Business case

Army Project

UTC Reading

Brunel

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# Stakeholders

In this section I will identify the stakeholders of the project. I will also suggest reasons why the chosen parties are stakeholders so that it can be assured that all of their requirements are met as well as giving a little bit of information about them.

## The Army

The initial stakeholder of the project is the Army. They are the ones who are running the project and will eventually take the outcome of the project (a remote controlled vehicle) and take it to other schools for activity days. We had a representative from the Army on the project days so that they could answer any questions that we have.

## UTC Reading

The UTC (our college) is also a stakeholder in the project. This is because when the vehicle travels to other schools it will represent what students at the college can do. If the vehicle is substandard then it will show badly on the college lowering any reputation of the college that people have, therefore, it is in the best interest of the college that we do well.

# Requirements

We were given a few requirements on the day that the project was released. These are:

* Raspberry Pi – There must be Raspberry Pi somewhere I the build.
* Remote – The user must be able to control the unit from a safe area away from it.
* Wired – The user must have the ability to wire a controller to the unit and control it directly.
* Arm – The unit must have the ability to run tasks such as bomb disposal with a robotic arm.
* Movement – The unit must be able to tackle difficult terrain without any assistance.
* Assembly – The unit must be able to be built by school children and then operated to run challenges.
* Robust – The unit needs to be able to last disassembly and reassembly on a daily basis by untrained children.
* Size – The unit must be able to be moved in a Land Rover to the destination needed.
* Cost – The unit has a total budget of £400 and cannot use any college equipment.
* Sourcing – All of the ordering must be done from RS-Online.
* Deadline – The unit must be complete by 20th March.

# Deliverables

During the task we need to create a few things in order to succeed in completion of the task. These are listed and detailed below.

## Remote-controlled vehicle (RCV)

We first and foremost need to create the actual vehicle. Which is taken to schools. It needs to be in compliance with the requirements detailed above as well as being generally suitable for the tasks that the Army is likely to give it.

## How to guide

We also need to build a guide for the RCV. This needs to detail exactly how to assemble/disassemble the unit as well as some instructions on how to control it and troubleshooting. This needs to be usable by young children and contain both pictures and instructions detailing how to do each step. The troubleshooting section should contain foreseeable errors and try to rectify those.

## Advertisement

The unit should also contain some kind of logo and advertisement. This could be done in the form of posters or on the actual unit itself. This is to mimic a manufacturer trying to sell the product to the Army.

# Success Factors

In this section I will be expressing some ideas of things that we need to do in order of being successful.

## Communication

In order to succeed we need to make sure that we are communicating. If one member of the team receives information and does not share it to the rest of the group then it may be that what we are building is not suitable for the final result. Proper communication can be achieved by using software such as OneNote or Yammer or even E-mail. This allows both text and files to be shared to individual people or the whole group.

## Checking the brief

It is important during the project to check back against both the brief and other information that you have been given about the task. It is pointless if everyone communicates but no one thinks about any of the information when taking the project forwards.

## Working Efficiently

This basically sums up the previous 2 points and adds a bit more. If you spend half the time doing work that ends up not being beneficial to the result then there was no point you doing it. You should make all work that you do working towards the end goal. You should also try to encourage others around you to help contribute to the project as many hands make light work.

## Having a Plan

Having a plan means that the whole time everyone knows what they need to do. If there is a moment in the day when people don’t know what to do then the plan has failed or communication has. Sticking to the plan is far more important than having it. You could make a 20 page long plan that no one follows and it just wouldn’t work, however, neither will having a bad plan that everyone follows.

# Scope (Boundaries)

As detailed above the deliverables for the project are the RCV, how-to guide and the advertisement. I will now go through those in more detail to suggest how far we should go with those points and what we don’t need to do.

## Remote controlled vehicle (RCV)

For the RCV we need to think about the final use, school fun days. This means that we should tailor it to that kind of environment.

