

# 1909751

*by* Alex Williams

---

**Submission date:** 19-Jan-2024 10:59AM (UTC+0000)

**Submission ID:** 222610938

**File name:** 11778\_Alex\_Williams\_1909751\_183171\_1513982222.pptx (922.88K)

**Word count:** 563

**Character count:** 3051

# Presentation 1: Project Definition, Research and Quality Planning

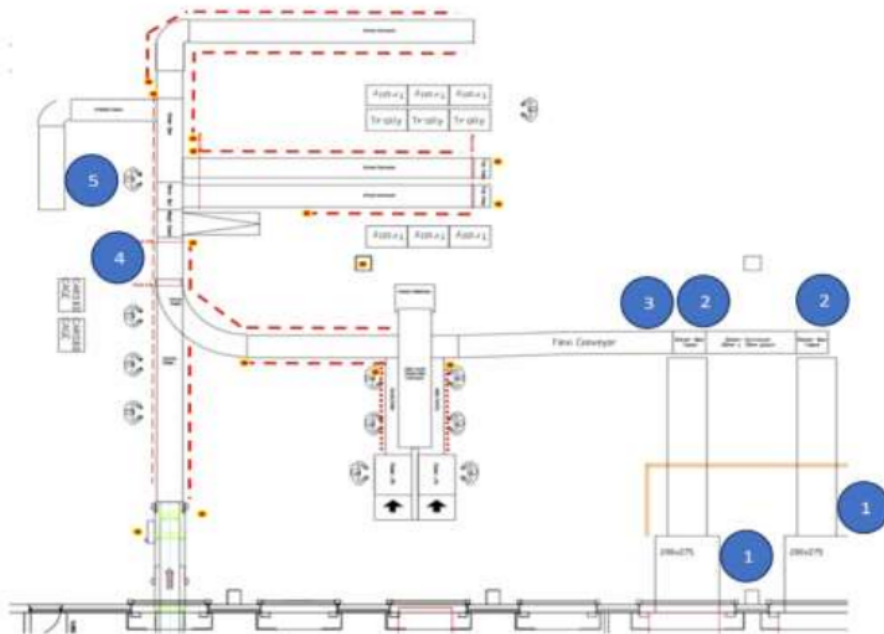
|                    |                                                |
|--------------------|------------------------------------------------|
| Course:            | BSc (Hons) Electrical & Electronic Engineering |
| Module:            | SGEL6000 Independent Project                   |
| Name:              | Alex Williams                                  |
| University Number: | 1909751                                        |

# Project Background

- Customer;
- Major worldwide E-commerce company online goods and services
- Location – South Wales Fulfilment Centre (FC)

# Aims and Objectives

- Reduce errors in receive process – providing proof of concept
- How are they introduced? - Manual sortation



# Functional Design Specification

- Agreed and signed by customer
- Target Areas
  - Performance
  - Safety
  - Environmental
  - Aesthetics
  - Finance
  - Technical

# FDS Highlights

| Reference | Outcome                                                                                                        |
|-----------|----------------------------------------------------------------------------------------------------------------|
| P2.1      | Must automate sortation to four destinations and a 5 <sup>th</sup> destination for kick outs/no reads/rejects. |
| P2.2      | The system must show where the carton is being diverted to by means of pilot lights or HMI                     |
| P2.3      | Be able to change routing destinations from the HMI                                                            |
| P3        | Must highlight faults and be presented to the engineering team via pilot lights and/or the SCADA System.       |
| P4        | Should start automatically when incoming cartons are detected                                                  |
| F1        | Project must be within budget of £70,000                                                                       |
| F2        | Project must provide a return of investment within 2 years.                                                    |
| T4.1      | HMI must have a view only mode                                                                                 |
| T4.2      | HMI must have an operations                                                                                    |
| T4.3      | Must have an engineering mode                                                                                  |

# Project Risks

| Risks                                                                                                                                                                               |                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>External</b><br>Changes in stakeholder or company expectations<br>Labour and material availability                                                                               | Agree functional design specifications (FDS) and test plans<br>Identify alternative suppliers/contractors and make a reserve list                                       |
| <b>Budget Creep</b><br>Occurs where there are changes in project scope<br>Poor planning and communication                                                                           | Have the FDS Signed by all stakeholders within the project to combat shifting scope of the project<br>Use the Gantt Chart to maintain time keeping                      |
| <b>Technical/ Equipment and System Risks-</b><br>equipment failure;<br>Upgradability and complexity of equipment may cause future operational issues if incorrect equipment is used | Keep spares on site for component failure<br>Draft instructions/procedures for end users and work with the training department<br>Test equipment prior to commissioning |

