

Group 1

Response to EDC Complaints

1. Transcript

Slide 1 - Welcome

Welcome to our presentation. We are Group 1 from the Software Engineering Project Management course at the University of Essex Online. Today we will present our responses to the challenges brought by the English Digital Computers (EDC).

My name is Mohammad Atieh. I will be the first speaker for today, and I will introduce you to the contents of this presentation.

Slide 2 - Contents

Firstly, we will give an overview of the initial proposed machine design, the restated EDC requirements, and any deviations from those requirements (UoEO, 2023). Continuing from there, we will examine the new design as well as the supporting justifications.

Then will have a detailed look at the project schedule, delivery and selling plan, as well as important milestones. We will also explore the costs, resource requirements, and the projected profits.

Next we will have a look at the cost estimator application, and lastly we will end up with conclusions.

Slide 3 - Initial Design (Table 1)

Hi, my name is Mustafa and over the next two slides I will be discussing the initial design and new design of our systems. Fortunately, the initial design that was planned to be implemented in three batches met most of the restated EDC requirements, which are: industry-standard operating system, at least a 68000 CPU which is upgradable due to the socketed board design, at least 512 KB of RAM, external keyboard connector, SCSI expansion capability through the availability of an expansion slot, at least one industry-standard removable drive, a minimum of two serial ports that support RS 422 and RS 485 standard, and system upgradability to the GUI system and mouse if required by the user.

The two requirements we could not meet in the old design are: first, the original proposed price was £470 compared to the one advertised by the EDC, which is £399.99. Second, we proposed only one model that may not satisfy all users.

Slide 4 - New Designs (Table 1 and 2)

Therefore, we propose having one basic and one premium model. Our initial proposed model will now be considered the basic model. The premium model includes:

- A Pro Expansion board.
- SCSI interface and terminator.
- 3-channel sound that will fit the needs of more advanced users and gamers.

Please note that according to the restated requirements of the EDC, some software packages were not required to be included with the shipped devices. However, the design and coding costs were covered in the project plan to prepare the devices for interested users upon request. They just need to order and install the software disks on their devices when required.

Those software packages are the C programming language, Office suite for both models and the old games replay engine for the premium model.

The price of the basic model will be as advertised as £399.99. The price of the premium model will be £439, which is not more than 10% of the basic model's price, as the market research recommends.

Slide 5 - Project Schedule

Hi, My name is Aaron Willis and over the next 2 slides I will be discussing the project schedule and outlining the delivery and selling plan.

As you can see from the overall Gantt chart in **Figure 1**, the project schedule contains the following key stages: On-the-Job training for the team, Software design and development, hardware design and development, hardware and software prototype testing, hardware components order and delivery and finally, the hardware manufacturing and delivery.

For the software design and development stage, an agile methodology will be adopted with 5-day sprints that include testing and feedback, as shown in **Figure 2**. There will be a total of 14 sprints during this stage. A waterfall methodology will be adopted for the hardware design and development stages since an iterative approach would not be suitable (Andrei et al., 2019). The hardware and software design and development stages will run concurrently to minimize the projected timeline and the associated costs.

Figure 3 shows the hardware and software prototype testing stages. These stages must be complete before we begin the final assembly and testing of the first batch of devices. This will cause a three month delay, however, this will be essential to ensure a satisfactory product and to eliminate any errors which could lead to longer delays.

Slide 6 - Key Milestones - Delivery and Selling Plan

After completion of the design and prototype testing stages, the manufacture and sale of devices can begin. The new proposed delivery and selling plan is divided into seven batches, as shown in **Table 3**. This 7 batch plan is a sustainable approach and will reduce risks to the project and the viability of Synful Computing. In each batch, 500 to 600 devices will be manufactured. Of these, 200 to 300 devices will be shipped to EDC. The remaining devices will be sold to the public to generate income. This way, Synful Computing will guarantee adequate funds before the manufacture of the next batch will begin.

The assembly of devices will be synchronized with the delivery of components and selling of the previous batch, as shown in **Figure 4**. This ensures that Synful Computing stays within budget during each batch.

By the end of the fourth batch, 13 months will have passed, marking the advertised stock availability date. By this time, the EDC will have already received 1200 devices, as shown by milestone number one in **Graph 1**.

After a further 6 months, the EDC will have received the remaining 800 devices, as marked by milestone 2. Synful Computing will have manufactured and delivered the full order for 2000 devices to the EDC. Of these devices, half will be the basic model, and half will be the premium model.

