

Document number:	EM-0001	Issue no:	-02	Issue date:	28/04/24
Document title:	Organisation Brief				

Executive summary:

This document details information about the company Software and Technology Products Ltd (STP Ltd.), STP Ltd. is a UK-based tech company founded in 2009, delivering innovative software-integrated technology products. The aim, mission statement and vision statement of the company are stated. The company's previous products, sales stats and organisation structure are also outlined.

Document Changes Log:

Issue	Reason/Main changes	Date issued
-01	First issue	28/01/24
-02	Sales stats and equity ownership of the company were added	4/02/24

Lead Author	Principal Reviewer	Approver
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Software and Technology Products Ltd.

Organisation Brief

STP Ltd. is a medium-sized tech company headquartered in Manchester, UK founded in 2009. At STP, we deliver innovative software-integrated tech products that enhance quality of life.



Purpose

Our aim is to provide cutting-edge solutions to redefine lifestyles in the digital era by maintaining dedication, accountability, professionalism, sustainability-oriented, and people-centric values.

Unique Positioning: The company has a strong competitive moat established by scalability and platform investment which has helped it to cement its recognition as the go-to lifestyle application of the modern era.

Growth Vectors: As a tech company, we leverage demographic tailwinds by targeting digitally native customer segments. Early penetration with our existing products has helped build market share.

Value Proposition: Our fast-paced growth drives consistent revenue which helped us achieve adjusted EBITDA (Earnings Before Income Tax Depreciation and Amortization) profitability in Q4 FY17.

Our Products

○ SereneSense (2020)

An automatic volume-adjusting hearing aid powered by AI. It offers an immersive clear and personalized sound, effortlessly adapting to surroundings for a harmonious blend of technology and tranquillity.

○ AuraPay (2021)

AuraPay seamlessly blends style and functionality with its smart ring, a companion for contactless payments. AuraPay can make transactions with a simple gesture in a compact and secure design.

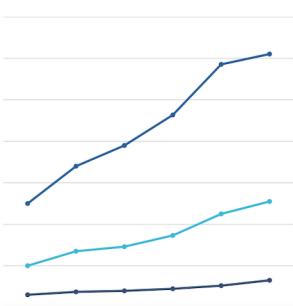
○ DreamTrack (2024)

DreamTrack aims to improve sleep by harnessing AI analytics. This health-tracking sleep mask monitors sleep patterns, ensuring consumer revitalization.

Mission Statement: Foster a connected world that prioritises safety, well-being, and an exceptional way of living.

Vision Statement: Become a leading global organisation that changes how humanity perceives and utilizes technology

Sales Stats



Global Monthly Active Users:
5M +, up 25% YoY

U.K Monthly Active Users:
2M+, up 20% YoY

Global Subscribers:
600K+, up 15% YoY

Equity Ownership

Promoters: 54.8%

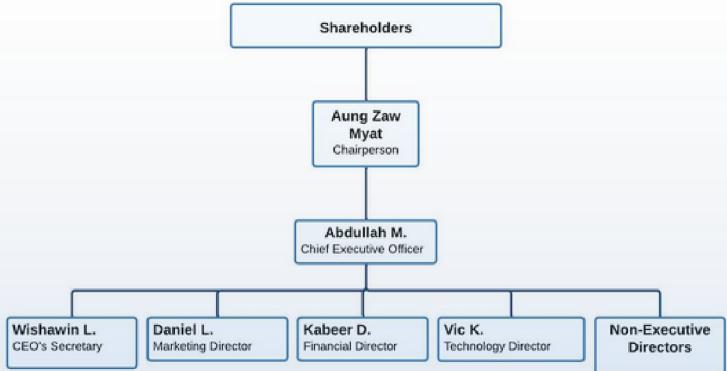


Institutions: 35.5%

Individual Insiders: 9.7%

Background

STP Ltd. employs over 250 people with an annual turnover of £ 30 million in FY23. Our headquarters are in MediaCityUK, Manchester, the hotspot for tech and creative industries in the UK. We have a research and development centre in Cambridge with partnerships with the University of Cambridge for state-of-the-art innovation in technology. Our people-centric and diverse culture led to the establishment of our 24/7 customer support and call centre in Chennai, India.



Document number:	EM-0002	Issue no:	-03	Issue date:	28/04/24
Document title:	Concept Selection Documentation				

Executive summary:

This document outlines the process used for the selection of a new product concept to be developed by STP. STP's motivations for developing a new product are discussed. A thorough evaluation process is then employed to select a suitable product area. Following consideration of all respective strengths and weaknesses, the product area of 'location-aware apps and associated hardware' is selected. Six product concepts are then presented from this product area, each with a brief description and schematic. Ten criteria are presented for the comparison of these product concepts, including budget compliance, innovation/novelty, ease of market entry, ease of IP protection and customer demand. The concept was selected using a weighted concept selection matrix. The result is that the 'smart sunglasses' concept (A) was selected since it scored highest in the matrix.

Document Changes Log:

Issue	Reason/Main changes	Date issued
-01	First issue	28/01/24
-02	Revision to the selection criteria and selection matrix	02/02/24
-03	Addition of the six product concept schematics	25/04/24

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Distribution: Entire project team		

Concept Selection Documentation

Due to recent breakthroughs in artificial intelligence (AI), augmented reality (AR) and virtual reality (VR), it is necessary to develop new innovative products that incorporate these features for society. This will enable STP to keep up with the evolving technological landscape. As customer needs are always evolving, the development of new products is essential for product portfolio renewal and customer retention. There has been a strong indication that our most recent product, AuraPay, has reached the maturity stage of its product life cycle. STP recognises the need to keep its product pipeline flowing to maintain cash flow. As such, it has been decided that now is an opportune time to develop a new product.

1. Product Area Selection

The product areas of highest potential were identified as washing machine related products, location-aware apps with an associated proprietary hardware, dental products, and mobility-assistive devices. The feasibility and potential of each of these 4 product areas was analysed whilst considering various organisational and project constraints, shown in Table 1.

Table 1: Different product areas with their respective advantages and disadvantages

Product Area	Advantages	Disadvantages
Washing machine related products	<ul style="list-style-type: none">- High demand and stable market.- Potential for eco-friendly features.- Longer than average product life, less influenced by rapid technological changes.	<ul style="list-style-type: none">- Well-established competitors such as Beko and Samsung.- Difficult to break into the market due to abundance of existing client-supplier partnerships.- Strict and changing regional regulations.- Higher customer-support expectation due to its longer lifecycle.- Greater potential for process innovation rather than product innovation, since the market is mature; this doesn't suit STP, given the domination of larger competitors.
Location-aware app and associated hardware	<ul style="list-style-type: none">- Potential for innovation, updates, and variants.- Easier to scale globally.- Less influenced by economic climate or environmental regulations.	<ul style="list-style-type: none">- More privacy concerns to consider.- Larger number of competitors who can frequently and easily enter the market.
Dental products	<ul style="list-style-type: none">- Growing market due to growing interest in oral health.- Consistently high product demand.- An essential product all over the world.	<ul style="list-style-type: none">- Requires dental specialists and scientists.- Strict regulations from health and welfare bodies such as FDA, GMP and HTA.- Research is time-consuming and requires volunteers, along with ethical concerns.- Rapid technology advances can easily make products outdated.
Mobility-assistive device	<ul style="list-style-type: none">- Widespread funding and support.- More essential to associated demographics.- Less volatile to sudden economic climate changes.	<ul style="list-style-type: none">- A more limited market.- Requires approval from health regulators, taking longer to reach market.- Lower customer expectation due to the limited functional requirements of the product.- Faulty products can cause injury lawsuits, so more focus required on Consumer Protection Act 1987.

For the location-aware app and associated bespoke hardware, its strengths clearly outweigh its disadvantages. STP's dedicated data protection team is well-equipped to manage the associated privacy concerns for this product area, given that many previous products have had similar concerns due to the tracking of user data. The presence of numerous competitors is also of less significance, given STP's status as a medium-sized, established brand with a significant budget and prior experience. Dental products are less feasible due to a lack of specialist knowledge in the field. Hiring these experts is an avoidable addition to the project cost. Mobility-assistive devices and washing machine related products have less potential for success, both due to saturated markets and not integrating well with our existing catalogue, which decreases the likelihood of these products succeeding with our previous customers. Considering these, it became apparent that the location-aware app and associated hardware project area was most appropriate.

2. Concepts

Table 2 shows the concepts generated by each member of the group.

Table 2: Concepts

Concept name	Description
Concept A: Smart sunglasses (by Aung)	The smart sunglasses have microphone, camera, and speaker. The features on the sunglasses can be controlled by voice-recognition. Location and visual data are used to provide augmented reality overlays, which can aid users with everyday activities and travelling. Data from location and camera are analysed by AI to give live audio-guide for the visually impaired to navigate. The camera and microphone can detect a medical or safety emergency and send alert and location to a nominated phone number.
Concept B: Location-aware language translation wearable (by Daniel)	This mobile product enables real-time, two-way translation. The hardware includes a microphone, earpiece speaker, external speaker, and location tracker. Location data is used to make the app aware of local languages, dialects, and accents in the area, and to provide context and knowledge of regional vocabulary. The app implements AI to complement this, with speech pattern recognition improving future use. The product is ideal for travellers, migrants and use in global organisations or governments.
Concept C: Tourism location aware app (by Vic)	The product is a software-integrated location-aware touchscreen device, ideal for tourists travelling to a new location. It shows popular landmarks, local tour guides, local events, restaurants, accommodation, and transportation, ranked by environmental impact. Another feature is an in-app currency for purchasing tickets. Local language selection and real-time location-precise weather are also available. A dedicated button on the device allows the transfer of location information to relevant emergency services.
Concept D: Path tracking AI device (by Abdullah)	The product is a small location tracking device, which pairs with an associated app to track location in real time. Using AI-integrated software, the app tracks location and reports sudden deviation from recognised usual paths to the user. The product is primarily aimed at young children and the elderly, who usually commute alone. The main selling point is that it is cheaper than Air Tag, its main competitor. Since it blends in with common accessories, it's less likely to be identified as a location tracking device, so in case of criminal activity it is less likely to be removed.
Concept E: Scavenger-hunt app (by Ein)	The product is an immersive scavenger hunt app and corresponding handheld portable gaming device. Within the app, clues and challenges can be tied to specific real-world locations, accessible to anyone within the vicinity. Multiple tasks must be completed, with clues and completion points able to be positioned in other geographical locations, including other countries requiring participants to collaborate. This encourages exploration and interaction between users from different countries. The product features machine learning models to automate appropriate placement and frequency of task points.
Concept F: Location-Based Fitness and Wellness App (by Kabeer)	The product is a fitness oriented smart watch with an associated app. It provides guidance based on the user's real-time location and environmental context. It offers personalized fitness plans based on the user's location, incorporating outdoor features for a dynamic workout. It also contains information on nearby restaurants/cafes with suitable dietary compatibility.

3. Concept Selection

For objective concept selection, it was necessary to specify the most important selection criteria. Complying with the budget is most important when deciding on the product, because companies fail due to lack of cash rather than lack of profit. Another important criterion is innovativeness and novelty, which allows our product to keep up with changing customer needs. The product must easily enter the market to ensure growing sales in the appropriate timeframe. There must be clear evidence of customer demand. There must be an ease of IP protection to prevent competitors from exploiting our IP. Other less significant criteria were also considered in the selection process. The concepts were assessed systematically through a weighted concept selection matrix, and this is summarised in Table 3.

Table 3: Concept Selection Matrix

Criteria	Weight	Concept A	Concept B	Concept C	Concept D	Concept E	Concept F
Innovation/Novelty	4	4	3	2	1	1	2
Specific Demographic	3	3	3	3	4	2	3
Ease of Market Entry	4	3	3	3	1	2	3
Political factors	1	2	3	3	2	3	4

Updateability	3	4	3	4	2	4	5
Market Expansion Potential	2	4	4	2	2	1	3
Budget Compliance	5	3	3	3	5	4	3
Ease of IP protection	4	3	3	1	1	1	2
Customer Demand	4	3	3	3	5	2	4
Economic climate adaptability	3	3	3	2	4	2	2
TOTAL		107	101	85	93	73	99

Concept A and B have high innovation as almost no other similar products exist. They target a relatively large variety of users and can easily enter the market. Additionally, their product designs are protectable with patents. Despite this, the products are more luxuries rather than necessities, which means they are less likely to excel in changing economic climates.

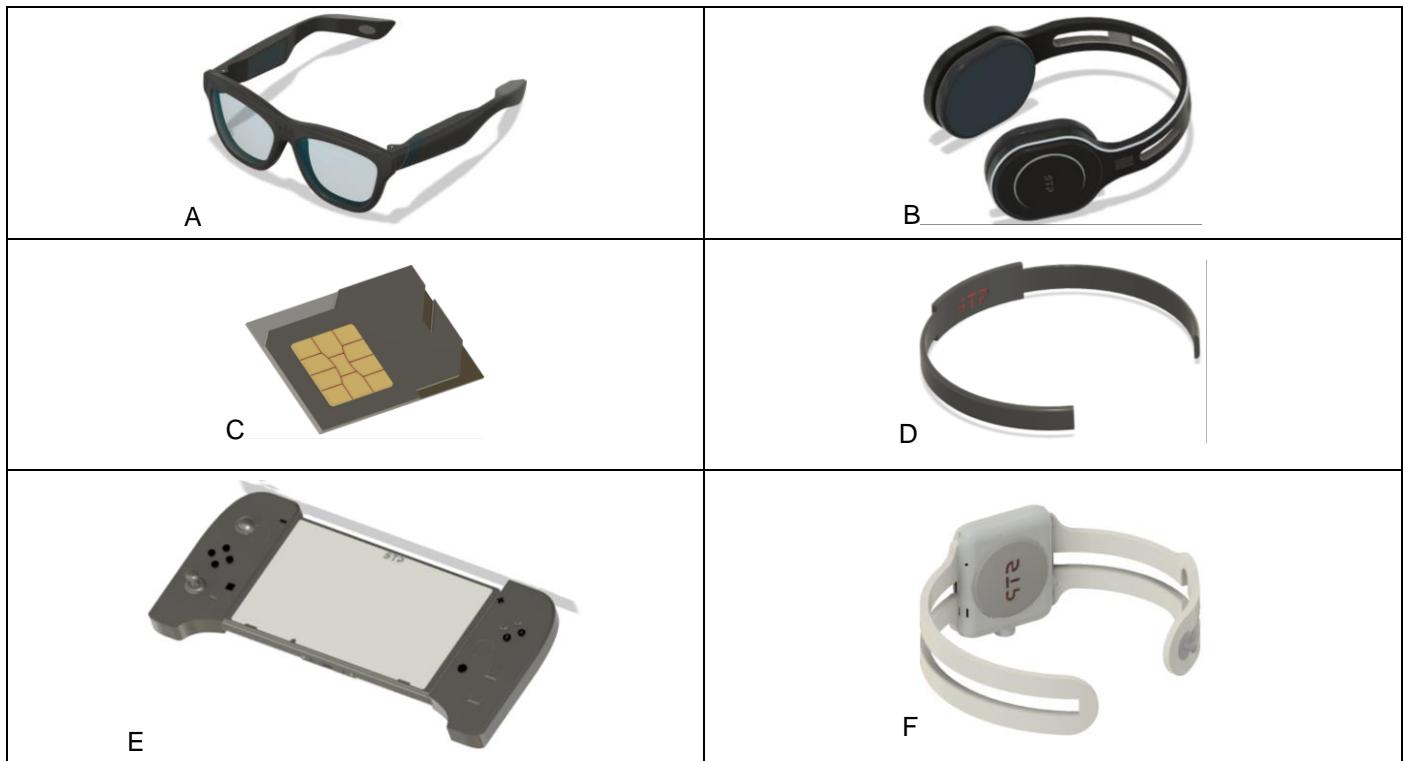
Concept C lacks innovation since successful location-aware apps to assist tourism already exist. Although there is a market of tourists and travelers, most users will prefer to just download apps onto their existing smartphones rather than buy this device. The software of our device can be frequently updated but there is limited potential for add-ons. Developing a touchscreen device will be expensive and the code inside cannot be protected as an intellectual property.

