Adjusted Project Plan

**Project Cost Analysis**

To establish the current budget the money spent to-date needs to be calculated. This will provide insight into the options available to redirect the project in terms of corrective solutions.

**Table 1 - Current Material and Software Costs**

| **Item** | **Model** | **Quantity** | **Unit Price £**  **(qty thousand)** | **Total Cost per PC** |
| --- | --- | --- | --- | --- |
| HB/OS (in-house) | OS | 1 | 0 | 0 |
| EZ-SUIT | - | 1 | 25 | 25 |
| CPU | 68k8 | 1 | 5.5 | 5.5 |
| ULA | G1 | 1 | 5 | 5 |
| ULA | G2 | 1 | 5 | 5 |
| ULA | G3 | 1 | 5 | 5 |
| ULA | G4 | 1 | 5 | 5 |
| Misc. | resistors, caps, etc | 1 | 0.05 | 5 |
| INTSND | i8042 | 1 | 1.5 | 1.5 |
| ROM | 32K | 1 | 4 | 4 |
| RAM | 32Kb | 4 | 1.5 | 6 |
| BOARD-SLDR | A83 | 1 | 15 | 15 |
| IOP-J | SC150 | 1 | 15 | 15 |
| IOP-S | 16550 UART | 1 | 1 | 5 |
| CASE | Desktop | 1 | 25 | 25 |
| Syn cartridge drive | Storage | 2 | 0 | 0 |
| KEYB | int | 1 | 5 | 5 |
| BOARD-SLDR Manufacture | A83 | 1 | 10 | 10 |
| CASE Manufacture | Desktop | 1 | 20 | 20 |
| **SUBTOTAL** |  |  |  | **162** |
| **TOTAL (2000 UNITS)** |  |  |  | **324000** |

**Table 2 - Internal Labour Costs**

| **Item** | **Cost Person.days** | **Professional Rate (£/day)** | **Amount (£)** |
| --- | --- | --- | --- |
| Hardware | 190 | 250 | 47500 |
| Software | 470 | 250 | 117500 |
| **TOTAL** | 660 | 484 | **165000** |

Considering the design times for the various items and using an average employee cost per hour of £250 produces Table 2.

Continuing from the original plan to absorb internal labour costs until such time as retrievable from sales would therefore yield a remaining budget of £176,000. This remainder can be used for the necessary hardware changes required to fulfill EDC’s requirements.

**Requirements Change Request**

Client satisfaction is the defining factor of a project's success, and all projects operate within their own constraints of resources and time (Frame, 2002). This proposal aims to achieve maximum client satisfaction within reasonable resource and time constraints. Therefore, the items in Table 3 address customer concerns.