Graph 2 shows the total public sales during each batch in thousands of pounds, helping to fund the continuation of the project throughout.

Slide 7 - Projected Resources and Estimation of Efforts

Hi, my name is Aaron Aubeck, and I will be going through the projected resources and estimation efforts, as well as the projected profit, with you today.

As you can see on this slide, **table 4** shows the resources plan and cost and the estimation of efforts. We have calculated that a total of **51 individuals** will be working on the project, this will consist of four internal employees, including the project manager, and the remaining resources will be hired through agency work.

We have considered that a total effort of **244.6 person weeks** will be needed for this project, excluding the time required to assemble and deliver the devices for which it has been assumed that Synful Computing will use their usual assembly line.

The project has been estimated to last for **20 months**. Throughout this period, the project manager will be hired 75% of the time and the project analyst 25% of the time until **1200 devices** are delivered to the EDC.

Once that number has been fulfilled, their availability will be diminished until the end of the project. This helps to reduce costs, with the confidence that the project is expected to run smoothly after completing all the design and testing stages and delivering a total of **2400 devices**.

The overhead cost from the design and implementation of the project will be **£330,550**, excluding the indirect cost of using internal resources, which will be **£74,028.75**.

The cost to deliver the final product will be compensated from the profit acquired and has not been included at the end of the project schedule after delivering all completed units to the EDC.

The overhead costs will be covered during the first batch of assembly and delivery, as shown in **Table 3**. As you can see, the units will be completed in 7 batches, this is to aid in the cost of manufacturing deliverables and to support timings in manufacturing parts for the units.

The batch and selling plan ensures the company accounts do not take on debt throughout the entire project, apart from internal costs. By the end of the seventh batch, Synful Computing will have covered all the project overheads, including these internal costs. The EDC order will also be completed in full.

Slide 8 - Projected Profit

It is estimated that the expected profit at this stage will be **£54,661.75**. After that, each device is expected to generate a profit of **£200**.

So, to summarise,

- A total of 51 individuals will be required to complete work.
- 244.6 person weeks will be required to fulfill this project with an estimation of lasting for 20 months.
- Overhead cost from design to implementation will be **£330,550**, with cost of internal resources being **£74,028.75**.

- All costs will be compensated from profit acquired and will generate a profit after the 7th batch of **£54,661.75** with each device after that generating a profit of **£200**.

Slide 9 - Cost Calculator Application

In order to illustrate the impact of adding different hardware and software components to the system on the unit cost, we developed a Cost Calculator Application in Python (**Appendix 3.4**). The application helps users to:

- Calculate the total cost of a project by importing project data from a .json file,
- Create a new project from scratch and add all components and costs manually,
- Update component costs, add or delete new components, and see the impact on unit cost in real-time,
- Export the project design as a .json file.

So, in a nutshell, the application relies on .json files that hold project data. The user may import his/her own .json file to start making estimations on the project cost. It is also possible to start a new project and create a .json file by adding hardware and software components, adding costs associated with each of them, and exporting the project as a .json file. The application accounts for unit price, manufacturing cost, design cost, coding cost, and the testing cost. The application is developed as a cross-platform desktop application, and all dependencies, installation instructions, and detailed information about its usage can be found in the accompanying readme file. The project package also includes a sample .json file which demonstrates the structure that is expected by the application. This file can also be used as a template to create new project cost estimations.

We believe that the application will help all stakeholders of a project to design and agree on the optimum system that is within the project budget. In our particular case, the application

helped us to demonstrate that our solution was the most viable one under the given conditions, and it supported our decisions, such as leaving some of the software components up to the clients to purchase.

Slide 10 - Conclusion

So, in conclusion:

- Synfull Computing will be able to fulfill the requirements placed by the EDC and those suggested by the market research. However, this can only be done by providing two models, one basic and another premium model, to avoid changes to the advertised price.
- Some software packages, such as C programming language or office suite, need to be purchased by the user as required.
- As demonstrated in the detailed project schedule, both models will be available in seven batches starting at the expected date, 13 months after signing the contract.
- We estimate that all overhead costs will be covered after seven batches, and after that, profit per device will be £200, which makes our project viable in the long term.

2. References

Andrei, B. A., Casu-Pop, A. C., Gheorghe, S. C., Bolangiu, C. A. (2019) A study on using waterfall and agile methods in software project management. *Journal of Information Systems and Operations Management* 13(1): 125-135.

