Ministry Of Defense (MOD): A ministerial department that works to defend and protect the United Kingdom in multiple areas. The MOD have 4 main forces that comprise their personnel: Royal Navy, British Army, Royal Air Force and Strategic Command. The MOD defend, secured and resilience the people, territories, values, and interests of the citizens of the UK and territories overseas. This is achieved through strong-armed forces and by partnerships with allies to ensure the security, support and safeguarding of national interests and prosperity. currently, the MOD has sent hundreds of metal detectors and bomb de-arming kits within Ukraine to help clear minefields and unexploded ordnance as part of the late care package. The MOD fly thousands of tons of military aid across the continent. They have also sent over 1000 anti-air missiles and 125 anti-aircraft guns to ensure the protection of the citizens of Ukraine. In addition to this, the MON has trained thousands of members from the Armed Forces of Ukraine (Ministry Of Defence, n.d.)

Business Model: The MOD business model is all about making the UK a Secure place to live. They are trying to build a safer future by dealing with political problems such as Russia invading Ukraine and the security operations for the FIFA World Cup. The MOD's vision for its business model is to create solutions to crime and war around the world within the UK territories whilst minimizing the risk of failure and reliability on their equipment to make the UK a haven for residents and foreigners alike.(Ministry Of Defence, n.d.)

Customer Experience: The MOD's services protect the entire country and impact everyone whether they are residents of the UK, a foreigner or in a United Kingdom territory, including counterterrorism and also contributing to improved understanding of the world through strategic intelligence and the global defense network. The MOD must be careful when making these decisions, not only could it jeopardize the safety, privacy, and security of the people in question, but it could also lead to financial collapses and leave the country open to attack. Country support and aid is also huge customer for the MOD. They will provide help across seas to benefit the government and in turn the MOD, as. Countries suffering who are in UK territories are provided with different forms of aid like refugee shelters and rations for food and drink. Furthermore, the government is expected to fund the MOD and to extent the public. This is for the service of keeping the country terror free and safe from invaders. The MOD also have over 200,000 acres of land. The MOD and the 4 main forces are provided with artillery and weapons, research and development, bespoke expenditure, and high-level computer specs to fully operate as a protective service. They will be able to help the development of their equipment as testing of different products allows for a better evaluation of their funding and net costs. (Ministry Of Defence, n.d.)

Efficiency: The MOD is supported by 26 agencies and many public bodies; the MOD has the manpower to be very efficient at their business. Threats to the UK and associated parties could impact this time however, this is due to the rate at which aid can be dispersed being reduced the more crises there are. In contrast, because their party is government lead and funded, they would adapt to the vast amount of help that is required and disperse as much as they can whether that be care packages, manpower or even helping to educate the allies' defense system. Being able to have the aid required assembled at the destination, the MOD can strategies ideas for both now and the future that will help the UK, and other UK territories, in issues surrounding defense and deterrents of these countries. To summarize, no matter how large the challenge they can still be efficient in prioritizing time-sensitive tasks and achieving their goals of the total protection of UK territories and projecting the UK's global influence. (Ministry Of Defence, n.d.)

Application Class: The creation of a mobile application to replace military gear when damaged can be implemented to help the MOD rapidly acquire the different broken equipment pieces. The app would scan the broken piece of gear to compare it to a database filled with their replacement parts. This app can cut down the time it takes for the forces in the MOD to require their different broken equipment. The methodology used in this is rapid application development due to the fast nature of the methodology which will help the MOD respond with aid much quicker.

Application Class: Implementing Robotic Process Automation to complete and legitimize the administrative side of the MOD. This can include the automation of paperwork completion, digitization, records management, data validation, inventory management and automated alerts, among other things. For this application, a Waterfall methodology would be best as the documents are so important that if there are any bugs within the system, the MOD could pay severely.

Application Class: a virtual reality immersive simulation of different scenarios that the MOD can't prepare as well as they could in real life like natural disaster aid and prevention of different terrorist attacks. The game would simulate the ways they could prevent the scenario from happening but also slow down the split-second moment that people take to make decisions and allow for in-depth time to process the best course of action. The methodology used for this is agile development as it rereleases different software updates to take into consideration the feedback from the user whilst still being relatively quick to release. (Wrike, n.d.)