Concept D has very low novelty due to the existing AirTag by Apple, which increases difficulty of market entry. It is essential to a wide variety of users who may be vulnerable. Its high customer demand is robust against a changing economic climate. Its limited functions and basic hardware limit its ability to adapt the changing customer needs or to expand its market.

Concept E is not novel as many location-aware games already exist. The product only targets specific gaming and entertainment markets in which many successful competitors exist. Customers are less inclined to invest during recession since gaming is not a necessity. Additionally, the gaming program cannot be protected as intellectual property.

Concept F is somewhat innovative, but the targeted market of fitness enthusiasts is relatively small. Customers may stop using the product during a recession as the features are not a necessity. The IP protection for the software is limited.

As shown in the final row of Table 3, Concept A (Smart sunglasses) has the greatest total score of following the scoring process. Consequently, this concept was taken forward for further consideration by STP's product development team. Closely following this concept were Concepts B and F (Translation wearable and Fitness + wellness app respectively). Given the versatility of Concept A, it was kept in mind by the product development team that there remains potential to integrate some of the features of B and F into the smart sunglasses.



Document number:	EM-0003	Issue no:	-04	Issue date:	30/04/24
Document title:	Business Case				

Executive summary:

The new AI-powered sunglasses LocaVision integrates location-aware technology and AR features to empower users through immersive experiences. A labelled schematic diagram of the features and hardware of the new product are included in this document. Customer segmentations are also defined, in which the main customer segments are travellers, tech/fashion enthusiasts and influencers. The smart glasses market was analysed. Key competitors were identified, and strategic planning on market penetration against those key competitors were made. Legal and security factors such as intellectual property rights that add/subtract value to the product are also summarized in the document. The product launch plan covering both pre-launch development stages and post-launch stages is detailed. The product will be launched in the UK in June 2026, and globally in December 2026. The project is expected to break-even by April 2027. The suppliers and partners for LocaVision are identified. Reliability, supply chain security and environmental sustainability were considered when choosing those suppliers. The annual budget is £21.5million. The cost breakdown structure is proposed, identifying the costs across most significant resources and activities. Labour costs, cost of semiconductor chips, marketing costs and distribution costs are one of the most significant areas of cost. Cost reduction opportunities were identified for later stages of the project post-launch. Ethical implications of the project were also discussed, covering user information security, design inclusivity, team inclusivity and sustainability. The use of OpenAI tools during the product development is discussed, including how to avoid significant risks, maintain ethics and prevent information from leaking into the public domain.

Document Changes Log:

Issue	Reason/Main changes	Date issued
-01	First issue	20/03/24
-02	Put graphical presentation of timeline into the product launch plan	31/03/24
-03	Add details about the cost structure of the project	15/04/24
-04	Rearrange the sections in a more sensible way	30/04/24

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Distribution: Board of Directors		

Business Case

1. Brief Overview

LocaVision is an AI-powered smart sunglasses product. It integrates location-aware capabilities and delivers immersive user experiences on augmented reality (AR) displays. The hardware is complemented with a companion app compatible with various operating systems. Figure 1 illustrates the finished product and its key components.

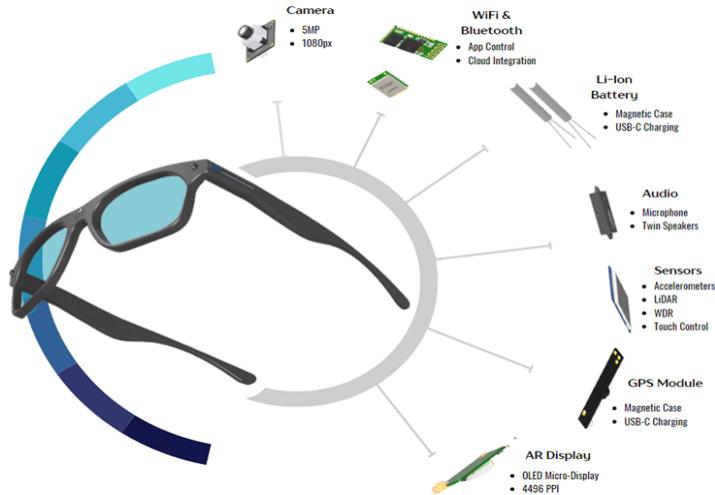


Figure 1: A schematic illustrating LocaVision and its key components.

STP has identified the following key features of LocaVision as the main contributors to product value:

Easy-to-use AR display: The micro-OLED lens displays provide an intuitive AR experience, with a plethora of overlays to enhance day-to-day convenience and immersivity. This is complemented with hands-free voice commands. This ensures the product requires little learning time, significantly improving accessibility for consumers who only possess basic technological know-how. This increases customer retention as users are far more inclined to continue using an easy-to-use device.

Powerful AI software: State-of-the-art machine learning is employed within the software, enabling extensive user personalisation through pattern recognition and tailored location recommendations. Algorithms are extensively optimised in beta testing to maximise reliability, building a trusted and functional product image. This will drive LocaVision's dominance over alternative offerings, justifying consumer investment in a more reputable and reliable product.

Location awareness and spatial recognition: Google Maps, a renowned and trusted location service provider, powers the product's location-assistive features. Coupled with the AR display, this offers a unique level of navigation capabilities. The spatial recognition capabilities also enable robust obstacle recognition and enhance the user's environmental awareness. These features massively appeal to frequent travellers, urban explorers and the visually impaired.

2. Customer Segmentation and Their Problems/Needs

STP has historically used a mono-segmentation approach, appealing to the high-end market. Post-pandemic, a multi-segment approach was employed. LocaVision's customer segmentation is outlined in Figure 2.

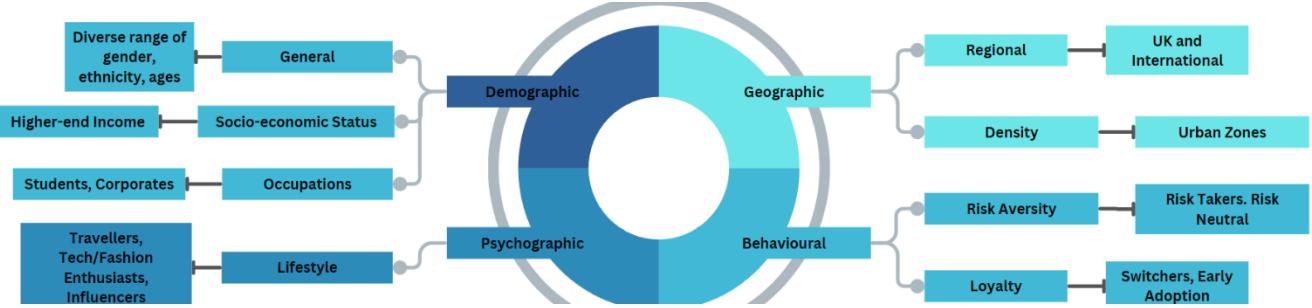


Figure 2: Customer Segmentation of LocaVision

Urban explorers require navigation tools for traversing through unfamiliar locations. The product offers real-time, contextual navigation guidance for enhanced outdoor experiences. Travelers seek immersive experiences and cultural insights during their journeys. LocaVision delivers proximity-based recommendations, such as tourist sites and venues. High-spending tech-enthusiasts prioritize innovation, so LocaVision's AI software embodies the latest advancements in

wearable tech. Fashion-forward consumers seek accessories that complement personal style, so a versatile and simple design is used.

3. Commercial Factors that add/subtract value to the product

Commercial factors that are considered include the market and competition, which are included below, as well as product lifecycle management, legal frameworks, and security considerations that can add/subtract value to the product.

3.1 Market and Competition

Key competitors are Apple Vision Pro and Meta Ray-Bans. The higher spec Apple Vision Pro sells at £2799 [1] while Meta Ray-Bans retail at £299 [2]. LocaVision has a recommended retail price (RRP) of **£270**, comparable to Meta Ray-Bans while offering more features. Consumers are less inclined to invest in lesser-known brands unless they provide a significantly higher utility-to-cost ratio. Hence, LocaVision offers numerous features such as location awareness, light and motion sensors and app compatibility. The global smart glasses market is projected to grow from £4.7 to £7.6Bn in 5 years. Based on the Bass diffusion model, STP expects to sell 500,000 units within five years of launch, achieving a 1.8% market share.

3.2 Product Lifecycle (PLC) Management

Costs are associated with developing LocaVision's unique selling features, such as combined GPS, AI, and AR overlay functionalities in the Research and Development (R&D) stage. Another value driver is an investment in primary market research techniques such as surveys, focus groups, and observational research at this time. Through these methods, precise refining techniques could be applied towards designing the final product that adds value and meets customer needs and wants. Final product testing and quality assurance are significant cost drivers. 9 personnel are employed within STP to assess durability and safety testing. This due diligence results in higher labour and overhead costs but improves product value perception. Manufacturing is outsourced to Foxconn, which has expertise in mass production and operational efficiency. LocaVision benefits from its economies of scale and streamlined production processes. Cost reductions will be implemented in later stages of the PLC, as detailed in Section 6.4. Supply chain process innovation, detailed in Section 5.4, improves the efficiency of production logistics. These factors further add value to the product.

Returned products, warranty claims and faulty products incur expenses. STP has maintained a policy of full refunds in case its technological support cannot resolve product issues. To minimise these costs, STP invests heavily in rigorous quality assurance and customer support infrastructure. This ensures customer satisfaction and adds perception value to the product.

3.3 Legal and Security

The primary contributor to the product value is its unique technology, particularly AI and AR capabilities. Legally protecting LocaVision, including patents, trademarks, and copyrights [4], is essential to prevent the unauthorised use of the protected property and counterfeit goods. They also act as a deterrence for the otherwise risk of infringement litigations [5].

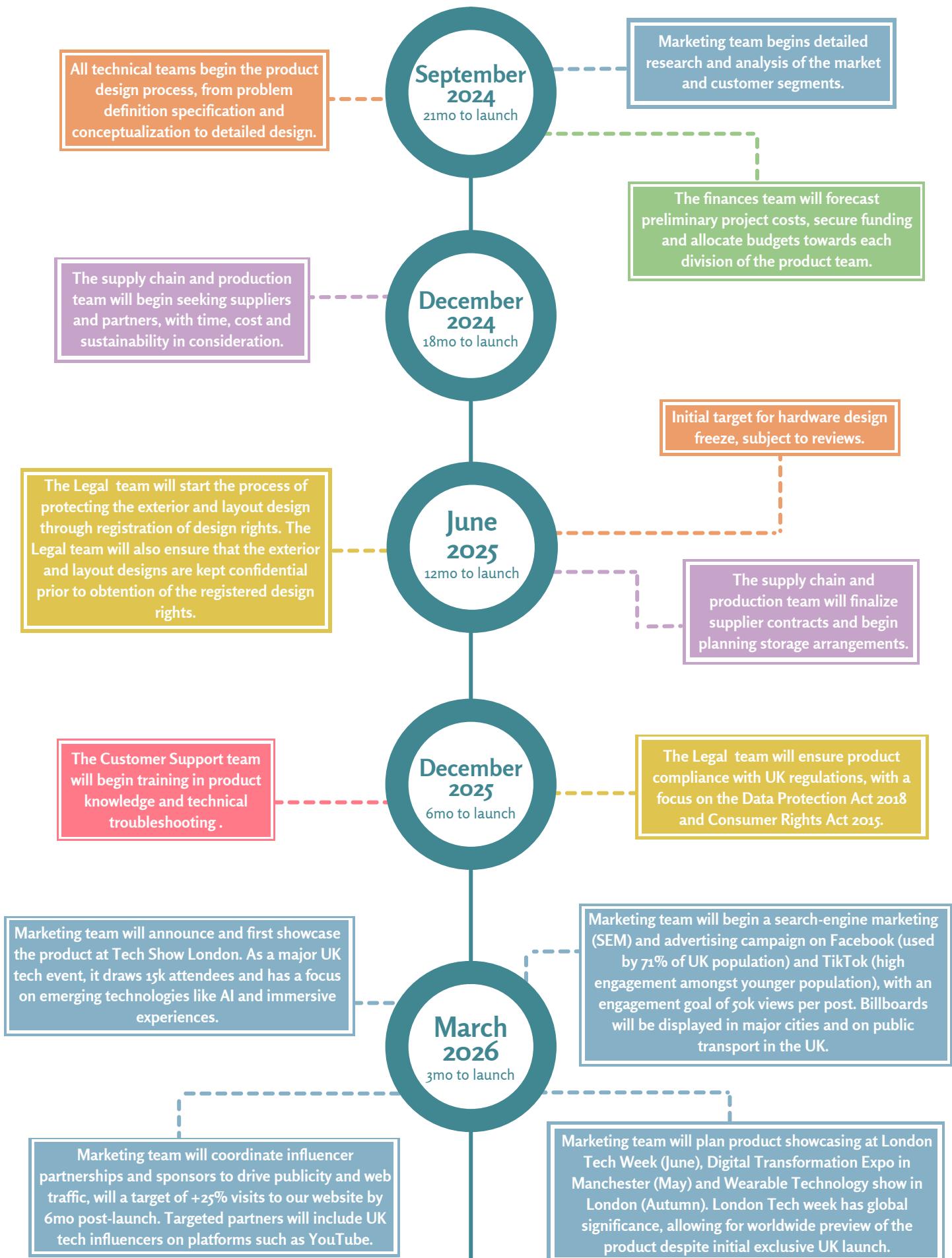
The project includes several patents as a necessary form of IP protection, which mainly protect the unique AI and AR/VR capabilities [6], classified under G05D 101 and H04N 13 [7], respectively, according to WIPO IPC standards. Other patent-contributing subsidiaries include software, user interface and display technologies [8]. Registered design rights also maintain value in visual branding [9] and are relatively inexpensive [10] yet guarantee that customer familiarity is met with technical quality and reliability. Registered Community Designs (RCDs) [11] provide value towards security, ensuring novel protection within the EU. Additional measures are taken in early development when appropriate IP protection is yet to be obtained, including standard practice of employee Non-Disclosure Agreements (NDA) signatures [12].