UoEO (2023). SEPM 2023 Case Study.

3. Appendix

3.1. Tables

A link to the original sheet used for planning can calculations can be found [here](#)).



| Table 1. List of Requirements - Basic Model/Old Model | |
|---|-------------------------------|
| Requirements | Chosen Option and Description |
| Hardware | |
| Board | A83-S |
| CPU | 68k0 |
| Glue Chips (ULAs) | |
| G1 | Glue IOP-CPU |
| G2 | Glue RAM-CPU |
| G3 | Glue DISP-CPU |
| G4 | Glue SYSTEM |
| GDISP | XVX |
| Misc | Resistors, caps, etc |
| ROMS | 32KB |
| | 8KB |
| RAM | 2x 256KB = 512KB |
| I/O chips | |
| IOP-J 1 | SC150 |
| IOP-J 2 | SC100 |
| IOP-X | SCSI interface & terminator |
| Pro Expansion | ProEx, CPU-Glue-SCSI - 4xRAM |
| INTSND | 3 ch snd, env, 2 8-bit ports |
| Storage | 2 x 3.5" floppy drives |
| Keyboard | Internal keyboard for case |
| Case | Desktop |
| Total Weight | < 2 Kg: No batteries |

Table 1. List of Requirements - Basic Model/Old Model

| Requirements | Chosen Option and Description |
|--|---|
| Hardware | |
| Board | A83-S |
| CPU | 68k0 |
| Glue Chips (ULAs) | |
| G1 | Glue IOP-CPU |
| G2 | Glue RAM-CPU |
| G3 | Glue DISP-CPU |
| G4 | Glue SYSTEM |
| GDISP | XVX |
| Misc | Resistors, caps, etc |
| ROMS | 32KB |
| | 8KB |
| RAM | 2x 256KB = 512KB |
| I/O chips | |
| Software | |
| OS with country and character set support | HB/OS in ROM 1 - kernel, libs & drivers |
| | McROM for full BDS system in ROM 2 |
| | MCC Kernel, sources, libraries, core utils, extensions, sound, graphics & drivers |
| HWCFG app | In-house in ROM 1 |
| Design & Coding (Software Purchased separately)* | |
| Programming language | C via Vi and PCC compiler |
| Office Suite | EZ-Suite |

Table 2. List of Requirements - Premium Model

| Requirements | Chosen Option and Description |
|--|---|
| Hardware | |
| Board | A83-S |
| CPU | 68k0 |
| Glue Chips (ULAs) | |
| G1 | Glue IOP-CPU |
| G2 | Glue RAM-CPU |
| G3 | Glue DISP-CPU |
| G4 | Glue SYSTEM |
| GDISP | XVX |
| Misc | Resistors, caps, etc |
| ROMS | 32KB |
| | 8KB |
| RAM | 2x 256KB = 512KB |
| I/O chips | |
| IOP-J 1 | SC150 |
| IOP-J 2 | SC100 |
| INTSND | i8042 |
| Storage | 2 x 3.5" floppy drives |
| Keyboard | Internal keyboard for case |
| Case | Desktop |
| Total Weight | < 2 Kg: No batteries |
| Software | |
| OS with country and character set support | HB/OS in ROM 1 - kernel, libs & drivers |
| | McROM for full BDS system in ROM 2 |
| | MCC Kernel, sources, libraries, core utils, extensions, sound, graphics & drivers |
| HWCFG app | In-house in ROM 1 |
| Design & Coding (Software Purchased separately)* | |
| Programming language | C via Vi and PCC compiler |
| Office Suite | EZ-Suite |
| OGRE96 | Old games replay engine |