# Health and Safety

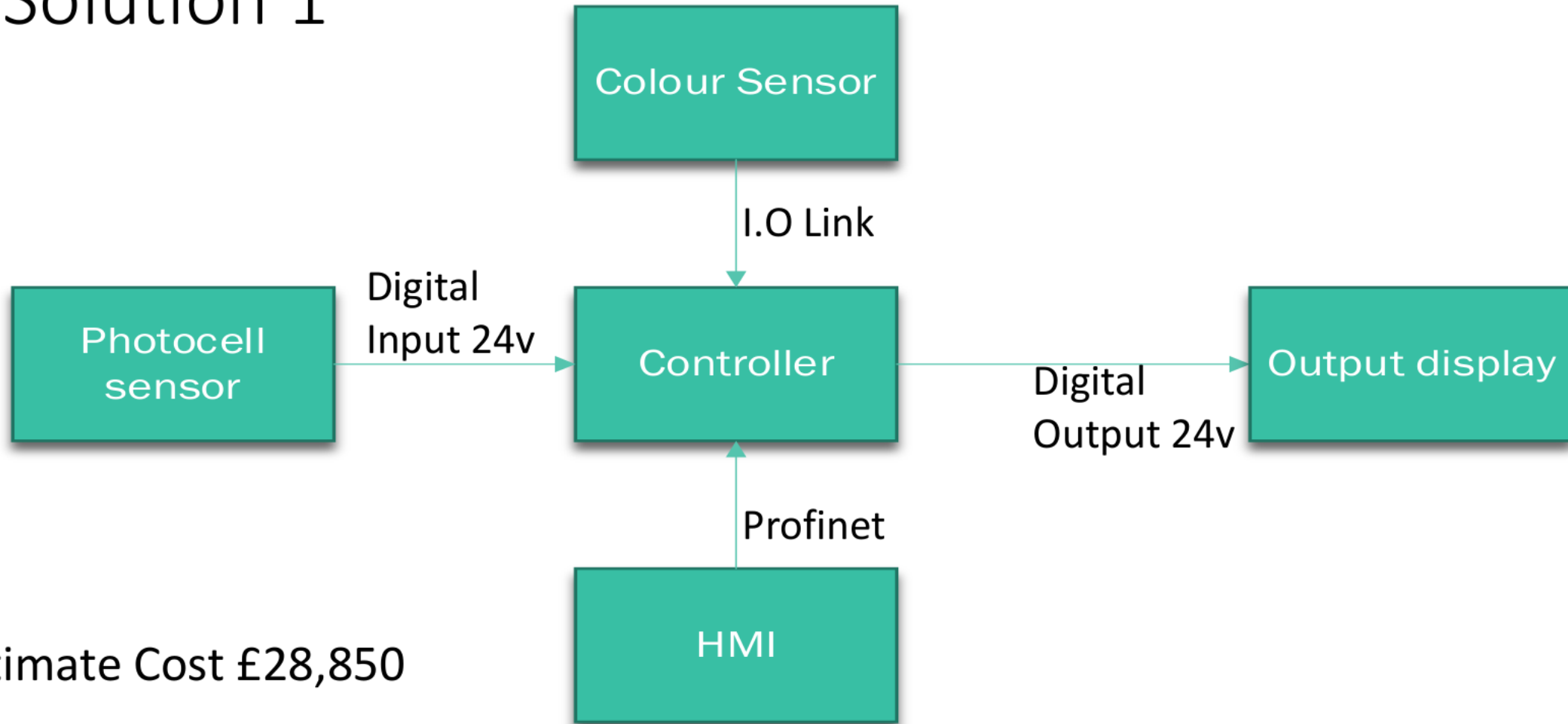
- Conform to current relevant UK regulations and standards
- The Supply of Machinery (Safety) Regulations 2008
- Provision and Use of Work Equipment Regulation (PUWER 78)
- Health & Safety at Work Act 1974 (HASWA 74)
  
