UNIVERSITY OF BATH

WorldWizzy

Business Plan

ME40228: Group Business and Design Project

Group 13

Executive Summary

Established in 2018, WorldWizzy is a not-for-profit start-up, dedicated to providing independent powered mobility to children in developing world. The organisation was founded to development a range of low-cost, robust and aesthetically pleasing powered wheelchairs as well as a sustainable distribution method for the targeted regions. The company's mission is to become a multinational NGO (Non-governmental organization) that can provide powered mobility to every child in need of it.

The company operates within the assistive devices and technologies sector which has been growing with an expected value of $ 26,757.4 million by 2024 and a Compound Annual Growth Rate of 7.4% (Coherent, 2017). This growth has led to increased visibility of the issues people with disabilities face and cemented them as an influential market segment.

The company will initially produce three products, this range is designed for maximum coverage of the market as it allows subsidisation to lower income consumers. The primary product is the WorldWizzy, a child-centric, low-cost, powered mobility aid tailored for Indian environment and culture. It will provide access to mobility for children from low-income families through institutions, referred to in this report as WizzyHubs, which purchase multiple products. The WorldWizzy Pro is a higher specification product that will be available for private customers to purchase directly, both products are aimed at developing nations. The control system for both products will be sold separately to developed countries as a disruptive alternative within the powered mobility market.

The marketing and sales strategy is geared toward three consumer groups, children, parents, and WizzyHubs. The urban market will be covered through social media campaigns, websites and from word of mouth by users and medical professionals. The charity will also be advertised to potential customers through a multilingual website which also contains fitting and assembly tutorials for existing customers. Sales of WorldWizzy in India are expected to reach approximately 1500 units by year five and 3600 units by year 10. The products will be manufactured and distributed locally to ensure low cost to stimulate the local economy through job creation and engage the community further.

The priority is to begin production of the powered wheelchairs which will require an initial investment of £65,000. An additional £110,000 is required for the mass production of the control system as a secondary objective. This is to be raised from mandatory charitable donations required from large companies based in India, as well as active fundraising from private donors. Future costs of expanding into five further countries will be covered by the predicted production rates at that point. Each expansion will lead to a design review of the WorldWizzy and revaluation of business strategy to fit local conditions. The disruptive Wizzy Control System is expected to generate £2.5 million profit over the first 10 years of sales to reinvest in expanding and subsidising the base WorldWizzy products.

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1. Background

1.1. Organisation Description and Project Background

WorldWizzy™, hence forth referred to as the company, is a non-profit start-up, orientated towards product design and operations, established in 2018. The founding team consists of six socially conscious, professional engineers, aiming to provide "powered mobility for every child that needs it" (Designability, 2018). The company's design brief was proposed by Designability, formerly known as Bath Institute of Medical Engineering. Established in 1968, they design assistive technologies that improve the well-being of people with disabilities. Their considerable experience and expertise in this field has been a valuable asset to the WorldWizzy™ team throughout the development of the new product.

Independent mobility plays a crucial role in maintaining social interaction for many people with disabilities, most notably their socio-psychological development (Woods & Watson, 2003). Powered mobility provides independence for children who otherwise would be reliant on their carers. In many developed countries, established health care systems ensure that people with reduced mobility have access to powered wheelchairs whereas developing countries rarely have such services in place. Even in developed countries there are often minimum requirements for age and cognitive development meaning mobility aids for children under 5 are often inaccessible.

Some organisations currently exist that attempt to fill this absence in availability of powered mobility, Designability's '*Wizzybug*' is an example of this. '*WizzyBug'* is an innovative powered wheelchair, designed specifically for children under five who are unable to use standard manual wheelchairs due to their condition. 343 *'WizzyBugs'* (Figure 1) have been manufactured and more than 500 families have benefited from their loan scheme (Designability, 2018)

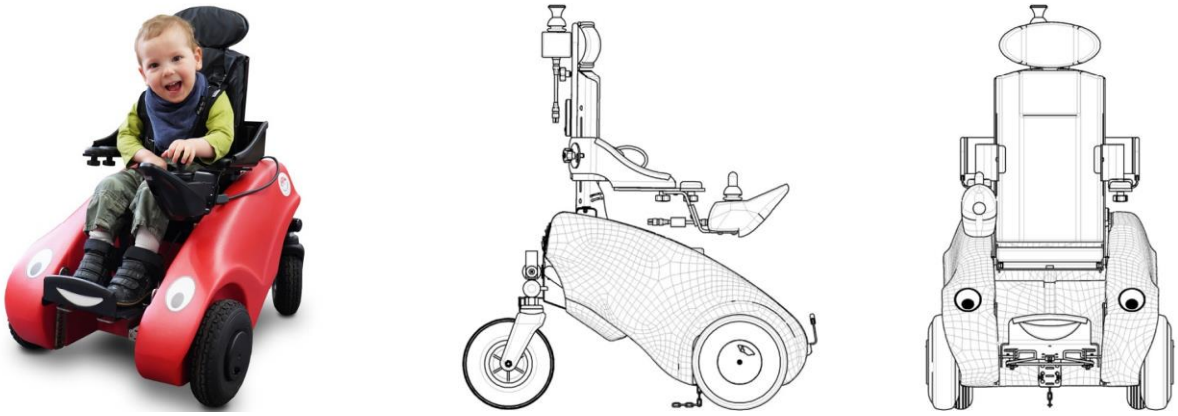

Figure 1 Designability's WizzyBug

The significance of independent mobility is not only proven by research but is also demonstrated through the development of young WizzyBug users (Designability, 2018). The high retail price of the WizzyBug (£3500) and its westernised design makes it unsuitable for most developing countries. In many middle and low-income countries, only 5-15% of people who require assistive devices and technologies have access to them (WHO, 2018). The company's aim is to create a completely new design, emphasising low cost and suitability for less developed regions worldwide.

1.2. Launching Platform

India was chosen as the initial market to distribute the WorldWizzy product. It is assumed that if the product can be effectively distributed in India, with its high wealth disparity and negative perception of those with disabilities (The Hindu, 2017), it sets a good precedent for global expansion. Table 1 gives more detailed insight into the decision to select the Indian market. The performance of WorldWizzy in India will set the standard for future expansions.

Table 1 The benefits of establishing a charity in India

Charity in India	The Benefits
2% Mandatory charitable donation*	Greater probability of raising sufficient start-up capital
2nd Most populated country in the world	Large market size and demand
Emerging as an economic powerhouse	Benefits from local growing economy
'Make in India' scheme aiming to increase the national GDP from the manufacturing sector	Contribute to local GDP in manufacturing sector by using inexpensive labour is a mutual benefit
Adequate infrastructure (Duane & Smith, 2017)	Distribution is possible
Extremely negative perspective of disabilities due to Karmic beliefs	WorldWizzy can make a difference and accelerate the elimination of discrimination

**businesses with annual revenues of more than 10bn rupees (£105m) must give 2% of their net profit as a corporate social responsibility donation to charity (India, 2013). The private sector's combined charitable spend jumped from an estimated 33.67bn rupees (£357.5m) in 2013 to around 250bn rupees (£2.63bn) after the law's enactment (Balch, 2018).*

1.3. Mission and Vision

The faster the product is launched; the more children and families will benefit from WorldWizzy. Consequently, the market must be saturated as efficiently as possible to maximise potential. The mission and vision can be seen in Table 2.

Table 2 WorldWizzy™ Mission and Vision

Mission (within 5 years)	Vision (beyond 5 years)
Design and manufacture a functional, affordable and aesthetically pleasing powered mobility aid for child aged between 14 months and 5 years. Enter Indian market with a creative business plan and a sustainable operation strategy. Prepare for global expansion.	Propagate the company brand, establish facilities in other developing countries and become a provider of assistive technology for children across the developing world. Eventually supply every child in need with powered mobility, saturating the serviceable available market.

1.4. Product Targeting

The company will enter into three markets.

Low Income

The primary focus is to develop the WorldWizzy; a low cost powered mobility aid for children. This product will be sold in batches of 2-5 to clinics and nursery's which will be referred to as WizzyHubs throughout this report.

High Income

Affluent users will have the option to privately purchase the WorldWizzy Pro which is a slightly higher specification version of the WorldWizzy. It will be sold at a mark-up to the subsidise the WorldWizzys.

Existing Powered Mobility Market

Finally, the control system present in WorldWizzy will be sold as a sperate product called Wizzy Control Systems. It will be supplied to developed countries as a disruptive alternative within the powered mobility market, undercutting the price of current products. This is summarised in Table 3.

Table 3 Summary of Product Streams

Product Line	Product Description	Target Customer	Customer Description
WizzyWorld (WW)	A functional powered wheelchair designed to meet the base requirements of the consumer.	WizzyHubs	Institutions like nurseries, clinics and community centres. Allow children with disability to access the WW product for free in the company of their peers.
WizzyWorld Pro	Longer-lasting batteries and additional customisation option.	Individuals	WizzyHub user that is financially capable and willing to purchase a WW to take home.
Wizzy Control Systems	Modular control system of WW can be integrated on other powered mobility devices.	Powered Mobility Companies	Powered Mobility companies that outsource their control systems. An example of this is Designability.

2. Management

2.1. The Team

Business roles for the WorldWizzy™ team were selected based on past experience and can be seen in Table 4.

Table 4 Team Role Breakdown

	**Oliver Holmes** Project & Sales Manager - PM role at world's largest telecommunication company. - Work experience in branding and advertising
	**Tuo Sang** Business Manager - Fundraising experience for charities - Research project management experience
	**Kinkit Wong** Product Manager - Project design engineer at BOSCH - Client design work
	**Annie Smith** Marketing Manager - 2 years as a charity representative for the Royal Air Force - STEM Ambassador
	**Daniel Platt** Operation Manager - Operational experience at an industry leading FMCG - Experience dealing with external suppliers and contractors
	**Ian McFaul** Finance Manager - Studied business processes for engineering - Extensive use of forecasting spreadsheets in industry

2.2. The Organisation

The organisational structure can be seen in Figure 2. The roles highlighted in orange represent the workers who will be based in India, with the remaining staff based in the UK. It is assumed that the team members in the second tier are trustees and do not have a salary.

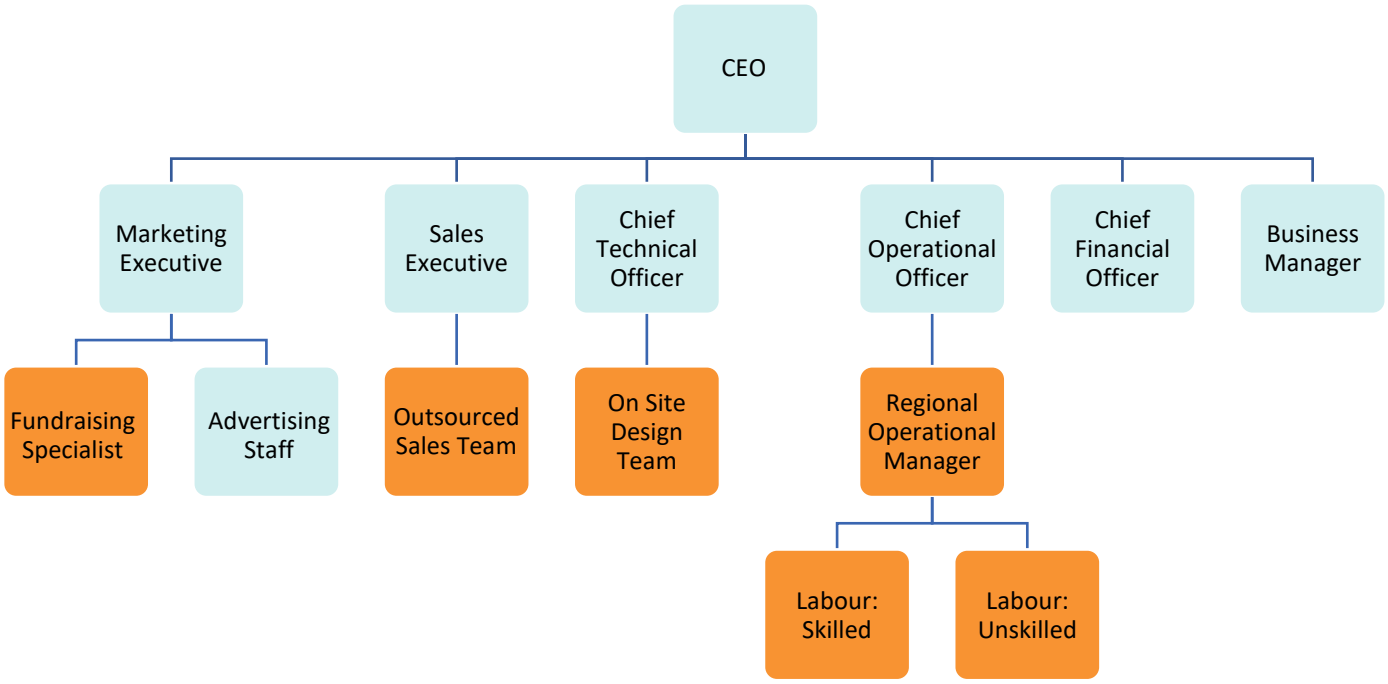

Figure 2 WorldWizzy™ Company Structure

2.3. Legal Structure

WorldWizzy™ will operate as a charitable company, referred to as a Section 8 company in India (Ministry Of Corporate Affairs, 2013). Registered under the Companies Act, 2013, a section 8 company must invest all profits into development of its products or services.

Being a section 8 company will allow WorldWizzy™ to have limited liability, be able to own properties, recruit staff and contract partners under the company's name. This cannot be achieved as a charitable group or a trust (Jain, 2017).

As a charity in India, there is heavy reliance on donors and CSR partners. It is the responsibility of the company to utilise the donations efficiently to benefit children with disabilities. Charitable integrity will be strictly enforced, with the financial report made public every quarter.

3. Product and Service

3.1. Executive Summary

WorldWizzy is a new, low cost, powered wheelchair tailored for India's environment and culture. It can be adjusted to securely seat the wide range of disabilities which make up the majority of the target market.

3.2. Description

WorldWizzy is a multi-environment accessibility aid that provides independent movement for children who are unable to achieve it themselves (Figure 3). It is tailored to India's culture and will be the first electric wheelchair for preschool children in the market. WorldWizzy will not only aid the child in achieving independent motion, but increase their social acceptance, aiding cognitive development of the child as well as altering negative perceptions of disabilities in India due to Hindu beliefs.

Figure 3 CAD Render of WorldWizzy

3.3. Unique Selling Point

Low Cost

WorldWizzy has many cost saving measures such as use of inexpensive materials and manufacturing methods (Appendix 3.1). This resulted in a product cost of £350, more than 85% less than similar products seen in the UK such as the WizzyBug (£3,500) and the Bugzi (£4,800).

The largest cost reduction was in the user interface. The design maintained only the core functions required which, along with the control system being manufactured in house, saved significant costs.

Cultural Influence

Hinduism is the religion of 79.8% of Indians (The Hindu, 2018) making it a major cultural influence in the nation. WorldWizzy uses religiously symbolic colours such as saffron, meaning purity, and blue, meaning the ability to deal with hardship. This will allow the WorldWizzy to better assimilate into Indian culture and become a more culturally accepted device.

WorldWizzy features a user assembled, flat-pack design to take advantage of India's make and fix culture in reducing costs (Appendix 3.2). It can be assembled using hand tools which allow for replacement parts and repairs to be easily carried out.

Social Interaction

On either side of WorldWizzy, the 'Play Panels' are meant for communal decoration (Appendix 3.3). Children are encouraged to decorate these panels together with paint and board markers in order to improve the approachability of the product.

A design styling guide was used to ensure the product looks unintimatating and fun to play with, more like a toy than an accessiblity tool. It has been ergonomically designed to ensure that the user remains at eye level with their peers allowing for more personal interactions.

Wizzy Hubs

WorldWizzy will be delivered to WizzyHubs in minimal cardboard packaging. This packaging can be folded into a 'garage' for the WorldWizzy, storing decoration utensils and charging facilities (Appendix 3.4). It can also be folded into an obstacle and allowing children to play with WorldWizzy in diverse ways.

WorldWizzy Pro

The 'WorldWizzy Pro' has additional, non-essential features that are sold for a profit. These include different 'play panels' and motor covers (Appendix 3.5). It also has improved battery life, ideal for longer usage around the house and travelling.

Wizzy Control System

The user interface sub assembly will also be sold separately to mobility companies who require an affordable control system. It will be sold at £140 which will generate revenue to subsidize WorldWizzy to consumers who can't afford it.

3.4. Standards

In Appendix 3.6, the standards used to guide the specification requirements within the design specification can be found. The two most significant standards were EN12182 and EN12184, both of which concerned adult mechanical and electric wheelchairs. Most standard requirements do not account for wheelchairs for young children, hence, they were abstracted to suit the current product. Other standards such as ISO 5349-1 and other safety standards were followed strictly.

3.5. Market Readiness

Hinduism teaches that disability represents 'divine justice' resulting from negative karma in a previous life (Ali Baquer, 2017). This negative connotation is slowly being phased out of more forward thinking urban areas, therefore the acceptance and need for an electric wheelchair is slowly growing, especially since there are no equivalent devices currently available to preschool children.

The Indian Government has invested heavily into technology and how it could benefit India's society. The 'IMPRINT' initiative, for example, aims to adopt, 'engineering and technology as a vehicle to address … social needs' (India, 2015-18). WorldWizzy will be considered as a technological advancement and therefore be welcomed into society with aid from the government making for an easy introduction into the market and a supported growth (Figure 4). Due to its improved specification, the WorldWizzy Pro can be sold as a luxury good, taking advantage of India's luxury market.

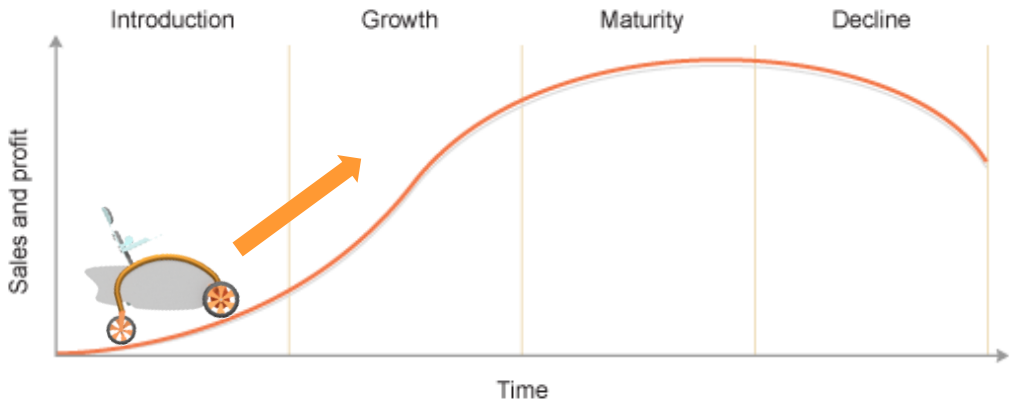

Figure 4 Lifecycle of Powered Mobility in India

3.6. Applications

WorldWizzy support features can be adjusted easily with one hand (Appendix 3.8). Due to the large variety of adjustable positions, children with disabilities described in Appendix 3.9 can be seated securely within the chair with correct posture. These disabilities make up the majority of those found in India, according to market data and first-hand data from a paediatric orthopaedic surgeon in Mumbai (Nagda, 2018). Hence, WorldWizzy will be applicable for most of the target market.

3.7. Service and Support

WorldWizzy is designed for an 8-year lifecycle. There is no warranty associated with the product, hence repairs must be paid for by the individual or the institution. The manual given contains an assembly and repair guide for components that can be repaired by the user. These components are stated in Appendix 3.10.

Once WorldWizzy has sustained functional damage, the institution can easily contact the company via the e-mail given in the user manual. Once the broken components have been identified, new components can be sent to the institution.

The repair work is done by staff at the institutions, taking advantage of India's make and fix culture. Tamper proof measures have been implemented into components that presented danger to the user, such as the electronics and the battery. If damages are to components outside of the ones listed in Appendix 3.10, the institution would be advised to dispose of the components safely according to the 'Disposal' instructions in the user manual.

3.8. Comparison with Competition

There are no established powered mobility providers in India, thus no direct competition. However, the company aims to target a world-wide audience in future expansion. Hence comparable products across the world are considered as possible substitutes. Due to the charitable nature of the business, these substitutes are not considered hostile and rather a partner in solving a common issue.

Most substitutes follow a similar charitable ethos such as 'Designability' and 'MERU' who provide their products for free on a loan scheme. A brief description of competitor products can be seen in Appendix 3.11.