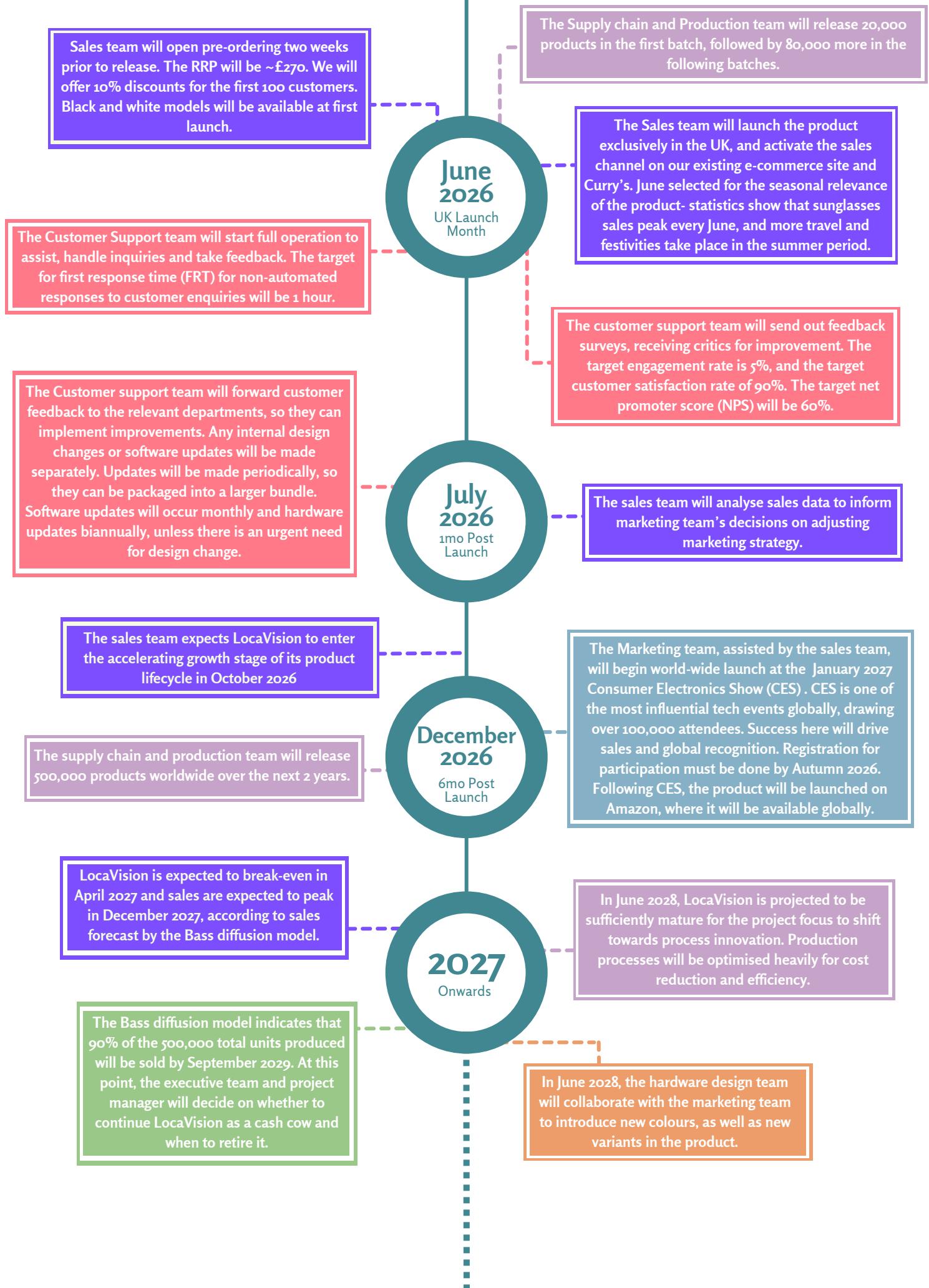
All retailers are required to enter distribution agreements outlining the terms for licensed use of LocaVision. As STP values the fostering of innovation within the technological sector [13] and acknowledges the contribution of marketplace cooperation, our principles are grounded in fair, reasonable, and non-discriminatory (FRAND) licensing [14]. This is especially true for leveraging the fair acquisition of standard essential patents (SEPs) from licensors and improving customer confidence. LocaVision also offers customers a one-year warranty and a free repair period, which increases the perceived value of the product.

LocaVision requires CE approval and marking to sell the product legally in the UK and EU. Failure to obtain CE approval will lead to legal challenges and financial losses. Production will conform to regulations through frequent third-party testing by TÜV SÜD. Software or hardware vulnerabilities and data privacy breaches can diminish customer trust, reducing product value and the risk of civil liability. Cyber security and data privacy measures will be enforced, as detailed in Section 7.1.

4. Product Launch Plan

This product launch plan outlines the preliminary timeline for the launch of LocaVision.





5. Supply Chain Logistics

STP's key partnerships and suppliers are critical to LocaVision's success, emphasising their role in enabling quality product manufacturing within reasonable economic bounds. STP has a long-standing relationship with these companies, assuring supply chain resilience and tested quality. STP also focuses on sustainability, security, and supply chain integrity, as well as process innovation techniques to enhance logistics and optimise operations to deliver a better financial outcome. The table below contains a list of LocaVision's suppliers and partners:

Supplier/Partner Names	Supplier Type	Location of Supplier	Service Provided
Mazzucchelli 1849	Component	Castiglione Olona VA, Italy	Zylonite Frame
Sony	Component	Tokyo, Japan	Camera
AMD - TSMC	Component	Taipei, Taiwan	GPU
ARM - Wistron	Component	Cambridge, UK	CPU
GoerTek	Component	Weifang, China	Motion, WDR, LiDAR sensors
Samsung	Component	Suwon, Korea	Micro-OLED Display
Anker Innovation	Component	Changsha, China	Rechargeable Batteries, Charging Port and Adapter
Broadcom	Component	Taipei, Taiwan	Wireless Charging Case
TCL	Component	Shenzhen, China	Speakers and Microphones
Skyworks Solutions	Component	California, US	GPS and Connectivity Modules
Micron Technology	Component	Hyderabad, India	RAM Memory Chips
Qualcomm	Component	California, US	Power Management
Hon Hai Precision Industry	Manufacturer	Longhua, China	Assembly
Rexam PLC	Packager	London, UK	Packaging Products
Google Maps	Partner	California, US	Location Services
Gentle Monster	Partner	London, UK	Exclusive Brand Outlets
Marc Jacobs	Partner	Bicester Village, UK	Exclusive Brand Outlets
UPS UK	Partner	London, UK	Transport and Inventory Logistics Management

The Original Equipment Manufacturers (OEMs) that STP has chosen to work with have years of experience providing services to high-profile clients. This aligns with LocaVision's long-term objective of entering the market with stellar product quality. It also ensures that the UK launch date set for June 2026 is fulfilled. LocaVision's unique selling point (USP) is its AI-powered location-aware features enabled through critical components like microchips, sensors, and microcontrollers. Based on the level of replaceability, volume of materials supplied and total cost per supplier for the elements that enable LocaVision's AI features, the key suppliers are Goertek, Wistron, Micron Technology, and ARM.

Moreover, companies like Goertek, Wistron, Broadcom and Anker are some of the most trusted players in electronics R&D. They possess the engineering capability to provide highly efficient technology for LocaVision's AI/AR features. In Taiwan, Hon Hai Precision Industry (Foxconn) specialises in high-volume manufacturing, ensuring that demand is met. Foxconn has a vertically integrated supply chain that manages the procurement of raw materials, component manufacturing, and final assembly. This allows them to optimise costs and ensure quality control. LocaVision's electronics suppliers are mostly based in Asia primarily due to massive production infrastructure and cheaper unit costs, as well as inexpensive labour and large infrastructures. Supplier selection is also based on achieving and maintaining customer satisfaction. STP imports Zylonite frames from one of Italy's most premium glass-frame manufacturers - Mazzucchelli 1849. A partner like Google Maps is a globally trusted GPS specialist which supports LocaVision's location-aware features. As for brand partnerships for LocaVision, the partners are considered based on improving product functionality and broadening audience attraction. Brand partners like Marc Jacobs and Gentle Monster hold products at a close price range, attracting targeted customer segments and enhancing product quality perception for LocaVision.

5.1 Environmental Consideration of Suppliers

Environmental considerations in sourcing components have become increasingly important in contemporary business management, as organizations recognize the potential impact of their supply chain activities on their ESG initiatives (Smith et al., 2020). LocaVision aims to follow this principle and assess environmental sustainability when choosing

partners and suppliers. STP considers each supplier's ESG reports for key sustainability metrics. Moreover, STP prioritises responsibly managed sources and eco-friendly manufacturing processes. Hon Hai Precision Industry has exceptional waste management [15], implementing 1,877 energy-saving projects with total carbon reductions of 306,204 tCO₂e and having obtained an UL 2799 Gold-Level waste handling certificate for their factory in Longhua. The multi-national British packaging company Rexam PLC implements eco-friendly retail-packaging solutions, such as recyclable or biodegradable materials, reducing waste and environmental impact in the supply chain. The glass-frame was chosen to be made of Zylonite which is both biodegradable and recyclable. Overall, creating a circular business model with closed-loop supply chains where materials are reused, recycled and repurposed are a prime consideration for STP.

STP's chip supplier, Goertek, was granted the national-level green factory certification in China [16]. Its five subsidiaries were granted ISO50001 certification for standard energy management. 13 of its subsidiaries in Weifang, South China and Vietnam were granted ISO14064 certification for standard greenhouse gas emissions. One receiver was granted ISO14067 certification for qualified carbon footprint levels. They have 98 energy management system-trained internal auditors and 110 ISO14064 internal carbon verifiers working within the supply chain.

5.2 Import Charges and Tariffs

As LocaVision has many overseas suppliers, effectively managing import charges and tariffs becomes a critical aspect of STP's supply chain strategy. STP works with OEMs that leverage their expertise in international trade regulations and tariff management to minimise risk. Due to sensitive political circumstances, heavy due diligence would be required towards monitoring tariff restrictions for electronic components and semiconductor chips sourced out of China/Taiwan. STP has strong relations with logistics giant UPS, which handles truck-freight-based component transport to Foxconn and air-freight transportation of assembled products from the Foxconn factory in Taiwan to the UK. Working with UPS minimises risk, given their familiarity with UK import regulations and processing customs documentation [17].

STP has a contractual agreement with an insurance provider to purchase All-risk Business Interruption Insurance and Product Recall Insurance. These insurances cover financial losses from business supply chain interruptions, as well as product recalls, mitigating risks due to unforeseen disruptions in the Chinese/Taiwanese marketplace.

5.3 Security and Contracts

To prevent the leakage of STP's sensitive information to suppliers (or vice-versa), STP will conduct thorough information security vetting of the suppliers. This will include an assessment of security practices, compliance with regulations such as the Data Protection Act 2018 and past data-security track record. All sensitive communications with suppliers and partners will occur over encrypted communication channels. All contracts with suppliers and partners will include specific clauses related to data security and confidentiality, clearly outlining the responsibilities and obligations of both parties. Whenever an STP employee visits a supplier facility (or vice-versa), non-disclosure agreements (NDA) will be signed. Contracts with suppliers will also include specific clauses for penalties and agreed arbitrations in case of delays or quality issues. Every contract will be decided in the local operating currency, GBP, to protect it from exchange price volatility.

5.4 Supply Chain Process Innovation

STP is constantly striving for process innovation to ensure the efficient and sustainable delivery of LocaVision. This is successfully managed by leveraging Enterprise Resource Planning (ERP) software technology to optimise supply chain efficiency through supply chain automation and predictive analytics for increased end-to-end visibility. LocaVision is a consumer-packaged good, so demand is frequent and predictable, and customer requirements can be aggregated to offer a more general solution. As such, a batch production model is used. STP has implemented automated systems specifically designed to handle LocaVision's order fulfilment process. This includes offering retailers and customers real-time order tracking post-purchase from the STP website. LocaVision will also have a real-time inventory management system that utilises barcodes and RFID. In addition, by analysing historical data of previous STP products and incorporating regional demand forecasts, STP utilises the Just-in-Time (JIT) inventory method. This ensures that LocaVision will be available in the right places at the right time, minimising the risk of stockouts and overstocking.

6. Cost Structure

The LocaVision Cost Breakdown Structure (CBS) establishes effective resource allocation and financial viability as a business venture. The proposed cost structure encompasses various vital resources, key business activities and channel costs. It introduces an organised way to identify cost-saving opportunities, which, along with sale revenue, would help build healthier margins for LocaVision.

A cost analysis was conducted for the first product launch of LocaVision in the UK, which had a deliverable quantity of 100,000 units in the first year. This CBS summarises the initial projected costs of the project, and is subject to variation through various stages of the product lifecycle. It is expected that the price per unit will decrease over the course of the product lifecycle through the implementation of various cost-reduction strategies, which will be discussed later. The CBS forecasts an annual budget for the LocaVision project of approximately £21.5 million. This aligns with our maximum permissible yearly investment of £28 million, which includes emergency funding.

