ability to express ideas clearly within team and across departments. | Ability to translate and communicate high level technical data to non-technical audience |  |
|  | Strong communication skills | Strong communication skills | Strong communication skills |
| **Programming languages needed** | Java, Scala, Python | Python, SQL | Java, HTML5, CSS, JavaScript, React/Angular |
| **Other specific expertise** | HTTPS/JSON/REST | Statistics | API's & Microservices |
|  | Experience building and supporting stable server-side systems | Excel | Spring (Core, MVC, Boot), Struts, JPA/Hibernate |
|  | Knowledge of database systems and data model design | Jupyter | API design and building RESTful web services |
|  |  | Github | Containerisation/Kubernetes Docker |
|  |  | Powerpoint | Experience with Performance tuning |
|  | AWS or similar | AWS or similar | AWS or similar |
|  |  | BI/Tableau | Experience in multi-threading and high availability/high throughput programming |
| **Non-essential skills** |  | SAP |  |

Tools

Team Name: The IT Crowd

Group Website: [COSC2196-A2-The-IT-Crowd (s3950562.github.io)](https://s3950562.github.io/COSC2196_A2_Team_Project-The-IT-Crowd/)

Github repository: [s3950562/COSC2196\_A2\_Team\_Project-The-IT-Crowd: Assignment 2 COSC2196 (github.com)](https://github.com/s3950562/COSC2196_A2_Team_Project-The-IT-Crowd)

How well does our audit trail represent our group’s work:

Industry Data

Our group listed Software Engineers and Data Scientist as the ideal jobs in Assignment 1.

Software Engineers are seen as the 11th most in demand job title by employers according to data provided by Burning Glass.

Data Scientist is a relatively new profession, and it is difficult to find data on the employer demand in this area as it is usually categorized under the inaccurate labor force category of Actuary or Statistician. However, there are many articles available online that recognize the high demand for this skill. An article on the RMIT website outlines research which calculates the number of qualified data scientists graduating annually vs the number of data science jobs being advertised and the numbers show that there is a clear undersupply of data scientists[[1]](#footnote-1). Despite it being a relative new job and difficult to find demand data there are currently many jobs in this area, and it is seen as a growth area for the future.

The following table shows the general and IT specific skills identified as needed for the job advertisements our group chose as their ideal jobs and how in demand each of these skills are as ranked by the Burning Glass data provided by RMIT.

|  |  |
| --- | --- |
| General Skill | Rank in TOP General Skills list (Burning Glass) |
| Problem solving | 2 |
| Analytical | 17 |
| Ability to learn independently | 10 |
| High level of accuracy | - |
| Manage project to deadlines | 12 |
| Communications skills | 1 |

|  |  |
| --- | --- |
| Specific IT Skill | Rank in TOP IT Specific Skills (Burning Glass) |
| Java | 3 |
| Python | 22 |
| SQL | 1 |
| Scala | - |
| JavaScript | 2 |
| HTML5/CSS | 17 |
| React/Angular | 17 |
| HTTPS/JSON/REST | 17 |
| AWS | - |
| Excel | 18 |
| Jupyter | - |
| Github | 21 |
| PowerPoint | 18 |
| BI/Tableau | - |
| SAP | 6 |
| APIs/Microservices | 17 |
| Sprint, Struts | 17 |
| Performance Tuning | - |

The highest-ranking general skills that did not appear in our job advertisements are,

* Organizational skills
* Writing
* Teamwork/Collaboration

The highest-ranking IT Specific skills that did not appear in our job advertisements are,

* Microsoft Windows
* Project Management
* Business Management

Timothy:

Joshua:

Vanessa: The Burning Glass data has not changed my opinion on the Data Science job. The Burning Glass data does not list Data Science jobs specifically however these roles are becoming more common. Data Science is a growth area in IT and still an area that interests me. According to an article in LinkedIn in February 2022 Data Scientists are in high demand. There has been a 344% increase in jobs since 2013 [[2]](#footnote-2). I have also been researching one of the tools used in Data Science which has been as the Data Science defacto standard, Jupyter. It is exploding in use on Github, a code sharing repository[[3]](#footnote-3).

References:

[Are We Facing An Oversupply Of Data Scientists? | RMIT Online](https://studyonline.rmit.edu.au/blog/are-we-facing-oversupply-data-scientists)

Labour Insight Jobs (Burning Glass Technologies) PDF supplied by RMIT

[Fastest Growing IT Jobs in 2022 (linkedin.com)](https://www.linkedin.com/pulse/fastest-growing-jobs-2022-linux)

[Why Jupyter is data scientists’ computational notebook of choice (nature.com)](https://www.nature.com/articles/d41586-018-07196-1/)

IT Work

Our team interviewed Sam Smair, he is the founder and CEO of a small-medium IT business called DELV Pty Ltd which specializes in mobility, emerging technology, and security. (See Appendix A)

The Work

As the CEO Sam oversees the running of the company at a higher level across all disciplines. He has a technical background which helps him understand the complexities of the field however he has mostly high-level interactions. He stated that he “runs the company day in day out operationally, strategically and commercially”. He spends a lot of time communicating with clients to build the business. He also has non-IT related work involved in running a business such as admin, HR, marketing, and advertising.

He employs executive level managers in operations, sales, products, and innovation so they run teams which are doing the technical work.

The People

Sam interacts with his own staff, walking the floor making sure he is present and encouraging. He also spends a lot of time with clients, he sees this as a vital part of his role making sure they are happy and if they have any issues, they can contact him or the CIO of the company. He also thinks it is valuable to build relationships with his competitors and other vendors to understand what else is happening in the marketplace. He spends time travelling and looking out for emerging technologies to see what is resonating and having success in other parts of the world so he can learn from them. Although the company is self-sufficient, he has had interactions with investors and periodically he catches up with them however doesn’t typically go searching for them at this point. He also is on panels for different government departments and uses lobbyists to push his company as it is a wholly Australian owned and staffed company which resonates with the government. He also interacts with politicians interested in the emerging technologies space. Delv developed the Coronavirus app and the COVID safe app as they had worked with the government on many large projects and had proven under tight deadlines and constraints they could deliver.

The Time

When he was setting up the company he wore multiple hats, CEO, CFO, Business Development Manager, engineer etc. Now he oversees the company as the CEO, and he finds it vital to use resources to do this. He automates as much as he can using AI, ML, robotic process automation and tools that help him make sure things are running seamlessly. He would prefer to spend his efforts engaging with clients getting more work and delivering more work. This gives him the power of revenue to reinvest in the company and the ability to build the company and hire more people with the right skill set around him.