The most comparable competition is a company called 'Go Baby Go' which originated in America and has spread to New Zealand and other countries. 'Go Baby Go's design ethos is to create a toy for all that can be modified to suit a child with a disability. By doing this, they can take advantage of economies of scale and sell their product (a modified ride on toy car) for a low price of £200. Despite the low price 'Go Baby Go' achieves, it may be difficult to implement in a developing country due to the reduced demand. Coupled with this, the WorldWizzy™'s current distribution plan, of giving accessibility solely to children with disabilities, is far more impactful to India's challenging culture.

Competitors to Wizzy Control Systems are far more expensive and offer features that are often not required. Wizzy Control Systems is simplistic and is easier for younger children to understand, filling a gap in the market.

3.9. Proprietary Position

WorldWizzy currently contains multiple innovative features (Appendix 3.12) in the field of electric wheelchairs for pre-school children hence a patent can be applied for.

The costs incurred from obtaining a patent is substantial. Initial filing of patent applications in India require a minimum of £1500 depending on the number of claims and pages of the patent (this excludes patent renewal fees). Moreover, there are considerable legal costs in dealing with businesses infringing on design patents.

As stated in the executive summary, the charity's purpose is to provide as many WorldWizzys to children in need across the world. Whether it be through WorldWizzy™ or other companies mimicking its design at a cheaper price, both would be beneficial to those who need it. Hence, obtaining patent protection may hinder the charity's purpose and is not required. However, WorldWizzy™ must trademark their company name and logo. The need for this is further discussed in section 4.

3.10. Future Product Developments

The company plans to accumulate market data concerning the use of the WorldWizzy via interviews and focus groups with customers. The data collected will be used to iteratively improve the design for the Indian market, following a user centred design methodology. Possible improvements may include having data feedback from the product back to the company headquarters to understand the use of the product. Areas of improvement have been theorised in Appendix 3.13. A design team will be based in India to develop these concepts and bring them to market.

4. Marketing

4.1. Executive Summary

The marketing is targeted towards three customers; the child, the parent and the Hub. The urban market will be penetrated to optimise their high population density with consumers being targeted through social media campaigns, websites and from the word of mouth of users and medical professionals. The charity will be advertised to high value donors through the company website and pitches, demonstrating the value WorldWizzy has in this new market.

4.2. Customer Description, Needs and Benefits

The clients fall into 3 categories. The primary focus is advertising the product towards the child who acts as the consumer. The parents and the Hub owners are the customer. The business model is marketed to the parents, who purchase the WorldWizzy Pro, and the Hub owners who purchase WorldWizzys. Research has been carried out to generate three user profiles for each of these personas to gain a greater understanding of the clients identified and can be seen in Appendix 4.1. The users who have been identified are based on research into the culture and society, references for which can be found in Appendix 4.1.

The customer needs have been considered using the user profiles, however, it has been further summarised in Appendix 4.2 alongside the benefits the customer receives by acquiring WorldWizzy. The largest number of benefits are to the child rather than the parents or Hubs. This is because the product is primarily aimed at them and is provided by the parents and Hubs. The benefits include their freedom, socialising and independent decision making. Primary needs which are present through all the customer profiles are the safety and enjoyment of the product. All the benefits will be apparent during the marketing campaign, using buzzwords such as independence, enjoyment and laughter to attract the attention of the target market and potential donors.

4.3. Market Segments, Size and Growth

Market segmentation has been carried out to select the main marketing focus and target market. It compares the level of urbanisation against the amount of disposable income (Figure 5). The largest volume of people are those living above the poverty line in big villages. However, the population density in rural regions is below 400 people per square km (Census of India, 2011). Urban regions have a much higher population density, such as Mumbai which has of 30,900 people per square km. Hence, more people will be reached per Hub if the urban market is targeted (Cox, 2012). As a result, the small towns and big cities above the poverty line have been chosen as a starting point to launch WorldWizzy, a market of 130,000 children (World Bank, 2018). Despite the target market being urban and above the poverty line, their disposable income is still low, so the product must be as cheap as possible.

The target markets of the Wizzy Control Systems are based in North America, Western Europe, Japan, South Korea, Australia and New Zealand. These countries have a total population of 1 billion (Worldometers, 2018) which results in a total market size of 4.5 million users. It is assumed that Wizzy Control Systems will control 0.25% of the total market, accounting for 11,250 people. Growth in the mobility aid market is predicted at 9.2%, so this will be applied thereafter (GrandViewResearch, 2017).

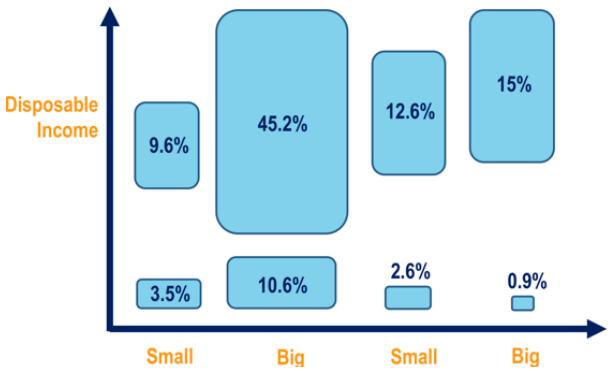

Figure 5 Market Segmentation

4.4. Marketing to the Customer

Attracting the Target Market

The focus of the marketing section is the promotion of WorldWizzy to the users. 86% of people in urban India own a phone, with the majority of those being smart phones (World Bank, 2018). As a result, social media will play a large role in the advertisement of WorldWizzy through online campaigns and creating links with users. Furthermore, Bollywood has a large impact on popular culture, with Actors and Actresses being viewed as heroes. Actors such as Salman Khan, who supports children requiring heart surgeries, have been known to have a big charitable impact (Mankame, 2016). It is hoped that their status can be used to aid the promotion of WorldWizzy. Other promotion sources will include word of mouth from communities which use WorldWizzy and through medical professionals who may receive commission for suggesting WorldWizzy. 4P analysis was carried out and can be seen in Appendix 4.3 to justify the promotion against the price, place and product which are also covered in more detail in the relevant sections of the report.

Trialling WorldWizzy

WizzyHubs are likely to show some resistance to adopting WorldWizzy so to make this transition fluid, the company will be setting up demonstration Hubs. An approximate cost of £16,000 has been calculated to run WizzyHub for one year in Mumbai with four trained members of staff as shown in Appendix 4.4. Once there is an uptake and the interest in WizzyHubs grow, the new institutions which decide to run them will become the advertising platform and the demonstration Hubs will be shut down.

It is imperative WizzyHubs are maintained to a high quality. This will be achieved by distributing instructions on how to run fun and engaging sessions, supported by a series of YouTube videos. The company's outsourced sales team will be setting up meetings with institutions and demonstrating the product in person.

It is expected that the majority of the direct to consumer sales will result from children enjoying their time in Hubs and wanting to bring this into their own home. To facilitate this, flyers will be used as advertisement within the Hubs detailing the product and its retail information. Video platforms such as YouTube aid the transition from Hubs to individual use with tutorials, advertisements and the release of new product variations or add-ons. An advertising manager will be hired at a cost of £25,000 per year to oversee this operation (Total Jobs, 2018).

Marketing to the Public

The company's successes will be heavily publicised on social media to reassure the public their money is going to good use. Donors will know which specific WorldWizzy they have donated towards and how many people are benefitting from it. This will be done using social media updates and bi-annual newsletters or emails. This has shown to be a success in other charities such as ActionAid and World Vision who allow donors to sponsor a child and see their progress. This will help public donors to see the real impact they are having, encouraging them to continue their support or make others aware of the charity. The company will use their USP of being the first of its kind within India to promote sales.

Marketing to the High Value Donors

High value donors will be targeted through the legal requirement that companies with an annual revenue of 10bn rupees or more (approx. £105m) must legally donate 2% of their profits to charitable causes. The government also encourages them to get involved with their charities rather than just giving money away, which could be used to our advantage. Fundraising executives are being hired and will be sent to large corporations to pitch the prospect of donating to the company. They will use social media to demonstrate how WorldWizzy can change children's lives and pitch the prospect of moving the charity globally.

Once partnerships have been established, they will be used as examples to other potential donors to show the impact supporting WorldWizzy can have on children and families. Companies who aid the promotion of WorldWizzy will have their brand represented within the social media campaign and be advertised in newsletters sent out to public donors. It will be made known to the large corporations that they will be subsidising the costs of admin for the charity so that

more of the public's money will be going directly to WorldWizzy manufacture, essentially aiding their public service image and reputation.

The company will attempt to associate with larger, well branded charities. This is not with the intention of gaining their money but rather to make use of their expertise. They have vast advertising platforms which can be used to establish the company brand and accelerate the process of becoming a household name.

4.5. Marketing to the Stakeholders

Stakeholder analysis has been carried out and can be found in Appendix 4.5. In order to make the project a success amongst all stakeholders, their interest in the company has been considered and their power in making it a success has been analysed in order to prioritise actions. It shows that manufacturers and workers are easily replaceable due to the simple design requiring low skilled workers, however, the business donators are critical to the success of this project due to the large start-up money required. Furthermore, the children, parents and Hubs must be satisfied for the project to be worthwhile.

4.6. Competition Analysis

There is currently no competition for the company within India and ultimately it is breaking into a new market. WorldWizzy is optimised around low cost so without cheaper labour or local sourcing and manufacturing, it would be difficult to sell a product of the same specification at a cheaper price unless they operated in a monopoly and have high economies of scale.

The ultimate goal is to provide powered mobility to every child that needs it, therefore potential rivals are more likely to be seen as partners. Although they will be monitored; the aim would be to cooperate with them to make the pledge a greater success.

The harmful competitors are profit making organisations rather than other charities. If WorldWizzy is a success, companies will likely want to make money from it. The company brand name and logo will be trademarked at a small cost of £99.30 (9000 rupees). This will protect them from the association with other companies and their potential faults using the non-patented WorldWizzy design (Intellectual Property India, 2018).

With only a trademark, rivals would not be limited by the boundaries of design, however, as the company operates as a charity, they are not looking to make a profit, therefore they will have less money going out on the employees and potential shareholders who will want to see a turnover. This allows the product to be sold at a lower cost, hindering potential competition nonetheless.

The social benefit of Hubs makes WorldWizzy particularly appealing to the user. The risk of other charities attempting to undercut WorldWizzy is low due to the partnership with larger charities and the protection of their reputation. Porter's 5 forces have been carried out to consider the threat from competitors which will cause a hindrance to the USP of being the only one of its kind in India (Appendix 4.6).

4.7. Marketing Risk Mitigation

PEST analysis has been carried out and can be seen in Appendix 4.7, the key features were identified as the popular culture among children constantly changing and the lack of patent on the product. Scenario planning was carried out to minimise the risks associated with these and the chance of this reducing the company's public image. This can be found in Appendix 4.7. A SWOT table can be seen in Appendix 4.8 which assesses the company's strengths, weaknesses, opportunities and threats. The main outcome shows that the unpredictable nature of charitable income is the largest threat, while good public perception and charity cooperation is the largest strength. These will be taken advantage of through the marketing campaign.

5. Sales

5.1. Executive Summary

The primary target market consists of existing nurseries, pre-schools, community centres, and clinics and the secondary target market will be consumer focused (Direct to Consumer (D2C)). This project prioritizes high distribution levels with minimal income discrimination, achievable via fast and sustainable growth.

Sales to nurseries, pre-schools, clinics and community centres will be facilitated via outsourced, local sales agents. This product will be subsidised (retailing at £350) and be branded as WorldWizzy. Sales directly to consumers will primarily be through private medical practices and be sold at a 100% mark up. To justify this margin the product will be branded as WorldWizzy Pro and come with styling options and a higher performance battery.

Sales of WorldWizzy in India are expected to reach approximately 1500 by year five and 3600 by year 10. The largest risks to the company's sales strategy are misrepresentation due to insufficient communication with sales partners, however this will be mitigated via regular visits and video conferencing.

5.2. Distribution Channels

For distribution to WizzyHubs it is intended to contract regional sales agents, utilising their local knowledge, low labour costs and ability to demonstrate the product in person (Appendix 5.1). The cost of outsourcing sales to a developing country ranges between £4,000 to £6,000 per agent per year (Staff India, 2018) + 25% for overheads (e.g. travel expenses). A value chain analysis (Appendix 5.2) was performed to compare the benefits of outsourcing primary and support activities. This highlighted shipping and sales agents as being suitable for outsourcing and component manufacturing as being suitable for partial outsourcing. Outsourcing primary sales maintains the company's product design and operations focus while facilitating quick, low risk, global sales expansion. The WorldWizzy will be sold with a 10-working day lead time allowing the product to be assembled to order, saving on storage cost and minimising financial exposure.

D2C distribution will primarily be done via private medical practices capitalising on India's growing, urban, private healthcare sector (Bhattacharjee & Mohan, 2017) and their access to wealthier individuals. This strategy utilises doctor's high consumer influence and their ability to professionally assess the needs of the child. It is assumed that medical practices will work off a 15% commission (O'Connor, et al., 2016).

Finally, both the WizzyHub and D2C product will be available via a multi-lingual, e-commerce website costing approximately £1,500 (Jordan, 2018). This will be managed in-house for maximum managerial control. It is assumed that sales from this website will predominately stem from individuals who have experienced WorldWizzy at WizzyHubs.

5.3. Revenue Strategy and Pricing

Appendix 5.2 compares potential revenue streams, several of which were combined to form the company's revenue strategy. Sales to WizzyHubs will be subsidised by approximately 15% (priced at £350). This is possible due to the profits from the control unit and D2C sales. Maintaining a low price should maximise the rate of adoption, making the product as accessible as possible. A demand curve (Figure 6) was approximated for the Indian 'Hub' market by applying a standard demand curve shape between the price of Designability's current product 'WizzyBug' which could potentially occupy 1% of the market (from an interview with Designability) and a popular Indian manual wheelchair which saturates the market (Senior Shelf, 2018). This was used to estimate that, at WorldWizzy's sales price and when fully saturated, 75% of target consumers will have access to a WorldWizzy in urban WizzyHubs.

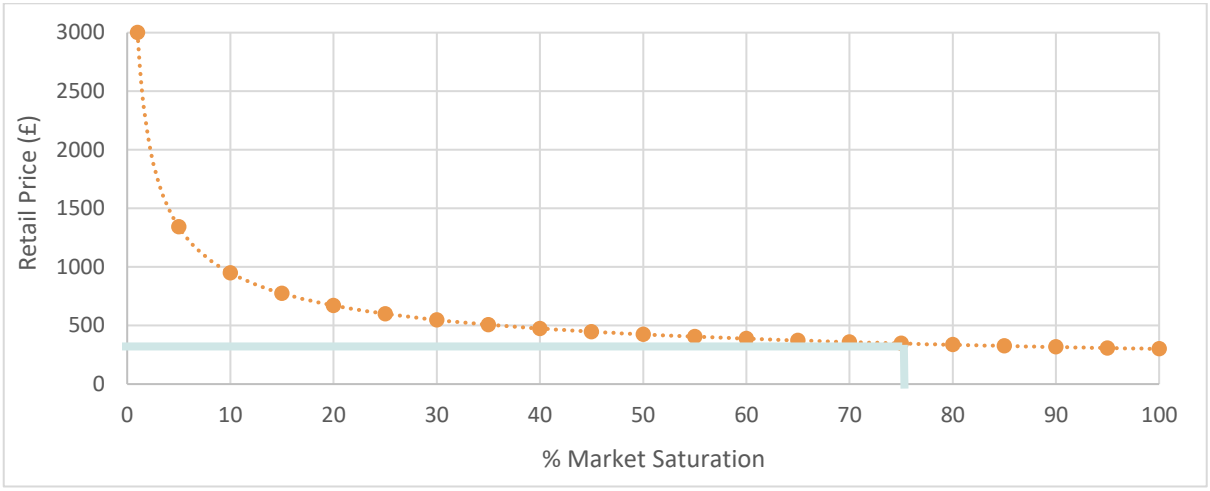

Figure 6 Demand Curve for WorldWizzy in Expanding Indian Hub Market

The D2C WorldWizzy will be sold at an 83% margin (£750) and the product will be sold as a luxury item (it is assumed that all D2C customers have access to a WizzyHub). This price was selected by comparing WorldWizzy to a similar product and adjusting for product and market differences (Appendix 5.3). Pricing up the demand curve (PUDC) will contribute an additional 25% revenue by selling optional, non-safety-critical accessories such as play panels, lights, horns and paint variations.

Fundraising will be sought to aid the company's expansions strategy however expansion will primarily be funded via large charitable donations from business partners (to be further discussed in section 7: Financial Analysis) capitalising on the growth of cooperate social responsibility both globally and especially in India (CSR) (Sahlin-Andersson, 2006).

5.4. Sales Forecasts

A fourteen-year sales forecast was approximated for the initial Indian market (Figure 7). This was based on market demand figures (Appendix 5.4) and a roll-out strategy which initially targets regions near factories (Appendix 5.5. & Appendix 5.6). It was assumed that one WorldWizzy will be shared between five children throughout the week, and that once sold into regions, it will take ten years of linear sales to reach full saturation. It was also assumed that for every five Worldwizzys sold (i.e. for every 25 children that have access to one) an additional one would be purchased by an individual. A detailed sales forecast for Hubs and D2C sales can be found in Appendix 5.7. These sales forecasts are pushed by market demand and assume sufficient fundraising and working capital can be achieved.

Wizzy Control Systems will be sold at £140 to an initial market of 11,125. The market growth is 9.2% which aligns with industry predicted growth within mobility devices. Sales of Wizzy Control Systems will have a minimum order quantity of 100 and companies will receive reductions for larger orders.

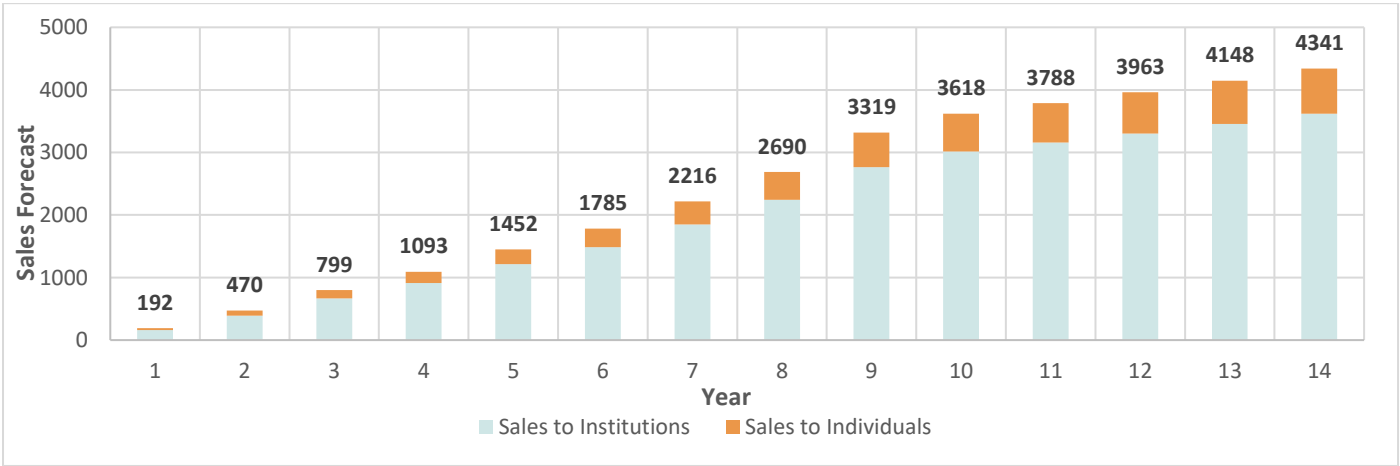

Figure 7 WorldWizzy Sales Forecasts for India

Sales Team Requirements

Sales team requirements were estimated (Table 5) based on assumptions that at full capacity, one sales-person will be able to sell 400 Worldwizzys per year and that when operating in a new region (N/E/S/W) the sales team will sell at 50% in Y1, 60% in Y2, 80% in Y3 and 100% thereafter.

Table 5 Indian Outsourced Sales Requirements

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Staffing	1	2	3	4	5	6	7	8	9	11	13	13	13	13

5.5. Branding Strategy

As the product will be sold into two different markets (Hub's and D2C) at two different price points, the products will be sold under different names. WorldWizzy will be the name used for the company and name of the product sold to WizzyHubs whilst the D2C product will be sold as WorldWizzy Pro. WorldWizzy Pro will be advertised as a luxury, capitalising on India's growing demand for luxury goods and be advertised as subsidising the Hub product.