**Table 3 - System Issues and Proposed Resolutions**

| **Requirement** | **Rationale/Justification** | **Source** | **Assumptions/Resolution** | **Status** |
| --- | --- | --- | --- | --- |
| Industry standard operating system | We have conducted a thorough analysis of the available options and their associated costs. Our findings suggest that the use of our current in-house OS may be a more advantageous solution.  Currently, there are two suppliers who can provide a standard OS: Microsoft and MCC. Microsoft's offering is priced at £99 per machine, inclusive of a free Graphical User Interface (GUI) component. On the other hand, MCC offers an OS with a command-line environment for £50 per machine but charges an additional £50 for each machine that requires a GUI component. Furthermore, the GUI provided by MCC necessitates high-end hardware support, implying that we would also need to allocate a significant portion of our budget to upgrade our hardware design and procure the necessary materials.  These costs significantly exceed our budgetary allocation for this component of the project. While the idea of transferring these costs to EDC or potential customers was considered, the substantial licensing fees, coupled with the potential hardware upgrade costs, present a considerable burden. There is a high likelihood that such costs could deter potential customers, making this approach less viable. | EDC feedback | Assuming our in-house OS can satisfy EDC’s daily business use, we propose leveraging our in-house OS, a solution that aligns with our budget, negates hardware upgrades, and promises a high-quality, cost-effective output for our customers. We anticipate this approach to yield mutual benefits. Alternatively, if EDC consents, we can plan based on their agreement to finance the new OS investments. | Rejected |
| External keyboard/ connector | EDC considers a keyboard connector to be a standard access point for their business. However, the system has integrated a keyboard, an extra connector requires a lot of budget. | EDC feedback | The current board design provides a connector for an external keyboard; however, the internal circuitry bypasses it. The bypass can be made external for the customer to select whether they want an internal or external keyboard wired. Additionally, EDC will need to agree on purchasing the external keyboards themselves. | Optional |
| Increase system RAM from 128KB to 512KB or above | While a 128KB RAM may suffice for minimal system use scenarios, it lacks future upgradeability, especially given that the current board design only supports up to 128KB RAM. This limitation on upgradeability could undermine user confidence in the system and restrict its applicability to a narrower range of use cases. Therefore, considering a design that allows for greater RAM capacity could enhance the system's versatility and user satisfaction in the long term. | EDC feedback  /Marketing | An extension board will need to be fitted to accommodate the extra RAM as the other RAM is already soldered in place. Furthermore, with an additional CPU larger RAM could also be used with the extension board. | Accepted |
| System attached a non-industry standard removable drive | EDC prioritizes standard compatibility and requires the capability to exchange data for their daily business operations. Failure to meet this requirement could result in significant dissatisfaction among EDC users. The original design encountered issues with electromagnetic interference from the floppy and cartridge, leading to system resets. Currently, due to technological limitations, engineers are unable to provide high-quality solid-state storage. | EDC feedback  / Hardware Engineer | Board can be compatible with standard removable drive.  Use one standard drive and one non-standard | Accepted |
| System Support SCSI expansion | EDC deems robust data exchange capabilities as essential and high in demand. Thus, the use of SCSI, particularly when various devices are interacting with the new system, could provide substantial benefits to their daily operations. Fulfilling this requirement is poised to significantly enhance EDC's satisfaction. | EDC feedback | The expansion board can accommodate the installation of a SCSI card. | Accepted |
| Support 68000 CPU | EDC evaluates system performance using specific CPUs, acknowledging that in the retail market, newer, more powerful CPUs are a key selling point. Consequently, implementing a superior CPU would satisfy user expectations and enhance our system's appeal. | EDC feedback | Pro expansion board can support the CPU. System can be compatible with 2 different CPUs | Accepted |
| Minimum of 2 serial ports that support RS 422/ 485 standard | The current system provides a serial port, but EDC finds this insufficient for their daily operations. Adding another serial port isn't significantly challenging and can effectively meet EDC's expectations, thereby enhancing their satisfaction. | EDC feedback | The expansion board can accommodate the necessary hardware. | Accepted |
| GUI system supportability | Support for a GUI OS can significantly enhance the UX, making the system more appealing and easier to use, thereby reducing the learning curve. If the system does not support a GUI, it could lead to dissatisfaction among EDC users and potentially deter retail clients. Therefore, GUI supportability is a critical requirement for improving user satisfaction and expanding the system's user base. | EDC feedback  /Marketing | It is assumed that there are sufficient resources available for the development of a GUI for the in-house OS. | Accepted |
| Drive EMI causing resets | System reliability is very important. So, addressing the system resetting issues caused by electromagnetic interference is necessary. | Tech department | Covering the drives with cheap earthed shields can prevent the EMI. | Accepted |

**Amended Parts System Design**

| **Item** | **Model** | **Quantity** | **Unit Price £**  **(qty thousand)** | **Total Cost per PC** |
| --- | --- | --- | --- | --- |
| HB/OS GUI | OS | 1 | 0 | 0 |
| 68k0 | CPU | 1 | 8 | 8 |
| Pro Expansion | ProEx | 1 | 15 | 15 |
| 128KB | RAM | 1 | 2.5 | 2.5 |
| 256KB | RAM | 1 | 5 | 5 |
| 3.5" floppy | Storage | 1 | 7.5 | 7.5 |
| IOP-X | SCSI | 1 | 5 | 5 |
| IOP-J | 16550 UART | 1 | 5 | 5 |
| Pro Expansion Manufacture | ProEx | 1 | 12 | 12 |
| **SUBTOTAL** |  |  |  | **60** |
| **TOTAL (2000 UNITS)** |  |  |  | **120000** |

**Scope of Work (SoW)**

**Table 3: Project Deliverables (Stellman & Greene, 2006)**

Project Manager (PM)

Hardware Architect (HA)

Hardware Engineer (HE)

Software Architect (SA)

Software Engineer (SE)

| **Deliverable** | **Category** | **Assignee** |
| --- | --- | --- |
| Add EMI shield to drive | Design | Hardware Engineer (HE) |
| Establish Amended System Manufacturing Contracts | Manufacturing | PM |
| Pro Expansion prototype preparing | Manufacturing | PM |
| HB/OS driver updating for new hardware. | Updating | SE |
| HB/OS GUI design | Design | SA |
| HB/OS GUI development | Implement | SA/SE |
| HB/OS GUI testing | Testing | SE |
| Amended System Prototype Testing | Testing | HE/SE |
|  |  |  |