­The Challenges

Sam finds the most challenging part of his position the frustration of working with staff who don’t meet deadlines or who don’t follow up with clients when they have promised to do so. He admits he is “a control freak with attention to detail”. If something is escalated to him by a client, for instance they are having difficulty getting a response from a Delv employee he needs to deal with this to make sure it doesn’t happen again as he is focused on customer experience.

IT Technologies

Cybersecurity

What is Cybersecurity

Cybersecurity is the practice of protecting data and digital assets from external threats. During the 2020-2021 Financial Year the Australian Cyber Security Centre observed 67,500 cybercrime reports and a total self-reported losses of $33 billion due to cybercrime. As the use of technology increases so too does the need for protection of our data and devices.

Timeline

Description automatically generated

Source: https://www.acs.org.au/content/dam/acs/acs-publications/ACS\_Cybersecurity\_Guide.pdf

Cyberattacks come in many forms, some common examples are:

* Malware – viruses used to maliciously cause harm to systems.
* Ransomware – like Malware however steals confidential data and demands currency in exchange for access or to avoid public shaming.
* Phishing/Social Engineering – legitimate looking emails and messages are used to trick people into supplying their sensitive information. There has been an increase in this due to the pandemic and many people working remotely.
* DDoS – Distribute Denial of Service attack on a website making it crash forcing downtime.
* APTs – Advanced Persistent Threats, an intruder(s) infiltrates a system without being detected and spies on business operations and sensitive information often for prolonged periods.
* Man-in-the-middle – an intruder eavesdrops/intercepts messages on unsecure networks to steal data.
* Backdoor Trojan – hackers create a weakness in a victim’s system which allows them access remotely.
* XSS attack – Cross-site scripting, hackers insert malicious code usually in JavaScript to steal user information.
* SQL injection – a hacker inserts SQL statements into legitimate website’s SQL code to potentially steal information or even destroy a database.
* Supply Chain attack – malicious actors can compromise widely used supply chain software products to disrupt networks.
* Cyberwarfare – the use of cyberattack by one nation state against another to steal information or disrupt society such as the banking industry to destabilize. A cyberespionage tool most likely developed by Russia called Energetic Bear was used to access company networks in the energy sector in countries including US, Spain, Japan and Germany.[[4]](#footnote-4)

Chart, treemap chart

Description automatically generated

Source: Category 1 (C1) – C6 shows numbers of incidents with C1 being the most severe.[[5]](#footnote-5)

The costs of implementing cybersecurity strategies that are comprehensive and use best practices are justified as the costs of cyberattacks are extensive and cause major disruptions. These costs include lost revenue, lack of consumer trust and the cost of responding to breaches. Where Critical Infrastructure such as Energy, Telecommunications and Hospitals are the target of cyber-attacks there is also potential for harm or loss of life.

Currently cybersecurity covers five main areas,

* Critical Infrastructure
* Applications
* Networks
* Cloud
* Internet of Things

How does Cyber-Security affect us?

With an increased number of people working remotely due to the COVID pandemic there has been an increase in vulnerability to both individuals and businesses. There has been a fast-track approach to allowing people to work remotely and unfortunately malicious actors have seized this opportunity to attack vulnerable networks[[6]](#footnote-6). We are all aware of how difficult life becomes when we no longer have access to the technology that enables us to live. We are so dependent on smart phones, devices, the internet, and critical infrastructure that if there is any downtime, we are to some extent unable to function properly. If we are a victim of identity theft or monetary theft due to cybercrime the outcome is even worse.

With the IoT and an increase on our dependence on devices connected to the internet we are opening ourselves to further vulnerabilities. Before purchasing a device, consumers must ensure that it is secure and made by a reputable manufacturer. IoT devices should not contain powerful functionality that in the wrong hands makes the device a weapon. Consumers must check for default settings on devices, passwords should be able to be changed from those set by the manufacturer. The device should also have a clear upgrade path otherwise the device may remain toxic if bug fixes cannot be applied. In 2016 a man was killed whilst being a passenger in a self-driving car which is an example of where despite all effort’s technology is still fallible and can cause harm. In this case no malicious actor was involved however it shows how in the wrong hands devices and machinery could potentially cause injury or death.[[7]](#footnote-7)

With the introduction of the cloud many of us have transferred our sensitive data to large cloud companies where the onus is on them to protect our data. However, this has also led to an increase in cloud breaches. [[8]](#footnote-8)

What can be done now?

Cyber-attacks are increasing all the time and they are becoming more sophisticated. The government including the Australian Cyber Security Agency is continuing to create frameworks and guidelines to educate individuals and organizations on technology and practices they should employ to minimize risks. It is the responsibility of anyone connected to the internet to understand how to best protect themselves and their data.

At present we can use people, processes, and technology to reduce the risks of cyberattack.

People: Individuals should be on the lookout for suspicious URL’s and emails, frequently change and secure passwords, don’t share personal information on social media, backup files, update software to most recent versions, use malware/antivirus software and don’t leave devices unattended or unsecured. Another important factor is education, if consumers are aware of the potential risks they can be better protected and prepared. The eSafety Commissioner is a great resource for learning about how to avoid cyber bullying/attacks. [[9]](#footnote-9)Unfortunately, people also pose a problem for insider threats, where people have access to a system, they can also sabotage. There must be protections in place such as unique login ids, restricted access, deactivation of access after a person leaves an organization and security policies. Verizon found in 2021 that 22% of security related incidents were attributed to insiders.[[10]](#footnote-10)

Processes: There are 3 main processes involved in cybersecurity - identifying threats, protecting information and infrastructure, and responding to attacks. Each of these processes is complex and with new advancements in technology improvements are developing all the time such as with AI and machine learning capabilities to identify threats.

As awareness grows organizations should follow processes to avoid destructive attacks. One such process is to ensure organizations are regularly running offsite backups of their sensitive information. Ransomware attacks are becoming more prevalent for small businesses where a ransom is demanded in return for data. Regular backups eliminate the risk of this being a successful strategy by organized cyber criminals as sensitive data can be restored easily from backup. Paying a ransom in return for data is usually a short-term solution and the attack is often repeated.