To promote a respectable and cohesive brand, medical approval and user testimonies will be sought and all the WorldWizzy products will be emblazoned with the company website URL and logo (Figure 8).

Figure 8 WorldWizzy CAD Rendering with Branding

5.6. Major Risk Assessment & Contingency Planning

The primary sales risk was identified as product misrepresentation due to communication issues with the outsourced sales partner. This could open the company up to legal liability so to mitigate this £3,000 has been budgeted for overseas business trips. Additional risks were also identified using a risk register and highest priority risks were assigned a contingency plan to mitigate them (Appendix 5.8).

6. Operations

6.1. Executive Summary

The operations section of this report details the key sections of the development and implementation process for the WorldWizzy product. This process is broken down into the sections detailed in Figure 9, it also shows how every stage leads back to further development work. This section also contains an overview of costs and some potential future developments to aid with global expansion. The product will be manufactured locally and distributed through outsourced logistic companies.

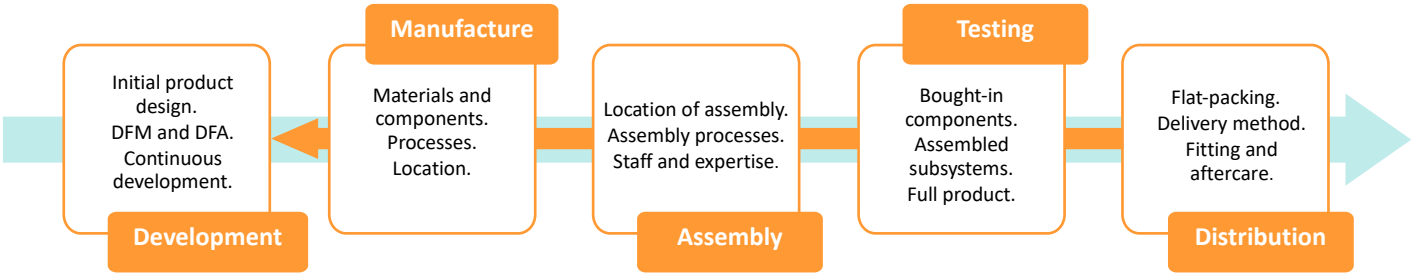

Figure 9 Product Development and Implementation Process

6.2. Design and development

Following the completion of the initial design phase carried out by the current design team, an intermediary stage of DFM (design for manufacture) and DFA (design for assembly) will be carried out to reduce production costs (Stienstra, 2013). The DFMA stage design work will be done by on-site team in India that will work in conjunction with staff in the UK. The on-site design team made up of local engineers will have more development control gradually transferred across to them as the production process continues. The on-site team will also be responsible for the continuous improvement and modification to the product and processes. By basing the team on-site, more local knowledge and contacts can be utilised compared to a UK based design team, as well as an 87% reduction in labour costs, and fewer logistical problems (Appendix 7.1). As the CSR partners are (William Armstrong, 2008) encouraged to provide more than just financial assistance, having a local design team will mean more opportunities for knowledge sharing. The proposed Gantt chart can be viewed in the Appendix 7.2 for the entire process. More detailed information about the DFM and DFA is covered later in this section.

Estimated production

The sales figures in Figure 7, provided a forecast for the production quantities of the product required to meet demand. Analysing the level of production quantities influenced the DFMA process as it guided the type of machinery, level of automation, and expertise of labour that will be required. From the analysis, the manufacturing will be low volume (<6000 units per annum) which may change as geographical expansion occurs. Precisely how this has affected the production process is detailed in the manufacturing and assembly sections.

6.3. Manufacture of components

With no pre-existing facilities or equipment to be based in or maximise use of, the production team will have to balance initial expenditure with future efficiency. Three potential sources for components will be; in-house manufacture, subcontracted manufacture, and off-shelf. The benefits and risks associated with each are detailed in Appendix 6.3.

After evaluating the options, a combination of the 3 sources will be used to maximise the benefits of each source while mitigating their risks. A breakdown of component sources and the general reasoning behind each source decision can be found in Appendix 6.4

Process and Equipment

To estimate the requirements for the in-house manufactured components (Appendix 6.4), the required processes, machinery, cycle times, materials, and manufacturing staff have been obtained. This was done through research into

appropriate source materials, comparisons with similar existing components, technicians, external experts, and suppliers for the relevant equipment (William Armstrong, 2008). A breakdown of the required equipment and estimated cycle times are shown in Appendix 6.5 with an estimated cycle time of 4.2 hours per product. The specific requirements for each process, the level of experience its operators required, and the footprint led into the selection of the initial site section 6.6.

All the machinery is either manual or semi-automated which is a conscious decision due to the low volume of production, as it reduces initial costs (for the pipe bender £138.21 vs £6921.26), training times, and maintains flexibility for component changes. The DFM design that will occur aims to ensure the manual processes are as efficient as possible to reduce scrappage and cycle times. Rather than using precise measuring tools, jigs (Appendix 6.6) are to be designed to reduce error and simplify processes. The increased simplicity also allows for the use of lower skilled labourers, broadening the recruitment pool and opportunities for volunteer labour (Rohwerder, 2018).

The low skill, manually intensive processes will require more workers than fully automated equipment, increasing overall labour costs but due to the low wages in India this is a saving over high capital expenditure. A benefit of employing more local people, that may otherwise struggle for regular work, is that the company will likely increase acceptance of the product and children with disabilities.

Supplier relations

Outsourced components and off-shelf products will be bought from local suppliers, when feasible, to reduce lead times and delivery costs (which are high in India Appendix 6.7). All off-shelf parts and raw materials use standard geometries and configurations to reduce costs and provide a more robust supplier network. This also ensures that replacement parts are available to consumers if the company is unable to supply them, which will increase product lifetime and reduce the high (75%) abandonment rates for un-repairable assistive aids (Rohwerder, 2018).
(Rohwerder, 2018)

By partnering with a major manufacturing company as the CSR funder their supply chain would be leveraged to the benefit of the product, either through buying their components for cost (with their donation), having them donated, or by taking advantage of their EOS for common parts. A list of potential suppliers and CSR partners with synergies is provided in Appendix 6.8.

6.4. Assembly

Like the manufacturing, the assembly is going to be moving station manual/semi-automated, this will increase the level of flexibility of the assembly line and reduce initial capital expenses. There are added benefits such as; re-distribution of workers to relieve bottlenecks, and multiple configurations of product being made by the same assembly line. A linear assembly line design along with assembly jigs will be used to simplify the process. The dimensions of this assembly line also fed into the selection of the site of the manufacturing plant. Once production quantities increase, and in line with the geographical expansion, the manufacturing will remain at the initial site, but assembly lines will be set up in more convenient 'nodes' closer to customers Figure 10. These nodes will employ local people and help to boost our profile in the new location.

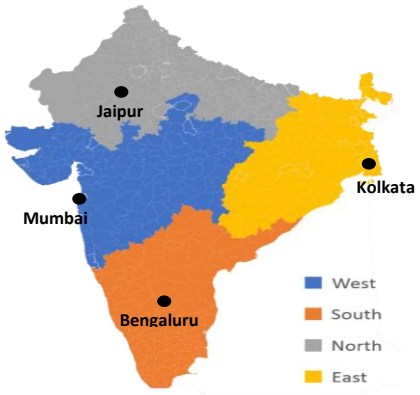

Figure 10 India's Regional Manufacturing Nodes

6.5. Testing

As this product is aimed at children it is vital that stringent safety measures are followed. The testing will be carried out in phases to reduce the time it adds to the production process and reduce waste through early detection. The raw materials and components that come into the facility will be inspected by visual testing technicians for obvious flaws Appendix 6.10. The electronic components will be vetted through a pass-fail system and be CE marked using the necessary equipment before being assembled into subsystems (Appendix 6.12). The in-house components will be

tested using basic measuring equipment to ensure their quality and reprocessed or scrapped (Appendix 6.13). Once assembled into subsystems further pass-fail tests will be carried out before delivery to a customer Appendix 6.15. Random spot checks of fully assembled products will be performed at each assembly site. The tested products will then be disassembled, and the parts re-used if possible. If an issue is highlighted, a review processes will be carried out to determine the root case and actions will be taken to rectify it.

6.6. Delivery

Our initial target market and infrastructure research into India led to the sales strategies detailed in Section 5. These strategies and further research into costings and logistical issues led to outsourced local road couriers being chosen as the delivery method Appendix 6.9 & 6.15. While more expensive than rail or sea freight, the benefits having one company pick up deliver the products and more the greater coverage of the market areas led to their selection. This decision of outsourcing delivery led to the design of the product being 'flat-packed' (appendix 6.14) into subassemblies which are then assembled at institutions. By flat-packing, the size of the delivered subassemblies will be reduced by ≈70% in volume which lowers (Stienstra, 2013) overall delivery costs for the courier service (appendix 6.7).

The customer assembly is supported by online tutorials from the website and a user manual. However, a technician service is also offered, for an additional fee, to both the assemble and fit the product if the customer is not confident to accomplish this themselves (appendix 6.15).

6.7. Site Selection and Inventory

The selection of the intial manufacturing facility was guided by; manufacturing and assembly processes, potential CSR partners, and the location of the first sales team. Mentioned previously, local production is key to reducing costs and gaining synergies with invested parties, which led to Mumbai being chosen. Mumbai is a major manufacturing centre, with many national and multi-national firms headquartered there, and has plenty of suitable facilities and an experienced work force to draw from. An overview of the facility layout and location and is shown in Figure 11.

By operating at a 10-day lead time and using local suppliers, storage facilities were minimised as production could react to sales after they were made. The amount of stock in holding will be reduced through sales predictions for components that require bulk purchasing.

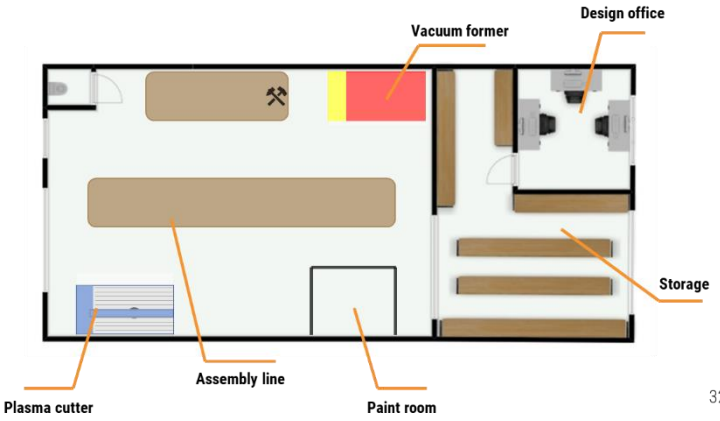

Figure 11 Preliminary Site Layout

6.8. Future production

When global expansion occurs, the local manufacturing and assembly using local suppliers will be started up in the new markets. When moving to new locations it is also the aim to make use of locally abundant materials and expertise, so changes may be made to the design to accommodate for that Appendix 6.16. Mass production facilities for components that are common across multiple designs may be considered to lower costs and larger EOS should mean better prices for bought-in components.

7. Finance

7.1. Executive Summary

As a charity the success of the company is measured by the its ability to help as many children as possible. This will be achieved through sustainable growth after receiving the initial start-up capital. An initial investment of £175k from CSR donation enables the company to expand throughout India and reach 130,000 children after 10 years. Money has been set aside to start-up in five further countries. The Wizzy Control System is a disruptive innovation in the powered mobility market, targeted at developed countries. It provides £2.5 million over the first 10 years of sales to reinvest in expanding and subsidising the base WorldWizzy.

7.2. Key Assumptions

- The company successfully receives £175k start up donation through CSR donation in Year 0.
- The predicted market demand will be met for the products at their current price
- Rate of Inflation has been taken as applied throughout due to the timescale of the project. It has been applied at 4%, the target rate of inflation in India (Bureau, 2016).

A full list of assumptions is available in Appendix 7.1.

7.3. Start-up Capital

In India, where the company aims to raise initial capital through CSR donations from companies, CSR spend was £2.63bn in 2016. This was a result of the 2013 Companies Act which mandated high grossing companies to donate 2% of profits to CSR. Capturing a small percentage of this would finance initial production and sales requirements. The company will require start-up capital of £65,000. The Wizzy Control System will require £110,000 to pay for injection mould plate tooling. This will prove harder to acquire and will likely need a large donation from at least one company. If the CSR donations do not eclipse £175,000 then priority will be given to starting production of WorldWizzy. If start-up capital cannot be provided through a large individual donation or crowdfunding, the control system will be bought in or the design will be adjusted for low-volume production.

7.4. Fundraising

It was recommended that fundraising staff are hired to seek public donations. A discussion with Designability showed that fundraising staff typically receive donations between 1.5-6 times their salary. Therefore, it has been estimated that staff will earn double their salary in their first year. They will develop their skills with experience to be able to quadruple their salary after 4 years. Figure 12 shows the projection of the amount of money the fundraising specialists will raise. The vertical dotted lines show the point at which a new member of the fundraising team is hired.

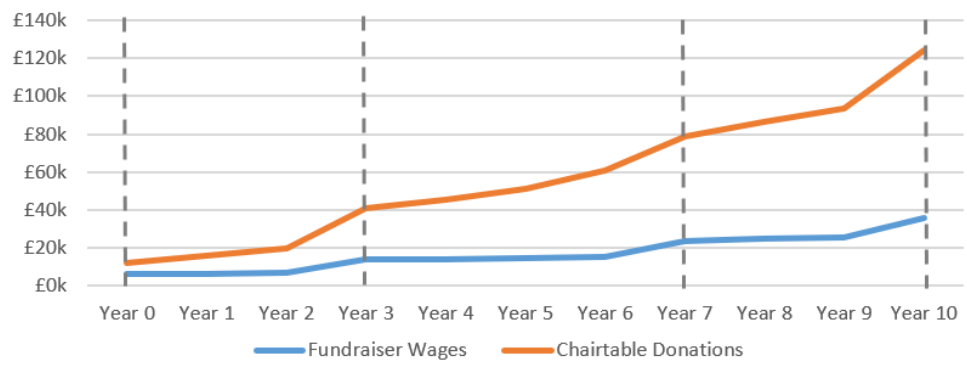

Figure 12 Fundraiser wages against the charitable donation they acquire

7.5. Cash Flow Forecast

The Cash Flow (Appendix 7.2) and the Expansion Plan (Appendix 5.3) were developed alongside each other to minimise the time required to expand throughout India. The Cash Flow Forecast for the first 6 years of business can be seen in Table 6.

Table 6 WorldWizzy Cash Flow for the First 6 Years

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Total Sales Revenues	£0k	£1,656k	£1,932k	£2,231k	£2,680k	£3,046k
Variable Costs	£0k	(£1,459k)	(£1,737k)	(£2,040k)	(£2,364k)	(£2,759k)
Fixed Costs	(£49k)	(£129k)	(£158k)	(£198k)	(£232k)	(£263k)
Delta Working Capital	£0k	£96k	£15k	£16k	£20k	£20k
Project Costs	£52k	(£4k)	£19k	£40k	£46k	£51k
Total	£3k	£64k	£56k	£33k	£129k	£76k
Cumulative Total	£3k	£67k	£123k	£157k	£286k	£362k

Product prices at product launch in 2020 are shown in Table 7. These will increase over time due to inflation of staff wages and component costs. However, by achieving economies of scale, WorldWizzy's price only increases at an average of 3% over 10 years. The working capital requirement is always positive as the customer pays 10 days prior to delivery and suppliers and staff will be paid 3 days in advance.

Table 7 Product Pricing at Launch in 2020

Product	WorldWizzy	WorldWizzy Pro	Wizzy Control Systems
GBP Price	£350	£800	£140
Selling Price	32,000Rs	73,000Rs	$190/€160

Wizzy Control Systems will disruptively innovate the powered mobility market in developed countries. It will target companies wanting a simplistic control system at a low cost, undercutting current control system providers. The marginal cost graph for Wizzy Control Systems shows the product cost settles at around £122 at volumes greater than 20,000 (Figure 13). The materials and bought-in component costs are the driving cost in the business. These costs decrease with volume due to economies of scale. The product cost only increases slightly when volumes slightly higher than injection moulding production capacity are eclipsed. Therefore, Wizzy Control Systems production volumes should be as high as possible.

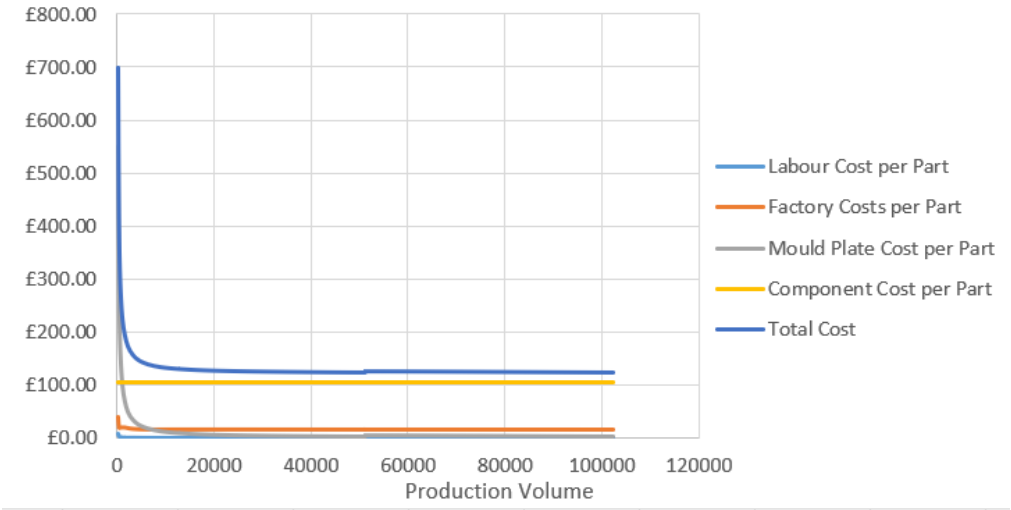

Figure 13 Marginal Cost Graph

7.6. Profit and Loss

The profits generated and profit margin for the first 10 years of production are shown in Figure 14. Any profits will be re-invested in the charity to subsidise WorldWizzy and expand the powered wheelchairs throughout the world.

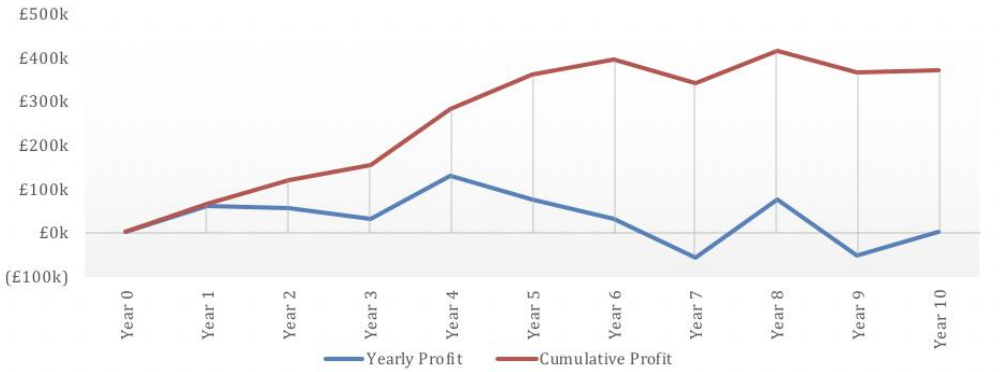

Figure 14 Yearly Profit and Cumulative Profit of WorldWizzy in First 10 Years

7.7. Principle Risks and Sensitivity

The potential risks to the company are detailed in Table 8. They have been ranked based on likelihood and severity to assess their potential harm to the company. A mitigation to each risk has been included for each.

Table 8 Risk Register

Risk	Result	Severity	Probability	Score	Contingency
Difficulty finding business partners	Insufficient growth capital	4	3	12	Seek advice from specialists and look at other sources.
Higher than expected demand	Insufficient working capital	4	2	8	
Lower than expected demand	Stagnant stock	1	4	4	
Initial WizzyHub insufficient advertising tool	Lower than expected demand	4	4	16	Maintain budget for other advertising (i.e. social media)
Outsourced partner management issues	Poor sales figures	3	2	6	
Outsourced partner communication issues	Poor sales figures	2	4	8	
Outsourced partner misunderstood product	Incorrectly advertised product (legal liability)	5	3	15	Schedule regular visits and conference calls from UK product team.

