Digital and Technology Solutions

WM16: Personal Skills for Professional Excellence 2/3

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Apprenticeship Reflection

On the Digital and Technology Solutions degree I am part of the software engineering pathway. This pathway requires me to have broad knowledge of different technology disciplines:

- Information Systems
- Programming
- The SDLC (Software Development Life Cycle)
- Cyber Security
- Agile Methods

My main motivation for pursuing this career and degree program is because of the wide range of technical knowledge that I will gain over the four years. As technology evolves more jobs are being automated. ONS (Office for National Statistics) say that 1.5 million jobs are under threat of automation and 25% of jobs have disappeared since 2011. 39% of those 1.5 million jobs are held by workers whose education only went to GCSE level, (Collinson, 2019). By choosing to do a degree, I avoid joining the 39% lower skilled jobs; and by doing this specific degree I believe I avoid my future career being automated at all. As more professions are becoming automated it leaves a higher demand for the people automating the jobs; which are the software engineers. This gives me the confidence that I will always have a job waiting for me if I need it. My main motivation for applying is that I believe that an apprenticeship is a much better opportunity for me as opposed to a standalone university degree course. I have always enjoyed playing with computers and computer science is has always been my favourite subject; this is due to the fact that it is such a practical and hands-on field. I know that this course could not only give me the knowledge that an equivalent university course could give me but it would also give me the experience of working in a fast paced and stressful environment, which after many years in education, is what I want to move onto.

As a student I have to accept that the degree I am studying is in an evolving sector and everyday it changes. A new programming language could be introduced, an operating system

becomes out of date or the standard for encryption could change. Any one of these changes or any other in the field will directly impact my work at JLR (Jaguar Land Rover) and my studies at WMG (Warwick Manufacturing Group) as it is important to keep up with these changes and be informed to keep your work at the highest standard possible. When studying this pathway, you need to be willing to adapt quickly to new technologies and programming principles.

The Digital and Technology Solutions Software pathway will prepare me perfectly for the roles I would like to pursue in the future in either Software Engineering, in a management role, or as a Cyber Security Engineer, also in a position of seniority. In the job description for my current role it asks that the candidate is easy to do business with, transparent, makes the customer feel special, dependable, personalised - relates to providing personalised customer service dependent on the customers' needs (JaguarLandRover, 2019). It also asks that candidates can build strong and positive working relationships, problem solve, have good attention to detail, can improve ways of working, have accountability for work and adapt to change effectively, seeks opportunities to practice and apply new skill and has strong written and verbal communication skills (JaguarLandRover, 2019). When looking over roles that I would be pursuing in the future, I found that a lot of skills and behaviors crossed over. I found that for a software engineer role at GCHQ (Government Communications Headquarters), working in a totally different industry, they were looking for similar skills and behaviors but with more experience in the workplace which is exactly what I will gain in this apprenticeship. The job description says that applicants should have proven software development experience of at least one year, are comfortable developing complex software features and working within a software team, are self-motivated and able to work with minimal guidance and sometimes guide others, are able to critically assess their own work and that of others inside the team and are keen to keep up with new and emerging technologies (GCHQ, 2019). These job descriptions show that a lot of the skills I learn while undertaking this apprenticeship will be applicable to these positions.

Technical Area

One of the modules I will be learning about is “Cyber risks in organisations.” Cyber security is how individuals and organisations reduce the risk of cyber attack (NCSC, 2019). Its main focus is to protect the devices we use, specifically cars in the context of this report, from theft or damage. Cyber security is important because connected devices have become an integral part of our lives and if used incorrectly could cause serious harm. The “Cyber risks in organisations” module aims to provide us, as students, with knowledge and skills to perform risk management. This should allow us to systematically address threats and vulnerabilities in the code that we and our teams produce (WMG, 2019). Some challenges that the automotive industry face are: digitization, connectivity, electrification of powertrain and autonomous driving (Haas and Möller, 2017). Firstly, digitization, has become an issue the automotive industry as it is trying