Technology: There are many software and hardware options to protect individuals and organizations against cyber-attacks. These include DNS filtering, malware protection, antivirus software, firewalls, and email security systems. Also, the CSPM (Cloud Security Posture Management) platform is an automated system which verifies that a cloud has been configured correctly when it was originally set up and runs checks to ensure the cloud infrastructure is free from risks.[[11]](#footnote-11)

What state of the art technology is improving cybersecurity?

State of the art technologies are being used to improve cybersecurity success. For example, Artificial Intelligence (AI) and Machine Learning (ML) are being used to prevent attacks. We now have powerful tools that help predict and prevent cyberattacks with developments in UBA (User Behavior Analytics) and UBI (User Behavior Intelligence) providing powerful information to organizations. UBA is an automated process of gathering data about user activity and then flagging any anomalies. We have SIEM (Security Information and Event Management) which is a useful tool for analysing patterns behind a firewall however UBA looks for suspicious behavior before a breach can occur. This can prevent attacks in real-time such as, where a system is accessed from an unknown location or there is an increase in network traffic, either of these could indicate suspicious behavior from a malicious actor and the system can lock out potentially harmful activity.

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# Forbes, 30/06/2016, Tesla Autopilot Enthusiast Killed in First Self-Driving Car Death

[www.forbes.com/sites/briansolomon/2016/06/30/the-first-self-driving-car-death-launches-tesla-investigation](http://www.forbes.com/sites/briansolomon/2016/06/30/the-first-self-driving-car-death-launches-tesla-investigation)

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Blockchain and Cryptocurrencies

What does it do?

Blockchain is a system of recording digital information in blocks where the information is highly secure and cannot be changed or hacked. Blockchains are distributed across a network making them even more secure as they are verified by all users on the network. Each block is individually encrypted and timestamped and each time a block is added to a blockchain it contains the identity of the previous block. If a block is changed then the reference to following blocks is lost and the block is invalid. Blockchain technology has revolutionised the way the financial industry works as the technology is fundamental to cryptocurrency.

Cryptocurrency is a digital or virtual form of decentralized peer to peer currency that is not limited by national currencies which are legislated. It is almost impossible to counterfeit or double spend cryptocurrency. It does not have a set value it is simply worth what people are willing to pay for it. Consumers can make payments directly to each other through an online system which uses cryptography to ensure secure transactions. (3) Cryptocurrency values have been volatile over the past few years and because of this there has been a lot of interest in buying them for speculative purposes to make a profit. The most popular cryptocurrencies are Bitcoin and Ether.

Diagram

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Source: https://pipeandpiper.co.uk/2021/08/16/what-is-cryptocurrency

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

Blockchain and cryptocurrency is changing the financial marketplace. Currently people are buying cryptocurrency in more of a parallel marketplace to the current financial marketplace which use fiat currency such as the Australian or US dollars. (8) There are many competing cryptocurrencies and many blockchain networks. The regulators of our current banking system are playing catch up with the crypto world. As such, countries are determining legislation to legalise and control this new marketplace. (5)

What can be done now?

As cryptocurrency is decentralised it can be used to transfer funds without a third party such as a bank which eliminates this point of failure and speeds up the entire process. A payment made on a Visa card may involve up to 6 entities for the approval process and payment to be made, there are also fees and charges applied. A credit cards details may also be stolen and misused by hackers. A Bitcoin transaction however is peer to peer and only involves the 2 entities that the transaction is between. It is also very difficult for the bitcoin to be hacked, there is no way for the transaction information to be intercepted by a hacker.

Cryptocurrency is unfortunately gaining a bad reputation for use by criminals because transactions can be made anonymously to buy/sell drugs or arms. Also, as we see with the war between Russia and Ukraine, it is possible for criminals to hide money in cryptocurrency to avoid sanctions. (7)

Ransomware attacks have become more prevalent due to the development of cryptocurrency as payments cannot be traced. (9)

What is likely to be able to be done soon (say in the next 3 years)?

As the internet decentralizes and the new phase of the internet Web 3.0 is launched, companies create their own digital assets in the form of networks within the internet. As such, the internet will be able to be owned by smaller companies and it will become monetized. Investors will invest in creators of these decentralized networks and will be rewarded by owning blocks or currency in recognition of those networks. In the past, the internet has been a centralized interactive network owned by only a few companies such as Google. (4) Blockchain is fundamental to this upgrade in the internet to Web 3.0 as it is more secure and transparent in how it performs transactions making it hackproof unlike the current internet. (6)

There is a push for cryptocurrencies to become compliant to an international standard, currently ISO 20022 is the benchmark international standard for compliant cryptocurrency. (10)

What is the likely impact?

The internet is changing with advancements in blockchain and cryptocurrency. Web 3.0 will be the new age of the internet and consumers will be able to participate in ownership of the internet. Companies will create applications and tools that work within the newly created networks on the internet, and these will be the future of how the global marketplace works.

It is likely that in the next five years as the digital world expands companies will move to cryptocurrency as it is faster and more secure to make transactions. (2) People working in the financial sector will need to understand the digital marketplace and companies will use the blockchain and cryptocurrency technology to enable their systems to be more transparent.

The financial sector will need to keep up with developments in cryptocurrency as more people invest. There must be legislation in place to ensure it is regulated. If we try to ban cryptocurrency it is likely people will just go offshore to invest in it anyway. At the moment some countries are implementing their own regulations however there should be an international regulatory body to legislate this new novel technology. (12)

Cryptocurrency may be a very good option for people living in countries with weak currencies. They would be much better off investing in Bitcoin than their local currency. (11)

How will this affect you?

Blockchain and Cryptocurrency have changed the internet and the financial sector. I think the main thing with these technologies is to understand them, they are complex and make me feel like I am behind the wave. I think that the changes to the internet with Blockchain technology will be huge, decentralizing the internet is going to be a change for everyone who is connected to the web. The web will be more secure however there will be other impacts such as the monetization of the internet. Perhaps this will make a lot of people richer and will change the economy on a larger scale. I am interested in learning more about cryptocurrency, I know people that have invested, and I feel like it is very volatile and perhaps risky however I don’t want to get left behind either. I think my children will live in a very different world in the future where there will probably be no more tangible currency, and everything will be digital. It is wise to learn more about it.

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Machine Learning

What is ML?