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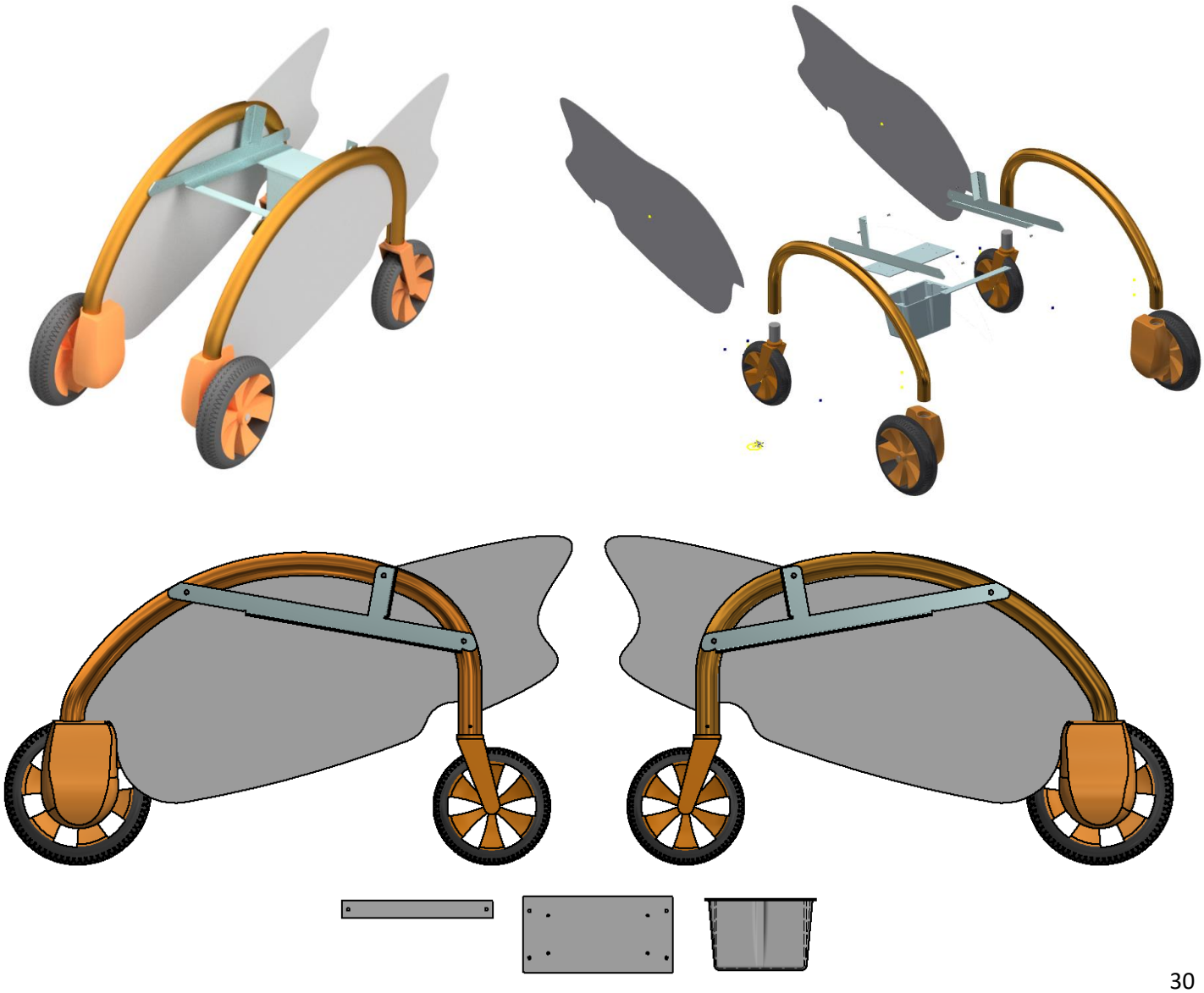
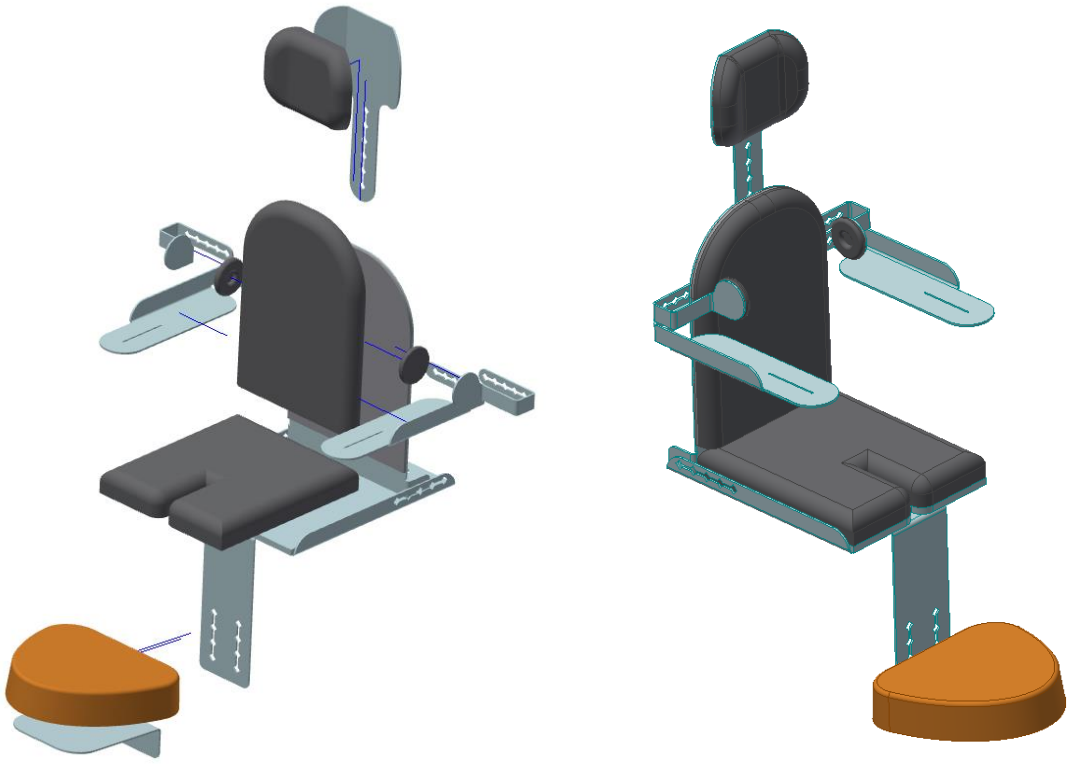
Appendices

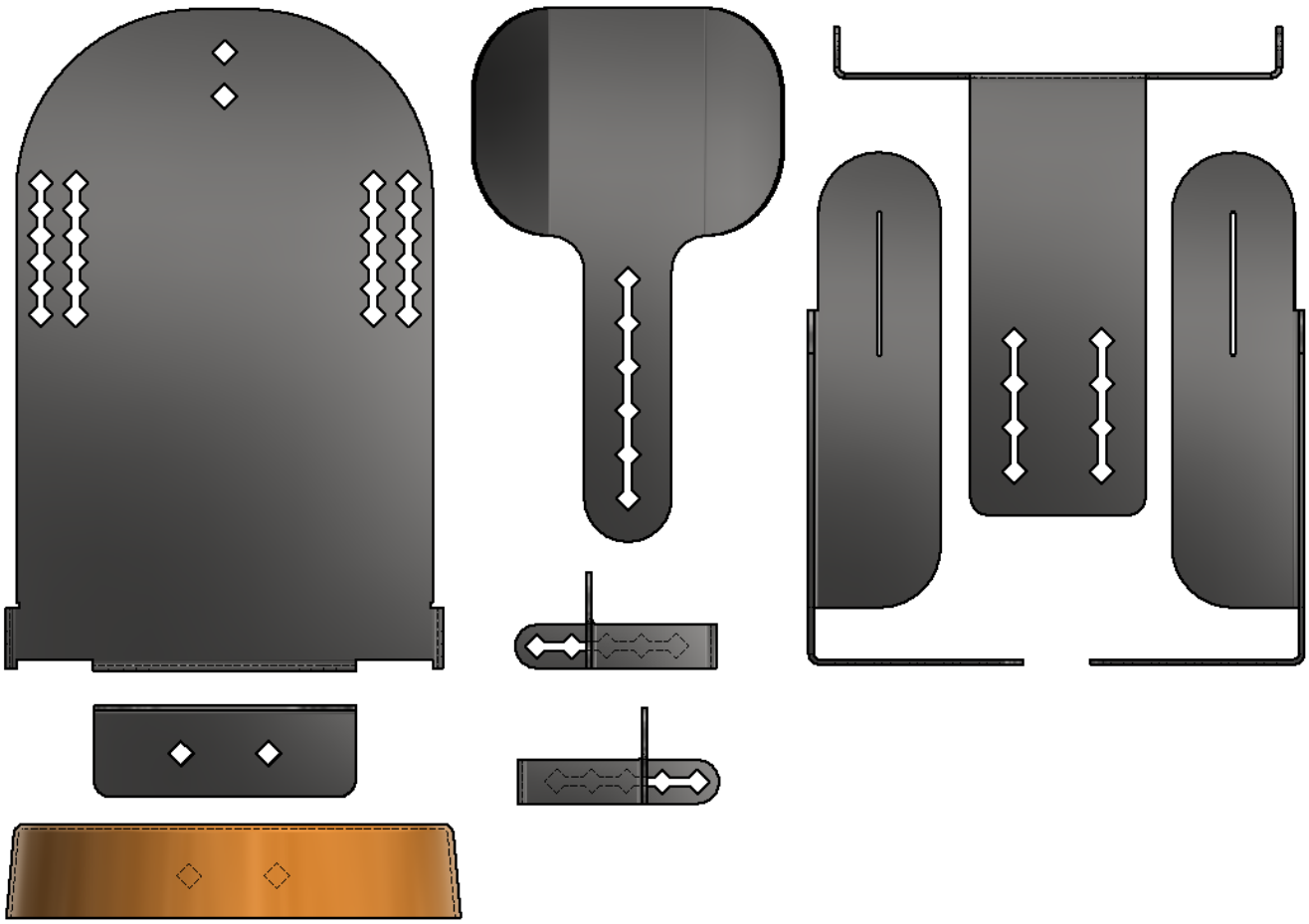
Appendix 3.1: Table displaying the main materials and manufacturing methods used in each sub assembly of WorldWizzy

Sub Assembly	Material	Manufacturing Method
Chassis	Aluminium	Pole Bending
Chair	Aluminium	Sheet Bending & Machining
Support Cushioning	Polyurethane	Bespoke
Harness	Nylon	Bespoke
Drive Train	Electronics	Bespoke
Battery	Lithium Ion or Lead Acid	Bespoke
Control System	Electronics	Wiring and Attachment
Styling	ABS	Vacuum Forming
	MDF	Laser Cut and Lacquer
	Customisation Elements	Bespoke

Appendix 3.2: Diagram of the separate components of each assembly that will be flat packed and sent to customers.



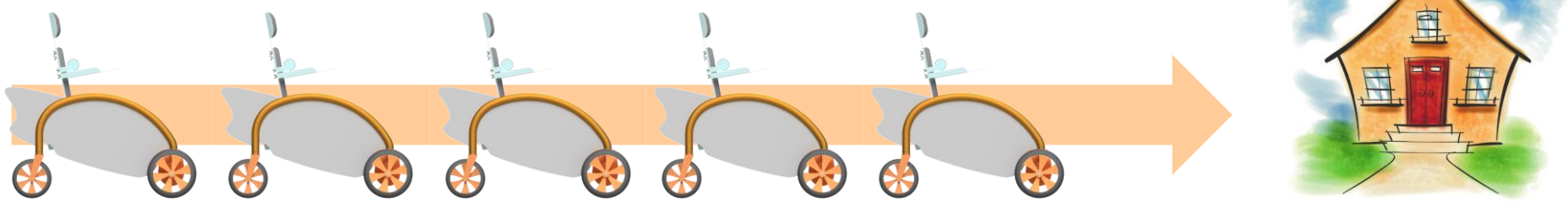




More detail on assembly instruction will be given in the **'User Manual'** given to each customer.

Appendix 3.3: Storyboard of social interactive features implemented into the 'WorldWizzy's design

1

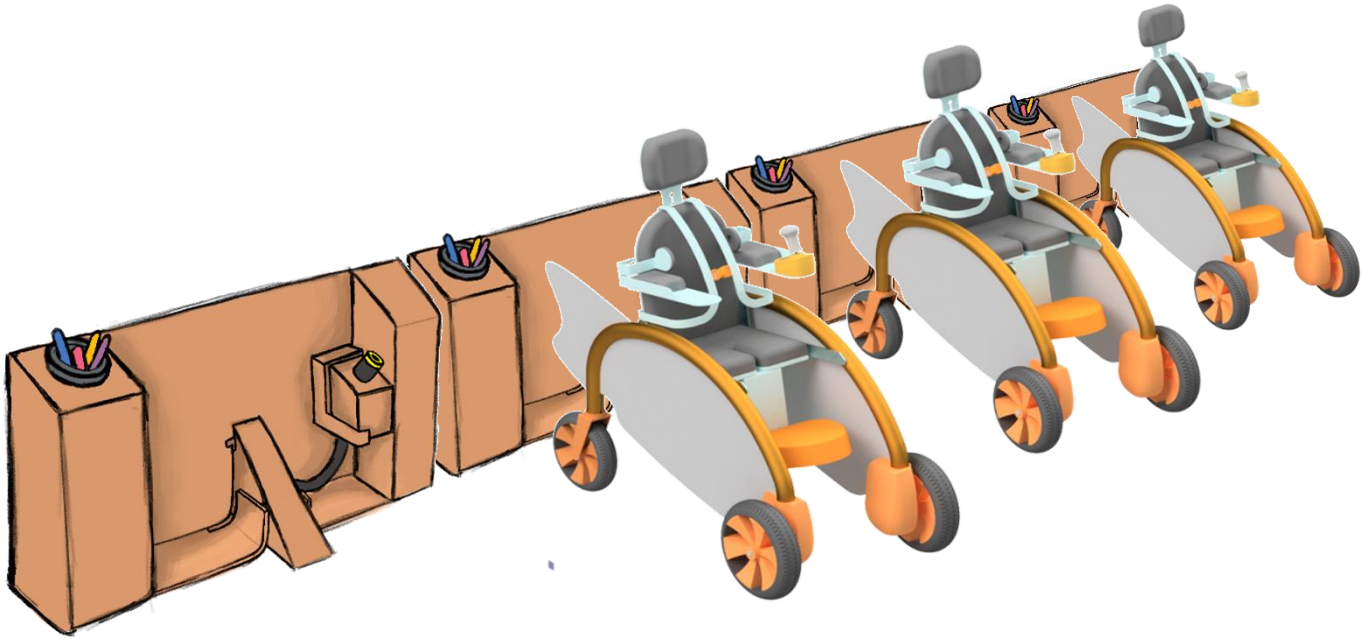


WorldWizzys bought by institutions such as nurseries and assembled by staff making them into 'WizzyHubs'

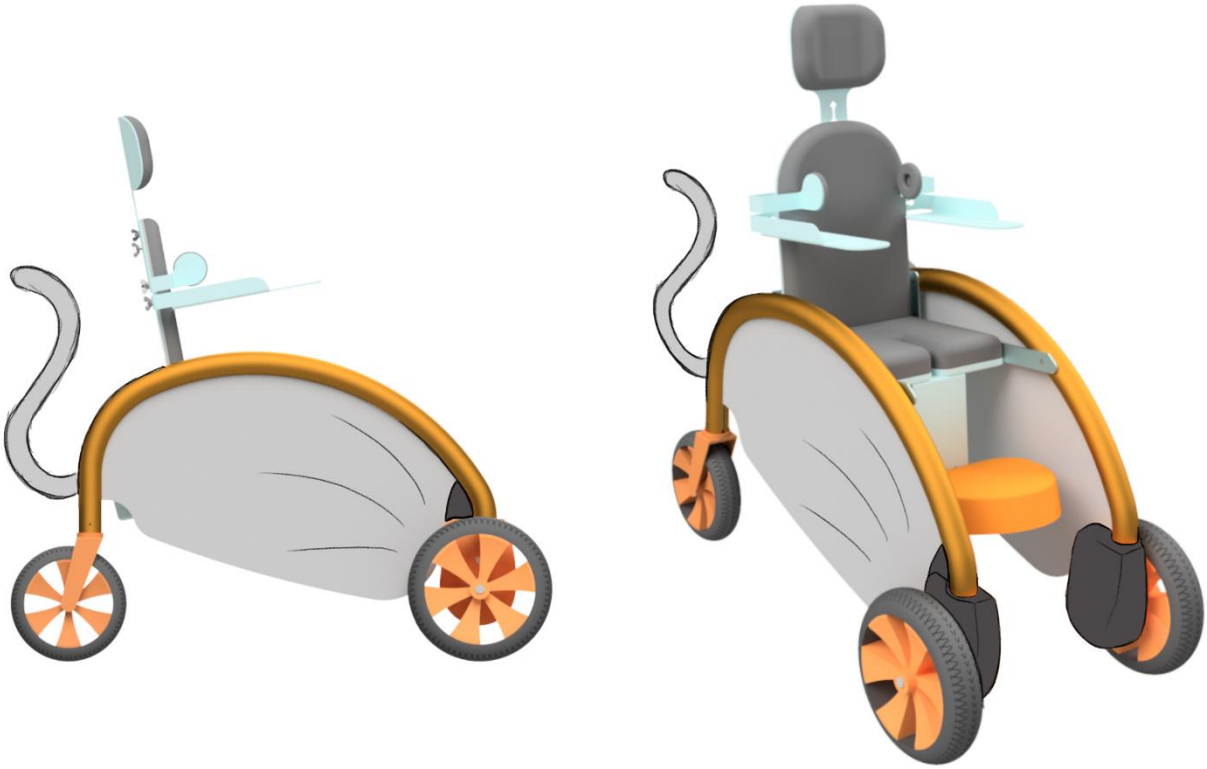
2

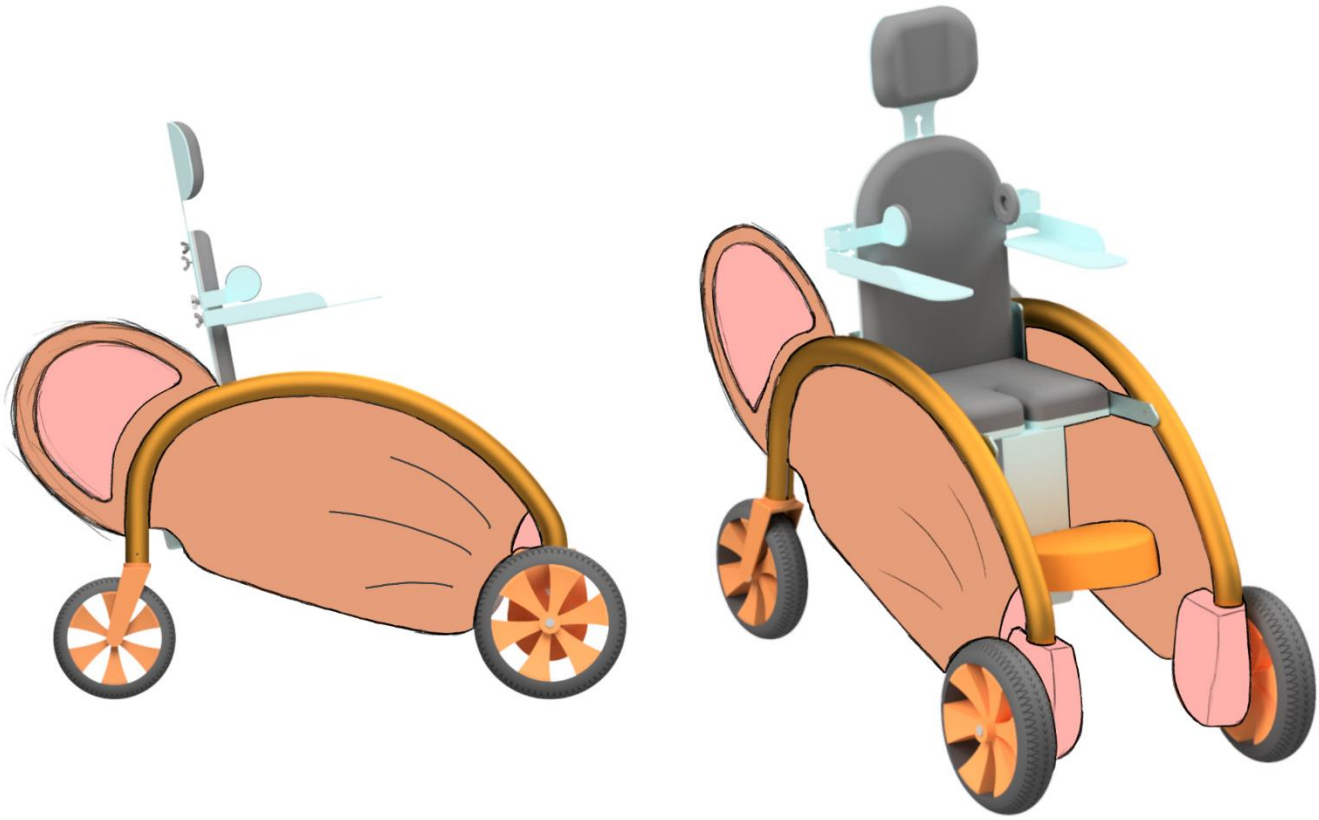
The 'WorldWizzy' is decorated by the children together, increasing the social acceptance of the child with a disability.

