



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

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“EUPHONY” – HEAD SET FREE AUDIO PROJECT APPRAISAL ASSIGNMENT – BUSINESS REPORT

EXECUTIVE SUMMARY

This Business Report presents an exciting opportunity for the Safran Seats Project Board to review, in relation to investment in a ground breaking Research and Development Technology project – ***Euphony***. Euphony, an Aerospace industry first, provides an innovative solution for Business and First Class Seating products, which ultimately provides high quality, “head-set free” audio sound, to passengers, in every position of their seat. Analysis completed as part of this Business Appraisal, indicates that the “Euphony Project” **should proceed** at Safran Seats Great Britain, based on the financial modelling completed. The project passes all of the key Financial Appraisal Projects Decision Making Criteria required by Safran Seats in relation to Future Value of Money models, Payback period, Return on Investment and Profitability Ratios. This project has the potential to bring significant financial benefit to the business, coupled with a wide range of other tangible and intangible business benefits. Note: This Business Report is accompanied by a supporting Business Appraisal PowerPoint Presentation (***Rama, 2023***).

HARISH RAMA

STUDENT NO: 2117172

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Introduction

Background to Company – Safran Seats GB

Safran Seats Great Britain (SSGB) is a leader in the design and manufacture of First Class (FC) and Business Class (BC) seating products for aircraft and helicopters (**Safran Group, 2023a**). SSGB's division is based in Cwmbran, Wales and has over 1,000,000 aircraft seats in service, covering aircraft over many of the world's largest airlines. The company is part of the wider Safran Group, which produces aerospace products for both the civil and defence sectors (**Safran Group, 2023b**).

Figure 1 and Figure 2 outline some of SSGB's core seating products.



Figure 1 - SSGB First Class Seating Product (*Aero Expo, 2022*)



Figure 2 - SSGB Business Class Seating Product (*Alkema, 2023*)

Investment Project - Euphony – Head Set Free Audio

This Business report presents the findings of analysis, around an exciting investment project opportunity. The project, **“Euphony”**, will be developed in partnership with audio expert Devialet, to provide a state of the art passenger audio experience, across SSGB’s FC and BC Seating Products (**Kevin Cm, 2022**).



Figure 3 - Euphony Seating Product (**Kevin Cm, 2022**)

The Euphony solution will make use of Devialet’s acoustic technologies, which coupled with Safrans expert audio tuning technologies, will provide a headset-free, high quality sound experience, for airline passengers (Figure 3). With Euphony, the headrest across SSGB’s seats will be modified to incorporate bespoke loud speakers, which will allow passengers to experience high quality audio without the need for headsets or cables (Figure 4), during all stages of flight (**Kevin Cm, 2022**).



Figure 4 - Euphony Headrest (**Kevin Cm, 2022**)

Project Lifespan & Project Costs

Project Timelines

Euphony is a long-term investment project for SSGB and is modelled over a ten-year timeline (Figure 5), covering two main phases:-

Development Phase (Year 0) – This phase accounts for bringing the Euphony product to market, through the integration of both Devialet and Safran technologies. Testing, certification and qualification activities are included to ensure the product is safe for flight (complying with all relevant aviation regulations).

Delivery & In-Service Phase (Year 1–Year 10) – This phase of the project involves the production and delivery of Euphony incorporated products to customers. The phase also includes the provision of after sales care/in-service support to customers, before culminating with decommissioning.

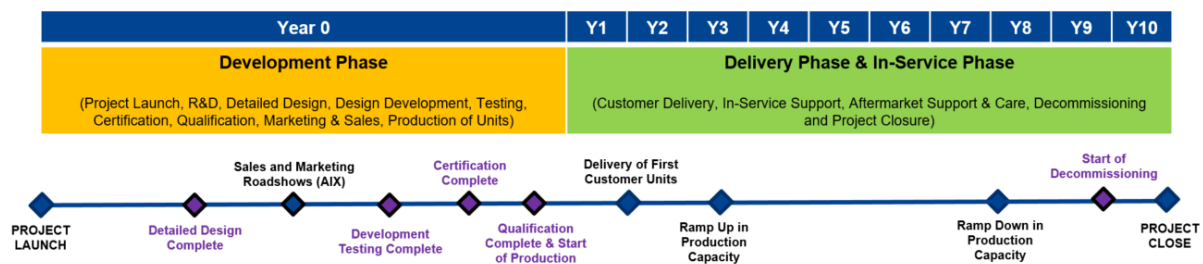


Figure 5 - Euphony Timeline

Project Costs

The total estimated cost for the completion of Euphony is £4,440,000.00 GBP - outlined in Table 1. Euphony is heavily reliant on Research, Development and Testing activities, which account for circa 45% of the overall project costs (£1,950,000.00 GBP).

R & D Costs	£ 600,000.00
Labour	£ 720,000.00
Prototype Costs	£ 425,000.00
Tooling	£ 330,000.00
Testing & Qualification	£ 925,000.00
External	£ 200,000.00
Other Costs	£ 100,000.00
Haulage, Shipping & Transport Costs	£ 120,000.00
Travel	£ 100,000.00
Programme Reserve	£ 500,000.00
Hospitality Costs	£ 50,000.00
Software	£ 120,000.00
Marketing and Sales Costs	£ 250,000.00
	£ 4,440,000.00

Table 1 - Euphony Project Costs

A full breakdown of project costs for Euphony are in **Appendix A**.