**Work Breakdown Structure (WBS)**

**Table 4: Project Tasks Breakdown (Stellman & Greene, 2006)**

| **Tasks** | **Effort Estimate (person.weeks)** | **Assignee** |
| --- | --- | --- |
| **EMI shield design** | **2** | **HA/HE** |
| Redesign | 1 | HA |
| Testing | 1 | HE |
| **Pro expansion solution for new requirements** | 4 |  |
| Hardware materials preparing | **1** | **HA/HE** |
| Proof of concept | 1 | HA/HE |
| Solution assessment | 1 | HA/HE |
| Amend system hardware integration Testing | 1 | HE |
| **HB/OS updating for Pro Expansion** | **4** | **SA/SE** |
| Driver updating | 2 | SA |
| Testing | 2 | SE |
| **HB/OS GUI:** | 40 | SA/SE |
| Design | 8 | SA |
| Coding | 16 | SE |
| Testing | 16 | SE |
| **Amended System prototype testing:** | 4 | HE/SE |
| Testing | 4 | HE/SE |
| **Establish Manufacturing Contracts and Product Tracking:** | **3** | **PM** |
| Liaise with manufacturers around requirements and order units | 1 | PM |
| Track orders | 2 | PM |

Please see attached Gantt chart related files in the GanttChart.zip

**Milestone**

Assuming our adjusted plan commences on December 1st, we expect to complete the proof of concept (POC) for the expansion solution by December 14. Hardware adjustments should conclude by December 28. The OS supporting hardware tasks are projected to wrap up by January 11. Concurrently, we plan to complete all GUI development by January 11, after which we'll initiate a 4-week testing phase to ensure the software quality meets client requirements. By February 15, we anticipate completing comprehensive testing of the entire prototype machine, both hardware and software. We will then be ready to present a demonstration to EDC.

**Table 5. Internal Labour Costs For Adjustment**

| **Item** | **Person.days** | **Professional Rate (£/day)** | **Amount (£)** |
| --- | --- | --- | --- |
| HA | 15 | 250 | 3750 |
| HE | 30 | 175 | 5250 |
| SA | 30 | 300 | 9000 |
| SE | 90 | 195 | 17550 |
| **TOTAL** |  |  | **35550** |

**Table 6. Outsource Labour Costs For Adjustment**

| **Item** | **Person.days** | **Professional Rate (£/day)** | **Amount (£)** |
| --- | --- | --- | --- |
| SA | 20 | 450 | 9000 |
| SE | 70 | 295 | 20650 |
| **TOTAL** |  |  | **29650** |

**Insights and Explanations**

This plan is designed to meet the needs of clients, including EDC and retail customers, while adhering to budget constraints, resource limits, and established deadlines.

Q: Should we develop two distinct systems (one for Synful, one for EDC), or can we create a single system used by both companies but sold under different names/badges?

A: Developing a single system is more advantageous. Many of EDC's requests can also benefit other potential customers, thereby enhancing the system's market competitiveness. Furthermore, managing two significantly different systems could necessitate substantial resources and complex strategies, potentially leading to technical debt (Intel, 2019). Therefore, a unified system is the more practical approach.

Q: The marketing department has already advertised the systems at £399.99, with a release date of December 1st. Your adjusted plan, however, could cause a delay of nearly three months. Is that acceptable?

A: Given the current design issues, which could significantly impair user experience (e.g., EM interference causing random system resets, absence of OS GUI support), prioritizing usability and stability is crucial (Minge & Thüring, 2018). Furthermore, if the product doesn't meet the expectations set by marketing, it could severely harm the company's reputation. Managing trust in user expectations is key to a successful project (Petter, 2008). Therefore, delaying the product to enhance overall system performance is an acceptable strategy. This delay can provide the opportunity to address and rectify issues, thereby increasing user satisfaction.

Reference

Frame, J.D., 2002. The new project management: tools for an age of rapid change, complexity, and other business realities. John Wiley & Sons, pp.93-104, 117

Intel. (2019). Enterprise Technical Debt Strategy and Framework. Available from: <https://www.intel.com/content/dam/www/central-libraries/us/en/documents/enterprise-technical-debt-strategy-and-framework-paper.pdf> [Accessed 10 July 2023].

Minge, M. and Thüring, M., 2018. Hedonic and pragmatic halo effects at early stages of user experience. International Journal of Human-Computer Studies, 109, pp.13-25.

Petter, S., 2008. Managing user expectations on software projects: Lessons from the trenches. International Journal of Project Management, 26(7), pp.700-712.