- Risk assessment completed during implementation
- Dynamic risk assessments to be completed for non routine tasks

# Test Plan

| Test Number | FDS Reference | Test Description                                                                                          | Expected outcome                                                                                    |
|-------------|---------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| 1.          | A1            | Check prototype fits within training area.                                                                | Prototype is within the training area in engineering workshop.                                      |
| 2.          | T5            | Check all cables are identifiable with cable IDs.                                                         | All cable IDs are present.                                                                          |
| 3.          | T2            | With no faults on the prototype, check healthy signal is shown via pilot lights or HMI                    | Healthy signal is displayed                                                                         |
| 4.          | T4.1          | Attempt to set a routing destination in view only mode                                                    | HMI won't navigate to the required page due to permissions                                          |
| 5.          | T4.2          | Attempt to set a routing destination in Operations mode                                                   | HMI will go to routing page and allow user to set routing destinations.                             |
| 6.          | P1            | Parcel moved under camera to simulate movement on a conveyor                                              | Automated output is given on the destination                                                        |
| 7.          | P2.1/P2.2     | Test sample simulated to go to selected routing destination                                               | Simulated output is seen to go to correct routing destination and intended destination shown on HMI |
| 8.          | P2.3          | Change routing destination on HMI                                                                         | Routing destination changes.                                                                        |