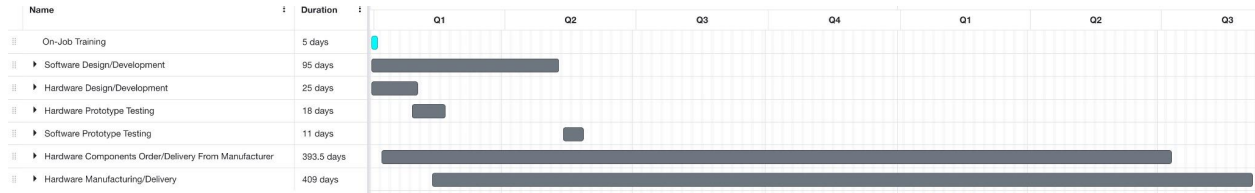
| Table 3. New Delivery and Selling Plan | | |
|--|--|---|
| First Batch (600 Devices) | Budget | £500,000.00 |
| | Total Overheads-Internal costs | -£330,550.00 |
| | Components cost for Premium model | -£71,700.00 |
| | Components cost for Basic model | -£61,850.00 |
| | Available fund | £35,900.00 |
| | | |
| | Ship 300 to EDC (150 from each model) |  |
| | Sell 150 premium (£439 unit price) | £65,850.00 |
| | Sell 150 basic (£399.99 unit price) | £59,998.50 |
| | Available fund | £161,748.50 |
| | | |
| Second Batch (600 Devices) | Components cost for Premium model | -£71,700.00 |
| | Components cost for Basic model | -£61,800.00 |
| | Available fund | £28,248.50 |
| | | |
| | Ship 300 to EDC (150 from each model) |  |
| | Sell 150 premium (£439 unit price) | £65,850.00 |
| | Sell 150 basic (£399.99 unit price) | £59,998.50 |
| | Available fund | £154,097.00 |
| | | |
| Third Batch (600 Devices) | Components cost for Premium model | -£71,700.00 |
| | Components cost for Basic model | -£61,800.00 |
| | Available fund | £20,597.00 |
| | | |
| | Ship 300 to EDC (150 from each model) |  |
| | Sell 150 premium (£439 unit price) | £65,850.00 |
| | Sell 150 basic (£399.99 unit price) | £59,998.50 |
| | Available fund | £146,445.50 |
| | | |
| | | |
| Fourth Batch (600 Devices) | Components cost for Premium model | -£71,700.00 |
| | Components cost for Basic model | -£61,800.00 |
| | Available fund | £12,945.50 |
| | | |

| | | |
|--------------------------------|--|-------------|
| | Ship 300 to EDC (150 from each model) | ✓ |
| | Sell 150 premium(£439 unit price) | £65,850.00 |
| | Sell 150 basic (£399.99 unit price) | £59,998.50 |
| | Available fund | £138,794.00 |
| | | |
| Fifth Batch (600 Devices) | Components cost for Premium model | -£71,700.00 |
| | Components cost for Basic model | -£61,800.00 |
| | Available fund | £5,294.00 |
| | | |
| | Ship 300 to EDC (150 from each model) | ✓ |
| | Sell 150 premium(£439 unit price) | £65,850.00 |
| | Sell 150 basic (£399.99 unit price) | £59,998.50 |
| | Available fund | £131,142.50 |
| | | |
| Sixth Batch (550 Devices) | Components cost for Premium model | -£71,700.00 |
| | Components cost for Basic model | -£51,500.00 |
| | Available fund | £7,942.50 |
| | | |
| | Ship 300 to EDC (150 from each model) | ✓ |
| | Sell 150 premium(£439 unit price) | £65,850.00 |
| | Sell 100 basic (£399.99 unit price) | £39,999.00 |
| | Available fund | £113,791.50 |
| | | |
| Seventh Batch (500 Devices) | Components cost for Premium model | -£71,700.00 |
| | Components cost for Basic model | -£41,200.00 |
| | Available fund | £891.50 |
| | | |
| | Ship 200 to EDC (100 from each model) | ✓ |
| | Sell 200 premium(£439 unit price) | £87,800.00 |
| | Sell 100 basic (£399.99 unit price) | £39,999.00 |
| | Internal costs | -£74,028.75 |
| | Available fund | £54,661.75 |