Residual Value

The Euphony project is expected to have a residual/salvage value of £1,200,000.00 GBP at the end of its 10-year lifecycle.

Financial Modelling & Appraisal Tools

SSGB uses seven main Financial Appraisal Tools, when considering investment projects, to estimate the value of the investment project, with a view to determining its viability and feasibility. Results are documented within a Project Appraisal document, which can be used by management as a reference point.

Each of the tools used by SSGB are outlined in detail below and can be used to derive valuable information around the project, in terms of expected returns, profitability and business value. Each tool has benefits and drawbacks when considered in isolation, therefore SSGB makes use of a combination of these.

Time Value of Money

The analysis tools discussed within this report can be categorised into two main categories – those that take into account the “Time Value of Money” (Future Value) and those, which do not.

The Time Value of Money (TVM) concept refers to the concept that a sum of money is worth more in the present day than the same amount in the future (*Nina Semczuk, 2018*). This is down to the fact that money today has the potential for immediate earning capacity via investment or interest accrued; whereas money in the future has inherent risk (external factors such as inflation) (*Fridson, Alvarez and Netlibrary, 2002*).

TVM (Future Value) can be calculated through the formula in Figure 6 (*Chen, 2019*).

$$FV = PV \left(1 + \frac{i}{n} \right)^{n \times t}$$

where:

FV = Future value of money

PV = Present value of money

i = Interest rate

n = Number of compounding periods per year

t = Number of years

Figure 6 - TVM Formula (*Chen, 2019*)

Financial Appraisal Tool 1 - Payback Period

Definition: Payback period determines the time taken for a project to generate sufficient cash flow, to cover its initial projects costs (breakeven position - Figure 7). It is desirable for a business to have a shorter payback period, as this means the business will quickly recoup its costs (*Kagan, 2023*).

Formula:

$$\text{Payback Period} = \frac{\text{Cost of Investment}}{\text{Average Annual Cash Flow}}$$

Figure 7 - Payback period Formula (Kagan, 2023)

Strengths:

- **Ease of Use** – The payback period tool is simple to calculate and easy to use.
- **Quick Evaluation** – The payback period of a project is quick to calculate and is a powerful screening tool.
- **Highlights liquidity within the calculation (Davies, 2023a)**

Weaknesses:

- **Does not capture TVM** - The simplicity of this tool, means it does not account for TVM, which is required for robust financial analysis. (Davies, 2023a)
- **Limited Application** – Payback period only focuses on the breakeven point of a project and does not account for anything after (Profitability not considered) (Kagan, 2023).

Financial Appraisal Tool 2 - Return of Investment (ROI)

Definition: Return on Investment (ROI) outlines the amount of money that been made, or lost, on an investment project, after accounting for its costs (Fern, 2022).

Formula:

$$\text{ROI} = \frac{\text{FVI} - \text{IVI}}{\text{Cost of Investment}} \times 100\%$$

where:

FVI = Final value of investment

IVI = Initial value of investment

Figure 8 - ROI Formula (Fern, 2022)

ROI is calculated by dividing profit earned on an investment project, by the total cost of that investment (Figure 8). A higher ROI is more desirable to a business than a lower ROI, however higher ROIs after often linked with greater risk (Fern, 2022).

Strengths:

- **Quick and Easy to Use** - ROI is quick, easy to calculate and a powerful first pass screening tool.

Weaknesses:

- **Does not account for TVM.**

- **Does not consider Project Timelines** – ROI does not factor in the duration associated with an investment project (*Fern, 2022*).

Financial Appraisal Tool 3 - Net Present Value (NPV)

Definition: Net Present Value (NPV) is based upon the TVM concept. It accounts for the cash flows in and out of a project and adjusts these in line with the future value of money, based on a discounted rate - Weighted Average Cost of Capital (WACC). A positive NPV calculation indicates that a project adds value to an organisation, where a negative NPV renders a project as undesirable (*Fernando, 2023*).

Formula: NPV can be calculated through the Formula in Figure 9 (*Fernando, 2023*).

$$NPV = \sum_{i=1}^n \frac{R_i}{(1+r)^i} - \text{Initial Investment}$$

Where:

R_i is the estimated net cash flow for i^{th} period,
 r is the required rate of return per period, and
 n is the life of the project in months, years etc.