| 9.          | S1            | Engage isolator                                                                                           | All system shuts down.                                                                              |
| 10.         | P3            | Place fault on system by using a bad shipment, e.g. Spoiled labels or upside down or interrupt the system | Fault light displays on pilot lights or HMI                                                         |

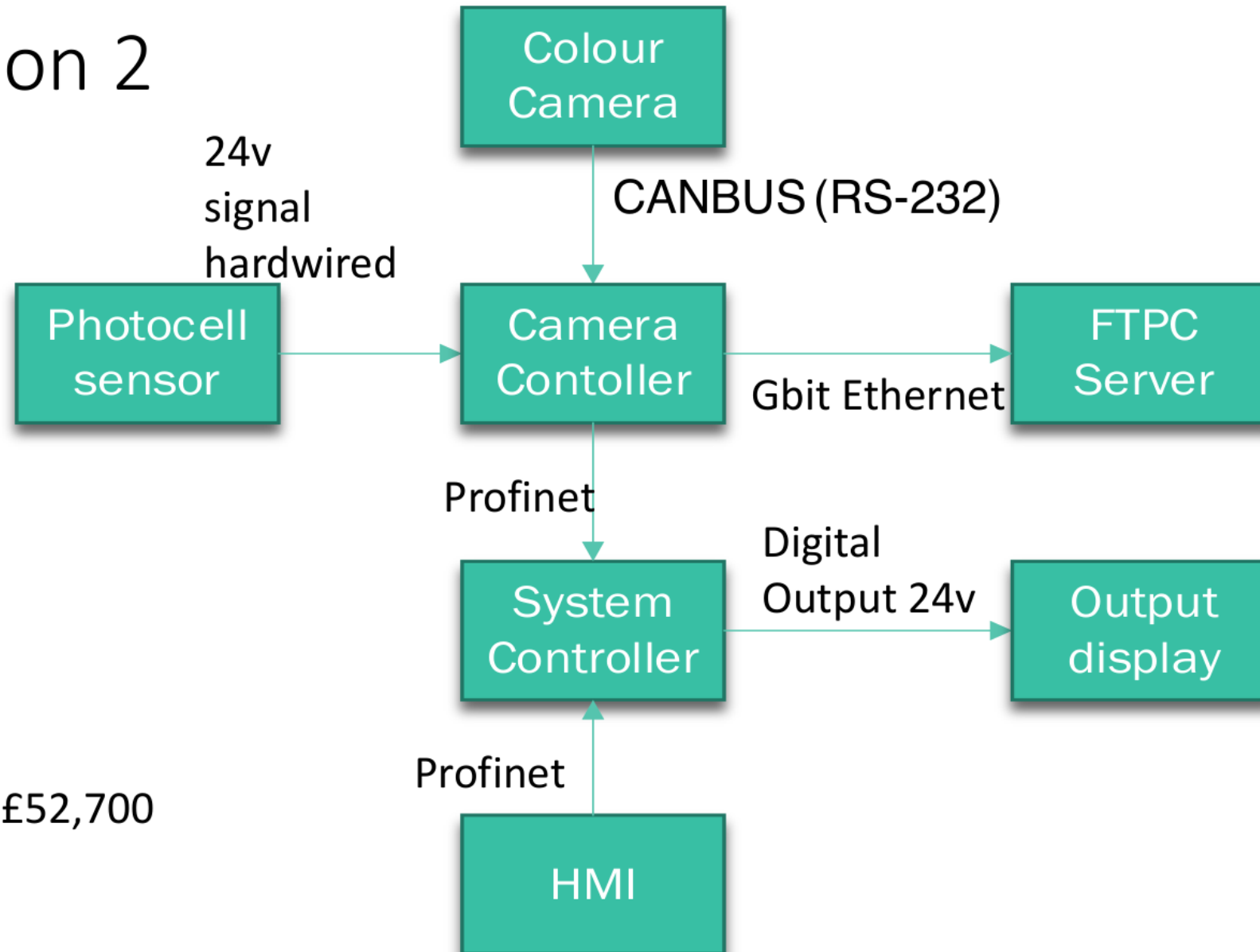
| Test Number | FDS Reference | Test Description                                                       | Expected outcome                                                 |
|-------------|---------------|------------------------------------------------------------------------|------------------------------------------------------------------|
| 11.         | P4            | Sensor input will start the sortation system                           | System starts without manual intervention.                       |
| 12.         | P5            | Test 100 samples                                                       | Has a read rate of <99%                                          |
| 13.         | T4.2          | Attempt to navigate to maintenance screen in operations mode           | HMI won't navigate to the required page due to permissions       |
| 14.         | T4.3          | Navigate to maintenance screen in engineering mode and reset read rate | HMI will go to the maintenance page and read rate will be reset. |
| 15.         | E1            | System triggers on demand                                              | System operates only when called and turns off after use         |
| 16.         | P6            | Time the process time for one unit                                     | Process time has to be under 7 seconds.                          |
| 17.         | T1            | Check components used/BOM matches preferred suppliers                  | Parts used are preferred manufactures                            |
| 18.         | T3            | Check documentation list (FDS T3) for required documents               | All required documentation is present.                           |
| 19.         | F1            | Project is within budget                                               | Project is within budget                                         |
| 20.         | F2            | Calculate ROI                                                          | Project will have an ROI <2 years                                |