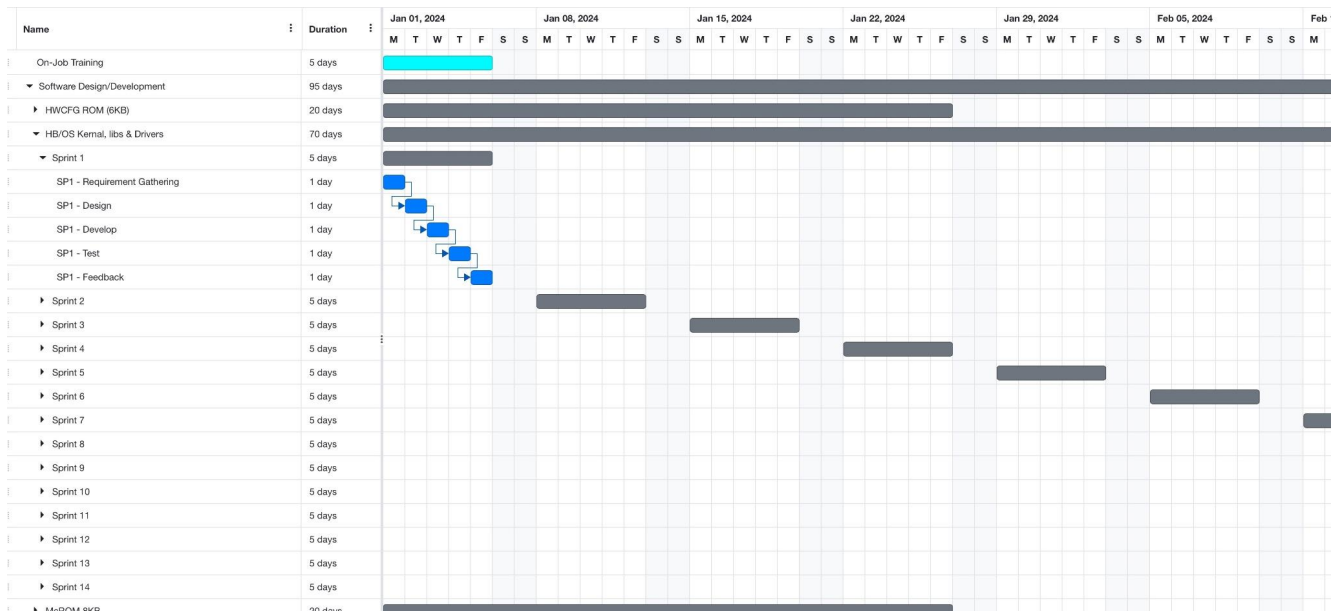
| Table 4. Resources Plan, Cost, and Estimation of Efforts | | | | | | |
|---|----------|-------|--------------|--------------|----------------------------|-------------|
| Role | Type | Count | Person Weeks | Actual Weeks | Cost/Day | Total Cost |
| HW Architects | Agency | 16 | 42 | 21 | £400.00 | £84,000.00 |
| HW Engineers | Agency | 8 | 10.5 | 10.5 | £275.00 | £14,437.50 |
| SW Architects | Internal | 1 | 2 | 2 | £300.00 | £3,000.00 |
| | Agency | 10 | 43 | 26.5 | £450.00 | £96,750.00 |
| SW Engineers | Internal | 2 | 4.1 | 2.2 | £195.00 | £3,997.50 |
| | Agency | 12 | 78 | 40 | £295.00 | £115,050.00 |
| Project Analyst | Agency | 1 | 16.25 | 16.25 | £250.00 | £20,312.50 |
| Project Manager | Internal | 1 | 48.75 | 48.75 | £275.00 | £67,031.25 |
| | Total | 51 | 244.6 | 167.2 | Total Overheads | £404,578.75 |
| Indirect internal costs incurred by using internal resources. | | | | | Internal Costs | £74,028.75 |
| | | | | | Overheads - Internal Costs | £330,550.00 |

3.2. Figures

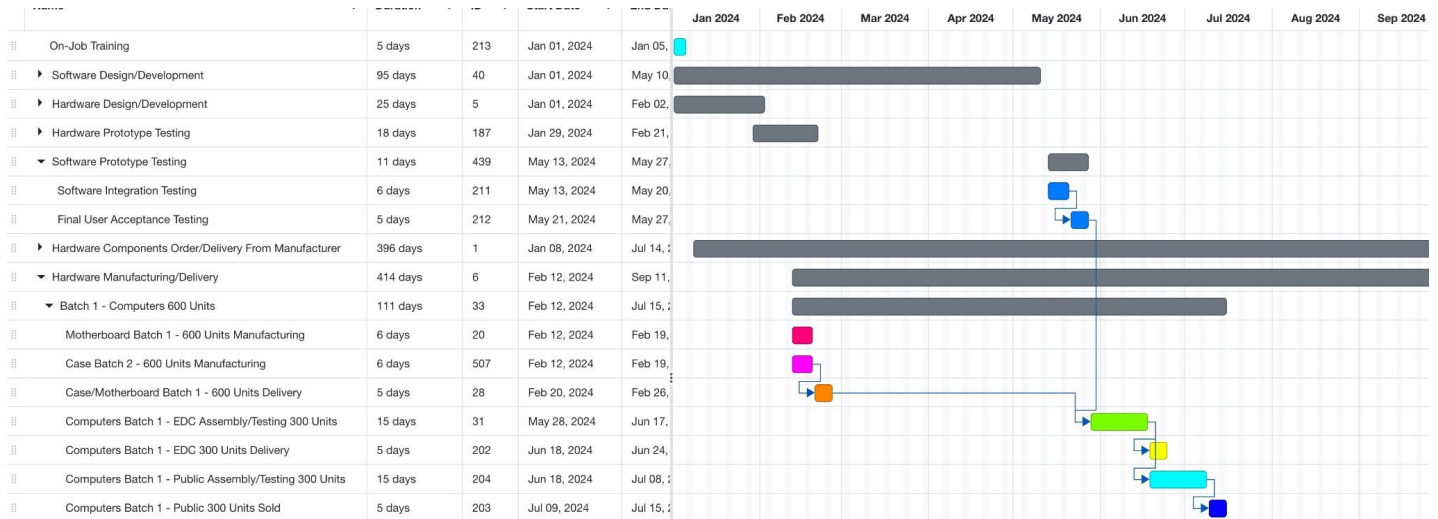
3.2.1. Figure 1. Entire Gantt chart that shows the key stages of the project schedule.