Machine learning (ML) is a branch of artificial intelligence that utilises algorithms and solid data to imitate human learning. ML is used in place of large teams of data scientists to process and categorise data based off its existing understanding of previous datasets. While ML dates back as far as the 1960s with the invention of the computerised checkers machine [IBM, 15/7/2020], ML has rose in popularity and importance over the past few years.

The primary focus of ML is to “[get] computers to act without being explicitly programmed” [Stanford University, n.d] to do so. Utilising their own programmed learning model, machines constantly improve their analysis by referring to their backlog of previous data sets they have interpreted.

How does ML work and what types of ML are there?

ML works through a constant loop of interpreting data, evaluating its success and optimising itself (aka a model). According to Dr Michael Tamir, ML models can be broken down into 3 components: “A decision process”, “An error function” and “an updating or optimisation process” (All are from M.Tamir, 26/6/2020).

**A decision process** is a set of a set of calculations and steps taken by a machine to find a pattern in its existing dataset to return an interpretative guess of the current data it is analysing.

**An error function** is a method the machine conducts to determine how confident their guess is correct (typically as a percentage). The machine uses this to compare its response to the accuracy of its own model.

**An updating or optimisation process** is an algorithm that interprets the machine’s failures (from the error function) and updates its decision process to ensure the failure isn’t repeated. The more data the machine processes the more optimised and accurate it is.

While similar in their core processing, machines can have different learning models depending on what type of data they have to predict. Ed Burns from Tech Target states that “There are four basic approaches [to ML]: supervised learning, unsupervised learning, semi-supervised learning and reinforcement learning” [Burns, March 2021].

Diagram

Description automatically generated

Source: <https://www.javatpoint.com/types-of-machine-learning>

**Supervised learning** is a model where “data scientists supply [the machine’s] algorithms with labelled training data” [Burns, March 2021] – which is often user data – to test how the machine’s algorithm correlates and classifies the data.

**Unsupervised learning** is the opposite approach to supervised learning where the machine has to detect its own patterns and relationships from a set of unlabelled data. This is used primarily when labelled data doesn’t exist or is too hard gather.

**Semi-supervised learning** is a combination of the previous two learning models. A smaller dataset is provided with labels for the machine to get a basic understanding of the classifications. However, they are also given the task to sort a set of unlabelled data into the existing labelled set.

**Reinforcement learning** is a model where a machine processes the data itself based off a set sequence. Data scientists then give it positive or negative cues [Burns, March 2021] based on its ability to process the data accurately. The machine then uses these cues to improve the way they process data.

Unlike the previous types of learning (aka “non-deep learning” [source IBM, n.d]), **Deep learning** is a model (which is a subset of machine learning) used to fully automate the data learning process without any form of human intervention. Machines using deep learning automatically process uncategorised and unfiltered data (including text and images) and determine its own categories. Deep learning is primarily used to process larger datasets along with being credited in “accelerating progress in areas such as computer vision, natural language processing and speech recognition” [IBM, n.d].

A picture containing text, compact disk

Description automatically generated

Source: <https://en.wikipedia.org/wiki/Deep_learning>

What are the current capabilities of ML?

In its current state machine learning is extremely powerful tool used to process data across a variety of industries. ML improves the efficiency of businesses so they can process larger amounts of data at extremely fast rates and provide detailed insight in their current operations. According to an analytical insight by SAS, businesses use to improve their operations and gain a “strong advantage over their competitors” [SAS, n.d]. Larger industries rely on the efficiency of ML to optimise the overall efficiency of their business.

Banks all over the world use ML to “provide important insights in data and prevent fraud” [SAS, n.d]. The transportation industry uses ML to identify patterns and trends of existing routes which is used to “increase the profitability of their operations” [SAS, n.d]. While, retail businesses also use ML to analyse buying history which can be used to “personalise the client’s shopping experience” [SAS, n.d]. However, these examples barely scratch the surface in what ML can be used for in modern day society and most sectors that process data use some form of ML [refer to image].

Diagram

Description automatically generated

Source: <https://www.javatpoint.com/applications-of-machine-learning>

What ML projects are expected to be completed in the next 3 years?

Generative Pre-trained Transformer (GPT) is a neural machine learning model developed by OpenAI used to produce pieces of text, translate languages and create code similar to how a human would in its place. GPT uses deep learning (more specially neural learning) to teach the algorithm to write accurate and engaging texts for the user.

Background pattern

Description automatically generated

Source: <https://n2.eco/n2-technology-blog/wow-its-openai-gpt-3-time/>

While the latest version – GPT-3 – was released in 2020, the next version of the program (GPT-4) is set to release in 2023. According to an article written by Alberto Romero, “GTP-4 will have 100 trillion parameters” which is “500 [times] the size of GTP-3” [Both are Romero, 12/9/21]. With these extra features and developments, GPT-4 is intended to provide additional services similar to more specialised systems such as Dall-E’s text to image based system along with Codex’s coding system [Romero, 12/9/21].

When ML and more broadly AI is developed further in the future to include more complex human features such at body/facial expressions, reasoning and common sense; GPT-4 will be an extremely strong generalist model for creation of human texts/ code.

What is the future of ML and its potential impact?

As mentioned before, ML has become increasingly popular over time as more time and money has been dedicated to improve ML’s capabilities. In the last four years the number of businesses adopting ML has increased by 270% with more than nine in ten leading businesses having ongoing investments in AI and ML [both from Ying Lin (Oberlo), 12/2/2022]. As stated above, in the future we see ML models becoming closer to replicating human learning and neural pathways. With further development in machines being able to apply human reasoning and recognise human features – such as facial expressions, ML (and AI more broadly) will become almost indistinguishable from human learning.

Text

Description automatically generated

Source: <https://www.oberlo.com/blog/artificial-intelligence-statistics>

How will ML impact people and jobs?

In the future, ML and more broadly AI will cause a shift in jobs across a variety of areas of industry – particularly in technology. ML tools and systems has improved the overall efficiency and productivity of modern businesses. While ML and AI may eventually be developed enough to replace human workers for some basic jobs, Forbes asserts that “AI will probably not make human workers obsolete, at least not for a long time” [Ashley Stahl, 10/3/21]. AI and ML (currently) can’t replace human reasoning and critical judgement; hence it still has a strong reliance on human workers to fill in what the machine is missing. The global AI and ML market is expected to increase to $641.3 billion by 2028 [Ying Lin (Oberlo), 12/2/2022] with many more jobs being created centred around AI and ML.