6.1 Key Resources

Figure 3 presents a chart which illustrates the distribution of critical resource costs for the product. It includes the costs associated with raw materials procurement and labour costs. Unit material costs are considered to monitor total budget allocation and calculate the margin on a unit product. All cost values are extracted from each supplier's catalogue, which accounts for seasonal price variation.

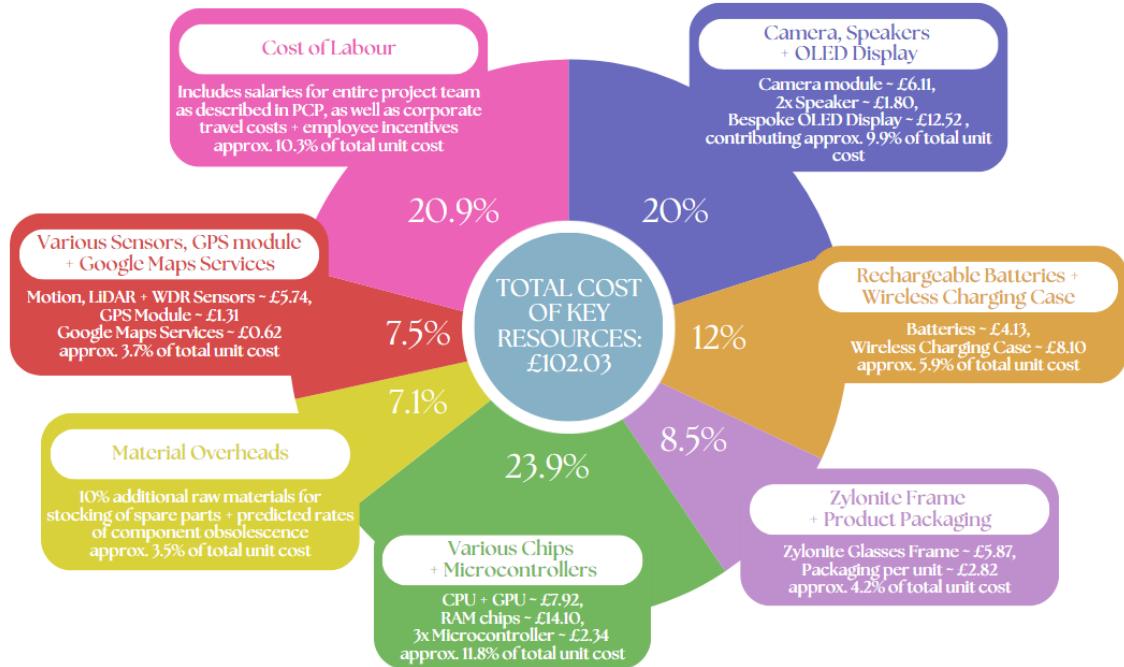


Figure 3 – Pie chart breakdown of essential resources costs.

Key resource costing enables Earned Value Analysis (EVA) in later stages of project management, which is a metric used to monitor the level of completion – quantified by the number of LocaVision products management vis a vis project budget allocation of £21.5 million. The tool also helps in time-phasing, evaluating the cadence at which this budget is consumed vis a vis the project progress time. This allows an enhanced understanding of the evolving margin of safety for budget spend with time and contractual alignment, enabling better-informed decisions towards costs such as marketing.

It is important to consider the product-associated human resource costs along with raw materials as part of key resource cost estimation. In accordance with the project communication plan, the product-specific team consists of 63 employees working in functions ranging from project management, marketing, sales, financial to legal. As a UK-registered enterprise, employee compensation at STP has always been determined through Wage and Salary Administration, involving job analysis and evaluation, market pricing studies, pay grades and incentive plans. Additionally, all labour wages are contractually agreed to rise in line with the year-on-year inflation rate in the UK.

Post cost considering LocaVision's key resources, the cost of materials and labour per unit product is £102.03, providing a healthy current Earnings Before Income Tax Depreciation Amortization (EBITDA) margin of 62.2% considering a price per unit of £270, which is an accounting metric for the financial viability of a venture. The current margin provides sufficient allocation of profits.

6.2 Key Activities

In Figure 4, STP's largest budget allocation within key activities go towards production, software development and the marketing for LocaVision; STP believes that outstanding product quality and user experience coupled with marketing

maximises long-term value in terms of healthy sales growth. The Foxconn manufacturing contract entails production costs for an annual order of 100,000 units as given below. Software development costs primarily consist of technical facilities required. Marketing costs are mainly targeted towards primary and secondary market research and performance marketing. Key activities costs were produced using historical data from STP products and similar products within the tech industry. These costs are estimate values and are subject to seasonal variation.

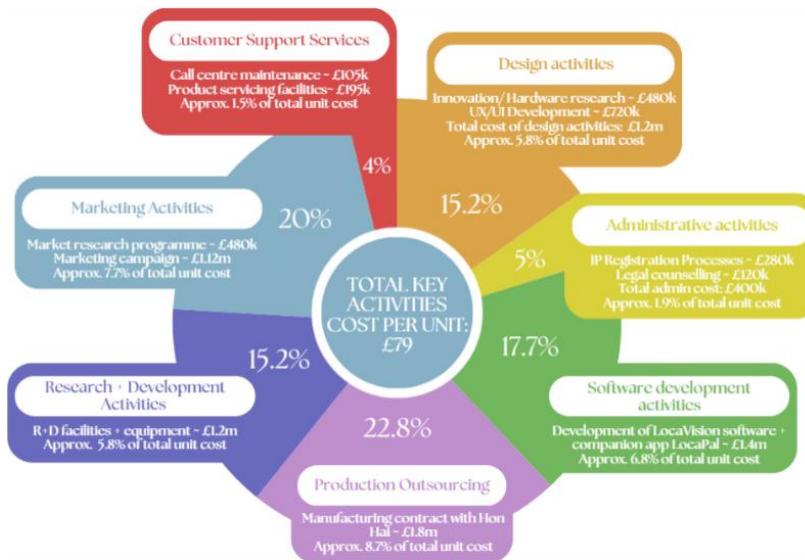


Figure 4 – Pie chart breakdown of essential activity costs

After considering key resources and activities, the total unit cost comes out to be £181.03, providing a new EBITDA margin of 33%. The healthy margins indicate that STP still has room to spend on distribution logistics and overall channel execution.

6.3 Channels

Preliminary informed estimates forecast this to contribute to around 16% of the cost of delivering the project, with the constituent cost estimates summarised in Figure 5. These are based on 3rd party distributor quotes and historical CBS analyses from past STP projects.

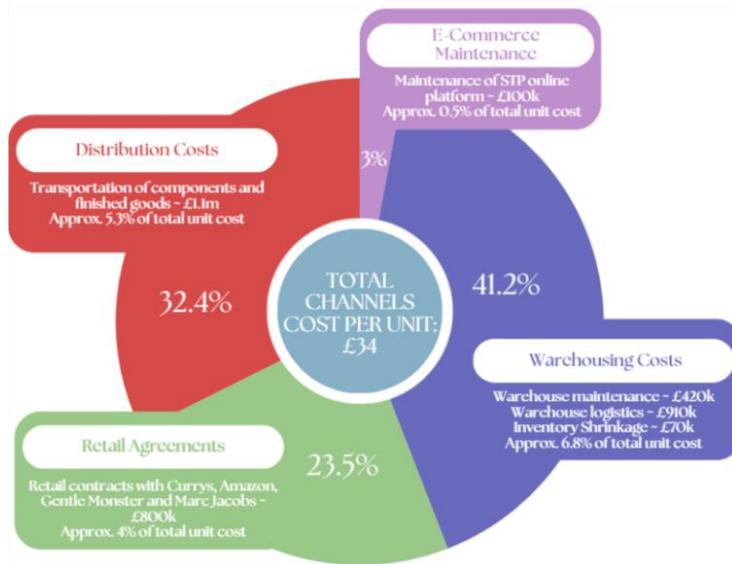


Figure 5 – Pie chart breakdown of channel costs

The most significant costs associated with channels by far are the amounts payable to UPS for the outsourcing of distribution and warehousing. More specifically, warehousing costs include UPS logistics services, maintenance, and accounting for inventory shrinkage. The logistics services provided to STP include warehouse management and inventory tracking services. Promoting contractual negotiations with UPS remains a priority in this aspect to improving margins. Maintenance comprises leasing and utilities costs. The inventory shrinkage cost is based on previous projects and accounts for theft, damage, or obsolescence of goods and tracking system inaccuracy. Retail agreement costs and

maintenance costs for STPs e-commerce platform are historically likely to remain stable, however warehousing and distribution costs are prone to seasonality and thus general fluctuation.

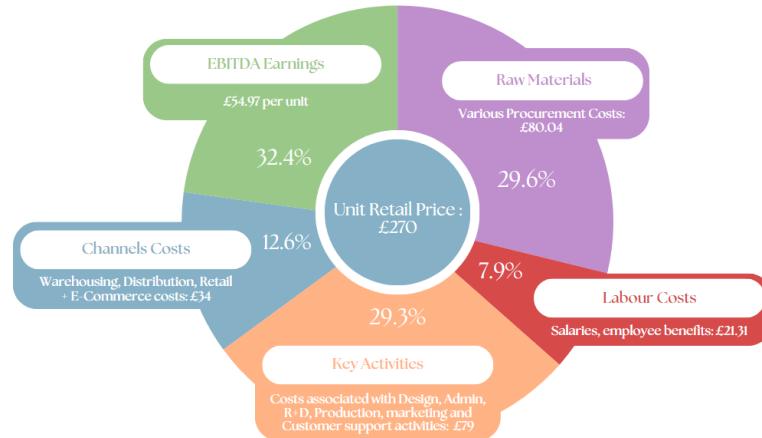


Figure 6 - Pie chart breakdown of all the costs in percentages.

Post accounting for crucial resources, activities and channel costs, the unit economics pie chart above predicts a unit cost of £215.03 for the fulfilment of a single product order, yielding a final EBITDA margin of 20.4%.

6.4 Cost Reduction Opportunities

Through the cost analysis process for LocaVision, STP has identified priority areas for cost reduction. Based on the highest budget allocation areas and areas predicted to save cost, the cost reduction opportunities are production/supply chain streamlining, efficient marketing strategies and achieving a circular economic model. Figure 7 shows the timescale for the implementation of these key cost-reduction opportunities relative to the product lifecycle.

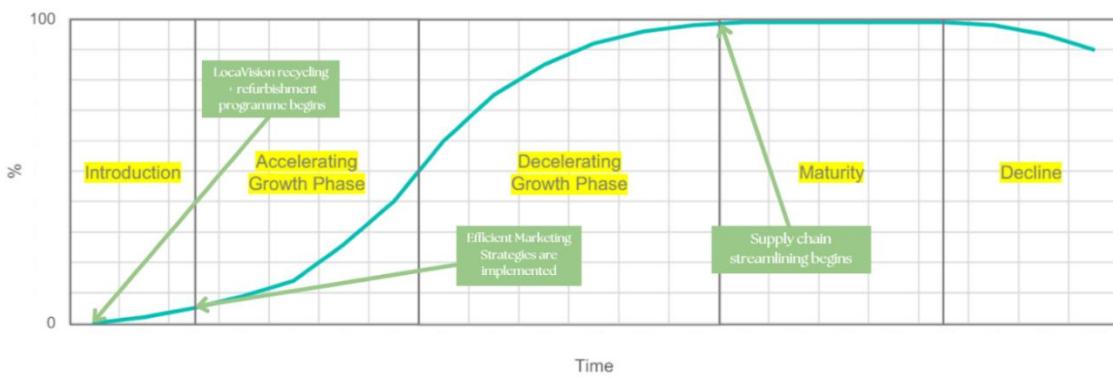


Figure 7 – Product life cycle

Production/Supply Chain Streamlining: Since production costs in Figure 4 seem to be a significant contributing factor to driving margins lower, STP can focus on production/supply chain streamlining. This would allow flexibility in reconfiguring assembly lines, adopting lean manufacturing principles, and implementing just-in-time inventory management. STP plans to shift focus towards this production process optimisation shortly before LocaVision enters its maturity phase. Automation and end-to-end supply chain visibility software, as reinforced in Section 5, could also be introduced to minimise inventory holding costs and enhance operational efficiency. This could significantly reduce costs in LocaVision's maturity stage, as STP would have the highest inventory at this time. High raw material costs shown in Figure 3 could be curbed by negotiating favourable terms with suppliers. This involves bulk purchasing, establishing long-term partnerships, or optimising logistics to minimise transportation costs. STP targets to reduce the cost associated with procuring Zylonite frames, micro-OLED displays, and the wireless charging case through bulk-buying compared. This strategy will be implemented when the sales team finds an indication that LocaVision has entered its maturity stage when STP's order value from Foxconn is highest.

Efficient Marketing Strategies: Optimizing digital performance marketing efforts can significantly improve return on investment and reduce customer acquisition costs. To implement this, a strong focus on data-driven strategies, such as targeted advertising, Search Engine Optimization (SEO), and social media marketing will be made. This strategy will be executed shortly after the release of first batch of products, in the growth stage. In the introductory phase, it is essential to target market expansion to promote a greater rate of return throughout the LocaVision growth stage, and potentially

break-even sooner than expected. Concentrating expenditure at this critical point in the lifecycle will reduce overall project marketing costs. STP has confidence in this strategy given its excellent rate of return in previous STP projects.

Circular economic model: The return of LocaVision components back to the company, regardless of condition, is encouraged. This will enable the refurbishment of parts for use in the production of new finished goods, significantly reducing procurement and manufacturing costs. This strategy will be implemented from the start of the project, with customers made strongly aware of used product/component return methods directly to STP.

7. Ethics and Corporate Social Responsibility

STP pledges to thoroughly assess ethical implications throughout the LocaVision project, extending beyond the statement of ethical principles by UK-SPEC. This encompasses user information security, environmental and sustainability, inclusive product design and team inclusivity.

7.1 User Information Security

Since LocaVision is centred around its location awareness, STP is aware of the anticipated concerns surrounding user information security. We extend beyond the Data Protection Act 2018, adhering to the ISO 27001 standard on information security management. Mitigations will be implemented through solid encryption protocols for data transmission, enabling easy-to-access privacy controls for users to manage settings, and routine security assessments.