# Solution 1



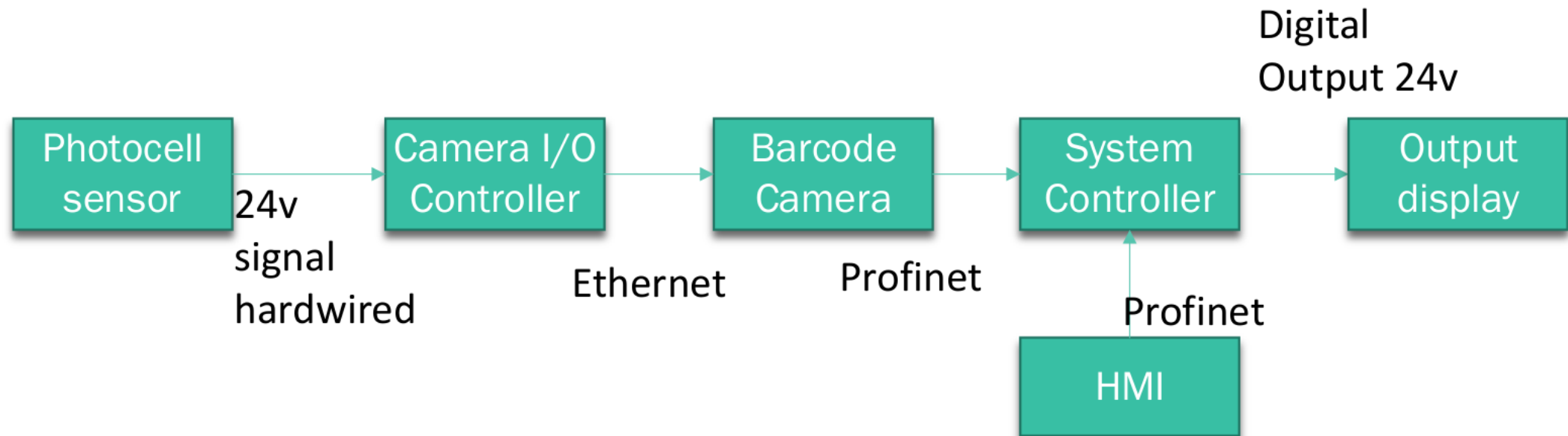
Estimate Cost £28,850

## Solution 2



Estimate Cost £52,700

# Solution 3



Estimate Cost £29,675

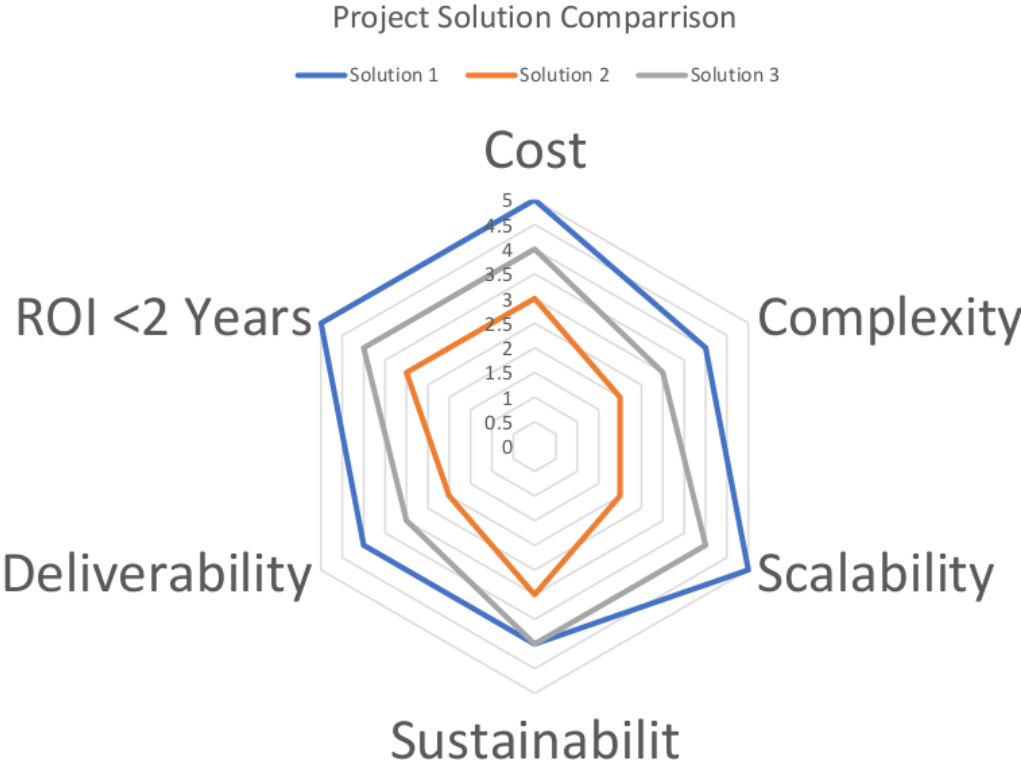
# Review of solutions

- 10 hours labour per shift, of which the process runs for 102 hours in a week.
- Annually saving £60,996 on labour
- Savings from reduced Re-processing of miss sorts £1,794 annually.