Developments in ML will also change how regular people interact with computer systems and businesses. As of last year, 15% of customer service interactions are powered by ML [Ying Lin (Oberlo), 12/2/2022] and still set to grow. Better machine learning model practices will improve (rather than make redundant) client interaction with systems such as voice assistance apps (Siri, Google assistant, Cortana, etc), search engines (Google, Bing, Firefox) and autonomous vehicles. With the aforementioned developments into complex human features, client-machine interactions will be almost identical to human-human ones.

How does ML influence my daily life?

ML has always had a strong impact in my daily life, it has just been growing stronger with further developments into ML. For example, the search/ recommendation engines run by Google, YouTube and my streaming services. Of these services they all store data about me and my watching/ viewing habits to create recommendations (and in some cases advertising + product recommendations) based on previous experience with other users. ML is also used to detect malicious activity/ spam across my devices such as my phone, systems and mailboxes (i.e. Gmail and outlook).

A picture containing car, outdoor, control panel

Description automatically generated

Source: <https://www.newscientist.com/article/2150330-driverless-cars-could-let-you-choose-who-survives-in-a-crash/>

Icon

Description automatically generated

Source: <https://www.cio.com/article/189347/what-is-a-chatbot-simulating-human-conversation-for-service.html>

With further developments in ML, I see that I will be interacting with more virtual systems over their human agents in both a physical and virtual setting. Some mundane jobs such as basic helpdesk and customer support personal being replaced by computers that can accurately predict a correct solution to the issue. I also predict that self-driving cars become more mainstream (potential as a taxi/ uber service) with further developments into how they learn.

How does ML impact my family and friends?

ML has a similar impact on my family and friends – the difference is what mediums of media they use. For example, my parents shop a lot more than I do – particularly online – and as a result get more advertising and promotions centred around their shopping. A friend of mine also has a google nest in their home that they use from time to time to search up specific pieces of information while cooking or doing chores. Throughout each of these devices/ apps, machines store and reuse my friend's and family's data to provide a variety of recommendations, ideas and/ or advertisements.

An orange on a table

Description automatically generated with medium confidence

Source: <https://www.digitaltrends.com/home/common-google-nest-mini-problems-and-how-to-fix-them/>

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Project Ideas

Group Reflection

Our group brainstormed our thoughts on the project as we completed it and have compiled the following summary.

|  |  |
| --- | --- |
| Liked | We found that our personalities were complimentary, and we each brought different ideas/perspectives to the project, as a whole it really worked. |
|  | Everyone filled a role and there was no conflict, we supported each other when we needed to without any resentment. |
|  | The dynamic was very collaborative and there was no judgment despite each of us having to speak freely and voice personal issues that needed to be raised to manage the project. |
| Learned | To create To Do lists earlier in the project would have been beneficial. |
|  | There was a steep learning curve to use Teams and Github effectively. |
|  | It is better to communicate and raise issues and be transparent with the team to deal with things than dwell on them individually. |
| Lacked | Initially we lacked a plan with milestones to drive the project forward. |
|  | We didn’t use meeting agendas effectively so we would often go off track in meetings. |
|  | We lost one member during the project as he stopped contributing and didn’t respond to our communication with him. |
| Longed for | We only had a small team and needed more time and human resources to divide the work up. |
|  | Some members of the team would have preferred to use a Discord, OneDrive and Github combination of tools as an alternative to using Teams. |
|  | We found the time taken to do the assignment has made it difficult to keep up with the modules for Introduction to IT and will have to now catch up on these. |

Individual Reflections:

Vanessa:

I found the personalities in our group were very compatible and I felt very comfortable to be myself and to speak honestly and openly when I didn’t understand something or about my contribution. My teammates were very supportive as I had to go away for a long weekend, and I also celebrated a big milestone birthday so had a lot going on in my personal life however we all discussed our competing priorities and helped each other. I was able to provide a person to interview for the Work element and I think the team responded well to this interviewee and found him very interesting.

I contributed basic HTML from the content I created however I was not involved in applying the CSS to these files due to the sheer pressure of dividing up the work and getting a lot of content written. In assignment 3 I would like to get more involved in the HTML side of things to make sure I am furthering this skill.

I enjoyed the team meetings and I look forward to working with my team for the rest of the unit.

Joshua:

Timothy:

Appendix A:

Transcript from Interview with Sam Smair

Vanessa Smair  
So thank you for joining us for the interview. We just want to get an idea of what IT is because it is so broad, we wanted to get an idea of what your job is and how it fits into the industry as a whole. So we've got a few questions for you to explain basically.

00:00:21.640 --> 00:00:29.450  
Vanessa Smair  
Sam if you can, I'll start with the first question anyway. So tell us about your work and what exactly do you do? What's your role?

00:00:30.580 --> 00:00:49.150  
Sam Smair  
So I founded my own company. There it is (points at logo) Delv for the record and I've started 10 years ago, so my title is the founder and CEO of the company. So I run the company day in day out, operationally, strategically, commercially.

00:00:50.770 --> 00:01:07.530  
Sam Smair  
I am not down in the weeds as I did in the past, coming from a programming background technical background, but I've got enough knowledge to try and get my way through conversations in regards to this skill sets and capabilities that we have.

00:01:09.030 --> 00:01:15.490  
Vanessa Smair  
Yeah. OK. So you you manage technical people, marketing people, managing people, project managers.

00:01:16.340 --> 00:01:18.670  
Vanessa Smair  
Those kinds of people, all the people that work in the industry.

00:01:19.470 --> 00:01:36.040  
Sam Smair  
Yeah. Look, it's in an organization. You don't want to manage everyone, so we've gotmy exec layer of managers, operations, sales product and innovation. So they deal with operations of their teams.

00:01:36.230 --> 00:01:43.690  
Sam Smair  
And I concentrate more about the bigger deals, the high level interaction, communication with clients.

00:01:44.810 --> 00:01:54.760  
Sam Smair  
Building that relationship with you know, my levels in organizations and a Hawkeye on commercials as well.

00:01:55.140 --> 00:01:57.480  
Vanessa Smair  
OK. So we'll get on to that a bit more later.

00:01:58.160 --> 00:02:06.510  
Vanessa Smair  
Can you tell us specifically your part of the industry and IT where does it sit? So what would you call your part of the industry?