7.2 Environmental and Social Sustainability

Carbon emissions, renewable energy usage, raw materials sourcing, and fair labour practices are prioritised in the selection of suppliers. LocaVision is designed according to BS-8887 standards on disassembly and end-of-life disposal. Recycling and waste reduction programmes are also implemented, encouraging users to return out-of-use components/products directly to STP. LocaVision's AI will provide recommendations promoting a healthy lifestyle for users. The project fosters technology innovation and increases opportunities for jobs and research partnerships.

7.3 Inclusive product design: Accessible and Welcoming to all

LocaVision incorporates features that cater to diverse preferences and identities within the target market. This includes versatile frame styles, adjustable nose pads, and interchangeable temple arms, ensuring a personalised fit for all users. The colour palette is gender-neutral and universally appealing to all skin tones. The display is colour-blind friendly, and light-filtering lenses are available to suit all types of colour blindness. By employing a 'design for one, extend to many' approach, LocaVision will be accessible to users regardless of disabilities, which will also benefit users with situational limitations. Algorithm bias is addressed through diverse data sourcing and beta testing for detection and mitigation.

7.4 Inclusivity within the project team

An inclusive LocaVision is only possible through inclusivity within the team. The project team, from engineers to market researchers, includes a diverse range of races, genders, sexual orientations, backgrounds, disabilities and ages. Mandatory EDI training is provided for all employees, including the prevention of unconscious bias to foster inclusivity. The unique skills, experiences and perspectives of every team member are valued. Creating a sense of belonging is the responsibility of every team member, promoting effective collaboration and utilising the strength of diversity.

8. Use of OpenAI in the development of LocaVision

OpenAI will be used in the development of the new product, LocaVision. Currently, in the UK and EU, legal regulations on AI are still being deliberated and are being outlined in whitepapers [18,19]. Regardless, we will be using OpenAI ethically and cautiously in places that can have the benefits with the most minor risks, following the EU's proposed AI Act [20] and Partnership on AI ethical guidelines [21].

OpenAI will not be used to process any biometrics, as it is considered an unacceptable risk according to the EU's proposed AI Act [20]. LocaVision's software has the capability of recommending healthcare tips and healthy lifestyles, but users will have to agree to a disclaimer that this is not a replacement for medical treatment. This is because any medical usage of AI is considered high risk under the EU's proposed AI Act [20]. OpenAI will not be used in decision-making in the development of LocaVision because decisions made by AI can be unjustifiable, unfairly discriminative, and lack human judgement [22]. LocaVision's software development process contains machine learning processes, which require the usage of data collected from many individuals. OpenAI will not be used solely to make decisions on processing these personal data, as it infringes Article 22 of EU-GDPR [23]. OpenAI will be used to summarise information obtained from market research and assist our software developers with code. However, even in these areas, OpenAI will not be solely relied on. Human reviews will always be involved as agreed in the terms of use of OpenAI [24]. For concept generation, OpenAI will be used to complement the concepts brainstormed by our design team. There is no concern about being unable to obtain IP protection, as OpenAI grants the user ownership of both input and output [24]. We will also opt out of the option for OpenAI to use our content to train their models [24]. This will prevent our information from leaking publicly.

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Document number:	EM-0004	Issue no:	-03	Issue date:	29/04/24
Document title:	Project Communication Plan				

Executive summary:

This document outlines the LocaVision project team and stakeholders and a plan for their communication. The project team of 63 employees is divided into 12 teams, in terms of their responsibilities. A stakeholder analysis is conducted, identifying all stakeholders with their levels of influence and interest, their priorities, ways they could contribute to or block the project. This includes both internal and external stakeholders. The communication plan covers all stakeholders and describes the purpose and type of communication. The communication channels and frequencies for each of these audiences are specified, as well as an owner responsible for managing each communication.

Document Changes Log:

Issue	Reason/Main changes	Date issued
-01	First issue	26/02/24
-02	Revision of project team structure	06/03/24
-03	Revisions to communication frequencies	11/03/24

Lead Author	Principal Reviewer	Approver
 Author Author Job Title Daniel Lee Marketing Director	 Reviewer Reviewer Job Title Aung Zaw Myat Chairperson	 Approver Author Job Title Wishawin Lertnawapan Company Secretary
Distribution: Managers for each project sub-team, project manager		

Project Communication Plan

1 Project Team

Role	Responsibility	Name
Hardware Design Lead (1) and Team (5)	Developing the design of the LocaVision hardware architecture. Delivery of technical drawings. Ensuring that the design meets all hardware requirements.	
Project Manager (1) and Assistant (1)	Conducting project reviews, ensuring the project adheres to the agreed schedule and all milestones are achieved. Ensuring that all divisions of the project team collaborate effectively and work at their full potential. Making executive project decisions. Coordinating appropriate communication with stakeholders. Identifying project risks and coordinating mitigation. Implement the Kaizen approach to the project.	
Sales Director (1) and Team (3)	Establish sales targets and ensure they are met. Seeking appropriate retailers to set up sales channels. Ensuring that all sales contracts are fair and beneficial to the company.	
Marketing Lead (1) and Team (2)	Conducting appropriate market research for the product. Employing an effective marketing strategy for the product. Monitoring changes in economic climate or market and informing those changes to the project manager.	
Customer Support Manager (1) and Team (8)	Supporting customers after the sale. Forwarding feedback and queries to the relevant technical team. Delivering customer feedback channels and optimising to maximise engagement. Writing user manuals using information obtained from relevant team divisions.	
Electrical Lead (1) and Team (5)	Designing electrical components within the device. Ensuring the electrical components meet all relevant requirements and regulations. Ensuring that electrical and mechanical components interface correctly.	
Structures and Materials Lead (1) and Team (2)	Ensuring the structural integrity and testing of the product. Selecting sustainable materials for the product.	
Software and Data Lead (1) and Team (7)	Implementing a strategy for safe handling of consumer data and contingencies in case of data breach. Ensuring that the product adheres to all data protection acts. Development of required software for the product. Ensuring that the software interfaces well with the hardware. Continuous, effective updates are made throughout the product lifecycle.	
Legal Director (1) and Team (3)	Ensuring the product and all its production processes adhere to all laws. Ensure that the product design and technology are protected by the appropriate intellectual property protection.	
Finances Manager (1) and Team (2)	Forecasting the project cost accurately. Ensuring that project cost does not exceed budget. Securing adequate funding from third-party investors and banks. Allocating the budget towards different divisions of the project and managing the timeline for budget disbursement in each phase. Internal audit to identify financial compliance concerns.	
Supply Chain & Production Manager (1) and Team (5)	Selecting sustainable and environmentally friendly suppliers and manufacturers. Ensuring that the company is protected fairly in all contracts with suppliers and distributors, as approved by the legal director. Ensuring that all contracts with third parties are beneficial to the company and add value to the product. Minimising costs of supply chain and distribution costs. Ensuring a timely resolution of all supply chain and distribution issues. Seeking alternative suppliers/distributors whenever necessary. Ensuring smooth flow of production without delays or bottlenecks in queues. Ensuring that customer agreements pertaining to delivery times and conditions are fulfilled.	
Quality Manager (1) and Team (8)	Conduct visits to suppliers and collaborate with them for quality management. (planning, assurance and control) that follows lean production principles and Six Sigma philosophies.	

2 Stakeholder Analysis

Stakeholder	Contact person	Influence	Interest	What is important to the stakeholder?	How could the stakeholder contribute to the project?	How could the stakeholder block the project?	Strategy for engaging the stakeholder
Project team		High	High	Product feasibility and performance. Employee welfare and benefits. Project success and profit. Pleasing stakeholders.	Optimising the product and project outcome through excellent and consistent contribution	Causing delays through strike action or producing a suboptimal product	Regularly engage and collaborate closely
Executive leadership team		High	Medium	Ensuring the project aligns with the company's overall goals and objectives	Giving strategic direction. Allocation of facilities and budget	Restrict budget, resources and facility usage	Meet their needs and keep them satisfied
Other project teams within the company		Low	Low	Fair budget and resource allocation across different projects	Share resources from other projects within the company	Take a disproportionate amount of company resources	Occasionally inform them of essential information and monitor them
Retail partners		High	Medium	Sales volume, profit margins and marketing support	Agree to contracts which are more beneficial to the company	Demand contractual agreements which are not in favour of the company or breach contracts	Monitor their needs and maintain engagement
Supply chain and manufacturing partners		High	Medium	Quality standards, reliability, cost and sustainability	Agree to contracts which are more beneficial to the company	Demand contractual agreements which are not in favour of the company or breach contracts	Monitor their needs and maintain engagement
Fashion industry		Low	Low	Aesthetics and compatibility with clothing and accessories	Promotion of the product or potential partnership	Establish partnerships with competitors	Occasionally inform them of essential information and monitor them
Travel and leisure industry		Low	Low	Integration with travel services and impact on their business	Promotion of the product or potential partnership	Establish partnerships with competitors.	Occasionally, inform them of essential information and monitor them.
Consumer rights watchdogs		Medium	High	Consumer safety and ethics	Endorsing the product for its consumer ethics	Reporting the product as unethical, which discourages potential customers	Regularly and transparently inform them to build trust
Other smart device producers and research institutions		Medium	Medium	Compatibility with their products, influence of our product on them and partnership	Through partnership and use of the product in research programmes	Partnering with or using competitor products	Occasionally inform them of essential information and monitor them
Investors		High	Low	Return on investment, market potential and risk management	Providing funding for the project	Lack of funding for the project. Not trusting in the project team.	Keep satisfied and monitor their needs.
Governmental bodies and regulators		High	Medium	Regulatory compliance, legal compliance, safety	By providing fast certification and approval of the product	Causing delays in the product certification or approval process	Meet their needs and keep them satisfied

				standards, certification			
Competitors		Medium	Medium	Market dynamics, IP, market share and fairness	Fair competition and raising standards	Unfair competition or dominating market share	Occasionally inform them of essential information and monitor them
Environmental activists, the healthcare industry and societies		Low	High	Sustainability, environmental and social impact, and ethical considerations	Endorsing the product for its eco-friendliness and lifestyle benefits	Discourage potential customers through protests or negative reporting on the product	Occasionally inform them of essential information and monitor them
Customers		High	High	Cost, features and availability	Improve sales and publicity	Boycotts or purchasing competitor products	Support closely. Keep satisfied and meet their needs.
Media and influencers		Medium	Medium	Publicity, credibility, engagement and endorsement	Promoting the product	Drive negative publicity or promote competitor products	Regularly engage and inform with essential information. Keep satisfied.

3 Communication plan

Audience	Purpose & type of message/content	Communication channel	Frequency	Owner
Hardware design team	Monitor the hardware design phase and be notified of any delays/issues	In-person meetings	Weekly	Hardware design lead
Sales Team	Discuss sales strategies Measure success against sales targets	In-person meetings	Weekly, starting from 3 months before release	Sales Director
Marketing Team	Discuss market research Measure success in marketing engagement targets	In-person meetings	Bi-monthly	Marketing Lead
Customer Support Team	Measure success against customer support targets and discuss feedback from customers	Emails and in-person meetings	6 months before launch, start meeting weekly	Customer Support Manager
Electrical Team	Monitor the progress of the electrical equipment incorporation	In-person meetings	Weekly	Electrical Lead
Structures and Materials Team	Monitor the quality of structural design and analysis	In-person meetings	Weekly	Structures and Materials Lead
Software and Data Team	Monitor the progress of software development and legal/ethical compliance with data usage.	In-person meetings	Weekly	Software and Data Lead
Legal Team	Verify the assurance of legal compliance. To review ongoing legal processes.	Emails and in-person meetings	Bi-monthly	Legal Director
Finances Team	Discuss budget allocation and costs. Discuss the acquisition of new funding. Discuss profit.	In-person meetings	Bi-monthly	Finances Manager
Supply Chain & Production Team	Monitor the performance of the supply chain and production. Discuss strategies to improve and minimise supply chain costs.	Emails and in-person meetings	Weekly	Supply Chain & Production Manager
Quality Management Team	Monitor progress and success of the quality management and discuss opportunities for continuous improvement.	Emails and in-person meetings	Weekly	Quality Manager

Project Communication Plan

Executive leadership team	Provide key project updates and obtain strategic direction	Emails and in-person meetings	Bi-monthly	Project Manager
Other project teams within the company	Share project updates and establish mutual assistance	Emails and in-person meetings	Quarterly	Project Manager
Retail partners	Negotiate contracts and discuss sales performance and strategies	Microsoft Teams meeting Email reports	Bi-monthly	Sales Director
Supply chain and manufacturing partners	Negotiate contracts and discuss quality/timescale of production	Microsoft Teams meeting Email reports	Bi-monthly	Supply Chain & Production Manager
Fashion industry	Discuss mutual benefits and potential partnerships	Emails At in-person events such as fashion shows	Whenever there is an opportunity	Marketing Lead
Travel and leisure industry	Discuss mutual benefits and potential partnerships	Emails At in-person events such as conferences	Whenever there is an opportunity	Marketing Lead
Consumer rights watchdogs	Provide transparency surrounding the product and its associated process	Emails Environmental audits made public In-person events Information provided on the website and media	Whenever there is an opportunity	Marketing Lead
Other smart device producers and research institutions	Discuss mutual benefits and potential partnerships	Emails At in-person events such as conferences	Whenever there is an opportunity	Marketing Lead
Investors	Provide information on investment opportunities, return on investment, and risks.	Shareholder briefings Microsoft Teams meeting Conferences and investor events	Quarterly	Project Manager
Governmental bodies and regulators	Prove our product complies with regulations and requirements	Regulatory submissions and inspections Uploading reports	Whenever required	Legal Director
Competitors	Discuss market dynamics and competition	Conferences and tech shows	Whenever there is an opportunity	Marketing Lead
Environmental activists, the healthcare industry and societies	Provide transparency surrounding eco-friendliness and lifestyle benefits	Emails Environmental audits made public At in-person events such as conferences Information provided on the website	Whenever there is an opportunity	Legal Director
Customers	Provide information and updates on the product	Ads Announcements	Whenever required	Marketing Lead
Media and influencers	Provide product information Discuss contracts and partnerships	Microsoft Teams meeting Emails reports	Monthly	Marketing Lead

Document number:	EM-0005	Issue no:	-06	Issue date:	30/04/24
Document title:	Risk Register				

Executive summary:

This document outlines all risks to be considered during the execution of the LocaVision project. There is a total of 40 risks, presented in the order the date that they were raised. The risks are divided into 7 categories: project, technical, financial, quality, security, legal and supply chain risks.