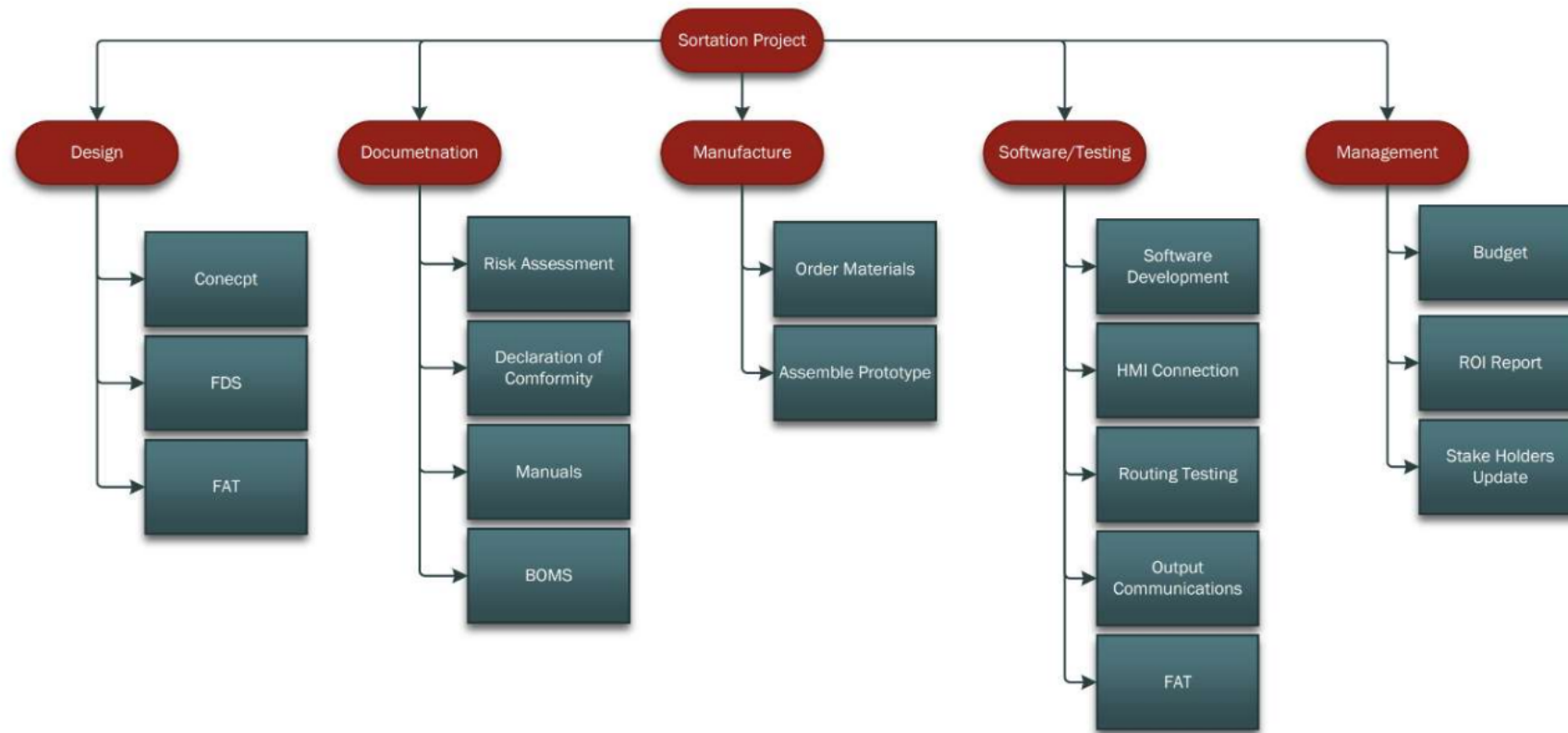
| Solution       | Advantage                                                                                                                                                            | Disadvantage                                                                                                                                                                             |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Solution One   | <ul style="list-style-type: none"><li>• Lowest Cost</li><li>• Better scalability</li><li>• Visual Representation with colour labels</li><li>• ROI 25 Weeks</li></ul> | <ul style="list-style-type: none"><li>• Requires Carton justification on an alignment conveyor</li><li>• Top scan only</li></ul>                                                         |
| Solution Two   | <ul style="list-style-type: none"><li>• Visual Representation with colour labels</li><li>• Boxes in any more orientation</li><li>• ROI 45 Weeks</li></ul>            | <ul style="list-style-type: none"><li>• Harder scalability due to conveyor change required</li><li>• Higher Cost</li><li>• More parts required</li></ul>                                 |
| Solution Three | <ul style="list-style-type: none"><li>• Cameras already in use on site</li><li>• ROI 24 Weeks</li></ul>                                                              | <ul style="list-style-type: none"><li>• Poor Visual Representation with colour labels</li><li>• Requires Carton justification on an alignment conveyor</li><li>• Top scan only</li></ul> |