to catch up with the rapid developments in technology in recent years leaving products vulnerable to cyber attack as they are not being developed correctly. As the industry becomes more digital companies like BMW are investing in new technology and recruitment into this sector; creating jobs like a chief digital officer (Haas and Möller, 2017). Secondly, electrification of powertrain has been a difficult task for most car manufacturers, with only Tesla, Jaguar Land Rover and Nissan making significant progress. When electrifying the powertrain, it requires a lot of new parts, specifically electronic ones and also new software. This can lead to cyber criminals gaining unauthorized access to a cars software and causing devastating accidents if software is not secured properly (Haas and Möller, 2017). Thirdly, autonomous driving has quickly become a popular technology in the in this industry. Advanced driver assistance systems (ADAS) have been around for many years but recently they have evolved into more sophisticated systems bringing about functions like blind spot detection, adaptive cruise control and emergency braking. The challenge that OEMs (Original engine manufacturers) have is that they have to balance both the security with functionality and quality (Möller et al., 2018). The transition between human and automated driving is a difficult one as OEMs main interest is to keep customer satisfaction at the highest possible. As cars are becoming autonomous there are more ways to cause harm to the users and people around them. A term that has been used recently is 'AI bullying' where as cars are automated they are programmed to avoid accidents, this can then lead to other road users driving non-autonomous vehicles to abuse the fact that self-driving cars will stop/slow down if someone pulls out in front of it (Rizvi et al., 2017). Finally, connectivity and connected cars raise some cyber security concerns. There is a lack of experience with highly connected cars (Takahashi, 2018). The networks used in connected vehicles are shifting from closed networks to open networks that connect to outside networks. This leaves them more vulnerable to cyber attacks as there are more access routes. DoS (Denial of service) attacks are a common attack in many industries and this can be applied to the automotive industry (Möller et al., 2018). Back-end systems are used to provide real-time map and traffic information therefore if an attack was performed on a back-end system it could have drastic consequences for traffic and congestion on an international scale. A mitigation system is necessary for these attacks to be prevented (Takahashi, 2018). These challenges all relate back to our 'Cyber risks in organisations' module and show how this module provides vital knowledge and skills for our positions in JLR where we will be developing these products.

Professional Bodies, CPD and Skills Required

If I intend to pursue a career in cyber security, there are some qualifications and skills that are beneficial to have. For example, a CompTIA qualification in either Network, Security or A+ give you the basic and advanced skills for a job in the IT sector and is widely recognized but we do not gain one over the course of this apprenticeship. This is something I would work

towards in my continued professional development. Cyber security engineers are usually required to have extensive knowledge in networking which is something I will not gain on the software pathway of the DTS program. In other areas of cyber security there is a need for skills such as penetration testing, which is testing systems for vulnerabilities and essentially breaking it. You can gain a qualification in this discipline, namely becoming a CEH (Certified Ethical Hacker) (Dice, 2019). In order to get to the standard required for a career in this sector I would look to try and complete these qualifications alongside or after my apprenticeship with the hope of the cost being covered by my employer. If I decided to leave JLR I would most likely look to do a master's degree in Cyber Security at a Russell group university and this would give me the extra knowledge and experience to progress further in my career and eventually make it to the top of the management structure. Some other important skills for this technical area are my programming skills. I have a strong understanding of Visual Basic 6 and Python; however to further improve my career prospects I would need to improve my Java and C++ skills (Dice, 2019) which are covered in our Smart Solutions module.