Figure 9 - NPV Formula (*Fernando, 2023*)

Strengths:

- **TVM considered** – NPV accounts for the TVM using a WACC, which is useful in providing the true value of a project (*Fernando, 2023*)
- **Indicator of Value** – NPV can quickly indicate whether a project will add value (positive or negative value) (*Fridson, Alvarez and Netlibrary, 2002*).
- **Simplified Calculation Possible** – Calculating NPV can be simplified through the use of software packages such as Microsoft Excel or SAGE (*Davies, 2023b*)

Weaknesses:

- **WACC Accuracy** – It is difficult to accurately define the WACC of a company, meaning NPV calculations can be inaccurate.
- **Project Comparison Difficulty** – NPV values can vary significantly from project to project, meaning it is difficult to compare projects through their NPV.
- **Manual Calculation** – NPV can be difficult and tedious to calculate manually (*Davies, 2023b*)

Financial Appraisal Tool 4 – Internal Rate of Return

Definition: The Internal Rate of Return (IRR) tool is used to outline the discounting rate, which brings discounted future cash flows of a project in par with the initial investment (*Folger, 2019*). The IRR is the discounting rate at which a company will make neither a loss nor profit (NPV equal to zero) (*Davies, 2023c*).

Formula: IRR is calculated as per Figure 10 (*Davies, 2023c*).

Internal Rate of Return:

$$= R1 + [(NPV1 \times (R2 - R1)\% \div (NPV1 - NPV2)]$$

Where:

- R1 = Lower discount rate
- R2 = Higher discount rate
- NPV1 = Higher Net Present Value (derived from R1)
- NPV2 = Lower Net Present Value (derived from R2)

Figure 10 - IRR Formula (Davies, 2023c)

Investment projects are generally approved for an organisation if the calculated IRR is higher than the organisations WACC and its required IRR (Banton, 2022).

Strengths:

- **TVM considered** – IRR takes into account the TVM.
- **Simplified Calculation** – The process of calculating the IRR can be simplified through software packages such as Microsoft Excel or SAGE
- **Trial and Error Method** – The IRR can be calculated manually (rough calculation method, aiming for a NPV of zero).
- **Highlights liquidity within the calculation** (Davies, 2023c).

Weaknesses:

- **Project Comparison Difficulty** – IRR values can vary significantly from project to project, meaning it is difficult to directly compare projects through their IRR.
- **Manual Calculation** – IRR can be difficult and tedious to calculate manually (Davies, 2023c).

Financial Appraisal Tool 5 - Profitability Index (PI)

Definition: Profitability Index (PI) defines how much profit an organisation will earn, per unit currency of investment. A PI of greater than 1 indicates that a project is profitable, where as a PI of less than 1 indicates a project is not profitable (Davies, 2023d).

Formula: PI is calculated by dividing the present value of anticipated future cash flows, by the initial outflow/cost of the project (Figure 11) (Davies, 2023d).

$$\text{Profitability Index} = \frac{\text{NPV of Cash Flows}}{\text{Investment}}$$

Figure 11 - PI Formula (Davies, 2023d)

Strengths:

- **TVM considered** – PI takes into account the TVM (derivative of NPV).

- **Quick and Easy to Use** - The PI of an investment project is quick and easy to calculate (powerful screening tool).
- **Captures liquidity of projects** (Davies, 2023d)

Weaknesses:

- **Project Comparison Difficulty** – PI values can vary significantly from project to project, meaning it is difficult to directly compare projects through PI.
- **WACC Accuracy** – It is difficult to accurately define the WACC of a company, meaning PI calculations can be inaccurate (Davies, 2023d).

Financial Appraisal Tool 6 - BCR (Benefit Cost Ratio)

Definition: Benefit Cost Ratio (BCR) tool is used to summarise the relationship between the relative costs and benefits of a project. Projects with a BCR greater than 1 are expected to deliver a positive NPV to the organisations and should be considered further (Davies, 2023d). A project with a BCR of greater than 1 indicates that the project has an IRR above the companies WACC, which is desirable (Atrill and McLaney, 2018). A BCR of less than 1 indicates that the project costs outweighs its benefits (Bulaki, 2019).

Formula: The BCR of a project is calculated by dividing the proposed total cash benefit of a project by the total cash cost of the project (Figure 12) (Davies, 2023d).

$$\frac{\text{Net present value}}{\text{Initial outlay}}$$

Figure 12 - BCR Formula (Davies, 2023d).

Strengths:

- **TVM considered** – BCR takes into account the TVM (derivative of NPV).
- **Quick and Easy to Use** - The BCR of an investment project is quick and easy to calculate meaning (powerful screening tool) (Davies, 2023d).

Weaknesses:

- **Project Comparison Difficulty** – BCR values can vary significantly from project to project, meaning it is difficult to directly compare projects through their BCR.
- **WACC Accuracy** – It is difficult to accurately define the WACC of a company, meaning BCR calculations can be inaccurate (Davies, 2023d).

Financial Appraisal Tool 7 – Accounting Rate of Return (ARR)

Definition: Accounting Rate of Return (ARR) outlines the annual percentage rate of return of a project, through comparing its average annual profit to its average initial investment (Murphy, 2022). ARR factors in all annual expenses linked to a project by spreading them out over the life of the project, including depreciation of goods and their final residual value. (Davies, 2023f)

Formula: ARR is expressed as a percentage and is calculated as per Figure 13 (Davies, 2023f).

$$\text{Annual Rate of Return} = \frac{\text{Average Annual Profit}}{(\text{Initial Investment} + \text{Future Residual Value})/2}$$

Figure 13 - ARR Formula (Davies, 2023f)

Strengths:

- **Simple Tool** – Calculation of the ARR is simple to complete.
- **Quick Comparison** – ARR can be used to perform initial screenings of an investment project (Davies, 2023f).