Appendix 3.4: Image of WorldWizzys with garages made from packaging



Appendix 3.5: WorldWizzy Pro 'Tom and Jerry' styling variations

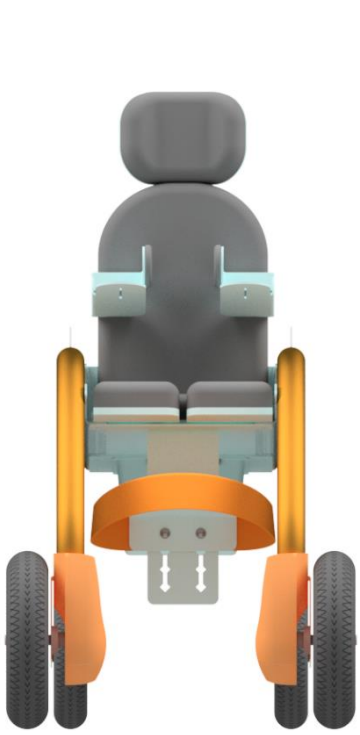




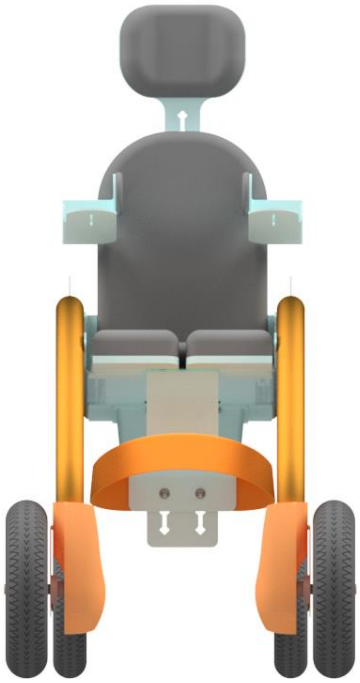
Appendix 3.6: Table displaying the standards used in creating the design specification

Standard	Title	Specification Requirements
BS ISO 7176 - 9	Wheelchairs -- Part 9: Climatic tests for electric wheelchairs	F12
EN 12182	Assistive products for persons with disability. General requirements and test methods	F6, F9, F10, F18, F19, F22, E2-7, E9, M1-7, EV1-3
EN 12184	Electrically powered wheelchairs, scooters and their chargers - Requirements and test methods	F11, F14-16
EN 60335 - 1	Safety of household and similar electrical appliances	E1
ISO 5349 - 1	Mechanical vibration -- Measurement and evaluation of human exposure to hand-transmitted vibration -- Part 1: General requirements	EV4-6
ISO 10542	Technical systems and aids for disabled or handicapped persons -- Wheelchair tiedown and occupant-restraint systems -- Part 1: Requirements and test methods for all systems	F36, F37

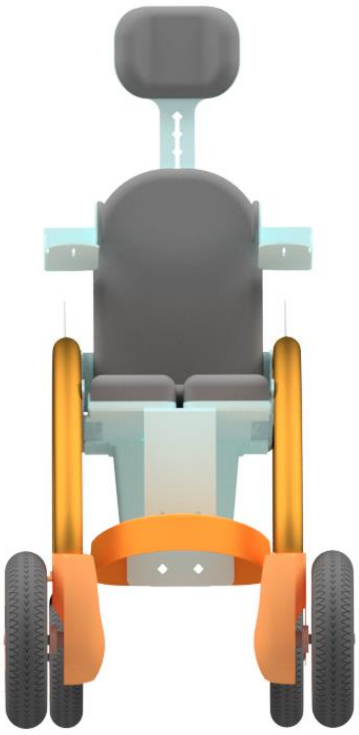
Appendix 3.7: CAD diagrams displaying all adjustable elements of the ‘WorldWizzy’.



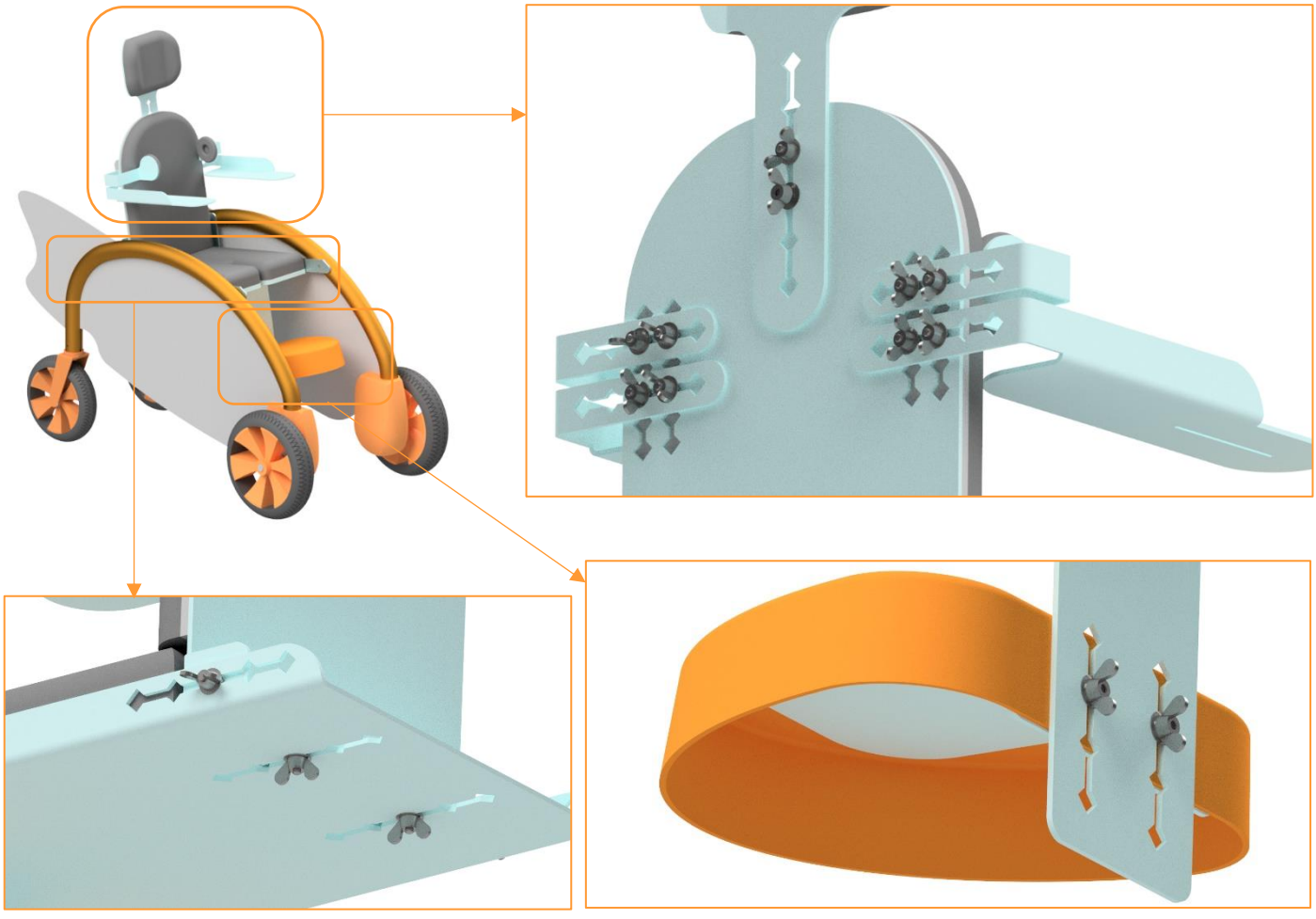
5%ile Position

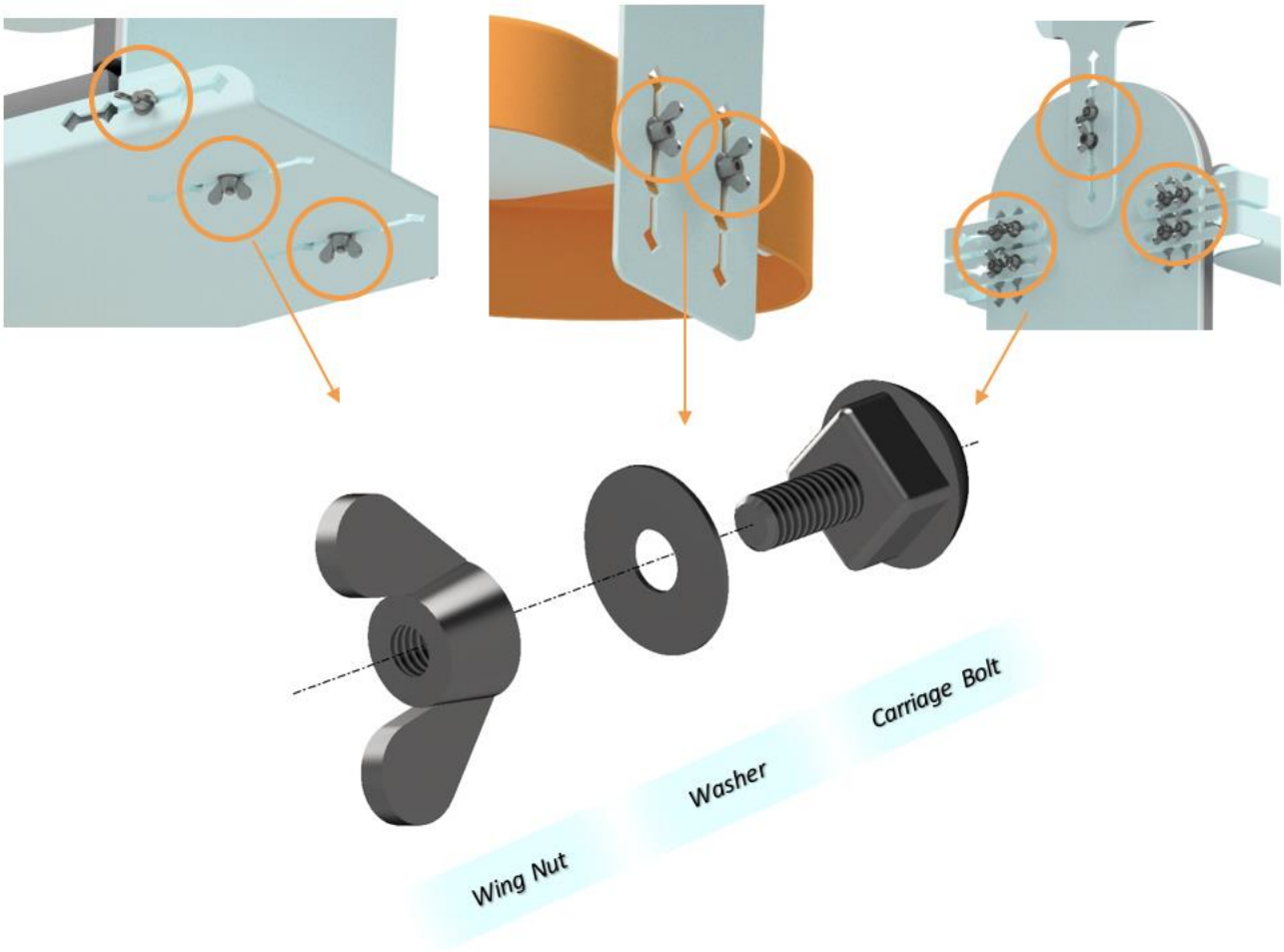


50%ile Position

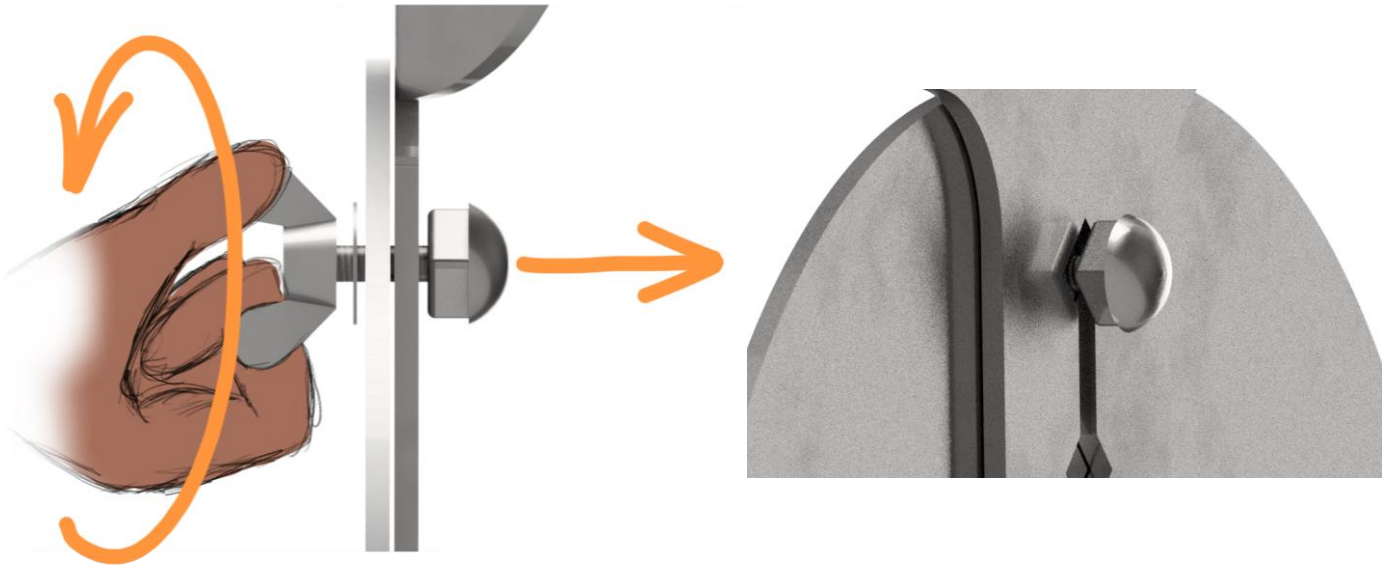


95%ile Position



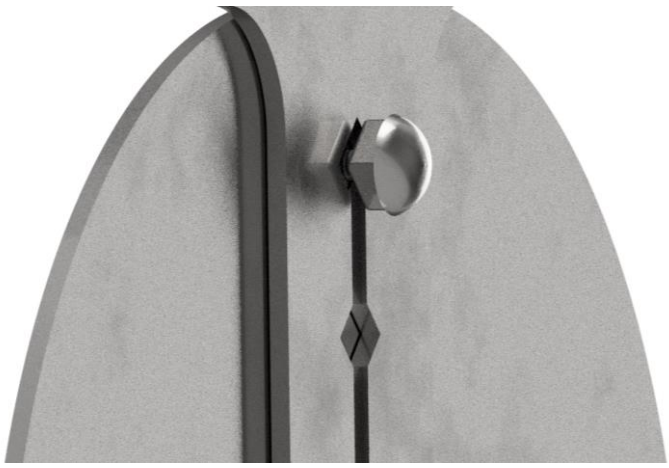


Step 1



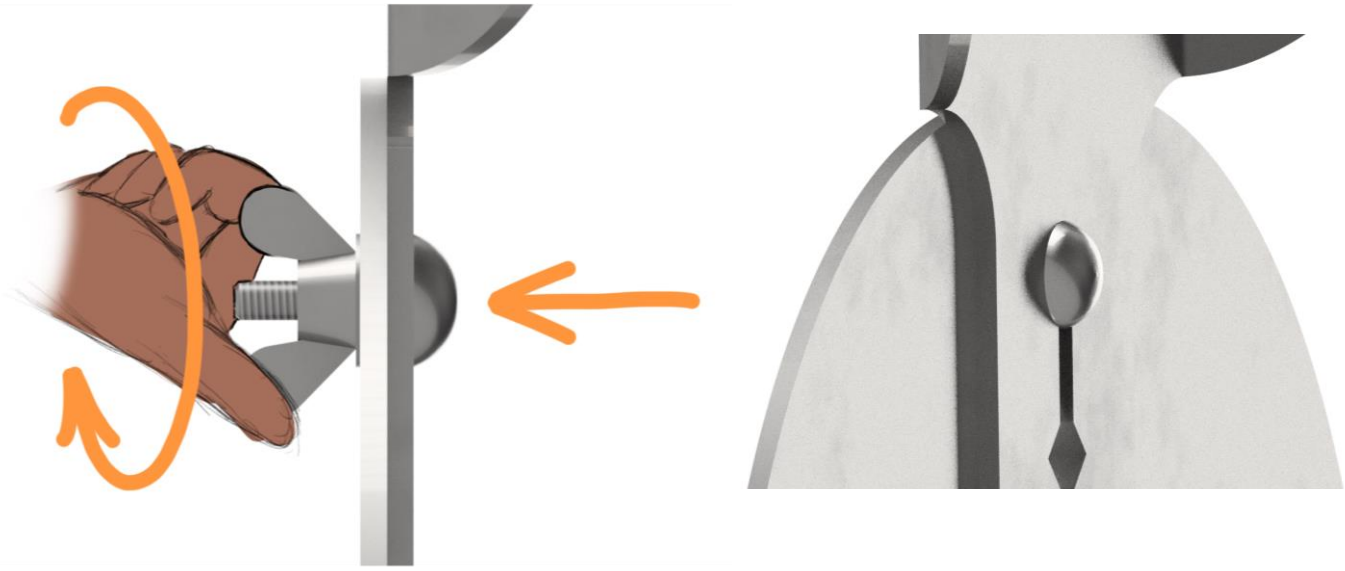
Loosen wingnut by hand and push the carriage bold out of square section

Step 2



Slide the component to the desired position

Step 3



Pull the wing nut to re-engage the carriage bolt with the square section and tighten the wing nut

Appendix 3.8 – Table of disabilities the 'WorldWizzy' can be adjusted to accommodate for

Disability	Symptoms	Power Buddy Support Mechanisms
Spastic Cerebral Palsy	Muscles are stiff and tight, reducing the possible range of movement. (NHS, 2017)	Fully adjustable seat depth, arm rest height, head rest height and foot plate height.
Dyskinetic Cerebral Palsy	Random uncontrollable body spasms occur. (NHS, 2017)	4-point harness and ankle shores used to stop spasms that may cause injuries.
Ataxic Cerebral Palsy	Co-ordination and balance issues causing unstable movements and sometime tremors. (NHS, 2017)	4-point harness supports the child by securely fastening the child to the seat, giving a stable support. Thoracic support that can change in height.
Spinal Muscular Atrophy	Weakness and tremors in limbs. Difficulty sitting up and scoliosis (a curved spine). (NHS, 2017)	Thoracic support to maintain good spinal alignment. 4-point harness securely supports the child.
Spina Bifida	Paralysis of legs and incontinence. (NHS, 2017)	Adjustable foot plate and seat depth ensure pressure is not too high around the legs. Preventing pressure sores. All cushioning is waterproof and easily removable.
Arthrogryposis	Lack of control of limbs, central nervous system or other body parts. (Tidy, 2015)	Thoracic supports, 4-point harness and full adjustability of the main components allow for a secure support base for the child.
Global Development Delay	General term for children with slower cognitive development.	The UI control is simple to understand. The joystick is comfortable to hold, therefore encouraging the child to interact with it.