00:02:07.510 --> 00:02:15.490  
Sam Smair  
Look, the way the way I look at it is like uh, every business and organization could utilize our product set.

00:02:15.850 --> 00:02:42.210  
Sam Smair  
And we're an emerging technology mobile first company. When I say mobile first is anything, if you think about it nowadays, anything that is done behind the scenes from back-end systems and operations, everything's now presented, visualized, articulated on a mobile device or a mobile footprint platform.

00:02:42.650 --> 00:02:45.150  
Sam Smair  
And an app.

00:02:46.320 --> 00:03:07.660  
Sam Smair  
Whatever system it is, it's more relevant now with COVID obviously that everyone's using their devices and we're noticing in some of our clients. So we target, as I said, almost every business is out there, but we concentrate more on government, federal government, state government, large enterprises.

00:03:07.780 --> 00:03:13.880  
Sam Smair  
Uh, and the banks, utilities, mornings and so on, so.

00:03:15.080 --> 00:03:19.870  
Sam Smair  
I'll give you an example like federal government spend hundreds of millions of dollars on a my Gov.

00:03:21.270 --> 00:03:40.010  
Sam Smair  
I'm sort of notion of interactions ID and ID and a lot of systems behind the scenes. The only thing that I've interest to my Gov is how they interact with the users on their mobile devices. What has the citizen interaction performance?

00:03:23.750 --> 00:03:24.470  
Vanessa Smair  
The idea.

00:03:40.550 --> 00:03:44.550  
Sam Smair  
An innovation from this end.

00:03:45.790 --> 00:03:53.280  
Sam Smair  
And that's, that's where I've started the company and more. So investing and focusing on that in that regard right now.

00:03:54.070 --> 00:04:04.750  
Vanessa Smair  
OK. My last question before I hand you over to Josh is what work do you have to do that is sort of unrelated to IT?

00:04:09.070 --> 00:04:14.960  
Vanessa Smair  
Umm, I guess you do admin you do because you're the founder. You've got HR, that kind of stuff.

00:04:18.490 --> 00:04:28.390  
Sam Smair  
Unrelated to IT. Obviously, when you run a business, uh, you're gonna have new ones and some skill set in running a business.

00:04:29.610 --> 00:04:39.860  
Sam Smair  
From a commercial sense, from future strategies, pivoting, resetting, growing. So all of that stuff is non IT related.

00:04:41.200 --> 00:05:09.790  
Sam Smair  
And some of the other stuff that I also do is the marketing piece as well. There's no organization that exist in this world without marketing. And we're really hard to market and we wanna say to marketing it's that relationship connections and communications with the industry, even the vendors as well as the customers, which is not it, but it's more towards marketing, advertising and growing together in regards to.

00:05:10.340 --> 00:05:11.690  
Sam Smair  
Footprint in the market.

00:05:12.040 --> 00:05:14.720  
Vanessa Smair  
OK, alright. Josh, take it away.

00:05:15.340 --> 00:05:16.970  
Joshua Wagner  
Well, my first question.

00:05:17.790 --> 00:05:22.880  
Joshua Wagner  
Uh, who are the kind of people do you interact with at work?

00:05:24.750 --> 00:05:28.350  
Sam Smair  
Me. I name namely interact with my managers.

00:05:29.380 --> 00:05:40.770  
Sam Smair  
But we are a small company, just under 100 people and I like to always walk the floor as well. Give kudos to some of the people that went over and beyond.

00:05:41.470 --> 00:05:48.130  
Sam Smair  
And I keep an eye on on everything not in detail, otherwise you're not gonna have enough time with the day so.

00:05:48.210 --> 00:05:57.540  
Sam Smair  
If I wanna send a message, I'll send it to the managers and the managers will take her on every now and then we gather the whole team.

00:05:59.400 --> 00:06:21.110  
Sam Smair  
In a setting that is outside work where you know dinner, lunch is whatever it is. Sometimes I target these teams one to many, but it's just for the smaller subset team just to make sure. If I have clear sort of guidance or instructions that I do that one on one on one of few rather than the whole company.

00:06:24.540 --> 00:06:29.950  
Joshua Wagner  
Also, what are your main interactions with other IT professionals?

00:06:33.390 --> 00:06:36.420  
Sam Smair  
I live, breathe, smell.

00:06:37.510 --> 00:06:43.360  
Sam Smair  
and drink IT, and especially if you're not connected in the IT industry.

00:06:44.160 --> 00:06:46.940  
Sam Smair  
And if you don't have a global lens.

00:06:47.280 --> 00:06:53.840  
Sam Smair  
And you will be just like your next door sort of competitor and so.

00:06:55.000 --> 00:07:19.890  
Sam Smair  
We do some of that stuff on a global lens where I spend a fair bit of time overseas, you need, you know, we can't, we can't just think of what we're doing now is everything, not even nationally. Australia's GDP is 1% of the global GDP. So what is the UK doing in terms of emerging technologies? What's resonating, what sort of success are they having? So you can learn from it and failures.

00:07:21.170 --> 00:07:44.540  
Sam Smair  
So the way to interact with some of those clients is to go and see them face to face and interact with them. Have a relationship, have a partnership that's from a vendor ecosystem. And I've got I've got this mantra that united, we prevail. So I've got this consortia mentality that not many small businesses have where I'm happy to get my competitors.

00:07:45.400 --> 00:08:04.140  
Sam Smair  
With me in that circle so we can for a bigger players. So you gotta have that notion is you know if you wanna be big and go hard at the market you need to play with your competitors or with your friends in it and to build that ecosystem takes years.

00:07:46.830 --> 00:07:47.310  
Timothy Nancarrow  
Hmm.

00:08:04.840 --> 00:08:08.410  
Sam Smair  
And I think I'm at a stage where.

00:08:09.170 --> 00:08:12.500  
Sam Smair  
We still got a fair way to go, but we're in a good situation.

00:08:15.020 --> 00:08:21.390  
Joshua Wagner  
Final question before I hand over to Tim, what are your main interactions with clients and investors?

00:08:23.230 --> 00:08:26.140  
Sam Smair  
So clients? Uh, a lot.

00:08:27.740 --> 00:08:43.090  
Sam Smair  
A client, if they don't hear from you or see in the face to face, then they're gonna figure about you. So you schmooze, you do whatever needs to be to try and make sure the client, and if there's any issues, you give them your number. The CIOs and the CEOs.

