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

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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.