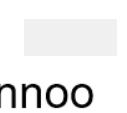
For each risk raised, a corresponding unmitigated consequence is stated, as well as likelihood and severity ratings on a scale of 1-5. These ratings are multiplied to give a risk factor. All risks have a corresponding mitigation strategy which is outlined in the penultimate column. The register includes a record of when the risks were raised, who raised them, and who is responsible for executing the mitigation strategy.

The top risks identified include:

- Lack of market for the product.
- Designs and technology being stolen before obtaining IP protection.
- Suppliers breach the contract in terms of quality or delivery schedule.
- Finished goods are damaged in storage or transit.

Document Changes Log:

Issue	Reason/Main changes	Date issued
-01	First issue	02/02/24
-02	Addition of various legal risks	12/02/24
-03	Addition of various supply chain risks	13/02/24
-04	Addition of various product quality risks	04/03/24
-05	General revision of risks, consequences and mitigation strategies	08/04/24
-06	Final revision	15/04/24

Lead Author	Principal Reviewer	Approver
 Author Author Job Title Aung Zaw Myat Chairperson	 Reviewer Reviewer Job Title Daniel Lee Marketing Director	 Abdullah Monnoo Approver Author Job Title CEO, STP Ltd.

Distribution: Entire project team

ID.	Status	Date Raised	Raised by	There is a risk that...	Risk Type (Category)	Unmitigated Consequence(s)	Likelihood (1-5)	Severity (1-5)	Risk Factor (L*S)	Avoid/Mitigate/Accept	Mitigation/Action(s)	Risk/Action Owner
1	Open	2/2/2024	Aung	The project is not completed by the deadline due to unexpected setbacks.	Project	The loss of a market opportunity. Financial losses in the company.	2	5	10	Mitigate	Set buffer times at various stages, detailed in the project Gantt chart.	Aung
2	Open	2/2/2024	Aung	The product's purpose is under-defined or it is misaligned with stakeholder objectives.	Project	Failing to meet the needs of stakeholders.	3	4	12	Mitigate	Clearly define the purpose of the product through relevant documentation.	Daniel
3	Open	2/2/2024	Daniel	There are late changes in design of the product.	Technical	Exceeding budget due to wasted resources, employees having to work overtime. Issues with quality of final product too.	3	4	12	Mitigate	Use effective innovation management techniques to reduce the likelihood of this.	Vic
4	Open	2/2/2024	Daniel	The product fails to adapt to the changing needs of the customers.	Technical	Sales decline much sooner than initially projected by the Bass diffusion model, forcing an executive decision on whether to retire the product prematurely/accelerate development of other products.	3	3	9	Mitigate	Continuous communication with marketing team and external stakeholders to better understand customer needs.	Daniel
5	Open	2/2/2024	Kabeer	There is a lack of cash in the introduction or growth phase of product innovation.	Financial	Project has to be terminated prematurely, eliminating a source of income, pushing the company closer to bankruptcy or administration.	2	5	10	Mitigate	Carefully allocation of budget and cost estimation in the early stages. Tracking the actual costs throughout the project using documents such as timesheets, to inform budget reallocation if necessary.	Abdullah
6	Open	2/2/2024	Vic	The product lacks innovation novelty.	Project	Less market share and less sales than expected.	3	3	9	Mitigate	Combine market research and effective innovation management processes to ensure the product is novel.	Vic
7	Open	2/2/2024	Daniel	The product struggles to enter the market due to competitors.	Project	Failure to meet capture the target market share.	3	3	9	Mitigate	Conduct detailed analysis of the market and competitors prior to design stages .	Vic
8	Open	2/2/2024	Daniel	There is a lack of a market for the product.	Project	Lowered sales and profitability and decline in company reputation due to high profile failure.	3	4	12	Mitigate	Research the market thoroughly to ensure there is strong customer demand for the product.	Vic
9	Open	2/2/2024	Kabeer	The product is unable to adapt to a variable economic climate.	Quality	Vulnerable to a drastic fall in sales during economic recession, severely decreasing revenue and leading to potential early retirement.	2	3	6	Mitigate	Continuously monitor the market even after launch, and prepare to adapt the product accordingly.	Abdullah
10	Open	2/2/2024	Ein	Designs or technology are stolen before acquiring IP protection.	Security	Loss of potential competitive advantage and inability to secure patents/design rights if exposed to the open domain.	3	4	12	Mitigate	Maintain a high level of secrecy, requiring project team to sign NDAs.	Ein
11	Open	2/2/2024	Abdullah	Intellectual property not protected when the product is launched.	Security	Loss of potential competitive advantage and inability to secure patents/design rights.	3	4	12	Mitigate	Start the patent or registered design right application before full scale production.	Ein
12	Open	12/2/2024	Ein	Accidental disclosure of commercially sensitive information with a competitor.	Legal	Liable of civil offense due to breakage of competition law.	4	3	12	Mitigate	Training provided to employees to prevent the occurrence of such a disclosure, as well as requirement to sign NDAs.	Ein
13	Open	12/2/2024	Vic	The collection of user data through the product is unethical/lacks transparency.	Legal	Liable of civil offense due to breakage of data protection act 2018, and decline in perceived company trustworthiness.	3	3	9	Mitigate	Always ask for permission/consent before collecting data, and provide transparent communication with users regarding data privacy.	Ein
14	Open	12/2/2024	Ein	Employees misuse data of partners and consumers.	Legal	Liable of civil offense due to breakage of data protection act 2018, and decline in perceived company trustworthiness.	2	3	6	Mitigate	Training provided to employees so that they use data for right reasons, fairly and transparently. Strong consequences enforced for failure to adhere to this.	Ein
15	Open	12/2/2024	Ein	User data is accidentally stored longer than necessary.	Legal	Liable of civil offense due to breakage of data protection act 2018, and decline in perceived company trustworthiness.	4	2	8	Mitigate	Implementation of an automated data retention and deletion system to reduce human error.	Ein
16	Open	12/2/2024	Ein	Consumers do not perceive our products to be as described, fit for purpose or of satisfactory quality.	Legal	Liable for refund or replacement of the product due to consumer rights act 2015, which will increase costs.	3	3	9	Mitigate	Use robust product quality management processes and ensure description accurately matches the actual product.	Aung
17	Open	12/2/2024	Kabeer	Consumers submit false claims on Consumer Rights Act 2015 or Consumer Protection Act 1987.	Legal	Unfair company liability is imposed.	2	4	8	Mitigate	Provide clear information on what can be claimed. Implement team that verifies the validity of claims.	Aung
18	Open	12/2/2024	Aung	The product fails to pass the safety regulations including but not limited to General Product Safety Regulations (GPSR) 2005 and CE.	Legal	The product cannot be put onto the market legally, resulting in a severe waste of resources.	2	5	10	Mitigate	Ensure the product meets all relevant safety regulations from the early stages.	Ein
19	Open	12/2/2024	Ein	There is a lack of spare parts stocked.	Legal	Non-compliance with right to repair legislation 2021.	2	3	6	Mitigate	Enter a contract with a third party company to stock and manage spare parts for this product. Produce an overhead of product components.	Vic
20	Open	13/2/2024	Ein	Cybercriminals breach into project systems or databases.	Security	Software and confidential/sensitive project data may be stolen and/or released to the public domain.	4	3	12	Mitigate	Always use secure network servers, multi-factor authentication and provide employee cyber-security training.	Ein
21	Open	13/2/2024	Aung	Suppliers breach the contract in terms of quality or delivery schedule.	Supply Chain	Quality and delivery schedule of supplied materials/components is suboptimal, causing delays later in the supply chain.	4	3	12	Mitigate	Have financial compensation (known as liquidated damage) if the components/materials arrive late or faulty by the supplier. Do not accept early deliveries as they can take up storage space.	Daniel
22	Open	13/2/2024	Abdullah	Natural disasters, political unrest and other external factors disrupt the routes of supply chain.	Supply Chain	Materials/components arrive significantly later, causing delays later in the supply chain.	3	3	9	Mitigate	Keep clear terms and conditions in all contracts which takes liability away from the company if product delivery to retailers are affected by natural disasters or political unrest.	Kabeer

23	Open	13/2/2024	Aung	Excessive stock of finished goods accumulates during off season.	Supply Chain	Insufficient facilities to store inbound finished goods.	2	3	6	Mitigate	Offer off season discounts and carry out seasonal marketing campaign to stimulate additional demand where necessary. Adjust production schedule according to demand forecast, to decrease output in off-seasons.	Aung
24	Open	13/2/2024	Daniel	Work in progress (WIP) stock is kept waiting in queues at any point in the production line.	Supply Chain	Increased lead time, high inventory costs, bottlenecks in production lines and wasted storage space.	3	4	12	Mitigate	Appropriate scheduling and management of supply chain and manufacturing processes.	Aung
25	Open	13/2/2024	Aung	Finished goods are lost in storage or transit.	Supply Chain	Delays in delivery to retailers/customers, which can cause financial and reputational damages to the company.	2	4	8	Mitigate	Use barcode readers, radio-frequency identification (RFID) trackers and information technology systems to track products during distribution and outbound. Predict frequency of damages and adapt production accordingly.	Ein
26	Open	13/2/2024	Vic	Finished products are damaged in storage or transit.	Supply Chain	Financial losses and reputation damage to the company.	3	4	12	Mitigate	Set clear terms and conditions on damage with retailers and third-party distributors. Ensure that finished goods are packed preservedly and ready for transportation. Predict frequency of damages and adapt production accordingly.	Vic
27	Open	13/2/2024	Aung	Suppliers and distribution partners cause unnecessary damage to the environments and do not comply with local sustainability goals.	Supply Chain	Lowered sales and a decline in company reputation.	2	3	6	Mitigate	Seek suppliers and partners which have transparency surrounding environmental impacts of their operations and have a good reputation on sustainability.	Daniel
28	Open	13/2/2024	Vic	Trading in a foreign currency can cause uncertainty in finances due to exchange rate volatility.	Supply Chain	Incur unnecessary losses or decrease in profit.	3	3	9	Mitigate	Ensure all trading contracts clearly state that costs are to be paid in GBP.	Kabeer
29	Open	4/3/2024	Aung	Defects are not discovered until they have reached the customer.	Quality	Financial losses due to warranty, decrease in reliability means that retailers may be inclined to offer concessions or deals on the product, reducing company revenue. This also reduces product and company reputation.	2	5	10	Mitigate	Implement a robust final quality check and testing phase before the item is sent to retailers.	Aung
30	Open	4/3/2024	Aung	There is a high number of defective components or defective finished products.	Quality	Delays in delivery and economic consequences in replacing defective stock.	3	3	9	Mitigate	Strategically place quality checkpoints before significant (expensive, lengthy or irreversible) processes in the production line, to minimise wasted budget and time.	Aung
31	Open	4/3/2024	Daniel	Suppliers produce a significant number of defective components.	Quality	Will take additional funds and time to replace defective components.	2	3	6	Mitigate	Employ our own quality management team who will visit supply chain partners on frequent rotations. Implement total quality management system that focuses on getting things right at the first time, rather than detecting defects and fixing them.	Aung
32	Open	4/3/2024	Aung	The quality management processes are inefficient or lengthy.	Quality	Delays in production which will push back distribution.	5	2	10	Mitigate	Use pareto charts to prioritize different causes of defects and corresponding preventive actions.	Aung
33	Open	4/3/2024	Kabeer	The customer support team is not able to solve issues or inquiries in a timely manner.	Quality	Customer disappointment and a failure to meet target customer support satisfaction and response rates, leading to negative product and company reputation.	3	4	12	Mitigate	Train the customer support team. Provide an efficient issue and inquiry management system. Allocate sufficient resources to the customer support department, and continuously review this.	Aung
34	Open	8/4/2024	Daniel	The product is not functional, robust or user-friendly.	Technical	Low customer satisfaction and increased workload for customer service team.	2	4	8	Mitigate	Develop a high-performing and robust design and test the product thoroughly prior to release, as well as conducting a beta test to find previously unknown sources of issues.	Daniel
35	Open	8/4/2024	Ein	There is high waste and lead times in manufacturing processes.	Quality	Unnecessary costs incurred in disposal and recovery, as well as wasted time.	4	2	8	Mitigate	Implement Lean Production processes.	Aung
36	Open	8/4/2024	Aung	The product and its components do not comply with relevant standards and guidelines.	Technical	The product receives low reputation by external organisations and customers, lowering perceived quality.	2	3	6	Mitigate	Ensure that all relevant standards and guidelines are adhered to through a robust process.	Daniel
37	Open	8/4/2024	Aung	There is inefficient management and resolution of defects or customer reported issues.	Quality	Delays in production and decrease in customer satisfaction.	2	4	8	Mitigate	Use a commercial software that manages defects and issues centrally. Assign configuration identity, serial number and production batch number to all components, materials and code.	Aung
38	Open	8/4/2024	Vic	Parts of the development process of the new product are not ethical.	Project	Negative reputation and protests or boycott from non-profit organisations and societies.	3	2	6	Mitigate	Follow the statement of ethical principles by the Engineering Council and use ethical decision making tools.	Kabeer
39	Open	8/4/2024	Ein	The design of the product is not inclusive, resulting in some customers feeling they are excluded from the product.	Quality	Inability to capture desired market share, and lower sales made.	5	1	5	Mitigate	Design with inclusive requirements, acknowledging customers can come in different sizes, races, genders and disabilities (including situational impairments).	Ein
40	Open	15/04/2024	Aung	The product cannot be sustainably disposed, inducing negative environmental impacts.	Technical	The product has negative reputation for sustainability, decreasing sales and not appealing to sustainability-aware consumers.	3	2	6	Mitigate	Design with circular economic model in mind, considering the end-of-life disposal. Ensure design adheres to BS-8887 guidelines.	Vic

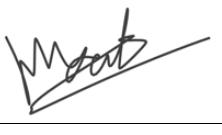
Document number:	EM-0006	Issue no:	-04	Issue date:	29/04/24
Document title:	Sustainability Assessment				

Executive summary:

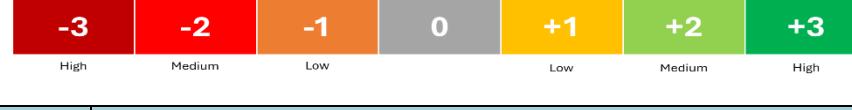
This document contains an assessment of LocaVision's impacts towards the United Nations (UN) Sustainable Development Goals (SDGs). The sustainability impact table outlines the influence of LocaVision towards each SDG, rating its respective influence on a measure between -3 and +3, with a supporting statement to justify the conclusions made. Of the six SDGs rated with maximum influence, three were selected. SDG9 industry, innovation and infrastructure and SDG12 responsible consumption and production are rated to have most positive impacts. SDG15 Life on land is deemed to receive the most negative impact. The sustainable design classification considers the most impacting SDGs and summarises the ratings across all goals. A table classifies the LocaVision product along an overall grading scale from A+ (most sustainable) to E (least sustainable). LocaVision is rated as C.