Appendix 3.9 – Table of all user repairable components of the 'WorldWizzy'

User Repairable Components			
Figure __ reference number	Component	Cost (£)	Cost (₹)
1	Styling Panels	5	455
2	User Interface Sub Assembly	140	12690
3	All Cushioning	40	3625
4	Two Caster Wheels	25	2265
5	All Chair Components	25	2265
6	Carriage Bolts & Wing Nut (20 of each)	2	185
7	Motor covers	2	185

Appendix 3.10 – Comparison with competitors table

Company	Company	Product	Distribution Model	Purchase Cost	Key Features	Image
designability	UK	WizzyBug	**Loan Scheme** - Provide the WizzyBug to people for free through crowd funding - Product is given back for redistribution when child grows out of it	£3,175	Toy Aesthetic Indoor and outdoor Wide range of adjustable positions Joystick based user control	
MERU	UK	Bugzi	**Loan Scheme** - Provide the WizzyBug to people for free through crowd funding	£4,800	Completely vacuum formed ABS body Many bought in components Additional purchasable addons such as iPad stands Switch basted user control	
Go Baby Go	America New Zealand	Modified ride on toy car	Direct to consumer sale Distribution from specific hubs open to all children to come and customise their own ride on toy regardless of disability.	£200	Toy for all children All modifications done by volunteers Cheap components such as PVC and such used as support	

Similar Products for Primary School Children						
Vela	UK	Vela Blues 100	Direct to consumer sale	-	Modular design - Base assembly remains the same - Seat is changes to accommodate for growing child	
Permobil	World Wide	F5 VS	Direct to consumer sale	-	Very High Tech Changes between seat and standing support Powerful engine Complex user interface with increased functionality such as memory	
Sunrise Medical	World Wide	Salsa M2 Mini	Direct to consumer sale	£5,280	Middle wheel drive allowing for a smaller turning radius, allowing for greater manoeuvrability in tight spaces Indoor and outdoor Suspension Powerful engine	

Appendix 3.11 – Table of all inventive features with patent potential

Inventive Features
Accessibility aid aesthetics can be customised by children
'Flat pack' electric wheelchair design
Carriage bolts used for single handed adjustment of support systems on an electric accessibility aid

Appendix 3.12 – Areas for future development of the 'WorldWizzy'

Improvement	Description
Open Source Model	In order to target countries with lower economic status. An open source model can be created where all unobtainable components such as the electronics are sent to the user along with detailed manufacturing instructions. The user will source materials and manufacture the product chassis and chair themselves and install the electronics. This will lower the cost greatly as users can use easily sources, cheap and abundant material to produce the product at a much lower price.
Durability	More durable materials and connection methods used to produce a more stable and longer lasting device. Components such as the 'play panels' and the motor covers can be made from more durable materials such as HIPs.
Range	Higher capacity batteries for longer use
Speed	Increased motor power allowing the child to move at a greater speed to match their peers' running pace. Allowing them to keep up with other children.
Age Demographic	Target beyond pre-schoolers as some developing countries have a high demand of electric wheelchairs for all ages.
Modular Base	Implements a modular base that can have many different chairs attached to it allowing it to be used by a wider age range of ages or wider variety of disabilities.
Culturally and economically tailored products	When expanding the WorldWizzy to other countries, the product must be tailored to the needs of that country. This includes such things as changing the motors to deal with different terrain more effectively and use of colours that mimic the country's colour schemes.

Appendix 4.1: User Profiles

Child 1		
Description	**Specific Needs**	**Design Considerations for Needs**
- 3 years old - Female - Has Cerebral Palsy - Does not attend school currently	- Diplegia with no effective use of legs - Incontinence - Moderate to high levels of cognition - No wheelchair experience - Hypotonic muscles	- Easily washable for incontinence - Firmer supports due to hypotonia - Straightforward to use - Modular to fit the small stature
Parent 1		
Description	**Specific Needs**	**Design Considerations for Needs**
- Full time workers - 2 other children - Live urban	- Easy to access in non-working hours - Able to drop child off and come back - Has access to activities for the other children while there	- Lots of toys available in the Hub - Open late hours or at the weekend - Carers qualified to look after the child without the parent
Hub 1		
Description	**Specific Needs**	**Design Considerations for Needs**
- A school - Run by teachers and care staff	- Able to accommodate many children - Cheap as possible - Safety considerations - indoor and Outdoor	- Customisable - Simple and cheap design - Safety features incorporated - Large wheels and weather resistant.

Child 2		
Description	**Specific Needs**	**Design Considerations for Needs**
- 18 months old - Female - Has Spinal Muscular Atrophy and Global Developmental Delay	- Weak Muscles which will get weaker - Occasional uncontrolled muscle twitching - Slower cognition - No wheelchair experience - Short life expectancy	- Restraints in place to control muscle twitching - Controls require little force - Supports for the spine and head - Controls are intuitive
Parent 2		
Description	**Specific Needs**	**Design Considerations for Needs**
- Mother does not work - Has disposable income - Lives in the city centre	- Able to spend more money - Wants to spend as much time with the child as possible - Does not own a car	- Must be local or easily accessible with public transport - Must allow the parent to stay with the child - Design has modular options to allow the parent to spend more money on their child.
Hub 2		
Description	**Specific Needs**	**Design Considerations for Needs**
- A play group and community centre - Run by carers	- Open working hours - Staff not highly trained or educated - Open to pre-school children - Safety considerations - indoor and Outdoor	- Have facilities for parents and children - Mixed ability child capability - Safety features incorporated - Large wheels and weather resistant.

Child 3		
Description	**Specific Needs**	**Design Considerations for Needs**
- 5 years old	- High levels of cognition	- Requires a larger chair

- Male - Had meningitis and is a recent right leg and right arm amputee	- Only has use of one arm - Very active and sociable - Quite a large child	- Must be able to control it with the left arm - Wants it to go as fast as his friends run
Parent 3		
Description	**Specific Needs**	**Design Considerations for Needs**
- Single working parent - Twin sister - Lives on the outskirts	- Able to commute with their child in standard wheelchair - Does not have time to be with the child all day - Needs to be able to drop both children to the same place	- Must be a day centre hub - Must accommodate mixed ability children - Can be further away due to the ability to commute
Hub 3		
Description	**Specific Needs**	**Design Considerations for Needs**
- A standard school - Run by teachers and support staff	- Power Buddy must not be a distraction - It must not disrupt learning or other children - Only one is required	- Must not make loud noises and must be able to turn off during class as a standard chair - Should last for the school day before it needs charging

(Firstpost, 2015) (Singhi et al, 2002) (The BMJ, 2017) (India Times, 2017) (Dasgupta, 2016)

Appendix 4.2: Customer Needs and Benefits

Child	
Needs	**Benefits**
- Well supported - Safety - Suitable aesthetic - Correct size and age appropriate - Intuitive controls and use - Able to express themselves - Non-exclusive	- Socialising - Decision making - Independence - Freedom - Learning opportunities - Happiness - Making friends - Meeting people like them - Special awareness for future chairs
Parent	
Needs	**Benefits**
- Safety of their child - Low cost - Easily accessible - Close proximity to home - Enjoyment for their child	- Freedom from a manual wheelchair - Educating their child - Possible ability to go back to work - Equality amongst their children - Meeting parents in a similar situation
Hub	
Needs	**Benefits**
- Low cost - Easy to clean - Modular and customisable - Easy to change between children - Safe for the child	- More customers - Good publicity - Helping their children - Equal opportunities among their children - Better education

Appendix 4.3: 4Ps Analysis

Product	- Must not clash with Indian culture - Appeals to children aged 14 months – 5 years - Robust and modular due to continuous use - Environmentally friendly where possible
Place	- Manufactured locally or in house - Shipped directly to the Hub - Can be issued via local doctors, nurseries, schools, physiotherapists - Hubs can be groups of WorldWizzys or clusters of children where some have a WorldWizzy - Online presence
Price	- The product is sold at cost to the Hubs - The extra add-ons can be sold at a higher price - Can be sold to individuals upon request - Replacement parts are sold for free - Subsidised from the 2% business donation and the charity partnerships
Promotion	- Word of mouth - Recommendations from doctors and physiotherapists - Advertisements and reputation through charity partnerships - Social Media - Popular culture such as Bollywood movies - The product itself is an advertisement for other children - Website - Fundraising agents - Advertising Specialists - Demonstration Hubs - Advertising in local communities and schools

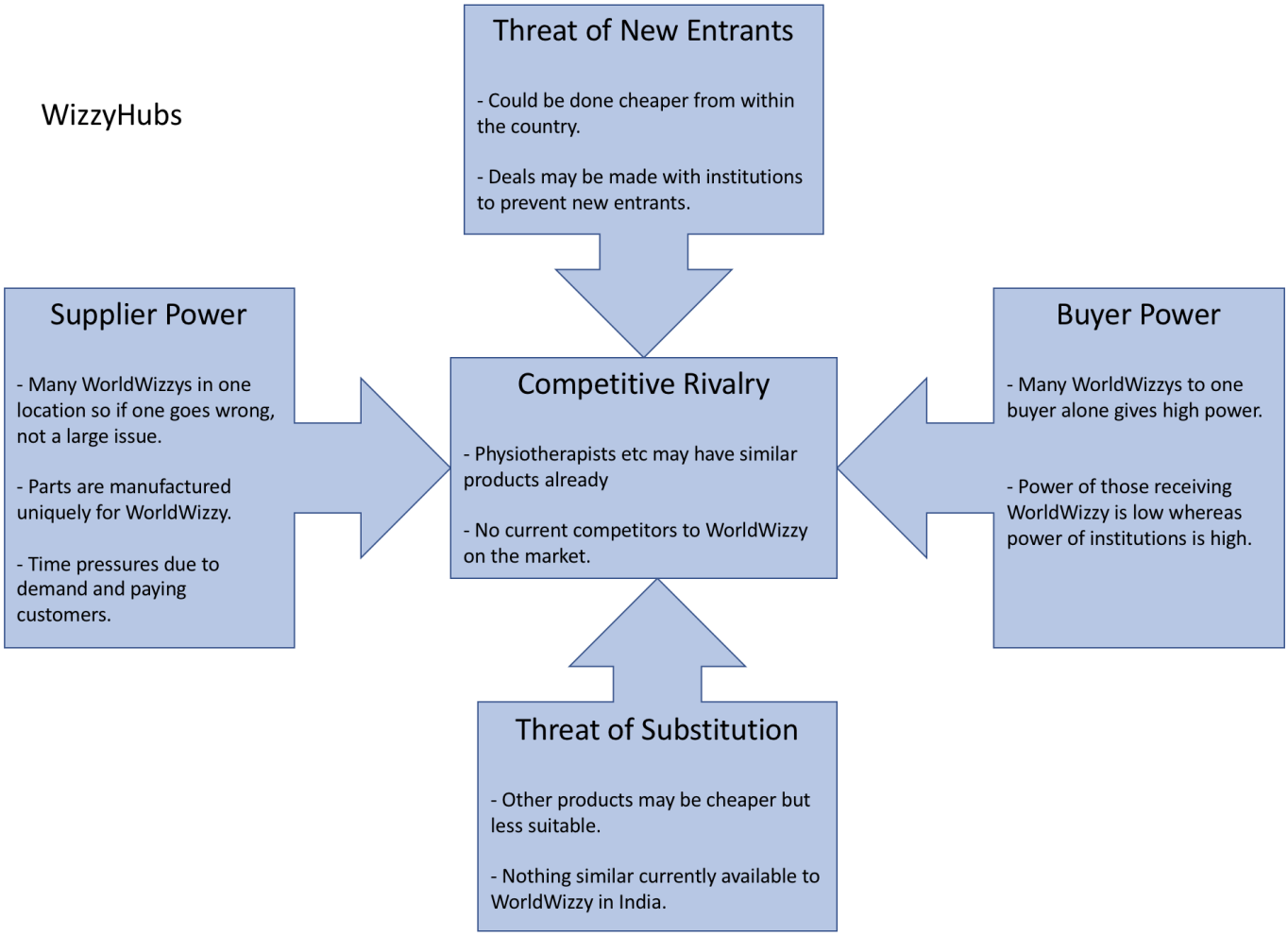
Appendix 4.4: Cost of a demonstration Hub

Item	Avg. Cost (£)	Upper Cost (£)	Lower Cost (£)
Annual Rent (Urban Area) [a]	4,000	6,500	2,000
Staffing Cost (Annual) [b]	10,500	15,500	7,500
Training Cost	1,000	1,200	800
Utilities [c]	300	600	100
Total	**15,800**	**23,800**	**10,400**

Appendix 4.5: Stakeholder Analysis

Who are they?	What is their interest?	What is their power?
Hub Owners	- They want to ensure the product is suitable for the children in their care. - They want to help bring people to their hub or institution. - Possibly want to make money through entrance to their institution.	- Without Hubs, the business plan and distribution will not be possible. - They can say no to hosting WorldWizzy and therefore other institutions will have to be explored.
Parents	- They want their child to be safe. - They want the product to fulfil their child's needs. - Want to see their child happy. - Want their child to learn and explore.	- They can choose to not send their child to the Hubs. - They can choose to buy a private WorldWizzy. - They can influence other parents.
Children	- Happiness and having fun. - Making friends and socialising. - Independence. - Learning opportunities	- If they don't like it, the parent will not send their child again. - The Hub will not want to purchase if the children don't enjoy it.
Charity Partners	- Want the product to fit with their agenda. - Want to enhance their reputation and therefore donations. -	- They can choose to not join a partnership and therefore not offer their funds, knowledge or reputation.
Business Donators	- Have a quota of charitable donation to fulfil. - Want their reputation to be good. - May want to be able to donate their goods such as materials or personnel. - Will want to be represented by the charity.	- Without their initial investment, the project will be a challenge to get off the ground. - without their continued support, the manufacturing process may have to be slowed or WorldWizzy may have to be sold at a high cost.
Manufacturers/ Workers	- They want to earn their living. - They want to improve their CV and skill level. - Possible promotions and pay rises if it is a success.	- They are easily replaced due to the low level of skill required and high demand for jobs. - if they all leave at once, it could cause a back log and sale losses.

Appendix 4.6: Competition Analysis



Appendix 4.7: PEST Analysis

Political and Legal	- Standards will be adhered to where possible, however, most are not entirely relevant to this specific project therefore will only be used as a guideline. - The manufacturing and shipping will be carried out within India; therefore, these are the laws that must be followed. - Where possible, manufacturing will be carried out privately and locally in order to aid small local businesses. - The product will not be patented as this will be a large cost for very little gain.
Economic	- As growth in demand increases, the economies of scale will be taken advantage of, allowing more units to be made at a lower cost. - The market is likely to fluctuate therefore it will be closely analysed, potential crashes will be considered, and market trends will be followed. - Lack of manpower could result in poor economics as demand will be higher for workers and therefore higher working rates will have to be charged. In a country of such large manufacturing power and such a large population, this is not anticipated to be a large issue. - The manufacturing will be as simple as possible in order to be able to employ less skilled workers at a lower cost. - Where possible, the product will be sold at an upfront cost, not in instalments. This will help cash flow.

	- High interest rates will promote more saving and less spending, reducing demand. - Risk associated with different currencies as the product expands globally will be considered and managed. - The rate of inflation in India is targeted to be 4% per year, therefore this will be considered over the 10-year lifecycle and product cost will be constantly scaled and changed. The risk of inflation increasing will be considered.
Social	- The product is aiming to reduce the stigma around disabilities, therefore, it will not be marketed as a disability aid alone, it will also be marketed as a toy. - The aesthetic of the product must be in line with the desires of a child to ensure they want it. - Consumers want to ensure the product is safe and of a high quality. - Social trends show that popular culture among children (and therefore their desired aesthetic) constantly changes, especially over a 10-year lifecycle.
Technical	- There are many technical risks for a product such as this, therefore a full risk assessment has been carried out. - Other manufacturers may be able to make the product simpler and therefore cheaper. - If any part of the product has a fault, it will be expensive to re-ship and fix without skilled workers. - Lifecycle of the product must be 10 years therefore lifecycle of each of the components must be 10 years also.

Scenario Planning

1. Social Scenario: Popular culture among children constantly changes.
    a. The product is designed to be unique and personalised by each child through their own artwork or magnetic additions therefore it will be able to keep up with the trends and desires of each child.
    b. Due to the personalised nature of WorldWizzy, it will be suitable for all ages aesthetically, not just physically.
2. Political and Legal Scenario: The product will not be patented.
    a. As the aim is to take the product global, it is extremely expensive to obtain a patent and would require a large upfront cost which will be hard to source as a charity.
    b. By not obtaining a patent, other companies may be able to make the product cheaper, due to higher competition and local resources, therefore more people will be reached, achieving WorldWizzy's goal.
    c. To ensure there are no issues with the open sourcing products being of an unsafe quality, quality checks have been included in the instructions manual for the user.

Appendix 4.8: SWOT Analysis

Strengths	- Good public perception due to charitable nature - Inclusive to children - Accessible via Hubs - Children's charity carries a good image - Inter-charitable cooperation could lead to shared reputations
Weaknesses	- Cost of fundraising if required is high - Hard to reach initial investment needed for start up - Low cost causes limited design functionality - Heavily dependent of donations from businesses
Opportunities	- 2% donation alone could be high enough if secured for a start up - Potential to make deals with companies to ensure 2% every year

	- Publicity through endorsement - Develop into other disability markets and other locations - Ties with local institutions could strike deals for cheaper services
Threats	- Profit making businesses may want to cash in on the idea - Open sourcing may take over leading to very little cash flow - Unpredictable source of income - No patent will mean no legal control or power

Appendix 5.1: Pros/Cons Analysis of Various Distribution Channels and their Selected Applications

Distribution Channel	Main Advantages/Disadvantages	Usage
Retail Outlet	+ Fully assess needs/capabilities of consumer - High cost/slow growth (shop, staff, training) - Requires significant local knowledge	x
Website	+ Globally accessible and low cost - No opportunity to trial/train/asses' user	Hubs/D2C
UK Based Sales Team	+ High level of sales control + Maintain 100% of profits for reinvestment - No face to face sales/high travel costs	x
International Sales Partners	+ Utilises local knowledge and face to face sales + Increased focus on product design + Fast growth strategy - Cost of sales (potentially less than UK team)	Institutes
Design Licencing	+ Increased focus on product design - No control over distribution - No control over quality/materials	x
Medical Professionals	+ High consumer influence + High access to consumers - Large commission	D2C
Charitable Partnership	+ Utilises existing local knowledge + Increased focus on product - Difficult to form partnerships - Attention not focussed on WordWizzy	x
Open Sourcing	+ Global access (requires access to internet) + Very low-cost production/distribution - No quality control (could endanger child)	x

Appendix 5.2: Pros/Cons Analysis of Various Revenue Streams and their Selected Applications

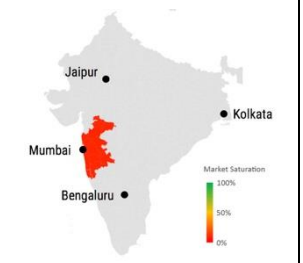
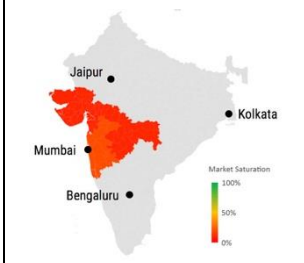
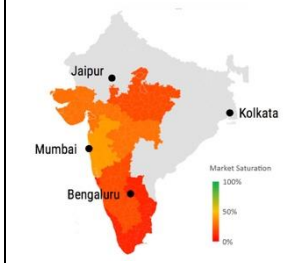
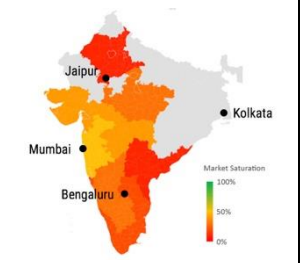
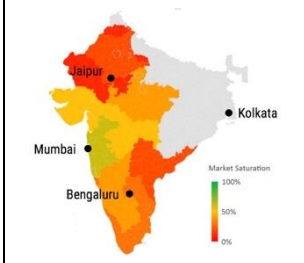
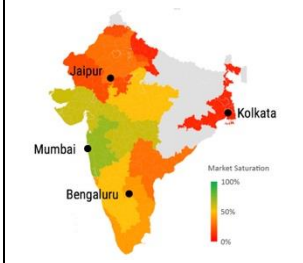
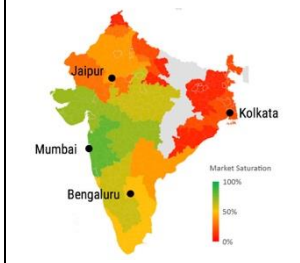
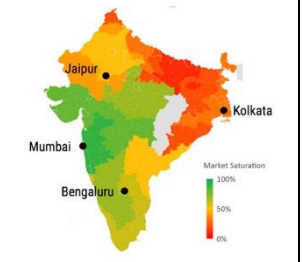
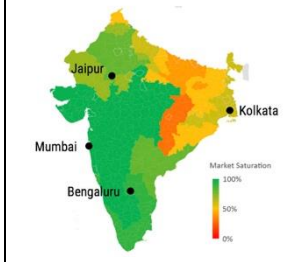
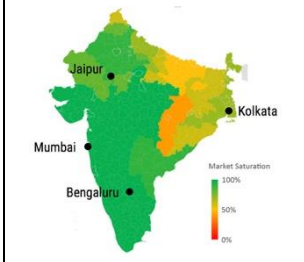
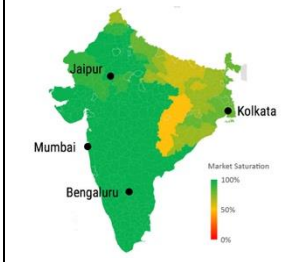
Revenue Stream	Main Advantages/Disadvantages	Usage
For Profit Sales	+ Profits reinvested in growth + Profits reinvested in subsidised - Morality of income discrimination	D2C/Growth
Non-Profit Sales	+ Low product cost = high distribution + Reduced sales requirement + Reduced product quality expectation - No net profit for reinvestment	Hubs
Subsidised Sales	+ Very low product cost = very high distribution + Reaches very low-income consumers - Funds diverted from growth (potentially smaller impact)	x
Product Lease	+ Access for consumers w/o immediate funds + Durable parts (i.e. frame) can be reused - Minimal cost saving due to low starting cost	x
Large Charitable Donations (e.g. business)	+ Utilises excess funds of large charities in developing countries + Growth of co-operate social responsibility - Funding inconsistent and can't be relied on	Growth
Small Charitable Donations (e.g. families)	+ Advertising through institutes + Families give what they can (no requirement) - Many donations required for large impact	Growth
PUDC	+ Maximises profit for reinvestment in growth - Added business complexity - Product variations required	D2C/Growth