00:08:44.590 --> 00:08:50.330  
Sam Smair  
To just make sure the delivery is right. So lot of interactions with clients almost on a daily basis.

00:08:52.420 --> 00:08:55.330  
Sam Smair  
What was the other part of that clients as well as?

00:08:55.450 --> 00:08:56.400  
Joshua Wagner  
Are investors.

00:08:57.000 --> 00:09:05.080  
Sam Smair  
Investors on investors knock on the door a lot of times and we've been self sufficient.

00:09:06.320 --> 00:09:14.920  
Sam Smair  
For 10 years now, so we don't, you know, we know who they are and they know who we are. Every now and then we get.

00:09:15.660 --> 00:09:17.110  
Sam Smair  
Interactions between us.

00:09:17.840 --> 00:09:20.420  
Sam Smair  
And that's just the game that we're in.

00:09:21.740 --> 00:09:25.770  
Sam Smair  
But we don't typically go out searching for those yet.

00:09:27.390 --> 00:09:56.640  
Timothy Nancarrow  
Can I add a quick question to that? Like add on a second? What about? I suppose stakeholders like in in the example that you do work with governments and like internationally as well. Do you have much interaction? I suppose there's a stakeholder because with the networking and working with those other competitors or the people in the industry, do you have what type of interactions do you do with other fellow stakeholders and such like legislation wise or?

00:09:30.530 --> 00:09:30.900  
Sam Smair  
Sure.

00:09:56.900 --> 00:09:58.540  
Timothy Nancarrow  
You know, sharing of information or.

00:09:59.030 --> 00:09:59.490  
Vanessa Smair  
Hmm.

00:09:59.910 --> 00:10:04.810  
Sam Smair  
So stakeholders in terms of like partnership you mean or?

00:10:04.800 --> 00:10:33.360  
Timothy Nancarrow  
Yeah, yeah, I suppose, like partnership or just I'm assuming like suppose with the government contract or a big organization they want to, you know have a you know be associated with a company that they wanted to be associated with in that aspect I suppose. And I know that comes under the schmoozing and everything. But like is there any expectation that even from your stance do you expect to receive from other people that have an interest in the company?

00:10:21.690 --> 00:10:22.150  
Sam Smair  
Yeah, yeah.

00:10:34.640 --> 00:10:41.130  
Sam Smair  
Yeah. So we're on the panel. You know, you need to be on the panel to try and get engagement.

00:10:42.000 --> 00:10:50.070  
Sam Smair  
Uh, we always couple of things that we try and deliver a message to the market. We're an SME, small to medium enterprise.

00:10:50.810 --> 00:11:20.580  
Sam Smair  
We’re sovereign. So all our all our people are in Australia where the ownership is Australian, we born in in Canberra which is the most secure type environment for a company to be raised in. So we always you know try and push that mantra. So we can't get more engagements you know while why do you give it to the bigger players and so on. So that's the way I'll do that and we use lobbyist we have interactions with politicians.

00:11:20.980 --> 00:11:51.780  
Sam Smair  
And and we do that in Victoria as well. You're from Victoria uh with government as well. So that's a big part of what we do. And we do engage on a level that is based on reputation as well. So the more you do the work and the more you have reputation, we build that coronavirus and COVID safe app from reputation they came to us and said we need this prime Minister's gonna present it in on Sunday. Can you have it in two weeks? Yes we will and that's what we've done so.

00:11:44.760 --> 00:11:44.960  
Timothy Nancarrow  
Yeah.

00:11:49.700 --> 00:11:50.000  
Timothy Nancarrow  
Hmm.

00:11:52.430 --> 00:12:06.540  
Sam Smair  
Yeah. So there you're part of that. You're part of the, you know, the associations out there as well. I don't believe too much in them, but we go to their events, we go to meet other people and there and interact.

00:12:06.850 --> 00:12:23.700  
Timothy Nancarrow  
Hmm. Cool. So my first question is Umm, I guess in your current position you have a lot of things to do and you have like a basically a company to run. But where do you find you spend most of your time on what aspects of your role?

00:12:25.460 --> 00:12:29.620  
Sam Smair  
Depends on the phase that we're in, right?

00:12:27.850 --> 00:12:28.070  
Timothy Nancarrow  
Yep.

00:12:30.350 --> 00:12:43.620  
Sam Smair  
This phase is when people start a company and they do everything like our multiple hats on 7,8,9 hats. You're a salesperson. You're a CFO your you know BDM, you're an engineer or whatever it is so.

00:12:43.690 --> 00:12:49.250  
Sam Smair  
The one we're at a stage now where.

00:12:52.030 --> 00:13:06.380  
Sam Smair  
You know, the set up in the company is solid and that takes time as well as long as the CEO is in control of their environment. So we use a lot of automation and efficiencies in what we do.

00:13:07.260 --> 00:13:20.730  
Sam Smair  
Anything that you look at like traditionally a lot of organizations use traditional tools, traditional systems, traditional services, traditional workflows, processes.

00:13:21.470 --> 00:13:52.360  
Sam Smair  
If you do that, you're gonna have a lot of resources in there to try and handle this, and it's not efficient. So you know we automate, we use AI and ML into artificial intelligence, machine learning, robotic process automation, whatever needs to happen to make sure things are seamless. So we don't need to put effort in thinking about that. We need to put effort in engaging more, getting more logos and and delivering well that's where I sit in now.

00:13:52.760 --> 00:14:11.310  
Timothy Nancarrow  
And you because you mentioned that you used to be a lot more like hands on obviously early on in the development of the company back then, did you focus a lot on like I suppose like the programming or the IT aspect like the delivering the product and you would spend most of your time doing that or just still focus on building the company. So if you go back in time?

00:14:11.760 --> 00:14:42.600  
Sam Smair  
Yeah, my main focus is to get more engagement because engagement gives you that power of revenue where you can reinvest it in the company and have more people that could lower your effort in that regard by having the right skill set around, you're only as good as the around, you're right. So yeah, we did. I did. I did this a lot. I just wanted to go out there and showcase. It's like Richard Branson used to say, you know, you gotta think large and never say no. That's how Microsoft started, you know, Bill Gates.

00:14:27.070 --> 00:14:27.340  
Timothy Nancarrow  
Yeah.

00:14:42.680 --> 00:14:53.150  
Sam Smair  
This is called saying I wanna 100 computers. He didn't have a computer in there and he said we'll deliver in five weeks. So they've gone and built it. So there's that mantra where.