The vehicle should be easily assemblable with help from the how-to guide. This means that the vehicle should be fairly modular (i.e. add the arm via a few screws and wires rather than a more complex system). We do not need to make the vehicle have any kind of connection system or any plates to transfer data rather than wires. This would make the RCV easier to build but in this case it is not necessary as the building should be part of the challenge.

The vehicle also needs to complete tasks set by the army. This means that the vehicle should be able to operate in muddy conditions. This means that the vehicles electronics should be shielded and preferably sealed off in a box. We do not need to make the vehicle waterproof as it will not be operating in such conditions. The vehicle should also have an arm to complete these tasks. The arm should be able to grip an object and carry it. We don’t need the arm to be very strong as it will not be carrying heavy objects.

## How-to guide

The guide is to aid the children in building the RCV.

Due to the fact that the operations are likely to be done outside the guide should be waterproof. This could be done by laminating the guide. The guide should also be sturdy enough to be used by the children. The guide should not be too shielded so that it is hard to read. It shouldn’t be made stiff by the cover as it needs to be folded.

The guide is going to be used by children on the day. This means it should be very clear and easy to read. The words used should be simple, large and accompanied by pictures. This will make it accessible to the children. The guide should not need multilingual support. This is because the kit will only be used in the UK where the main language is English.

## Advertisement

To gain excitement in the children we need to make some type of advertisement.

We need to create some kind of poster to get the children excited for the challenge. This should be colourful, so that the kids like the look of it, and obviously it needs to boost the reputation of the RCV. It should also easily readable from a distance. The poster could be made into a webpage however we should not create any kind of moving image/TV advert.

The advertisement should also try to push the Army towards the children. This could be done by comparing the RCV to similar vehicles that the army use. This could also be done by suggesting tasks that the RCV could be used for in the Army. We do not need to actually get the children looking into careers in the army as they may be too young. We could also have a link/suggestion on what to search for those who are interested in careers that the Army offer.

# Constraints

In this section I will be explaining the factors that could limit the productivity of the group.

## Cost

As we only have £400 it means that we have to be sensible in what we are buying and make sure that it will actually benefit the project. We can also only purchase things from rs-online which on first looks seems to be quite expensive compared to the rest of the market. This means that the budget might not stretch as far as we would have hoped.

## Time

Due to the fact that the projects are done in set times throughout the term we only have specific time that we can work on the project. Any work that we do outside of these times is often just a singular person finishing/setting up some work. This time is also unsupervised meaning that it may not for fill requirements of the project, rendering it pointless or even destructive to the project.

## People

People is also another limit to the task. We only have a set number of people between each competency and also the total number in the project. Each competency only has around 20-30 people with a total of around 75 people in the project.

# Consideration of Options (risks) M2

### Risk table

|  |  |  |  |
| --- | --- | --- | --- |
| Description | Likelihood | Impact | Mitigating actions |
| Cannot acquire correct parts | Low | Very High | Purchasing different parts if the ones we want aren’t available |
| Software isn’t developed in time | Medium | High | Use time effectively to make sure that the work is completed on time. We should use milestones to ensure this. |
| Link to RCV cannot handle streaming data. | Low-medium | Medium | Consider alternative ways of transmitting data, decrease camera quality and data size. |
| RCV cannot lift a large enough weight | Low | Low | Make sure that the motors are strong enough for the task required |
| Arm is too difficult to control even with training and practise | Medium | Medium | Budget enough time to create an IK system so that the arm takes less skill to operate. |
| Part cost goes over budget | Low-Medium | Medium-High | Correctly account the price of the parts that we need. Only purchase things that we need and in the right quantity. |
| Not meeting the deadline | Medium | Very high | Work efficiently and to a pre-planned schedule. Make sure everything you do is relevant. |
| Products become damaged during testing. | Medium-low | High | We could order spares of easily breakable parts or make sure that the tests we do will not stress the parts too much. |