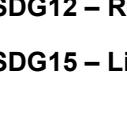
Document Changes Log:

Issue	Reason/Main changes	Date issued
-01	First issue	11/04/24
-02	Revised Impact Rating	12/04/24
-03	Modified Supporting Statements	28/04/24
-04	Sustainability Design Classification	29/04/24

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Distribution:		

Sustainability Assessment



Sustainable Development Goal	Impact Rating (-3 → +3)	Supporting statement
 1 NO POVERTY	+1	LocaVision as a business may lead to job creation and increased employment within manufacturing zones. In developing countries, the increase in the production of electronic components can reduce poverty and thus benefit SDG1. Glasses may also provide a minimal form of social support system for the vulnerable through visual and auditory aid towards navigation and health monitoring.
 2 ZERO HUNGER	0	LocaVision, as a technical product, would have little impact on the food market, infrastructure and agricultural practices which mitigate global malnutrition. There may be some negligible positive influence on the prevalence of malnutrition, though only through accessible dietary recommendations.
 3 GOOD HEALTH AND WELL-BEING	+2	Promoting healthy lifestyles and effective healthcare can be aided by LocaVision's accessible AI recommendations. It would encourage affordable alternative products to promote well-being that have positive impacts regarding improvement of Quality of Life by preemptive diagnosis of common diseases or recommendations against substance abuse for the user. However, it will not significantly impact the healthcare industry.
 4 QUALITY EDUCATION	0	Though LocaVision may provide a more accessible means of education in the form of intuitive information gathering, no direct substantial impact exists. Some indirect causation effects may arise from the result of increased job opportunities towards education completion. Again, this is not significant enough to warrant any rating, although the addition of later software or applications could realise an educational effect.
 5 GENDER EQUALITY	0	STP does not approach or otherwise promote additional values regarding gender equality. Outside the organisation, the product itself does not provide benefits towards issues of SDG5, including domestic inequality, forced marriages, or discriminatory violence. Within the employment space, UK regulations ensure participation towards leadership and equity in economic resource allocation but no more than standard practice.
 6 CLEAN WATER AND SANITATION	-1	SDG6 aims to ensure the availability of sustainable water and sanitation management. Processes involved in manufacturing and transport may contribute negatively towards this goal to a minimal degree, i.e. through reduction of water quality and lowered supply efficiency. Lithium-ion batteries, for instance, demand a large quantity of water for the manufacturing process and, when disposed of, are pollutants, contributing to reduced water availability.
 7 AFFORDABLE AND CLEAN ENERGY	-1	Manufacturing processes and trade activities such as transport will inherently be energy-intensive and detrimental in this aspect. However, through actively sourcing components from sustainability-oriented manufacturers, LocaVision's production takes measures to improve energy efficiency. The involvement within developing countries can also lead to expansion in energy services, which play a role in universal access.
 8 DECENT WORK AND ECONOMIC GROWTH	+3	As a medium-sized company within a rapidly advancing field, such as technology and AI, it provides a significant platform for economic growth for all parties. Introducing economic productivity adds significant job opportunities, driving growth and contributing towards SGD8. The increase in exports from global suppliers and LocaVision's compliance with efficient consumption and production regulations will also aid countries financially.
 9 INDUSTRY INNOVATION AND INFRASTRUCTURE	+3	By selection of sustainable suppliers, these forms of infrastructure are more invested in and likely to grow. Our AI models are a key example of the enhancement towards industrial technologies as they can be pioneered for various applications. The facilitation of technological growth is critical to increasing affordable and accessible communication infrastructure, such as extending electrical and telephone grids, especially within developing countries.
 10 REDUCED INEQUALITIES	0	Despite complying with the UK-SPEC statement of ethical business practices, STP has no contribution towards diversified or equal wealth distribution other than standard practices. STP, including branches like LocaVision, does not directly implement workplace inclusion towards race, age, sex or other demographic status. Some official investment is encouraged within LDCs; however, no differential treatment is placed.
 11 SUSTAINABLE CITIES AND COMMUNITIES	0	Minor contribution within this goal leads to a net 0 rating. Very minute positive impacts can be attributed to sustainable resource management within cities and tending to the need for disability assistance. However, these are limited and have little contribution towards SDG11's focus on infrastructure and settlement development. In contrast, it may increase the carbon footprint of cities where LocaVision and its derivatives are based negatively.
 12 RESPONSIBLE CONSUMPTION AND PRODUCTION	+3	Implementing sustainable and consumption frameworks within the organisation is a large step towards SDG12. Despite the consumption and production practices not being net positive for sustainability, especially due to the large effect of e-waste, STP puts in the best efforts for sustainability awareness and proactive decision-making. Most of the company's values place emphasis and highest priority regarding sustainable practices. This includes designing the LocaVision product with a circular economic model in mind. Where possible, waste is managed responsibly; sustainability is prioritised when selecting manufacturers and suppliers.
 13 CLIMATE ACTION	-3	Energy-intensive servers and large-scale manufacturing processes negatively contribute to climate change. Carbon emissions and E-waste/plastic generation contributing to GHGs are examples of mechanisms for which STP is responsible. Though mitigating by sourcing sustainably operating suppliers and complying with standards is a strategy, SDG13 expects implementation of such frameworks to national levels, which is not covered by LocaVision policies.
 14 LIFE BELOW WATER	-3	The degradation of ocean quality is directly due to the LocaVision project. Despite adherence to BS-8887, component manufacturing, which generates metallic waste such as lead, mercury and arsenic, or non-biodegradable e-waste, can leech into nearby water sources. The contribution of airborne pollution through carbon emission from transportation and manufacturing can cause biodegradation by acidification. Factories built in coastal regions in countries with less regulation are additional impact factors. These negative impacts, without means of restoration or protection, lead to heavy drawbacks.
 15 LIFE ON LAND	-3	Similarly, terrestrial ecosystems and biodiversity suffer heavily as a result of LocaVision despite some sustainability-oriented disassembly and disposal standards, including BS-8887. As with SDG14, waste from manufacturing can accumulate within the soil, leading to the loss of natural habitats. Deforestation within LDCs, due to infrastructure and other consequences to decreased biodiversity, potentially introduces invasive species.
 16 PEACE JUSTICE AND STRONG INSTITUTIONS	0	STP does not directly address SDG16 other than within workplace settings. Minor contributions towards safety risks, such as trafficking and individual security, can be moderated through LocaVision's guidance. However, no large-scale initiatives towards justice and political conflicts are present.
 17 PARTNERSHIPS FOR THE GOALS	+2	By innovation of SDG9, further research opportunities and investments can be brought to light to increase collaboration and cooperation internationally. Through global innovation in an emerging field, R&D partnerships and encouraging outreach with LDCs can directly contribute to more appropriate financial allocation regimes.

Summary

1 SDG9 – Industry, Innovation, Infrastructure (+3)

2 SDG12 – Responsible Consumption and Production (+3)

3 SDG15 – Life on Land (-3)

Sustainable Design Classification

LocaVision is rated C along the sustainability scale. LocaVision places primary emphasis on compliance with regulatory standards, mainly regarding BS-8887, which outlines sustainable practices across all manufacturing, assembly, disassembly, and end-of-life processing (MADE).

By ensuring sustainable MADE frameworks and their value are attained at the highest organisation level, LocaVision significantly contributes towards SGD12 as its highest impacting goal, justifying the high rating given. Despite these specifications, STP remains a company based in the technology and electronics sector, contributing to significant adverse environmental degradation that negatively impacts the environmental SDGs, e.g., SDG13, SDG14, and SDG15. Factors including greenhouse emissions, deforestation for infrastructure, and non-biodegradable waste all contribute to lowering the quality of both terrestrial and marine ecosystems, which significantly reduces the justifiable rating. This is especially prevalent when rating SDG13, for which metrics are expected to be contributed at a national level.

SDGs 4, 5, 10, and 16 do not benefit directly from LocaVision's practices other than compliance with UK-based regulations for common workplace equality. However, the increased employment in LDC regions and opportunities provided by improved local infrastructure ensure LocaVision contributes towards SDG1 and SDG17.

As mentioned, the presence of LocaVision in a growing field is a large platform and driver for innovation and research, which are massive contributions towards SDG8 and SDG17. SDG9 is facilitated significantly by the design and enhancement of AI, in which research can lead to technological growth, especially towards communication infrastructure.

Rating	Description	New Product Classification
A+	Most sustainable ↓ Least sustainable	
A		
B		
C		✓
D		
E		

Document number:	EM-0007	Issue no:	-03	Issue date:	30/04/24
Document title:	Product Quality Management Plan				

Executive summary:

This quality management plan covers the quality planning, quality assurance activities and quality control activities that will result in a high-quality product that meets customer expectations. The teams that play a crucial role in the product quality management are project manager, hardware design team, software and data team, customer support team, supply chain & production team, and quality team. Their key activities to contribute the product quality are also identified. The specific quality goals and objectives are defined. The standards, criteria and key performance indicators to meet these goals are specified, quantitatively whenever possible. A list of required documentation for quality management is stated, including the quality information they include and their document management plan. Inspection and testing methods were defined, outlining the requirements and pass/fail criteria. Detailed procedure on how defects and issues will be managed are outlined, including the use of commercial software for defect management.

Document Changes Log:

Issue	Reason/Main changes	Date issued
-01	First issue	18/03/24
-02	Use a table to outline the inspection/testing methods and requirements	07/04/24
-03	Remove content to ensure that the quality management plan is more product specific than broader project perspective.	20/04/24

Lead Author	Principal Reviewer	Approver
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Distribution: Entire project team and supply chain partners

Product Quality Management Plan LocaVision

1. Introduction

1.1 Scope

This quality management plan covers quality planning, quality assurance activities and quality control activities that will result in a high-quality product that meets customer expectations. This plan considers the entire product lifecycle, from market research and conceptual design to mass production and continuous improvement post-launch. The quality management of LocaVision is based on the culture and mindset of all sub-teams within the project team. All sub-teams within the project contribute collectively, making this product quality management a total quality management system.

The project manager will oversee all the operations of the project and ensure there is effective collaboration among different sub-teams so that the product's quality is high and continuously improved. The hardware design team produces a high-performing design that meets all the customer expectations. The customer support team will resolve issues quickly and collect customer feedback. The software and data team will contribute with high-performing, up-to-date and user-friendly software systems and ethical handling of data. The supply chain and production team will secure beneficial contracts with reliable and sustainable suppliers while resolving supply chain issues to ensure a high-quality product is delivered on time. The quality team will visit LocaVision's suppliers in frequent rotations, playing an active role in quality management and conforming to specifications in upstream manufacturing processes.

1.2 Objectives

The product quality management plan aims to make a total quality management system that conducts quality planning and specifies quality assurance and control activities. This will help LocaVision efficiently meet customer expectations on time, the first time, and all the time. The product will have a long-term competitive advantage, sustainable success, and continuous improvement in quality rather than short-term profitability.

1.3 Definitions and Acronyms

Artificial Intelligence (AI) is a technology that enables computers and machines to simulate the intelligence of living things and problem-solving capabilities.

Augmented Reality (AR) is an interactive technology that enhances the real-world experience with computer-generated perceptual visuals.

Quality Management Plan (QMP) documents necessary information required to effectively manage product quality.

Quality Management System (QMS) is a collection of processes that focuses on quality management.

Key Performance Indicators (KPIs) are metrics that quantitatively measure success against targets.

Failure Mode and Effect Analysis (FMEA) is a technique to determine the modes under which a system or product might fail and what effect the identified failures would have on the system's performance, safety, and environment.

Lean Production (LP) principles that aim to minimise waste and lead time in the production line [1].

General Data Protection Regulation (GDPR) is a regulation of information privacy in the European Union.

CE marking is the approval to show products meet European Union safety, health and environmental requirements.

Restriction of Hazardous Substances (RoHS) directive is a restriction of certain hazardous substances in electrical and electronic equipment by the European Union [2].

The International Organization for Standardization (ISO) prepares and publishes international standards and guidelines for ease of use for end-users and the common market.

National Institute of Science and Technology (NIST) is an agency of the United States to promote innovation and industrial competitiveness [3].

International Electrotechnical Commission (IEC) is an international standards organisation that prepares and publishes standards for all electrical, electronic and related technologies [4].

Institute of Electrical and Electronics Engineers (IEEE) is an American professional association for electrical engineering, electronic engineering and related technologies [5].

Ingress Protection (IP) code indicates how well a device is protected against water and dust.