00:14:53.940 --> 00:15:03.560  
Sam Smair  
If you think it fits in, you gotta go hard at it. You know the you can't have an essays and the company, otherwise you become a little bit more negative. And that's my pet hate.

00:14:56.890 --> 00:14:57.130  
Timothy Nancarrow  
Hmm.

00:15:04.220 --> 00:15:04.650  
Timothy Nancarrow  
Cool.

00:15:07.030 --> 00:15:16.150  
Timothy Nancarrow  
What aspects of the work? Well, OK, what aspect of your role do you find most challenging? Like, what do you find being the biggest challenge or hurdle to overcome?

00:15:17.380 --> 00:15:20.070  
Sam Smair  
OK, so I'm.

00:15:20.830 --> 00:15:24.520  
Sam Smair  
I'm a control freak and attention to detail.

00:15:25.940 --> 00:15:27.180  
Sam Smair  
Customer focused.

00:15:28.290 --> 00:15:29.560  
Sam Smair  
And.

00:15:30.740 --> 00:15:35.260  
Sam Smair  
And OCD and all of these things that you know, I need to go and see sociologist about but.

00:15:36.490 --> 00:15:43.140  
Sam Smair  
And so any aspect that defies these four or five notions that I just mentioned.

00:15:43.980 --> 00:15:58.020  
Sam Smair  
Is something that I get involved in and if an email is sent to Rebecca, one of my customer experiences and she hasn't answered that email in 2-3 days and I got a call about it through escalations.

00:15:58.940 --> 00:16:07.270  
Sam Smair  
That's, I'll. I'll put a little bit of effort. So that doesn't happen again and everyone needs to follow the mission of the company and the stuff that I talked about is in the mission.

00:16:08.290 --> 00:16:26.970  
Sam Smair  
And obviously that's internally focused externally on the business rather than on in the businesses, making sure the customers are happy and showcasing more of our product set. So we can farm what we have and go after new logos as well.

00:16:27.220 --> 00:16:38.250  
Timothy Nancarrow  
Umm. And finally, can you share an example of the work that best captures your essence or the essence of the IT industry? I know you mentioned the COVID safe app, I think.

00:16:39.170 --> 00:16:45.560  
Sam Smair  
So COVID safe app is everywhere like a the COVID set and the coronavirus app. I don't know if you remember back in March 2020.

00:16:39.280 --> 00:16:39.700  
Vanessa Smair  
Yeah.

00:16:46.900 --> 00:16:51.850  
Sam Smair  
When Coronavirus hit, at that time we got given this.

00:16:52.490 --> 00:17:22.180  
Sam Smair  
And we worked so hard on it and we had a like a year and a half contract with the government on it. We've been in the news, we've been in the National 9 news with Peter Overton talking about Delv, some of the issues and it was a little bit political between the Liberals and Labor. And so we're proud that we were part of it, but we got infamously, we got a little bit of.

00:17:22.570 --> 00:17:23.900  
Sam Smair  
Air time in media.

00:17:24.500 --> 00:17:31.640  
Sam Smair  
And but the one that the one that I was most proud of is that I spent a little bit of R&D to create this slow enforcement app.

00:17:32.390 --> 00:17:44.420  
Sam Smair  
Back in 2012, when it didn't exist around the world, I had FBI, CIA agency using it. I had meatball in the UK, Interpol we presented in Singapore.

00:17:45.150 --> 00:18:15.760  
Sam Smair  
I had six people in the company and we were punching above our weight to where all of these people were using our MVP, the minimum viable product in an app, and I failed in a regard that I didn't wanna have a say. I didn't have salespeople to go and present it and follow it. I was just consumed with the noise and the innovation and all of that stuff. But you learned your lesson and some of these aspects of what we've built is we're using now as well anyway.

00:18:15.840 --> 00:18:27.400  
Sam Smair  
So it wasn't all the waste of time, but that's a proud moment where you were the first in the world used by CIA, FBI and all the other law enforcement policing around the world.

00:18:28.050 --> 00:18:30.260  
Sam Smair  
And I only had six people in the company.

00:18:30.580 --> 00:18:38.870  
Timothy Nancarrow  
Yeah. Wow. How did you come to that idea? That’s what you wanted to do that at that time? If you don't mind me asking?

00:18:38.460 --> 00:18:45.780  
Sam Smair  
So that that came from a relationship and getting out there and being in the crowd and.

00:18:46.920 --> 00:18:52.420  
Sam Smair  
We had, we did some work for the Australian Federal Police, one of the innovate innovation guys.

00:18:54.000 --> 00:19:02.610  
Sam Smair  
I befriended him and I did this MVP for the federal police in here and all over the place as well. So it came from.

00:19:03.380 --> 00:19:06.230  
Sam Smair  
You. You never say you're lucky, but uh, you make your own luck.

00:19:06.780 --> 00:19:07.310  
Timothy Nancarrow  
Yeah.

00:19:08.750 --> 00:19:10.490  
Sam Smair  
Sorry, let me just open this door.

00:19:10.220 --> 00:19:10.880  
Timothy Nancarrow  
No, that's not good.

00:19:12.780 --> 00:19:13.970  
Vanessa Smair  
That's it anyway, isn't it?

00:19:14.350 --> 00:19:16.820  
Timothy Nancarrow  
That is, that is that was quite, Umm, that's quite cool.

00:19:17.000 --> 00:19:19.180  
Sam Smair  
Alright, I'll probably have to go get my.

00:19:18.810 --> 00:19:22.300  
Vanessa Smair  
Now we have to go anyway. Sam. We'll. Yeah. That was the last question.

00:19:22.630 --> 00:19:23.710  
Timothy Nancarrow  
Thank you so much, Sam.

00:19:24.090 --> 00:19:24.540  
Joshua Wagner  
Thank you.

00:19:24.510 --> 00:19:28.800  
Sam Smair  
No worries. Thank you guys. Any anytime you can send me an email and I'll I'll follow up with you.

00:19:29.400 --> 00:19:30.180  
Timothy Nancarrow  
All right. Thank you.

00:19:29.680 --> 00:19:31.040  
Vanessa Smair  
OK. Thank you.

00:19:30.510 --> 00:19:31.920  
Sam Smair  
Thank you. Bye.

00:19:38.540 --> 00:19:39.770  
Joshua Wagner  
I'll stop the recording now.

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