Weaknesses:

- **Does not account for TVM** – ARR does not account for the TVM.
- **Residual Value Inaccuracy** – The salvage value of capital goods is often hard to calculate thus impacting the calculation of the ARR.
- **Cash Flow Timing not considered** – ARR does not take into account for the impact of cash flow timing on a project (based solely on accounting profits). Projects that are cash flow rich or income heavy in their earlier/later years cannot be adequately validated through ARR (Murphy, 2022).

Business Rationale

Safran Financial Appraisal Tools Minimum Threshold

Table 2 outlines the minimum target values required for an investment project to proceed at SSGB, against each Financial Appraisal Tool.

Financial Appraisal Tool	Safran Seats GB Target Value
Payback	Payback < 5 years
Return on Investment (ROI)	ROI > 175%
Net Present Value (NPV) (Based on WACC @ 9%)	NPV = Positive from WACC of 9%
IRR (Internal Rate of Return)	IRR > 15%
Profitability Index (PI)	PI > 1.5
Benefit Cost Ratio (BCR)	BCR > 1
Accounting Rate of Return (ARR)	ARR > 21%

Table 2 - SSGB Financial Appraisal Target Values

If an Investment Project does not meet the minimum target value, against any one of the Financial Appraisal Tools outlined in Table 2, then it cannot proceed further.

Euphony Project Modelling

This section outlines results of the Financial Modelling completed for Euphony, against each of the seven Financial Appraisal Tools.

Sales Forecast, Revenue and Cash Flow

Figure 14 outlines the forecasted sales of SSGB's FC & BC Seating Products, with the inclusion of the Euphony Head Set Free System (Data from SSGB Sales Team).

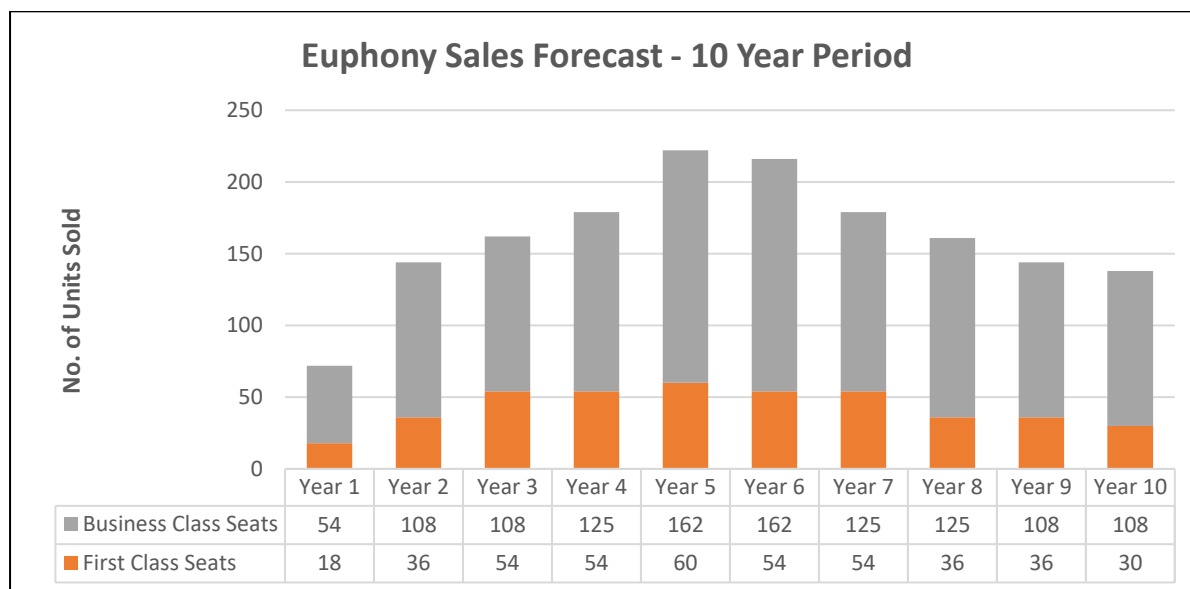


Figure 14 - Euphony Project Forecasted Sales

Figure 14 indicates sales of Euphony will be more prominent across Safran's BC seats with sales peaking in year five of the ten-year life cycle. Over the ten-year project lifecycle, SSGB is expected to sell 1617 Euphony Units, across 432 FC Seats and 1185 BC Seats. Based on the forecasted sales of Euphony, Figure 15 has been created, which outlines the expected sales revenue for Euphony Project, over its life cycle (Total of £18,096,300.00 GBP).