Methodologist Signoff: xxx

<table>
<tr><td colspan="2">Application Class - Mobile Application Development: Find My Part – find my part is a tool that is focused on the scanning selection and redeployment of different military parts. The tool uses the advanced technology of lidar technology to visually capture a 3d data sheet of a broken part. the tool uses a visual interface to help the user scan their item and then match it with a data model in the database. They can then request to send this item to the nearest facility where they can receive it and reinstall it into the user's equipment/vehicle.</td></tr>
<tr><td>Process: The forces in the MOD can create a 3D data sheet using the lidar scanning technology on a portable phone or device. The app then compares this with the saved data on a network and then finds a replacement for it. forces in the MOD can then choose whether two receive this item at the nearest depot or manually select an item the manual selection does not require the use of an A3 di scanner and therefore can provide more concise data on which part is missing.</td><td>Data: Databases, network configuration data, infrastructure components, and customer requirements are all needed as data forms in this app</td></tr>
<tr><td>Hardware: The hardware selected for this will be a high-spec portable phone with a large battery to make the software easy to use in the situations that a person in the MOD will be in. This in addition to cloud servers</td><td>Other: An engine like Android studios or the respective iOS counterpart can be used to develop this software the main programming languages would be Kotlin and XML with the database connected and written in SQL</td></tr>
<tr><td colspan="2">Methodology One – Rapid Application development involves prototyping and feedback in a rapid environment over an extended period of development. This allows the developers to create many iterations and update the software rapidly.This is especially effective within this project as getting an app released as soon as possible to the MOD would require this form of the app as soon as possible. The repair of the vehicles and equipment depends on new parts being both accurate and fast. The emoji can also give feedback to ensure the project is handled in the best capacity possible. The MOD would then implement the final prototype into their forces.</td></tr>
<tr><td colspan="2">Methodology Two – DevOps is a combination of software developers and operations. It aims to integrate the work of software development and software operations teams by creating a culture of collaboration and shared responsibility. The strategy is focused on improving time-to-market methodology as it enhances collaboration between the MOD and the developers. DevOps Is a branch of agile development and therefore all the users' requirements will be defined at the start of the development cycle before the development takes place. When development is started, the methodology puts starting versions of the system into a docker container. During the development, automatic tests are tested upon the system in the docker container. Out of this, a new and improved version of the app is created and out of this, the cycle repeats itself over and over until it is ready for release. Once released the final system is sent on docker containers and is observed in a productive environment. (Synopsys Editorial Team, n.d.)</td></tr>
<tr><td colspan="2">Evaluation: As the app relies on a complex cloud server DevOps may be a better methodology as it goes through multiple testing cycles making the final product more efficient this contrasts with rapid application development where prototypes address user feedback but comparatively only have one testing cycle applied on the system.</td></tr>
</table>

Application Class - Robotic Process Automation: The MOD has 4 subsections, the RAF, the Royal Navy, the British army, and Strategic Command. These are separate entities, and all of which need reports whenever something needs approval/documentation. It is crucial to create a single system that can be implemented for every department. To keep an enthusiastic national force, wages and pension schemes must be consistently working and the systems used to process these payments must be accessible to the administrative side of the MOD. Due to this point, an RPA system to automate the MOD's payroll, including the 4 forces, is to be working with one automated system that can have frequent maintenance, freeing up precious resource information from the MOD.

Process: Take the data inputted from the personnel, calculate the payment needed for each one and send the payment for processing through the banks	**Data:** Personnel bank details, working contract and pension scheme.
Hardware: the only hardware required is a computer with Windows or Linux	**Other:** UiPath

Methodology One – Waterfall development

Waterfall development is a linear model, and its lifecycle never repeats itself. For an RPA which requires repeated tests, the full linear development is. The steps within the waterfall methodologies and the phases of waterfall development are typical: 1 Analysis, 2 Design, 3 Development, 4 Testing, and 5 Deployment. For a simple system with no need for iterations, this model is appealing for an RPA and especially a tedious task that needs minimal code. The project would be easier to manage as well.