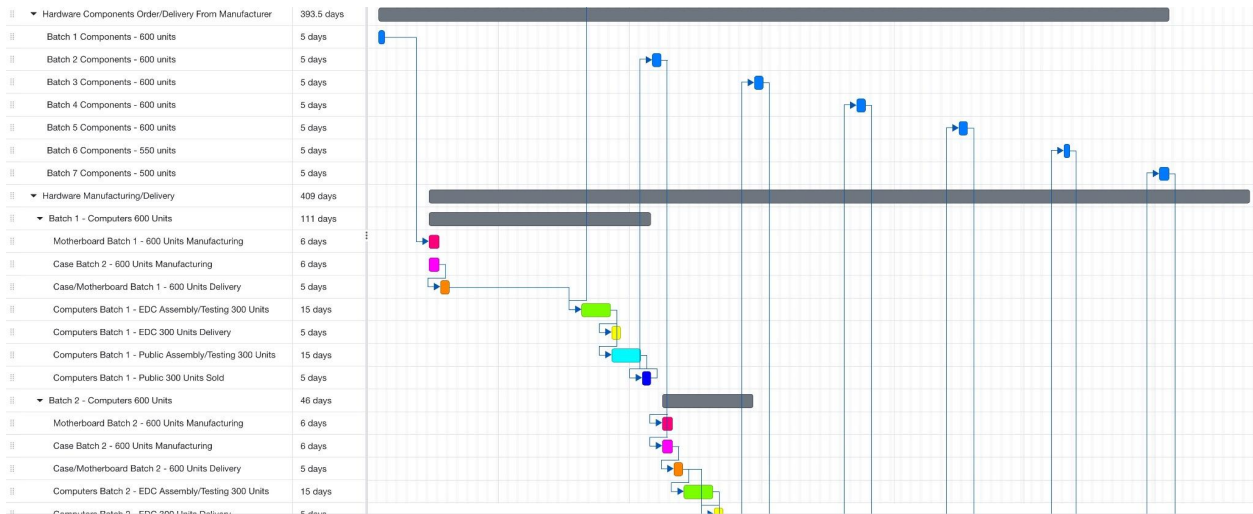
3.2.2. Figure 2. Five-day sprints for the software development stage.