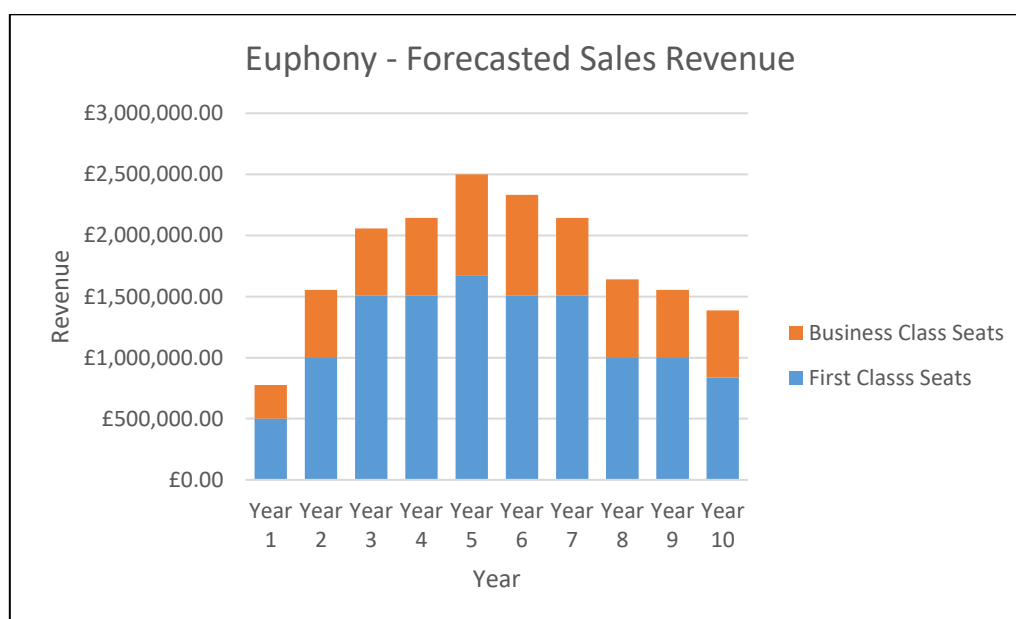


Figure 15 - Euphony Project Forecasted Sales Revenue

Forecasted sales revenue for Euphony has been generated through consideration of the selling price of Safran's FC and BC Seating products, and portioning a percentage of this sales revenue to Euphony. From Figure 15 we can see that FC Seats generate significantly higher revenue for Euphony than BC seats, despite a lower volume sold. This is down to the selling price of a FC Seat, which is considerably higher than that of a BC Seat.

Financial Modelling

Data outlined in Figure 14 and Figure 15 will be used as the basis for Financial Modelling on Euphony (**Appendix B**).

Euphony Payback

A highly desirable payback period of **3.02 years** has been calculated for Euphony (**Appendix C**), based on Total Project Costs and Expected Revenue. This value indicates costs spent of Euphony will be recouped quickly, in relation to the overall project timescales.

Euphony ROI

A ROI of 308% has been calculated for Euphony (**Appendix D**) based on forecasted Profits and Total costs. This value is far greater than the 175% ROI minimum required by SSGB, indicating that this project is highly desirable.

Euphony NPV

NPV for Euphony has been calculated both manually and electronically (**Appendix E**) based on a WACC of 9%:

Manually Calculated NPV: **£7,002,452.10 GBP**

Excel Calculated NPV: **£7,005,120.25 GBP**

NPV figures of circa £7million GBP calculated outline that this project will be extremely lucrative for SSGB.

Euphony IRR

IRR for the Euphony Project has been calculated both manually and electronically (**Appendix F**):-

IRR Manual (Rough Calculation): **36%**

IRR Excel Calculated: **35%**

The IRR calculated is significantly greater than SSGB's cost of capital (WACC@9%) and its minimum IRR threshold of 15%. This further indicates Euphony is highly desirable from a financial perspective.

Euphony PI

PI for Euphony has been calculated at **2.57** (**Appendix G**), indicating that each £1.00GBP of investment in Euphony will return £2.57GBP. This outlines the potential for Euphony to deliver significant profits.

Euphony BCR

BCR for Euphony has been calculated at **1.57** (**Appendix H**) which outlines the projects benefits will outweigh its costs. A BCR value of greater than 1 indicates that Euphony will deliver a positive NPV and IRR greater than the WACC@9%.

Euphony ARR

ARR for Euphony has been calculated at **53% (Appendix I)** - another highly desirable figure. The magnitude of the ARR value indicates that project will deliver strong annual returns when compared to its average annual investment.

Euphony Financial Modelling Summary

Table 3 summarises results from the Financial Modelling completed for Euphony, against each Appraisal Tool. Euphony meets each of the minimum required target values and in the majority of cases, exceeds these significantly. The project has a large positive NPV, IRR and ARR, coupled with a short payback, high ROI and strong PI/BCR values – all of which are desirable. Further details around the Financial Modelling completed can be found within the accompanying Euphony Appraisal Presentation (*Rama, 2023*).

Financial Appraisal Tool	Safran Seats Minimum Target Value	Euphony Head Set Free Expected Value
Payback	Payback < 5 years	3.02 years
Return on Investment (ROI)	ROI > 175%	308%
Net Present Value (NPV) <i>(Based on WACC @ 9%)</i>	NPV = Positive from WACC of 9%	£7,005,120.25
IRR (Internal Rate of Return)	IRR > 15%	35%
Profitability Index (PI)	PI > 1.5	2.58
Benefit Cost Ratio (BCR)	BCR > 1	1.58
Accounting Rate of Return (ARR)	ARR > 21%	53%

Table 3 - Euphony Project Financial Appraisal Summary

Funding Options

Both Internal and External Funding options have been considered for Euphony (Table 4 and Table 5). These options consider both traditional/non-traditional sources of funding (**Fields, 2011**).