Appendix 5.3: Indian States Market Size

No.	Region	Division	Market Size
001	Konkan Division	West	71
002	Pune Division	West	52
003	Nashik Division	West	40
004	South Gujarat	West	27
005	Central Gujarat	West	46
006	Aurangabad Division	West	43
007	Amravati Division	West	25
008	North Gujarat	West	23
009	Saurashtra - Kutch	West	39
010	Nagpur Division	West	27
011	Indore Division	West	20
012	Ujjain Division	West	14
013	Narmadapuram Division	West	5
014	Bhopal Division	West	13
015	Chambal Division	West	7
016	Gwalior Division	West	11
017	Sagar Division	West	13
018	Jabalpur Division	West	18
019	Rewa Division	West	11
020	Shahdol Division	West	5
021	Bengaluru Division	South	45
022	West Tamil Nadu	South	41
023	Mysuru Division	South	25
024	Kalaburagi Division	South	17
025	Belagavi Division	South	29
026	North Tamil Nadu	South	57
027	Rayalaseema	South	24
028	Goa	South	4
029	North Kerala	South	37
030	Central Tamil Nadu	South	25
031	South Tamil Nadu	South	37
032	South Kerala	South	33
033	South Telangana	South	31
034	Coastal Andhra	South	56
035	North Telangana	South	20
036	Jaipur Division	North	31
037	South Haryana	North	34
038	Bikaner Division	North	15
039	Bharatpur Division	North	12
040	Ajmer Division	North	18
041	Agra Division	North	18
042	North Haryana	North	26
043	NCT of Delhi	North	124
044	Kota Division	North	11
045	Udaipur Division	North	17
046	Jodhpur Division	North	24
047	Aligarh Division	North	14
048	South Punjab	North	30
049	Bareilly Division	North	25

050	Kanpur Division	North	25
051	Meerut Division	North	31
052	Moradabad Division	North	24
053	Saharanpur Division	North	14
054	Chandigarh	North	7
055	North Punjab	North	34
056	Chitrakoot Division	North	10
057	Jhansi Division	North	10
058	Lucknow Division	North	52
059	Uttarakhand	North	32
060	Himachal Pradesh	North	4
061	Allahabad Division	North	37
062	Basti Division	North	17
063	Devipatan Division	North	26
064	Faziabad Division	North	31
065	Jammu & Kashmir	North	45
066	Azmgarh Division	North	26
067	Gorakhpur Division	North	35
068	Mirzapur Division	North	15
069	Varanasi Division	North	35
070	Presidency Division	East	55
071	Burdwan Division	East	28
072	Malda Division	East	26
073	Medinipur Division	East	29
074	Northern Division	East	12
075	Jalpaiguri Division	East	14
076	North Chotanagpur Division	East	30
077	South Chotanagpur Division	East	14
078	Kolhan Division	East	12
079	Santhal Pargana Division	East	18
080	Central Division	East	19
081	Darbhanga Division	East	19
082	Kosi Division	East	9
083	Purnia Division	East	16
0844	Bhagalpur Division	East	7
085	Munger Division	East	14
086	Palamu Division	East	10
087	Sikkim	East	0
088	Southern Division	East	12
089	Patna Divison	East	27
090	Tirhut Division	East	40
091	Saran Division	East	18
092	Magadh Division	East	20
093	Meghalaya	East	10
094	Assam	East	35
095	Chhattisgarh	East	92
096	Mizoram	East	9
097	Tripura	East	7
098	Manipur	East	10
099	Nagaland	East	3
100	Arunachal Pradesh	East	5

Appendix 5.4: Distribution Strategy Graphic

			
Year 1	**Year 2**	**Year 3**	**Year 4**
			
Year 5	**Year 6**	**Year 7**	**Year 8**
			
Year 9	**Year 10**	**Year 11**	**Year 12**
			
	Year 13	**Year 14**	

Appendix 5.5: Indian Expansion Strategy and Staffing Requirements

Year	Division(s)	Sales Target	Staffing			
			N	S	E	W
0	-	-	0	0	0	0
1	001 – 003	160	0	0	0	1
2	001 – 011	392	0	0	0	2
3	001– 025	666	0	1	0	2
4	001 – 032	911	0	2	0	2
5	001 – 042	1212	1	2	0	2
6	001 – 048	1488	2	2	0	2
7	001 – 054 , 070 - 075	1847	2	2	1	2
8	001 - 058, 070 - 089	2242	2	2	2	2
9	001 – 069, 070 - 094	2766	3	2	2	2
10	001 – 100	3015	4	2	2	3
11	001 – 100	3157	4	3	3	3
12	001 – 100	3303	4	3	3	3
13	001 – 100	3457	4	3	3	3
14	001 – 100	3618	4	3	3	3

Appendix 5.6: WizzyHubs Sales Targets in Indian Market

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Hubs	160	392	666	911	1212	1488	1847	2242	2766	3015	3157	3303	3457	3618
D2C	32	78	133	182	240	297	369	448	553	603	631	660	691	723

Appendix 5.7: Value Added Price Analysis

Value Added	Price	Uncertainty	Lower	Upper	Notes
Excel Rehab Buggy w. Reclining Backrest	1,195	0%	1,195	1,195	Similar product as baseline. (Wheelchairs UK, 2018)
+ mobility (motors + battery)	57%	10%	52%	63%	% diff of 2 similar wheelchairs, 1 manual and 1 powered. (Sunrise Medical, 2018)
+ simple control	9.99	10%	8.99	10.99	(Amazon, 2018)
+ toy aesthetic	11.99	20%	9.59	14.39	Children's bike accessories (Amazon, 2018)
- rain cover	(18.99)	20%	(22.79)	(15.19)	(Amazon, 2018)
- back adjustability	(248.40)	5%	(260.82)	(235.98)	Comparison of 2 similar wheelchairs, 1 with an adjustable back tilt. (Wheelchairs UK, 2018)
- quality reduction	-31%	20%	-37%	-24%	% diff of 2 very similar framed wheelchairs of different qualities. (Sunrise Medical, 2018)
- adjustment for developing countries	-36%	20%	-43%	-29%	UK vs Indian big mac index (The Economist, 2018)
Total Cost (GBP)	**726**		**507**	**850**	

Appendix 5.8: Value Chain Analysis

Task	Linkage	Value Added	
		Insourced	Outsourced
Inbound Logistics – Primary Activity			
Receiving raw materials (i.e. metal tubing).	Procurement	High	Low
Receive pre-manufactured components (i.e. fastenings and outsourced components).	Procurement	High	Low
Check quality of incoming components.	-	Medium	Medium
Operations – Primary Activity			
Manufacture components.	Inbound Logistics Infrastructure	Medium	Medium
Assemble components into completed product on site.	Outbound Logistics Infrastructure	High	Low
Test assembly for strength.	-	High	Low
Outbound Logistics – Primary Activity			
Sending manufacturing plans to suppliers.	R&D	High	Low
Sending WorldWizzy to WizzyHubs for onsite assembly.	Operations	High	Medium
Sending components for DIY WorldWizzy to consumers.	Operations	Low	High
Sending individual WorldWizzy to consumers.	Operations	Low	High
Marketing and Sales – Primary Activity			
Sales agents visiting potential customers.	-	Low	High
Website used as main retail outlet.	-	High	Medium
Initial WizzyHub used to advertise product need.	Procurement	High	Low
Service – Primary Activity			
Spare components made available through website.	-	Low	Low
Infrastructure – Support Activity			
Main UK based management office.	Procurement	High	Low
Regional operations and sales offices in sales locations.	Procurement	Low	High
Storage locations for unassembled WorldWizzy's near regional operations offices.	Procurement	Low	High
Delivery equipment (i.e. van).	Procurement	Low	High
Human Resource Management – Support Activity			
Management of internal UK based employees.	-	High	Low
Hiring and Management of internal global employees.	-	High	Low
Hiring and Management of external global employees.	-	High	Low
Procurement – Support Activity			
Purchasing raw materials.	R&D	Medium	Low
Purchasing UK based offices.	Operations	Medium	Low

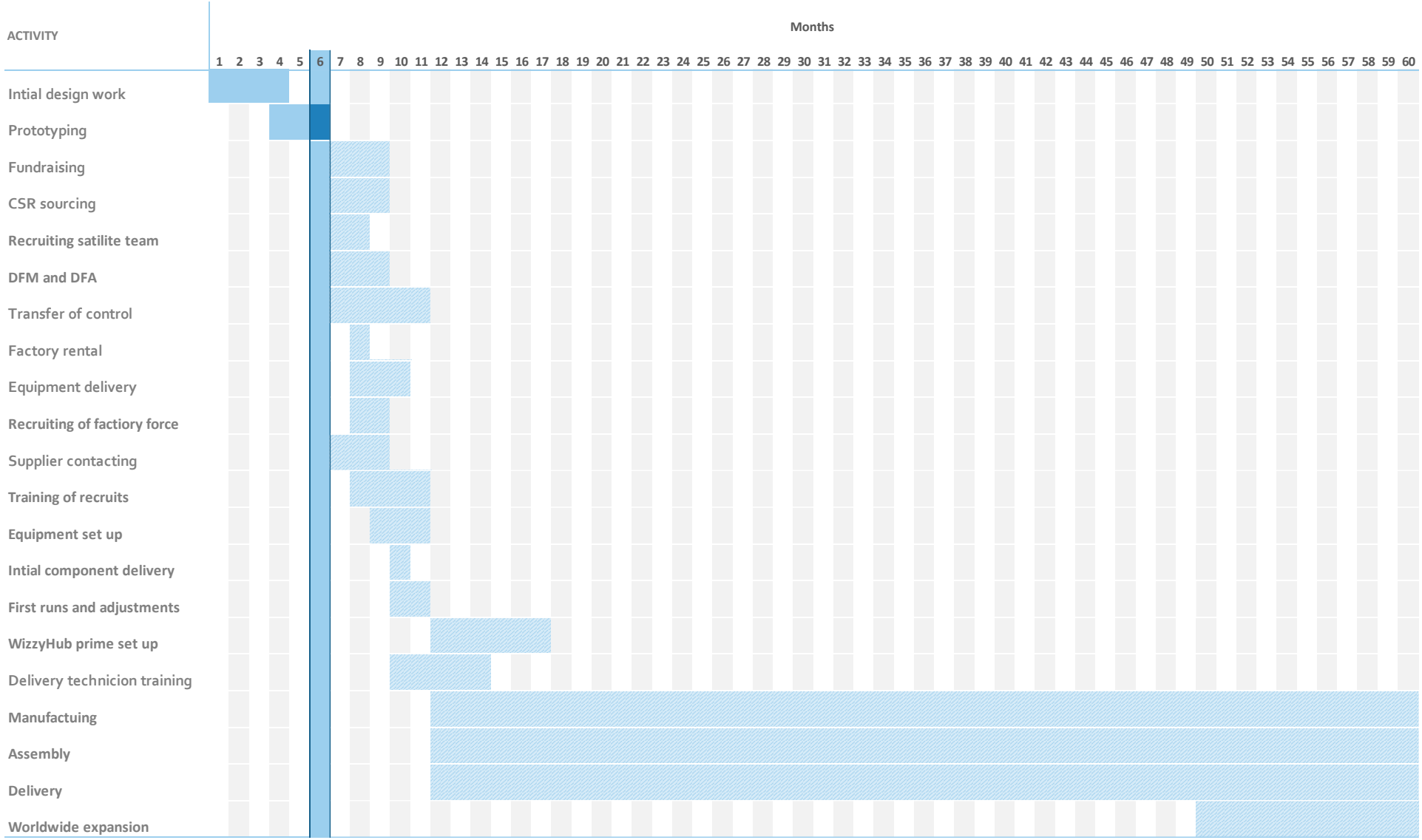
Purchasing regional offices and operations facilities.	Operations	Medium	Low
Research and Development – Support Activity			
Producing manufacturing plans	Outbound Logistics	High	Low

* note value added is value added to the business estimated by subtracting cost from value added to the customer

Appendix 6.1: Table of salaries from lowest 10% median and highest 10%

Engineer	£20,054	£30,012	£44,858
Machinist	£12,704	£18,870	£28,804
Factory worker	£11,328	£18,028	£27,528
Engineer	£1622	£3751	£10,145
Machinist	£1285	£2537	£5820
Factory worker	£1045	£1965	£3608

Appendix 6.2: Gantt Chart



Appendix 6.3: Buy, Outsource and Make

In house	Benefits	• Greater control over component • More flexibility more design changes • Reduces lead-times • Reduces transportation costs • Less expensive in long run (depreciation) • Higher customer satisfaction • More control over IP • Less administration strain dealing with suppliers • Prototyping ease and low batch runs
	Risks	• High initial costs • Requires in house expertise • Additional storage for material before and after • Requires large volumes/long runs to make viable • Requires larger facilities • Additional costs for development and testing • If demand drops wasted production capacity
Sub-contracting	Benefits	• Faster initial set up, • Utilise specialist knowledge of supplier • No investment in machine costs • Can leverage multiple suppliers for cheaper components • Reduced facility space required • Less certification required
	Risks	• Less control over design • Expensive Charges for services • Expensive prototyping • High transportation costs • Longer lead times • Can be slow to respond to changes • Partners may be unreliable or go bust
Off shelf	Benefits	• Cheaper components initially as development has been paid for by supplier • Little expertise required • Zero machine costs • Reputable suppliers are likely to have quality control processes • Warranties • Shorter lead times • Reduced facility size
	Risks	• Sub optimal products – not designed just for us • No control over design • Suppliers may have large minimum order quantities • Can halt whole production process if part goes out of stock • Can be expensive if niche • Must deal with lots of suppliers

Appendix 6.4: Component breakdown per WorldWizzy

Part code	Description	Source	Processes	Quantity
A1.1	Play Panel	In-house	Cutting, painting	2
A1.2	4mm Blind Rivet	Off-shelf	N/A	30
A1.3	RHS Tubing	In-house	Bending, drilling	1
A1.4	RHS Seat Support	In-house	Plasma cut, bent	1
A2.3	LHS Tubing	In-house	Bending, drilling	1
A2.4	LHS Seat Support	In-house	Plasma cut, bent	1
A3.1	Casing	In-house	Vacuum formed	1
A3.2	Heat Sink Connector	In-house	Plasma cut	1
A3.3	M5 x 12mm Bolt	Off-shelf	N/A	8
A3.4	SS M5 Spring washer	Off-shelf	N/A	10
A3.5	M5 Nut	Off-shelf	N/A	8
A4.1	Connector Bar	In-house	Plasma cut	1
B1.1	Seat Panel	In-house	Plasma cut	1
B1.2	Seat Cushion	Contracted	N/A	1
B1.3	Abduction Block	In-house	Plasma cut, bent	2
B2.1	Backrest Panel	In-house	Plasma cut	1
B2.2	Backrest Cushion	Contracted	N/A	1
B2.3	M5 Custom Carriage Bolt	Off-shelf	N/A	18
B2.4	M5 Wingnut	Off-shelf	N/A	18
B3.1	Headrest Panel	In-house	Plasma cut	1
B3.2	Headrest Cushion	Contracted	N/A	1
B4.1	Left Armrest Panel	In-house	Plasma cut	1
B4.2	Left Armrest Cushion	Contracted	N/A	1
B5.1	Right Armrest Panel	In-house	Plasma cut	1
B5.2	Right Armrest Cushion	Contracted	N/A	1
B6.1	Footrest Panel	In-house	Plasma cut	1
B6.2	Footrest Custom Styling Cover	In-house	Vacuum formed	1
B6.5	Left Ankle Harness	Contracted	N/A	1
B6.6	Right Ankle Harness	Contracted	N/A	1
B7.1	Left Side Support Panel	In-house	Plasma cut, drilled	1
B7.2	Left Side Support Cushion	Contracted	N/A	
B8.1	Right Side Support Panel	In-house	Plasma cut, drilled	1
B8.2	Right Side Support Cushion	Contracted	N/A	1
B9	Chest Harness	Off-shelf	N/A	1
C1.1.1	Case AR	In-house	Vacuum formed, cut	1
C1.1.2	Case BR	In-house	Vacuum formed, cut	1
C1.1.3	M4 Bolt - round countersunk	Off-shelf	N/A	12
C1.1.4	M4 nut - hex nylon	Off-shelf	N/A	12
C1.2.1	Case AL	In-house	Vacuum formed, cut	1
C1.2.2	Case BL	In-house	Vacuum formed, cut	1
C2.1.1	LC-578VA right	Off-shelf	N/A	1
C2.1.2	Mount plate	In-house	Plasma cut, drilled	2

C2.1.3	M5 bolt	Off-shelf	N/A	8
C2.1.6	SS M5 Washer	Off-shelf	N/A	10
C2.2.1	LC-578VA right	Off-shelf	N/A	1
C3.1	Front Wheel	Off-shelf	N/A	2
C3.2	Front Axle	Contracted	Milled	2
C3.2.1	M4 Grub screw	Off-shelf	N/A	2
C3.2.2	M8 bolt	Off-shelf	N/A	2
D1	200mm solid rubber Castors	Off-shelf	N/A	2
D2	Plastic expanding adaptor	Off-shelf	N/A	2
E1.1.1	Top Casing	Contracted	Injection moulding	1
E1.1.2	Bottom Casing	Contracted	Injection moulding	1
E1.1.3	Circular Button	Contracted	Injection moulding	2
E1.1.4	LED Window	Contracted	Injection moulding	2
E1.2	Button PCB	Contracted	Injection moulding	2
E1.3	Li-ion Batteries	Off-shelf	N/A	3
E1.4	Battery Cover	Off-shelf	N/A	1
E1.6	Battery Connectors	Off-shelf	N/A	6
E2.1	Joystick Casing	Contracted	Injection moulding	1
E2.2	Joystick	Off-shelf	N/A	1
E2.3	Joystick PCB	Contracted	N/A	1
E2.4	Stop Button PCB	Contracted	N/A	1
E2.4	M2x6.5 Screw	Off-shelf	N/A	4
E3	Main PCB	Contracted	N/A	1
E4	Wiring	Off-shelf	N/A	1

MAKE	CONTRACT	OFF-SHELF
• Control of asethetically critical parts • Bespoke design • Process optimisation	• Bespoke design • Avoid Expensive machinary • No Specalist knowledge	• No set up cost • Avoid Expensive machinary • No Specalist knowledge