3.2.3. Figure 3. Prototype testing stages.



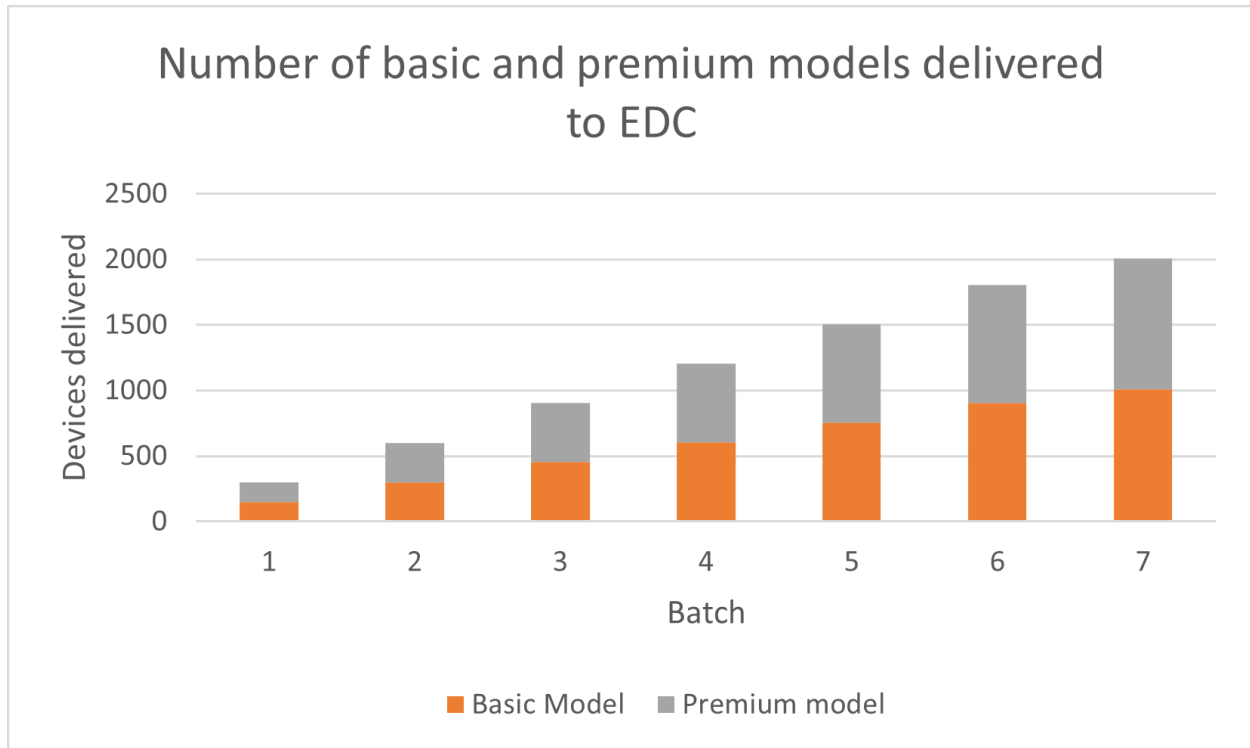
3.2.4. Figure 4. Synchronization between the delivery of components and assembly of devices



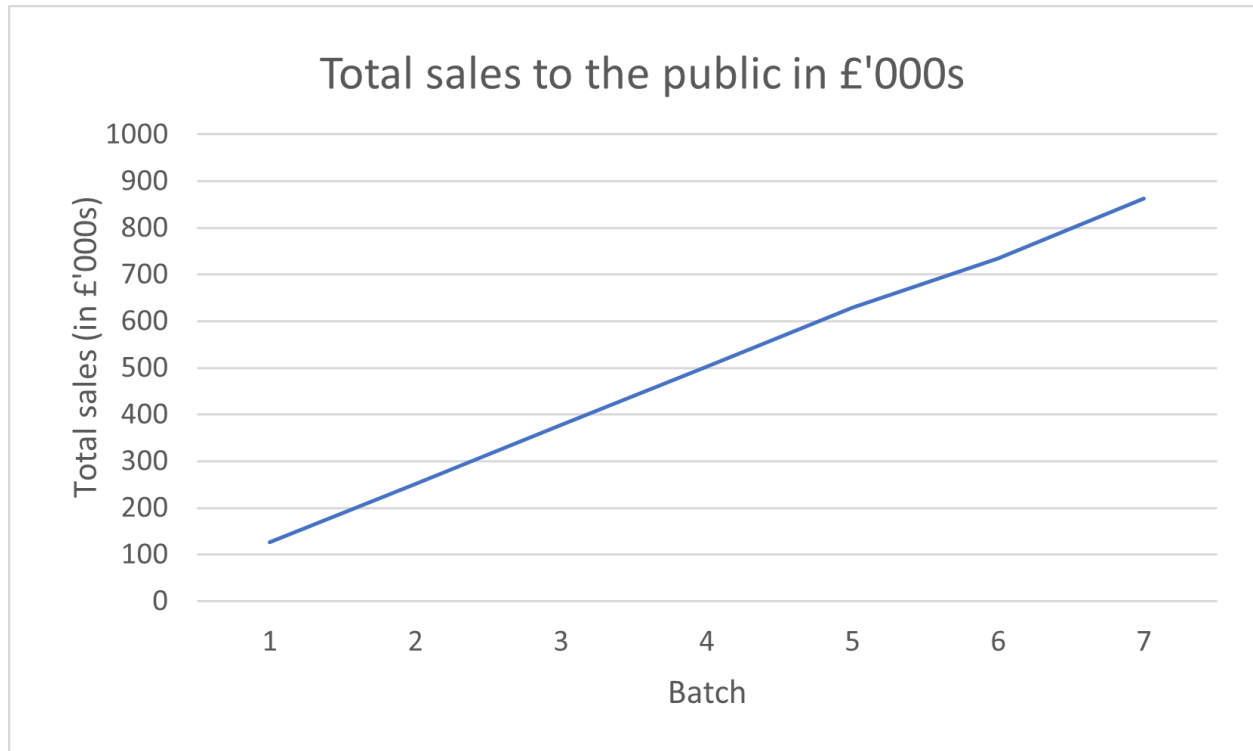
3.2.5. Figure 5. [Link](#) to the entire Gantt chart.