Internal Funding

Table 4 covers a series of Internal Funding Options (**Atrill and McLaney, 2018**).

Internal Funding		
1	Internal Capex - Safran Seats Innovation Budget	Use of SSGB Annual Capex Budget to support this Investment Project. Project Board approval required for all Capex funding cases. Annual Capex funding limited, based upon previous financial performance.
2	Safran Group Funding	Funding for this Investment Project from the Safran Group Executive Committee (Based at Safran's Head Office - France). Group Funding is limited and granted on a case by case basis.
3	Employee Funding - Share Save Scheme	Use of a SSGB share save scheme to raise funds for this investment project, through the sale of equity. Employees would make use of a salary sacrifice scheme to purchase shares within the Safran Business, in return for cash funds, which can be used to support the project costs.
4	Funding from Other Projects - Capital Rationing	Funding for this Investment Project may be obtained through the principle of Capital Rationing. Previously approved Divisible projects at SSGB, may be paused, or completed incrementally, to allow funds to be diverted to support the Euphony Project.
5	Safran Seats GB Reserve (Retained Profits)	SSGB's reserve fund made of retained profits, may be used to fund this investment project.
6	Sale of Inventory and Excess Stock	Sale of SSGB's current inventory or excess/obsolete stock items may be sold, to finance this investment project (Currently high volumes of obsolete stock at SSGB).
7	Sale of Assets (Unused facilities, machinery, tooling)	Sales of SSGB's assets may be used to fund this investment project (SSGB currently has both unused facility space and machinery).

Table 4 - Euphony Project Internal Funding Options

Capital Rationing

All appraised project that pass their respective decision making criteria should be selected for implementation (**Smith, 2021**). This assumes that unlimited funds are available, which is not always the case. The concept of Capital Rationing can be used here, where limited funds mean choices have to be made regarding project selection (**Davies, 2023e**).

There are three main types of capital rationing:-

- **Soft Rationing** – An organisation sets its own internal limits on funding for projects.
- **Hard Rationing** – An organisation has access to limited capital only (from external sources).
- **One-Period Rationing** – Limits are placed on finance availability over a one-year period only. Funds for subsequent years are unlimited. (**Davies, 2023e**)

External Funding

Table 5 covers a series of External Funding Options (**Fields, 2011**).

External Funding		
1	Government Grants (UK) - Research and Development	Application for Government Research and Development Grants may be used to obtain funding for the Euphony Project.
2	Council Funding (Wales) - Local Economy	Application for Council Funding (Wales) to supplement this project, with the view that implementation of Euphony will benefit the local economy, through job creation etc.
3	Stock Market - Safran Stock	Funding for this project may be obtained through the sale of Safran stock (shares) on the Stock Exchange.
4	ATI Grants - Aerospace Technology Institute	Application for Aerospace Sector Grants may be used to obtain funding for the Euphony Project.
5	Crowd Funding	External Crowd Funding may be used to fund this investment project, through the sale of bonds or equity within the company.
6	Customer Sponsorship	Customer Sponsorship of SSGB facilities, technologies or events, may be used to supplement additional income which can be used to fund the Euphony Programme.
7	Bank Loan	A traditional bank loan may be acquired to fund the Euphony project, which will require repayment at specific interest rates.
8	Venture Capitalists Loan	Venture Capitalist loans may be obtained as a source of funding for Euphony.
9	Supplier Payment Agreements	SSGB may establish special supplier payment terms which facilitate cash flow within the business (e.g. discounted applied for early payments).

Table 5 - Euphony Project External Funding Options

Funding Options Summary

A wide range of funding options exist, which have the potential to support Euphony implementation. Internal Funding Options are desirable as these methods are of low cost to the business, when compared to external methods such as loans (**Fields, 2011**). Despite this, valuable streams of funding are available externally, through Government/Aerospace Sector Grants – thus a combination of internal and external funding options will be considered (**ATI, 2023**).

The Euphony project is heavily based on Research, Development and Testing and is cash rich in its development phase (Front Loaded – Figure 5 Y0). Funding options considered will need to account for this and ensure sufficient Cash Flow is available during this development phase (**Atrill and McInaney, 2018**). The SSGB organisation may also wish to make use of One-Period Capital Rationing in the case of Euphony, and reassign funding from other divisible projects, to support implementation (**Fields, 2011**).

Conclusions and Recommendations

The analysis completed using financial appraisal tools, coupled with the wider findings summarised within this Business Report and accompanying Appraisal Presentation (**Rama, 2023**) have allowed for a conclusion to be reached. A **recommendation to proceed** with the implementation of Euphony has been provided to the SSGB Project Committee.