Methodology Two – Deloitte RPA methodology has 3 key stages. Stage 1, gain an understanding of the RPA, and implementation plan, and provide support. The potential impact the RPA could do (including the scope and requirements of the RPA) is thought of first before continuing to the second stage. Stage 2 create a plan to implement the system and how it would be introduced across different locations. For the MOD this would be between the 4 forces. The system is then introduced to these different locations, first in a smaller environment and, if proven successful, sent to the other larger sectors. After the distribution of your system, the RPA would be maintained frequently and concisely. This could be a physical repair but also could be software patches. This could be beneficial as the MOD may require different tasks also be added or tweaked in the RPA. (deloitte, n.d.)

Evaluation: the MOD would have more use for the waterfall methodology. This is because although it may take longer to implement, RPA systems are supposed to be short and simple pieces of code. This meaning that although the Deloitte RPA methodology has less steps and faster to implement it is possible to overlook something upon launch. waterfall has a thorough. The MOD has over 26 agencies and numerous public bodies. There budget can be spent elsewhere on equipment, aid or defence research and development. For this reason, a one-off purchase on a waterfall methodology team may be best as constant and frequent maintenance could be costly

Application Class – Games Development: A VR simulation game involving scenarios like natural disasters and attacks from other enemy forces. This simulation would be used to mainly train the 4 military forces. It would include different situations that will be adapted depending on which force the user is in. This would help the MOD to give further training to recruits without endangering any of their equipment and existing employees. It would show what could happen depending on their choices, helping them make the right decision in the future depending on what military force they are in.

Process: The MOD employee and force member will be provided with the simulation of a city; different problems could occur but won't alert the user as to which one it is or when it is happening. This will improve the cognitive thinking of the user and allow them to constantly be on the ball looking for different threats. The user will then make changes that will either benefit the situation or make it worse which will help them realize the exact way to incorporate their efforts in real-life situations.	**Data:** A server to include all the different situations that will occur. A database to store all the users' accounts as well.
Hardware: High-Grade computers with top-of-the-range graphic cards will be needed when creating the simulation. A server and data center will be required and finally a VR headset or similar immersive peripherals.	**Other:** A game engine like unreal engine 4 to develop the simulation. A game API should also be used to get data and statistics as well as render the graphics for the simulation.

Methodology One – Agile development is an iterative approach to developing a piece of software. It allows developers to build software with incremental steps throughout the project. The work is broken down into smaller iterations allowing the developer to make changes accordingly. This methodology will help the MOD as the program can be frequently altered to ensure it is as accurate to real-life situations as possibly can be. Developing a game with this allows the MOD to give feedback and input for the updates, producing an event like real life that only the MOD and associated parties would know about real-life experiences**.** Firstly, it will be pre-known which simulations are going to be created first and how they can continue bringing new scenarios to the simulation. The requirements for this will be determined by the MOD. After this is decided, the project is developed and tested to make the scenarios realistic. After that, the iteration will be presented to the MOD. After each iteration is finished and the software is 100% accurate to each scenario that is taking place feedback is incorporated from the end user to ensure that each scenario is accurately representing the problems the MOD and their forces counteract within the events (Sergeev, n.d.)

Methodology Two – Extreme programming is like agile development extreme programming is designed 2 iteratively release software throughout the project allowing both the developers and the end user to test examine and review the project.

The methodology of extreme programming allows a lot of changes during the modelling process. it focuses on rapid releases of iterations of working software and different scenarios that will allow developers to bring regular patches for the simulation. New emergency situations like natural disasters and political invasions will allow the forces to be more adaptable, prepared, and proficient in their endeavors and know what to do in the event of any crisis. to begin, these situations initially implemented will be planned and created first. After this, the managing phase of the extreme programming stance is where the project leader ensures that the simulated events are worthwhile training material. next, the simulation will be designed, programmed and the code will be reviewed by all programmers any programmer working on the project can add any functionality and fit the code to the scenario. finally, all programmers test the code to reaffirm that it is in its best form for the MOD. (Sergeev, n.d.)

Evaluation In evaluation, both agile and extreme programming development will be beneficial for the programmers when creating the simulation. However, I do believe that agile development is the better methodology in this case due to the fact that you need to have first-hand accounts of disasters and attacks in order to program a realistic experience for the user. In contrast, extreme programming is a form of agile development that doesn't, unlike other Agile approaches, have intermediaries between the customer and the team. This is a key development point within the simulation and for that reason, an agile approach is the best option.

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