2. Quality Summary

2.1 Quality Objectives

The specific quality goals for the product are as follows:

- Achieve a seamless integration of AI, AR, location-aware features and relevant contextual information to provide enhanced user experience.
- Build and continuously improve the software in terms of functionality, performance, robustness, and user-friendliness.
- Design hardware that is functional, durable, safe and aesthetic
- Manufacture and assemble hardware that matches design specifications
- Strictly protect data privacy and security of the users
- Ensure the customer expectation of the product is aligned with the product's actual performance and specifications.
- Decrease the cost of nonconformance to product quality (such as cost of scrap, rework, replacement, warranty repairs, damaged reputation)
- Focus on long-term commitment to quality rather than short-term profitability.
- Achieve consistent quality and specifications in the design and manufacturing of different subteams.
- Resolve issues and enquires from customers quickly and effectively
- Ensure the product adheres to all the laws and regulations, obtaining approval from various regulatory bodies.
- Ensure the product follows relevant national/international standards and guidelines for good practices.
- Ensure the project adheres to schedule

2.2 Deliverable Quality Standards

The standards and criteria to evaluate the product deliverables are as follows:

- STP Ltd and all LocaVision's suppliers are certified with ISO 9001:2015. LocaVision's quality team will work with suppliers to ensure the components supplied and all their production processes comply with ISO 9000 standards and guidelines [6].
- The sunglasses frame provided by Mazzucchelli 1849 must comply with the fundamental requirements of ISO 12870:2016 [7]. The physical and mechanical properties must comply with ISO 18526-3:2020 [8].
- Hardware follows guidelines of ISO 9241-210:2019 on ergonomics, usability and accessibility of interactive systems, including wearables [9].
- Design follows guidelines of ISO technical report 25060:2023. It follows guidelines on systematic human-centred design for interactive systems.
- Ensure compliance with the Data Protection Act 2018 and the GDPR.
- Ensure compliance with General Product Safety Regulations 2005, Electromagnetic Compatibility Regulations and RoHS directive. Obtain CE approval.
- Batteries and energy management systems follow IEC 62133 safety requirements [10] and IEC 61960 performance requirements [11] on lithium-ion batteries
- Ensure compliance with IEEE 802.11 standard for wireless local area network technology [12].
- Follow the guidelines of the NIST Cybersecurity Framework and NIST guidance for wearable electronic products.
- Follow the AI ethical guidelines of Partnership on AI
- Follow the web content accessibility guidelines of ISO 40500:2012 [13]
- Follow international software quality standard ISO/IEC 25000:2014 [14]
- Upon sale, include a comprehensive, accessible multilingual user manual and technical documentation.
- Hardware manufacturing follows LP guidelines to minimise waste and lead time in the production line.
- Follow the right-to-repair legislation 2021 by having a third-party company stock and manage spare parts
- Ensure the design, marketing, legal production, and supplier delivery adheres to schedule.

2.3 Quality Metrics and KPIs

The KPI to measure the outcome metric is the defect rate of finished products. The target is 0.05%.

Four KPIs are used to measure the process performance metric – process potential (Cp), capability index (Cpk), mean time to detect (MTTD) and mean time to repair (MTTR).

Process potential (C_p) and capability index (C_{pk}) both describe the ability to meet specifications. Process potential (C_p) measures the spread relative to the specification limits. Capability index (C_{pk}) measures both the spread and mean relative to the specification limits. Both process potential (C_p) and capability index (C_{pk}) are targeted at 2.

MTTD is the average time to detect a defect from the moment the defect was first introduced in a component or code. MTTR is the average time to fix a defect once it has been detected. The target MTTD is one week and MTTR is 3 days.

The KPI that measures cost metric is the cost of quality as the percentage of project earnings. In a good QMS, more money is spent on quality assurance and control activities. Still, the cost of nonconformance to product quality (such as the cost of scrap, rework, replacement, warranty repairs, and damaged reputation) is heavily reduced. So, the cost metric is lower for a good QMS. The target cost of quality is less than 4% of project earnings.

Five KPIs measure customer support metrics – customer satisfaction rate, net promoter score (NPS), customer complaint rate, warranty-claim rate, and non-automated response time to enquiries. The target customer satisfaction rate is 90%. The target net promoter score (NPS) is 60%. The target customer complaint rate is less than 1%. The target warranty-claim rate is less than 2%. The target non-automated response time to enquiries is 1 hour.

Two KPIs measure supplier quality metrics – defect rate of components supplied and timely delivery of tasks. Supplier quality metrics can be beneficial in supplier selection and contract negotiations. The defect rate of components arriving from any supplier is aimed to be less than 0.5%.

The KPI that measures the metric of inspection tests is the rate of escaped defects, which are defective products that reach the end-users. The rate of escaped defects is aimed to be 0%.

The KPI for the durability of the product will be IP ratings and height of drop tests. The IP rating of the product will be IP53. The product will survive a drop from 2 metres high.

The KPI for product reliability is a warranty and free repair period. There will be a 1-year period.

2.4 Quality Documentation

Quality Documentation Type	Quality Information Provided	Document Management Plan
Product Quality Management Plan	- Quality planning, quality assurance and quality control information of the product and its production processes	Created by Quality Manager in 09/2024 Reviewed by the leads of all the sub-teams within the project in 09/2024 Approved by Project Manager in 10/2024 Review cycle: Quarterly Changes tracked using OneDrive
Product Requirements	- List of requirements and objectives which the product aims to achieve. - Test methods for the requirements and objectives.	Created by Project Manager in 09/2024 Reviewed by the leads of all the subteams within the project in 09/2024 Approved by the Chief Executive Officer in 10/2024 Review cycle: Monthly Changes tracked using OneDrive
Project Risk Register	- Potential risks that can affect product quality and their mitigations	Created by Assistant Project Manager in 09/2024 Reviewed by the leads of all the subteams within the project in 09/2024 Approved by Project Manager in 10/2024 Review cycle: Monthly Changes tracked using OneDrive
Configuration Identification and Control Documentation	- Specifications of a component - Drawings of a component - Prototypes of a component (if any) - Changes made and their dates	Created by a member of the technical team relevant to the component at the date the component was first designed Reviewed by another member of the same technical team Approved by the lead of the technical team Review cycle: whenever there is a change in the component information Changes tracked using OneDrive
Documentation for Formal Design Review	- Functionality of the concept - Feasibility of the concept - Compliance with requirements - Potential risks - Design assumptions - Design calculations	Created by relevant design lead on the first day of formal design review Reviewed by all members of the relevant design team Approved by the project manager

	<ul style="list-style-type: none"> - Completeness of design - Compliance with specifications - Intellectual property rights - Manufacturability - Tests on early-produced items on their efficacy - Design check and input from external technical experts hired from engineering consultancies 	<p>Review cycle: whenever another design review is done Changes tracked using OneDrive or Git if it is code</p>
Quality Audit	<ul style="list-style-type: none"> - Verification of the quality management processes implemented - Verification of compliance with quality standards and meeting the KPIs 	<p>Created by the quality manager on the first day of the audit Reviewed by the leads of all the subteams within the project Approved by the project manager on the last day of the audit Review cycle: whenever another audit is done Changes tracked using OneDrive</p>
Supplier Audit (second-party audit)	<ul style="list-style-type: none"> - Monitoring of supplier's ability to maintain the quality of components supplied - Monitoring the supplier's ability to deliver services on time - Monitoring the cost 	<p>Created by a member of the supply chain & production team in 09/2023 Reviewed by the supply chain & production manager Approved by the project manager Review cycle: Yearly Changes tracked using OneDrive</p>
Inspection and Testing Documentation	<ul style="list-style-type: none"> - Date and owner of an inspection - Inspection and testing methods - Inspection and testing requirements - Pass/fail criteria - Configuration identity or production batch number - Inspection and testing results 	<p>Created by the owner of the inspection on the day the inspection is first planned Reviewed by another member of the quality team Approved by the quality manager Review cycle: Whenever information about the inspection needs to be traced Changes tracked using OneDrive</p>
Issue and Defect Management Documentation	<ul style="list-style-type: none"> - Configuration identity or unique serial number of the defective component/product - Details of issue/defect - Categories and priorities of the issues/defects - Owner and status of the issue/defect - Cause of the issue/defect - Corrective actions implemented - Lessons learnt - Preventive actions implemented 	<p>Created by the owner of the issue/defect Reviewed by another member of the quality team Approved by the quality manager Review cycle: Whenever information about the issue/defect needs to be traced Changes tracked using OneDrive</p>
Standard Operating Procedures (SOP) Documents	<ul style="list-style-type: none"> - SOP of manufacturing processes - SOP of inspection and testing methods - Issue/defect fixing SOP - Customer service SOP 	<p>Created by the relevant technical lead at the start of the project Reviewed by project manager Approved by the Chief Technical Officer Review cycle: Monthly Changes tracked using OneDrive</p>
FMEA Document	<ul style="list-style-type: none"> - Relevant parts or functions of the component - All the possible failure modes and causes - Probability and detectability of each failure mode - Effects and severity of each failure mode - Priority of each risk - Plan to circumvent each failure mode, mitigate the effects of each failure mode, and take contingent action in case the failure occurred 	<p>Created by a member of the quality team on the first day of design Reviewed by the members of the relevant technical team Approved by the quality manager Review cycle: Monthly Changes tracked using OneDrive</p>

Control Charts	<ul style="list-style-type: none"> - Consistency, trends, spread and variations in the production processes - Process potential (C_p) and capability index (C_{pk}) - Exponentially-weighted moving average (EWMA) 	<p>Created by a member of the quality team on the first day of production Reviewed by the members of the relevant technical team Approved by the quality manager Review cycle: Monthly Changes tracked using OneDrive</p>
Pareto Charts Documentation	<ul style="list-style-type: none"> - Different causes of defects and how much each contributes to total defects - Most vital causes of defects 	<p>Created by the quality manager Reviewed by the members of the relevant technical team Approved by the project manager Review cycle: Monthly Changes tracked using OneDrive</p>

3. New Product Quality Control

3.1 Inspection and Testing

For all the tests and inspections, test procedures, requirements, and pass/fail criteria will be clearly defined. Measured results will be used to generate KPIs, control charts and Pareto charts. Reports will be written, which include configuration identity, detailed inspection results, and the date and owner of the inspection. The configuration identity of every component, material or code inspected will be documented for tracking and tracing purposes.

The table below shows the inspection methods and pass/fail criteria for the essential requirements.

Key Requirements	Inspection Methods	Pass Criteria
Functionality of sunglasses frame	Manual testing was conducted on all finished products.	See if the frames, adjustable features and opening/closing work properly.
External dimensions and absence of damage in the sunglasses frame	<p>Automated coordinate measuring machines (CMM) or digital callipers will measure dimensions.</p> <p>The absence of damages will be inspected visually, using magnification tools if necessary.</p> <p>Test on all finished products.</p>	Dimensions are correct within the specified tolerances.
IP53 and 2m drop durability	<p>Spray water from a nozzle at various angles up to 60° from the vertical.</p> <p>Put the product into a dust chamber and inspect for minimal ingress of dust.</p> <p>Drop the finished product from a height of 2m.</p> <p>Test on 1 product of every batch.</p>	<p>The water must not have any adverse effect on the performance.</p> <p>Dust must not interfere with the operation of the product.</p> <p>The drop must not have any adverse effect on the performance.</p>
Electrical safety	<p>Supply the nominal electrical current and voltage and inspect for any risks of electric shock or fire.</p> <p>Conduct circuit integration and continuity tests.</p> <p>Temperature test using thermal cameras when the product is executing tasks with high loads.</p> <p>Test on all finished products.</p>	<p>No risk of electric shock or fire.</p> <p>No open circuits.</p> <p>All components are fully and correctly integrated.</p> <p>The temperature measured must be within the required temperature range.</p>
Electromagnetic compatibility	<p>Follow the test procedures in the Electromagnetic Compatibility Regulations [15]</p> <p>Test on all finished products.</p>	Emitted electromagnetic radiation is below the upper limits specified in Electromagnetic Compatibility Regulations.
Performance of logic circuit	<p>Executes the automated self-test program in the logic circuit</p> <p>Test on all finished products</p>	Executes the test successfully with expected speed and outputs, without any errors or faults.
Functionality of AR feature, camera, microphone, speaker, and GPS module	<p>Manually test if all those features work.</p> <p>Test on all finished products</p>	All those features must work.
Performance of camera and AR	<p>Test the camera resolution with image processing software</p> <p>Test the AR rendering speed by assessing the frame rate, latency, and stability in various simulated environments.</p> <p>Test on a sample size of 10%</p>	The camera resolution and AR rendering speed must be as specified
User experience	Beta testing by 100 people outside the project team, and they will rate their experience out of 10.	Average rating must be 9

Software performance	Conduct load testing to see how the software performs under high workloads. Conduct latency tests to inspect AI processing times.	Ensure the latency remains consistent and within the targeted response time. Ensure the software can handle the high workloads without lagging.
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3.2 Issue and Defect Tracking

Every component, material or code in the production line has a configuration identity. Every finished product has its unique serial number alongside the production batch number.

We will use JIRA Work Management, which is a commercial management software that can be used for centralised issue/defect tracking and management. As JIRA is integrated with Git and our software team uses Git for version control, our software team will also be able to utilise JIRA effectively.

Each issue or defect will be logged onto the system as soon as it is detected at inspection or reported by the customer support team. Each log will include details of the issue and the configuration identity of the component, material or code where the issue lies. The configuration identity can be used to trace if there are any issues in the upstream production line. If it is a customer-reported issue, the serial number and production batch number of the product will be noted. The serial number can be used to trace the production process and manufacturing history.

Categories will be assigned to the defects/issues. Each defect/issue will be prioritised based on how severely it impacts the product functionality or customer experience. Defective components will be retrieved and returned to the supplier.

The issue will be assigned ownership to a member of the relevant team who has the expertise and capacity to manage and resolve it. The status of every issue will be regularly updated and documented in JIRA. If it is a customer-reported issue, timely and transparent updates will be given to the customer, with the expected time for the issue to be resolved.

Root-cause analysis will be conducted to systematically analyse the underlying cause of the issue/defect. The issue/defect will be fixed. There will be predefined procedures and workflows to resolve issues. If the time and resources needed to fix an issue/defect outweigh the potential benefits of resolution, a waiver or deviation may be sought. If a waiver or deviation is not possible, the component will be disposed of.

If the investigation of the issue indicates that there is a problem not only in this specific item but also in the whole production batch, the entire production batch may be retrieved. Suppose retrieval of the whole production batch is not beneficial. In that case, announcements will be sent to all customers who have purchased from this production batch, apologising and offering guidelines on how to report any issues, avoid the issues and self-fix the issue. Compensation will be given to the customers, regardless of whether we are legally liable or not. This enhances customer satisfaction.

Once an issue is resolved, another member of the relevant team will inspect and verify the resolution of the problem. If it is a customer-reported issue, a closure email will be sent out, apologising for the inconvenience and recommending how to prevent the issue in the future. A customer feedback survey will also be sent to obtain criticism and determine what needs to be improved.

Detailed documentation will be kept for future reference and traceability. The defects/issues and their causes will be analysed. Actions will be taken to prevent similar defects/issues and continuously improve product/project quality.

References

- [1] <https://www.leanproduction.com/>
- [2] <https://www.gov.uk/guidance/rohs-compliance-and-guidance>
- [3] <https://www.nist.gov/>
- [4] <https://www.iec.ch/homepage>
- [5] <https://www.ieee.org/>
- [6] <https://www.iso.org/standard/62085.html>
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