# Comparing Solutions

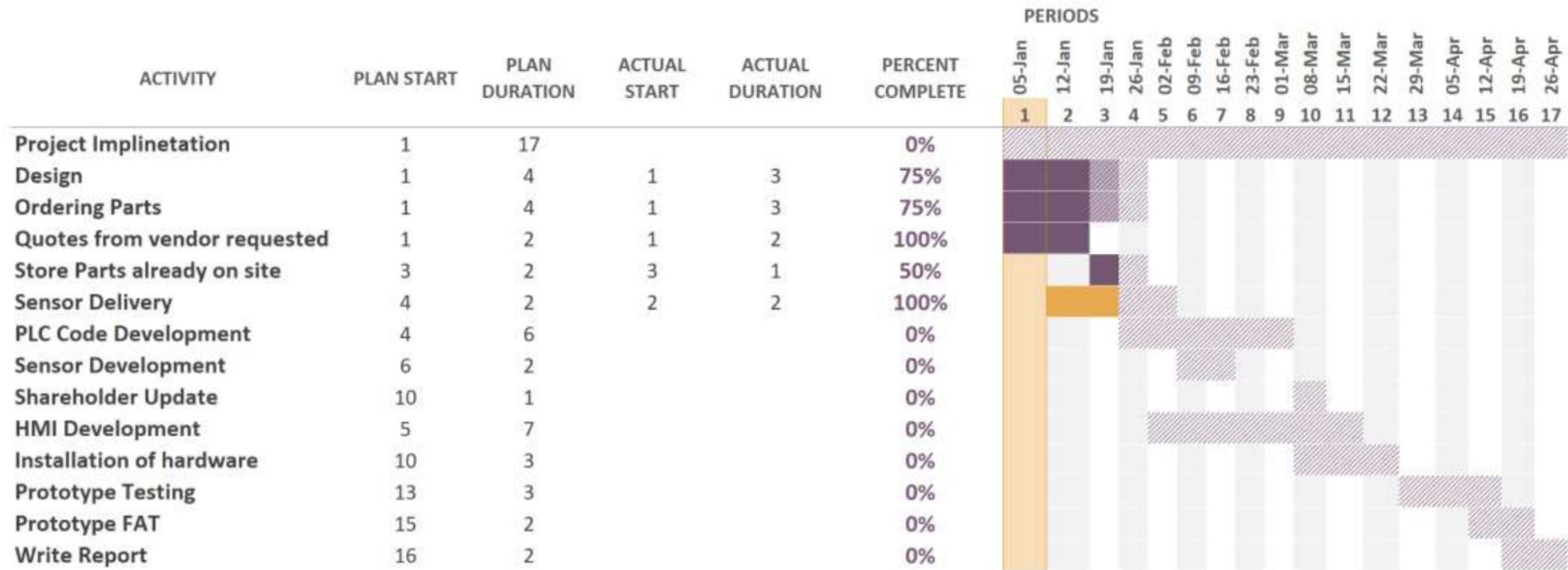
| Criteria       | Solution 1 | Solution 2 | Solution 3 |
|----------------|------------|------------|------------|
| Cost           | 5          | 3          | 4          |
| Complexity     | 4          | 2          | 3          |
| Scalability    | 5          | 2          | 4          |
| Sustainability | 4          | 3          | 4          |
| Deliverability | 4          | 2          | 3          |
| ROI <2 Years   | 5          | 3          | 4          |



# Work Breakdown Structure



# Gantt Chart



Any Questions?

FINAL GRADE

GENERAL COMMENTS

65/100

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

GRADING FORM: NEW CSG-RUBRIC

ALEX WILLIAMS

65

1. ENGAGEMENT WITH LITERATURE

 NA

2. KNOWLEDGE AND UNDERSTANDING

 Project background and problem definition (4/10)  
Project constraints, risks, health and safety (7/10)  
Response to questions (8/10) **19**

### 3. COGNITIVE AND INTELLECTUAL

 Functional Design Specification (7/10)  
Test planning (7/10)  
Project Planning and management methods (7/10) **21**

### 4. PRACTICAL APPLICATION

 Review of Solutions (7/10)  
Justification of final solution (6/10) **13**

### 5. TRANSFERABLE SKILLS

 Quality of the presentation slides (7/10)  
Quality of the delivery style  
Monotone style, went over time (5/10) **12**