Business Benefits & Drawbacks

It is clear that Euphony will bring strong financial benefits to SSGB in terms of sales, revenue and profitability. Similarly, the technology developed also has the potential to benefit the wider Safran group, due to its versatility and adaptation to other applications. Finally, this project also has potential to realise a wide range of other business benefits (Figure 16) such as job creation and environmental benefits through lean manufacturing/reduced wastage. This project does have some drawbacks such as availability of skilled resource to support its implementation; however, these are negligible in comparison. Further detail on Business Benefits/Drawbacks can be found within the Euphony Appraisal Presentation (**Rama, 2023**).



Figure 16 - Euphony Project Benefits

To further the review of this project, other financial appraisal tools may be used, such as Required Rate of Return and Discounted Payback Period (**Atrill and McLaney, 2018**).

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Appendices

Appendix A – Project Costs Breakdown

Figure 17 outlines the breakdown of Project Costs for Euphony.

Project Costs	
Cost Type	Cost (£ GBP)
R and D	£600,000.00
Core Team	£720,000.00
Detailed Design	£200,000.00
Development Testing	£120,000.00
Software Tuning	£120,000.00
Prototype Hardware	£200,000.00
Certification Testing	£350,000.00
Flam Testing	£180,000.00
Qualification	£275,000.00
PDR Mock Up	£50,000.00
CDR Mock Up	£75,000.00
DDR Mock Ups	£100,000.00
Marketing and Sales Units	£150,000.00
Marketing Road Shows	£100,000.00
AC simulator	£250,000.00
Team Travel	£100,000.00
Tooling	£80,000.00
Programme Reserve	£500,000.00
Other cost	£100,000.00
Haulage/Transport/Shipping	£120,000.00
Customer Hospitality	£50,000.00
TOTAL Costs	£4,440,000.00

Figure 17 - Euphony Project Cost Breakdown

Appendix B – Euphony Financial Modelling

Calculation of Revenue for the Euphony Project is outlined Figure 18 below. For each First Class/Business class seat sold, 6% of the selling price is apportioned to Euphony.

	Selling price	Euphony Project Revenue per Seat Sale (6% of selling price)
FC Seat	£465,000.00	£27,900.00
BC Seat	£85,000.00	£5,100.00

Figure 18 - Euphony Seat Sales Revenue

Figure 19 outlines the Financial Model for the Euphony project over its 10-year lifespan, with revenue based on the Seat sales forecast.

Here Present Value has been calculated and Future Value has also been calculated (based on WACC of 9%).

WACC @ 9%

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	
Sales A	First Class Seat Sales Qty	18	36	54	54	60	54	54	36	36	30	
Sales B	Business Class Seat Sales Qty	54	108	108	125	162	162	125	125	108	108	
Revenue Stream A	First Class Seats Revenue	£502,200.00	£1,004,400.00	£1,506,600.00	£1,506,600.00	£1,674,000.00	£1,506,600.00	£1,506,600.00	£1,004,400.00	£1,004,400.00	£837,000.00	
Revenue Stream B	Business Class Seat Sales Revenue	£275,400.00	£550,800.00	£550,800.00	£637,500.00	£826,200.00	£826,200.00	£637,500.00	£637,500.00	£550,800.00	£550,800.00	
Investment		Revenue (Present Value)										Total Revenue (Present Value)
-£ 4,440,000.00		£777,600.00	£1,555,200.00	£2,057,400.00	£2,144,100.00	£2,500,200.00	£2,332,800.00	£2,144,100.00	£1,641,900.00	£1,555,200.00	£1,387,800.00	£18,096,300.00
Discount Rate (WACC)		9%										
Denominator		0.917	0.842	0.772	0.708	0.65	0.596	0.547	0.502	0.46	0.422	Total Revenue (Future Value)
Future Value (Disc. Cash Flow)		£713,059.20	£1,309,478.40	£1,588,312.80	£1,518,022.80	£1,625,130.00	£1,390,348.80	£1,172,822.70	£824,233.80	£715,392.00	£585,651.60	£11,442,452.10

Figure 19 - Euphony Project Financial Model

Appendix C – Payback Calculation

Figure 20 outlines the calculation of Payback for Euphony.

Payback (Manually Calculated)	3.023226529	Years
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		Cumulative Revenue
Revenue Year 1	£777,600.00	£777,600.00
Revenue Year 2	£1,555,200.00	£2,332,800.00
Revenue Year 3	£2,057,400.00	£4,390,200.00
Revenue Year 4	£2,144,100.00	£6,534,300.00
Payback Point Revenue	£4,440,000.00	
Year 3 - 4 Delta	£49,800.00	
Payback Period	3.023226529	

Figure 20 - Euphony Project Payback Calculation

Appendix D – ROI Calculation

Figure 21 outlines the calculation of ROI for Euphony.

ROI	307.57%
Total Costs	£4,440,000.00
Total Revenue (Present Value)	£18,096,300.00
Delta	£13,656,300.00
ROI	307.57%

Figure 21- Euphony Project ROI Calculation

Appendix E – NPV Calculations

Figure 22 outlines the calculation of NPV for Euphony, both manually and via Microsoft Excel. The calculations for NPV are based on a WACC @ 9%.