3.3. Graphs

3.3.1. Graph 1. Number of basic and premium models delivered across 7 batches to EDC.



3.3.2. Graph 2. Number of basic and premium models delivered across 7 batches to EDC.



3.4. Cost Estimation Python Application

[GitHub repository](#)

Project Cost Calculator

You can see the total project cost broken down to Hardware and Software below.
You can update your estimates by pressing 'Update' button below the table.

| Type | Description | Count | Price | Mfg. Cost | Design Cost | Coding Cost | Testing Cost | Total |
|--|-----------------|--------------------------------|------------------------------------|---------------------------------|------------------------------------|------------------------------------|-----------------------------------|--------------------------------------|
| Board | A83-S | <input type="text" value="1"/> | <input type="text" value="25"/> | <input type="text" value="14"/> | <input type="text" value="8"/> | <input type="text" value="0"/> | <input type="text" value="1.38"/> | <input type="text" value="48.38"/> |
| CPU | 68k0 | <input type="text" value="1"/> | <input type="text" value="8"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="8"/> |
| Glue Chip | G1 | <input type="text" value="1"/> | <input type="text" value="5"/> | <input type="text" value="0"/> | <input type="text" value="16"/> | <input type="text" value="0"/> | <input type="text" value="2.76"/> | <input type="text" value="23.76"/> |
| Glue Chip | G2 | <input type="text" value="1"/> | <input type="text" value="5"/> | <input type="text" value="0"/> | <input type="text" value="16"/> | <input type="text" value="0"/> | <input type="text" value="2.76"/> | <input type="text" value="23.76"/> |
| Glue Chip | G3 | <input type="text" value="1"/> | <input type="text" value="5"/> | <input type="text" value="0"/> | <input type="text" value="16"/> | <input type="text" value="0"/> | <input type="text" value="2.76"/> | <input type="text" value="23.76"/> |
| Glue Chip | G4 | <input type="text" value="1"/> | <input type="text" value="5"/> | <input type="text" value="0"/> | <input type="text" value="16"/> | <input type="text" value="0"/> | <input type="text" value="2.76"/> | <input type="text" value="23.76"/> |
| RAM | 256KB | <input type="text" value="2"/> | <input type="text" value="5"/> | <input type="text" value="0"/> | <input type="text" value="16"/> | <input type="text" value="0"/> | <input type="text" value="2.76"/> | <input type="text" value="28.76"/> |
| | | | | | | | Hardware Total | <input type="text" value="£180.18"/> |
| <input type="button" value="Update Hardware"/> | | | | | | | | |
| OS | HB/OS in ROM | <input type="text" value="1"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="9"/> | <input type="text" value="8.85"/> | <input type="text" value="1.38"/> | <input type="text" value="19.23"/> |
| OS | MccOS | <input type="text" value="1"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="2.25"/> | <input type="text" value="2.95"/> | <input type="text" value="0.15"/> | <input type="text" value="5.35"/> |
| OS | Libraries and d | <input type="text" value="1"/> | <input type="text" value="0.025"/> | <input type="text" value="0"/> | <input type="text" value="12.38"/> | <input type="text" value="19.18"/> | <input type="text" value="0.52"/> | <input type="text" value="32.11"/> |
| | | | | | | | Software Total | <input type="text" value="£56.69"/> |
| <input type="button" value="Update Software"/> | | | | | | | | |
| | | | | | | | GRAND TOTAL | <input type="text" value="£236.87"/> |