## Risk write up

### Cannot acquire correct parts

Not being able to get the correct parts for the RCV will possibly cause a lot more faults in the project. It may lead to the project not being able to be completed. One way that the problem could be solved is by ordering the right parts once we run into the problem. Depending on when the problem is identified this can have various impacts. If it is spotted before the ordering process then the order list can be changed. This could lead to some things having to be reconsidered such as power needed. If it is discovered after the order has been placed then we may be able to change the order, this will cause delays and maybe higher costs. If we cannot change the order then we will have to order the parts that we didn’t receive. This will cause a massive time delay, possibly meaning we don’t finish on time, and also massive cost implication, possibly meaning we go over budget.

### Software isn’t developed in time

If the systems control (software development) team doesn’t finish the software in time it could cause massive faults in the project. One way to prevent this risk is to make sure that they are using their time effectively. This can be done with the milestones set out on the project plan and extras that the team can decide themselves. If the team finds itself being behind, then other competencies should try to help out by transferring some people to the team and doing some of the more simple tasks. If this doesn’t happen then we could find that we miss the deadline. We may also find that due to people being moved from one group to another, other teams start to fall behind. This can bring the whole project to a standstill.

### Link to RCV cannot handle streaming data

If the link to the RCV is too weak to handle the data then it may result in lack of control/communication. One way we could fix this issue is by lowering the camera quality or considering other ways of transmitting the data. If we lower the camera quality too much then it may be very difficult to understand what is happening at the point of the RCV therefore making it very hard to control. Using another method of transmitting will mean that we need new hardware and software to do so. Again this may mean that we could go over budget and miss the deadline.

### RCV cannot lift a large enough weight

If the vehicle cannot lift the weight that the Army set it to then it won’t be able to complete the challenge and may break some of the hardware. A way that we could prevent this is by speaking to the stakeholder (the Army) and asking what kind of challenges they need it to do. We can then make sure that the motors can lift that but preferably a bit more. We should also think about the weight of the rest of the vehicle and make sure that the vehicle will not fall over by adding the necessary weight to the body.

### Arm is too difficult to control even with training and practise

If the arm is very difficult to control then it may mean that the operator cannot for fill the task required. This could be prevented and fixed by installing an inverse kinematics system to the arm. This is where the user controls a final destination and the algorithm controls and completes movement for the arm. By doing this it will require a lot more time spent by the systems control. This may mean that other parts of the program are substandard/incomplete and may mean that we miss the deadline. If we don’t finish parts of the software then it will mean that the vehicle will be very hard/impossible to control, therefore, it won’t be able won’t be able to complete the set task and it will be of no use to the Army.

### Part cost goes over budget

If the costing goes over budget then the project may be rejected. Other options are that UTC reading (a part funder) may ask for some unused goods in return. One way to mitigate this risk is by correctly accounting all of the parts that we need. One way to prevent this is by correctly accounting the products that we require. We need to work out if we are going to be over budget and try to slim down the parts list if we are.

### Not meeting the deadline

If we don’t meet the deadline then the project may be rejected. This could mean that all of our work is for nothing. If it is accepted then the Army will have to come back in past the date which costs time and money. Due to the negative impact we will lose good rapport with both the Army and UTC reading. One way that we could prevent this is by making sure all groups are on task and following the schedule set out at the beginning of the project. This could require more man power to supervise the teams however it will have a positive impact.

### Products become damaged during testing.

If the products are damaged in the testing stage of the program then it may mean that we have to order new parts. This will take time and money and may cause the project to go over time and budget. One way to prevent this is by ordering spare of easily breakable products. This will be quite expensive and still leaves the chance that more products will be damaged. One way that this could be fixed is by ordering the parts that were broken. This will be very costly to time and will cost a bit more money. This again could result in the project missing the deadline and going over budget.

# Project PDF (P5)

Being this document I will add an A3 PDF of the Microsoft project document.