Payback (Manually Calculated)	3.023226529	Years
	£777,600.00	
NPV (Excel Calculated)	£7,005,120.25	GBP
NPV (Manually Calculated)	£7,002,452.10	GBP
Total Future Value (Discounted Cash Flow)	£11,442,452.10	GBP
Total Initial Investment	-£ 4,440,000.00	GBP
NPV	£7,002,452.10	GBP

Figure 22 - Euphony Project NPV Calculation

Similarity between both the manually and excel calculated NPV figures, outlines confidence in the values calculated.

Appendix F – IRR Calculations

Figure 23 and Figure 24 outlines the calculation of IRR for Euphony, both manually (rough calculation) and via Microsoft Excel.

WACC @ 9%											
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Sales A	First Class Seat Sales Qty	18	36	54	54	60	54	54	36	36	30
Sales B	Business Class Seat Sales Qty	54	108	108	125	162	162	125	125	108	108
Revenue Stream A	First Class Seats Revenue	£502,200.00	£1,004,400.00	£1,506,600.00	£1,506,600.00	£1,674,000.00	£1,506,600.00	£1,506,600.00	£1,004,400.00	£1,004,400.00	£837,000.00
Revenue Stream B	Business Class Seat Sales Revenue	£275,400.00	£550,800.00	£550,800.00	£637,500.00	£826,200.00	£826,200.00	£637,500.00	£637,500.00	£550,800.00	£550,800.00
Investment		Revenue (Present Value)									
-£ 4,440,000.00		£777,600.00	£1,555,200.00	£2,057,400.00	£2,144,100.00	£2,500,200.00	£2,332,800.00	£2,144,100.00	£1,641,900.00	£1,555,200.00	£1,387,800.00
Total Revenue (Present Value)		£18,096,300.00									
Discount Rate (WACC)		9%									
Denominator		0.917	0.842	0.772	0.708	0.65	0.596	0.547	0.502	0.46	0.422
Future Value (Disc. Cash Flow)		£713,059.20	£1,309,478.40	£1,588,312.80	£1,518,022.80	£1,625,130.00	£1,390,348.80	£1,172,822.70	£824,233.80	£715,392.00	£585,651.60
Total Revenue (Future Value)		£11,442,452.10									
NPV (Excel Calculated)		£7,005,120.25 GBP									

WACC @ 36% (Estimate NPV equal to 0)											
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Sales A	First Class Seat Sales Qty	18	36	54	54	60	54	54	36	36	30
Sales B	Business Class Seat Sales Qty	54	108	108	125	162	162	125	125	108	108
Revenue Stream A	First Class Seats Revenue	£502,200.00	£1,004,400.00	£1,506,600.00	£1,506,600.00	£1,674,000.00	£1,506,600.00	£1,506,600.00	£1,004,400.00	£1,004,400.00	£837,000.00
Revenue Stream B	Business Class Seat Sales Revenue	£275,400.00	£550,800.00	£550,800.00	£637,500.00	£826,200.00	£826,200.00	£637,500.00	£637,500.00	£550,800.00	£550,800.00
Investment		Revenue (Present Value)									
-£ 4,440,000.00		£777,600.00	£1,555,200.00	£2,057,400.00	£2,144,100.00	£2,500,200.00	£2,332,800.00	£2,144,100.00	£1,641,900.00	£1,555,200.00	£1,387,800.00
Total Revenue (Present Value)		£18,096,300.00									
Discount Rate (WACC)		36%									
NPV (Excel Calculated)		-£125,434.17 GBP									

Figure 23 - Euphony Project IRR Financial Model

An estimated WACC @36% was used, to obtain a NPV close to zero, when using the IRR rough calculation method.

IRR Rough Calc		
NPV Movement %	27	%
NPV Movement	£7,130,554.42	GBP
Movement per %	£264,094.61	GBP
Positie NPV (WACC @9%)	£7,005,120.25	GBP
%NPV to zero	26.53%	
IRR Rough Calc	35.53%	

Figure 24 - Euphony Project IRR Rough Calculation

Similarity between both the manually and excel calculated IRR figures, outlines confidence in the values calculated.

Appendix G – PI Calculation

Figure 25 outlines the calculation of PI for Euphony.

PI	2.577128851
GPV (Total Future Cash Flow)	£11,442,452.10
Total Costs (Initial Investment)	£ 4,440,000.00
PI	2.577128851

Figure 25 - Euphony Project PI Calculation

Appendix H – BCR Calculation

Figure 26 outlines the calculation of BCR for Euphony.

BCR	1.577729786
NPV	£7,002,452.10
Total Costs (Initial Investment)	£ 4,440,000.00
BCR	1.577128851

Figure 26 - Euphony Project BCR Calculation

Appendix I – ARR Calculations

Figure 27 outlines the calculation of ARR for Euphony, based on a Residual Value of £1,200,00.00 GBP.

ARR	52.68191%
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Total Cash Flow (Present Value)	£18,096,300.00
Depreciation	£3,240,000.00
Net Income/Profit	£14,856,300.00
Average Annual Profit	£1,485,630.00

Initial Investment	£4,440,000.00
Residual Value	£1,200,000.00
Average Investment	£2,820,000.00
ARR	52.68191%

Figure 27 - Euphony Project ARR Calculation