As a software engineer, I will be hoping to register with the IET (Institute of Engineering and Technology) as an EngTech (Engineering Technician) and then further along the line as an IEng (Incorporated Engineer). Becoming professionally registered means that I will gain recognition as a professional in my field which in turn will improve my career and salary prospects. Referring back to the possibility of undertaking a master's degree after my apprenticeship; if I wish to become a CEng (Chartered Engineer) I will need to have said degree (IET, 2019). I am required to show continued professional development so I will be looking to take the CompTIA qualifications and push myself further to learn about new technologies to show my commitment to the industry and engineering itself. To gain professional registration I will need to have Level 4 or above qualification in an engineering related subject, give details of projects I have worked on, provide references from colleagues/managers and show how I am continually professionally developing. However, I can join the IET on a student membership to begin my IPD (Initial Professional Development). After being registered for a long time and making my way to a CEng I can gain fellowship in the IET (IET, 2019).

Student Reflection

During my time on this apprenticeship I have thoroughly enjoyed meeting hundreds of new people on our corporate induction week. During this week we were bombarded with new information and it made me so excited to see what the future of JLR looked like and what the company has planned for us as apprentices along the course of our careers. Over the last 8 weeks I have struggled getting to grips with our PSPE (Personal Skills for Professional Excellence) module; specifically getting into writing academic essays again. I have not written an essay for nearly three years, so it has been difficult to get into the flow again. However, as

difficult as it has been, I know that it is essential for my degree and career. Finally, completing these studies will give me the knowledge, skills and behaviors needed to progress in my career and create high quality products at JLR which will ultimately lead to professional registration which should help me get to my end goal of Director in a Cyber or Software discipline.

References

COLLINSON, P. 2019. *Automation threatens 1.5 million workers in Britain, says ONS* [Online]. Available: https://www.theguardian.com/money/2019/mar/25/automation-threatens-15-million-workers-britain-says-ons [Accessed 25/10/ 2019].

DICE. 2019. *Six Skills You Need to Succeed in Cybersecurity* [Online]. Available: https://insights.dice.com/cybersecurity-skills/ [Accessed 01/11/ 2019].

GCHQ. 2019. *Software Engineer* [Online]. Available: https://recruitmentservices.applicationtrack.com/vx/lang-en-GB/mobile-0/appcentre-3/brand-4/xf-bc59bef21a3d/candidate/so/pm/1/pl/6/opp/1807-Software-Engineers-Ref-1807/en-GB [Accessed 28/10/ 2019].

HAAS, R. E. & MÖLLER, D. P. F. Automotive connectivity, cyber attack scenarios and automotive cyber security. 2017 IEEE International Conference on Electro Information Technology (EIT), 14-17 May 2017 2017. 635-639.

IET. 2019. *What is professional registration?* [Online]. Available: https://www.theiet.org/career/professional-registration/what-is-professional-registration/ [Accessed 01/11/ 2019].

JAGUARLANDROVER. 2019. *DTS Software Pathway* [Online]. Available: https://www.jaguarlandrovercareers.com/job/Coventry-Digital-and-Technology-Solutions-Degree-Apprenticeship-Software-Pathway/557691101/ [Accessed 25/10/ 2019].

MÖLLER, D. P. F., JEHLE, I. A. & HAAS, R. E. Challenges for Vehicular Cybersecurity. 2018 IEEE International Conference on Electro/Information Technology (EIT), 3-5 May 2018 2018. 0428-0433.

NCSC. 2019. *What is Cyber Security?* [Online]. Available: https://www.ncsc.gov.uk/section/about-ncsc/what-is-cyber-security [Accessed 01/11/ 2019].

RIZVI, S., WILLET, J., PERINO, D., MARASCO, S. & CONDO, C. 2017. A Threat to Vehicular Cyber Security and the Urgency for Correction. *Procedia Computer Science,* 114**,** 100-105.

TAKAHASHI, J. 2018. An Overview of Cyber Security for Connected Vehicles. *IEICE Transactions on Information and Systems,* E101.D**,** 2561-2575.

WMG. 2019. *Cyber risks in organisations* [Online]. Available: https://warwick.ac.uk/fac/sci/wmg/education/degree-apprenticeships/courses/digital-technology-solutions/dtsmodules/cro [Accessed 25/10/ 2019].