Appendix 6.5: Equipment and Cycle Times

Equipment	Cost (£)	Quantity	Staff expertise (1-2)	Total cost (£)
Heavy				
Hydraulic bender	£138.21	2	2	£276.42
Vacuum former	£3,862.25	1	1	£3,862.25
Sheet metal bender	£551.75	1	2	£551.75
Plasma cutter	£10,503.66	1	2	£10,503.66
Pillar drill	£49.75	1	1	£49.75
Bandsaw	£232.19	1	1	£232.19
Trimmer	£199.02	1	1	£199.02
Extraction system	£442.26	1	N/A	£442.26
Manual				
TIG welder	£353.81	2	2	£707.62
Rivet gun	£7.43	2	1	£14.86
Hacksaw	£2.00	4	1	£8.00
Misc. Hand tools	£120.00	N/A	1	£120.00
Adhesives	£40.00	N/A	1	£40.00
Paint gun	£31.99	1	2	£31.99
Safety equipment	£4.90	15	N/A	£73.50
Furniture				
Computers	£187.59	2	N/A	£375.18
Computer chair	£21.52	2	N/A	£43.04
Computer desk	£60.00	2	N/A	£120.00
Stationary	£85.00	N/A	N/A	£85.00
Software	£650.00	1	N/A	£650.00
Communications	£73.93	2	N/A	£147.86
Filing units	£38.62	4	N/A	£154.48
Work benches	£82.76	6	N/A	£496.56
Storage				
Trollies	£16.55	2	N/A	£33.10
Industrial shelving	£248.30	8.1m^2	N/A	£248.30
Fastener boxes	£0.80	13	N/A	£10.40
Staff				
Experience 1	£1,285.00	4	Unskilled/volunteer	£5,140.00
Experience 2	£2,537.00	1	Skilled	£2,537.00
				£27,154.19

Appendix 6.6: Jig Examples

Appendix 6.7: Delivery problems and costs

Mode of delivery	Major issues	Cost per per km (+500km)
Road	• Often poor surface conditions • Indirect routes • Inadequte coverage of rural areas	£0.00811
Rail	• Overburdened and antiquated lines • Some regions are currently inacessible • High diesel prices	£0.00598
Sea	• Lack of devlopment near ports • Low governement funding • Extensive buerucracy	£0.00354
Air	• Fuel prices • Safety and security concerns • Underdeveloped airports leading to bottlenecks	£0.0156

Appendix 6.8: CSR partners and suppliers

Company	Area of expertise	CSR (£) 15/16	Potential synergies
Tata Group	Automotive, heavy manufacturing, infrastructure	£ 32,383,321	Motor, metal parts, wheels
ITC limited	Tobacco, agriculture	£ 27,240,159	Rural distribution
Mahindra Group	Utility vehicles, two wheelers	£ 9,454,261	Motors, wheels, batteries
Reliance Industries	Energy, petrochemicals, textiles	£ 71,759,934	Seat fabric, batteries, cushioning
Larsen & Toubro	Engineering, construction, manufacturing goods	£ 12,315,853	Production facilities, machines
Hindalco Industries	Aluminium manufacturing	£ 814,453	Raw material
Bajaj Group	Two and Three wheelers	£ 9,544,511	Motors, wheels, batteries
Asian Paints Ltd	Paint	£ 3,790,509	Paint, coating
Unilever	FMCG's	£ 10,138,842	Distribution, packaging
Bharat Petroleum	Petrochemical	£ 12,392,896	Plastics

Appendix 6.9: Distribution Nodes

Mumbai to Jaipur	1,153km
Mumbai to Bengaluru	984km
Mumbai to Kolkata	2,059km

Appendix 6.10: Visual Testing

https://www-pub.iaea.org/MTCD/Publications/PDF/TCS_54_web.pdf
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3066354/

Appendix 6.11: Electrical Equipment

Equipment	Cost	Test	Cycle time (s)
Multi-meter	£6.00	Resistance check	120
oscilloscope	£180.00	Voltage levels	160
Current clamp	£8.00	Current draw	20
Continuity tester	£2.00	Connection quality	50
Thermometer	£17.00	Battery/board heat	10

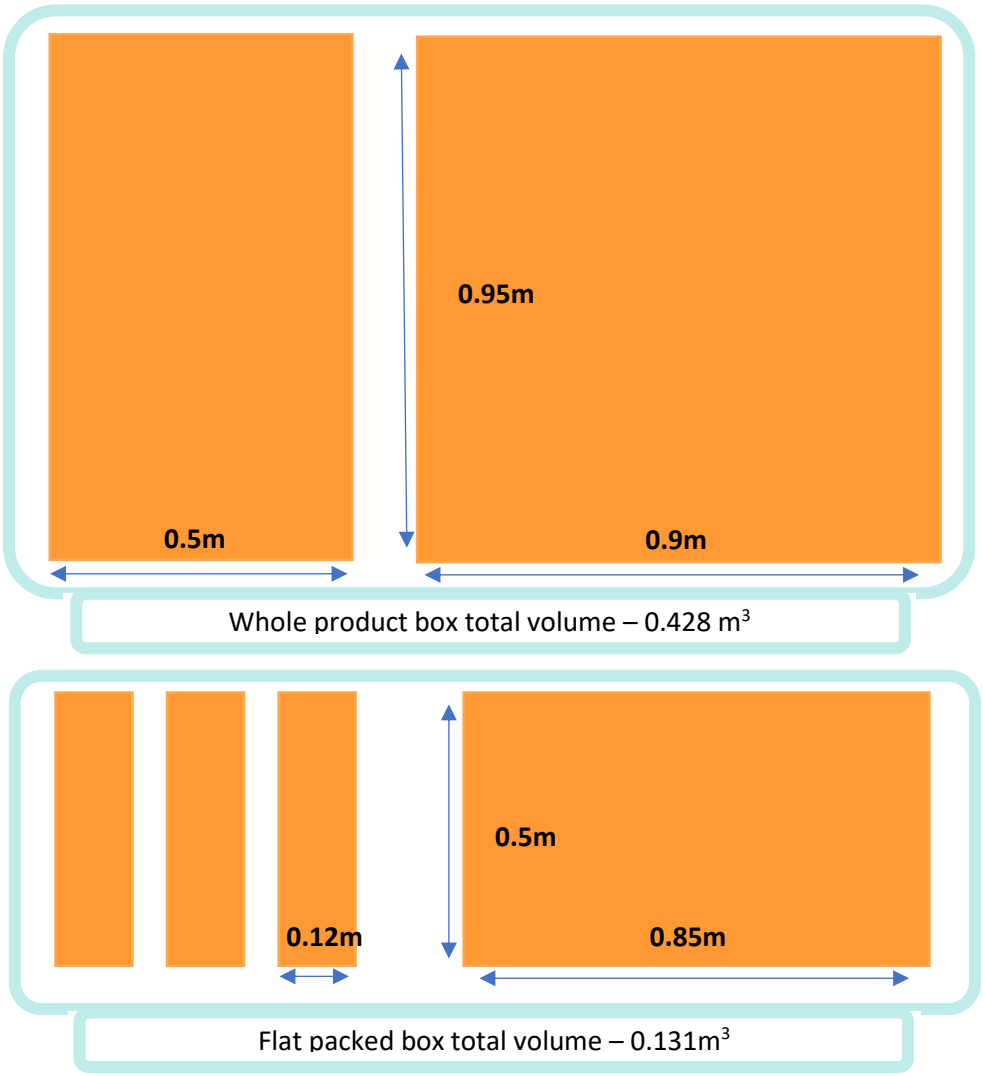
Appendix 6.12: Manufacturing Testing

Equipment	Cost	Test	Cycle time (s)
Go-no go gauge for 90 bends	£25.00	Sheet metal bend geometry	5
Tube bend go no-go	£27.00	Chassis geometry	15
Plasma cut silhouettes	£12.00	Superstructure geometry	10
Vacuum form passes through	£5.00	Styling component check	10
Play board silhouette	£3.00	Styling component check	10
Hole gauge	£6.00	Fastener fit check	45

Appendix 6.13: Final testing

Equipment	Cost	Test	Cycle time (s)
Weight system for chassis	£30.00	Chassis static loads	40
Axle loader	£20.00	Axle fatigue and loading	300
Seat frame loader	£40.00	seat dynamic load	100
Newton meter	£5.00	Pull resistance	50

Appendix 6.14: Flatpacking pakages and distribution methods



Appendix 6.15: Technican role and training

Role description	• Working with children with disabilities to ensure proper fitting of chairs • Assessing the level of need arrising from different disabilities • Measuring of anthropomorphic dimensions of customers • Assembly of product sub-systems at POC • Delivery of packages to customers • Working in manufacturing facility when required
Salary	£4310
Training	• 3 months training for assessment and ftting • 1 month for product specific assembly • 1 month delievry and pakagaging training
Qualification	Full Indian drivers license (LMV minimum) NSQF in relevant area
Fee to consumer	£13.65

Appendix 6.16: Local material and expertise

Water hyacinth
Low cost fabric potential
Invasive weed species
Easily harvested and removal benefits eco-system

Bamboo
Fast growing sustainable material
Widely available in SE Asia
Naturally antibiotic

Coir
Sri Lankan Coconut husk fibre
Excellent moisture resistance
Used by Mercedes-Benz in chairs

Appendix 7.1: Assumptions

Assumption	Section
Division Populations are from the 2011 Census with growth rates applied	(Chandramouli, 2011)
Growth rates are the state average from the 2011 Census and are assumed to be constant	
The percentage of 0-6 year olds in urban/rural areas is the state average from the 2011 Census	
64% of children between the age of 0-6 years old are in the target range of 14 months to 5 years	Calculated Estimate
Wizzy Control System has an initial market demand of 11,250. This is 0.5% of the predicted total market of people with mobility limitations in developed countries.	
Developed countries have been assumed to be Western Europe, North America, South Korea/Japan and Australia/New Zealand.	
0.4463% of market has mobility limitations	
Wizzy Control Systems market growth is 9.2%	
The cost of outsourcing sales to urban India will be similar to many urban regions in developing counties.	5.2
Travelling expenses and additional overheads will add an additional 25% to the cost of outsourcing sales.	5.2
All individuals who wish to purchase a complete WorldWizzy will also have access to a WizzyHub.	5.3
A sales price can be validated using a value-added approach, by drawing comparisons from existing similar and successful products.	5.3
Revenue from PUDC will contribute an additional 25% to that made from D2C sales of the whole product.	5.3
Market will reach full saturation when 75% of children with mobility impairment, in the 14mth – 5yr age range, have access to a WorldWizzy via a WizzyHub (when sold at cost).	5.3
Designability's WizzyBug can saturate 5% of India's "Hub" market based off an interview with designability.	5.3
The price of a low-cost manual wheelchair is approximately half of a low cost powered wheelchair at the same level of demand.	5.3
Fundraising through business partners will be sufficient to raise initial capital and working capital.	5.4
4% of families (i.e. 1/25) who experience WorldWizzy will have the desire to and the means to purchase an individual product.	5.4
Once WorldWizzy has been sold into a region it will take 10 years to fully saturate that region.	5.4
Demand for WizzyHubs in rural areas will be negligible due to the low population density.	5.4
Sufficient fundraising can be raised to meet demand driven sales forecast.	5.4
At full capacity, one sales-person will be able to sell 400 Worldwizzys per year.	5.4.1
When operating in a new region (N/S/E/W) the sales team will sell at 50% in y1, 60% in y2, 80% in y3 and 100% thereafter.	5.4.1

Debtor lead time of 10 days in advance	6.8
Creditor lead time of 3 days in advance	6.8
Rate of inflation is set at 4%	7.2
Stock levels on average have 2 weeks supply	Decision
Rent of £1.92 per month per square meter of floor space	(99Acres, 2018)
Delivery costs per product are: Mumbai to Bengaluru: £7.15 Mumbai to Jaipur: £7.15 Mumbai to Kolkata: £8.50 Distribution nodes to consumer: £6.75 Mumbai to developed country: £10.00	
Injection mould plates will cost £110,000 for Wizzy Control Systems	(Campo, 2008)
Gas use per m square is 5.775Btu and it costs £2.05 per MMBtu in India	(MGE, N/A) and (Abdi, 2017)
Electricity use per square meter is 1023.6kWh and it costs £0.065 per kWh in India	(MGE, N/A) and (Varadhan, 2018)
Staff Salaries UK manager: £40,000 Design Team: £3,750 Skilled Labours: £2,537 Unskilled Labours: £1,280 HR Salary: £6,770 Fundraiser: £6,000 Advertisement Executive: £25,000	(Payscale, 2018)
WorldWizzy and WorldWizzy Pro labour times: Skilled Labour: 144 minutes, Unskilled Labour: 85 minutes Wizzy Control Systems labour times: Unskilled Labour: 45 minutes	Appendix 7.3
Staff work at an efficiency of 50% so the above times are doubled	Estimate
Two UK based trustees will travel to India every 4 months at a cost of £500 each	Decision
Economies of scale of 1% for component costs	Estimate
Injection moulding outsourcing cost £7,000 per tonne	(IndiaMart, 2018)
Soldering outsourcing cost of £0.05 per pin/pad	(Robert, 2018)
Upholstery outsourcing cost of £25.61 per product	Estimation

Appendix 7.2: Full Cashflow

	0	1	2	3	4	5	6	7	8	9	10
Total Sales Revenues	£ -	£ 1,656,050.00	£ 1,932,080.00	£ 2,231,440.00	£ 2,680,060.00	£ 3,046,380.00	£ 3,589,900.00	£ 4,047,040.00	£ 4,784,130.00	£ 5,422,580.00	£ 6,163,950.00
WizzyHub Sales	£ -	£ 57,050.00	£ 149,040.00	£ 248,270.00	£ 339,340.00	£ 452,790.00	£ 556,800.00	£ 694,950.00	£ 871,180.00	£ 1,087,240.00	£ 1,183,500.00
Individual Sales	£ -	£ 24,000.00	£ 63,140.00	£ 105,070.00	£ 143,370.00	£ 194,040.00	£ 238,220.00	£ 299,930.00	£ 371,680.00	£ 468,350.00	£ 509,250.00
Wizzy Control System Sales	£ -	£ 1,575,000.00	£ 1,719,900.00	£ 1,878,100.00	£ 2,197,350.00	£ 2,399,550.00	£ 2,794,880.00	£ 3,052,160.00	£ 3,541,270.00	£ 3,866,990.00	£ 4,471,200.00
Variable Costs	£ -	£ (1,459,408.15)	£ (1,737,422.16)	£ (2,039,980.75)	£ (2,364,177.72)	£ (2,758,906.67)	£ (3,181,546.79)	£ (3,681,384.43)	£ (4,246,531.51)	£ (4,946,559.96)	£ (5,591,751.18)
Components	£ -	£ (1,208,769.23)	£ (1,440,898.62)	£ (1,690,394.46)	£ (1,957,042.92)	£ (2,283,993.42)	£ (2,633,725.27)	£ (3,046,096.15)	£ (3,510,993.15)	£ (4,089,441.62)	£ (4,625,307.38)
Outsourced Manufacturing	£ -	£ (121,841.15)	£ (149,213.60)	£ (179,906.97)	£ (212,269.55)	£ (250,705.10)	£ (291,384.86)	£ (340,692.00)	£ (397,145.19)	£ (466,669.56)	£ (525,709.57)
Stock holding	£ -	£ (215.43)	£ (521.59)	£ (827.90)	£ (1,079.16)	£ (1,441.22)	£ (1,720.54)	£ (2,083.11)	£ (2,501.27)	£ (3,113.23)	£ (3,283.22)
Dispatch	£ -	£ (118,952.34)	£ (137,158.36)	£ (159,221.42)	£ (184,156.09)	£ (213,136.93)	£ (245,086.12)	£ (282,883.17)	£ (326,261.90)	£ (377,705.56)	£ (427,821.00)
Maintenance & Repairs	£ -	£ (9,630.00)	£ (9,630.00)	£ (9,630.00)	£ (9,630.00)	£ (9,630.00)	£ (9,630.00)	£ (9,630.00)	£ (9,630.00)	£ (9,630.00)	£ (9,630.00)
Fixed Costs	£ (49,000.00)	£ (128,965.24)	£ (158,057.05)	£ (198,399.54)	£ (232,411.00)	£ (262,512.54)	£ (301,966.40)	£ (360,313.50)	£ (402,918.29)	£ (471,610.39)	£ (536,681.23)
Factory Rent	£ -	£ (8,122.98)	£ (8,447.90)	£ (17,571.64)	£ (27,411.75)	£ (28,508.22)	£ (39,531.40)	£ (51,390.82)	£ (53,446.45)	£ (66,701.17)	£ (80,930.76)
Energy Bills	£ -	£ (9,148.32)	£ (24,200.36)	£ (40,797.12)	£ (56,466.46)	£ (76,397.53)	£ (95,264.21)	£ (120,623.10)	£ (150,019.04)	£ (190,305.64)	£ (210,671.68)
Management Wages	£ (40,000.00)	£ (41,600.00)	£ (43,260.00)	£ (44,990.00)	£ (46,790.00)	£ (48,660.00)	£ (50,610.00)	£ (52,630.00)	£ (54,740.00)	£ (56,930.00)	£ (59,200.00)
Indian Design Team Wages	£ -	£ (7,800.00)	£ (8,100.00)	£ (8,420.00)	£ (8,760.00)	£ (9,120.00)	£ (9,480.00)	£ (9,860.00)	£ (10,260.00)	£ (10,660.00)	£ (11,100.00)
Labour Wages	£ -	£ (13,150.00)	£ (16,440.00)	£ (19,950.00)	£ (23,680.00)	£ (27,720.00)	£ (32,100.00)	£ (39,960.00)	£ (45,110.00)	£ (54,150.00)	£ (60,000.00)
HR Wages	£ -	£ (7,040.00)	£ (7,320.00)	£ (7,610.00)	£ (7,910.00)	£ (8,230.00)	£ (8,560.00)	£ (8,900.00)	£ (9,260.00)	£ (9,630.00)	£ (10,020.00)
Fundraiser Wages	£ (6,000.00)	£ (6,240.00)	£ (6,480.00)	£ (13,480.00)	£ (14,020.00)	£ (14,580.00)	£ (15,180.00)	£ (23,670.00)	£ (24,630.00)	£ (25,590.00)	£ (35,520.00)
Sales Team	£ -	£ (6,500.00)	£ (13,520.00)	£ (14,060.00)	£ (14,620.00)	£ (15,200.00)	£ (15,800.00)	£ (16,440.00)	£ (17,100.00)	£ (17,780.00)	£ (27,750.00)
Advertisement	£ -	£ (26,000.00)	£ (27,000.00)	£ (28,100.00)	£ (29,200.00)	£ (30,400.00)	£ (31,600.00)	£ (32,800.00)	£ (34,200.00)	£ (35,500.00)	£ (37,000.00)
Training	£ -	£ (243.94)	£ (48.79)	£ (48.79)	£ (48.79)	£ (48.79)	£ (48.79)	£ (97.58)	£ (48.79)	£ (97.58)	£ (48.79)
UK Support Travel Costs	£ (3,000.00)	£ (3,120.00)	£ (3,240.00)	£ (3,372.00)	£ (3,504.00)	£ (3,648.00)	£ (3,792.00)	£ (3,942.00)	£ (4,104.00)	£ (4,266.00)	£ (4,440.00)
Delta Working Capital	£ -	£ 95,646.11	£ 15,288.31	£ 15,653.28	£ 19,616.78	£ 19,574.41	£ 22,832.93	£ 21,966.56	£ 30,769.03	£ 30,693.53	£ 28,313.74
Working Capital	£ -	£ 95,646.11	£ 110,934.42	£ 126,587.70	£ 146,204.48	£ 165,778.88	£ 188,611.81	£ 210,578.37	£ 241,347.40	£ 272,040.93	£ 300,354.67
Project Costs	£ 52,250.00	£ (3,700.00)	£ 19,440.00	£ 40,440.00	£ 45,565.00	£ 51,030.00	£ (72,138.50)	£ (59,272.84)	£ (57,494.75)	£ (55,617.74)	£ (31,105.65)
Business Donations	£ 65,000.00	£ 110,000.00	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -
Chairtable Donations	£ 12,000.00	£ 15,600.00	£ 19,440.00	£ 40,440.00	£ 45,565.00	£ 51,030.00	£ 60,720.00	£ 78,900.00	£ 86,205.00	£ 93,830.00	£ 124,320.00
Equipment		£ (129,300.00)	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -
Branding	£ (8,750.00)	£ -	£ -	£ -	£ -	£ -	£ (6,326.60)	£ (6,579.66)	£ (6,842.85)	£ (7,116.56)	£ (7,401.22)
WizzyHub Investment	£ (16,000.00)	£ -	£ -	£ -	£ -	£ -	£ (126,531.90)	£ (131,593.18)	£ (136,856.91)	£ (142,331.18)	£ (148,024.43)
Total	£ 3,250.00	£ 63,976.60	£ 56,040.79	£ 33,499.71	£ 129,036.28	£ 75,990.78	£ 34,248.31	-£ 53,930.76	£ 77,185.45	-£ 51,208.09	£ 4,411.94
Cumilative Total	£ 3,250.00	£ 67,226.60	£ 123,267.40	£ 156,767.11	£ 285,803.39	£ 361,794.17	£ 396,042.48	£ 342,111.72	£ 419,297.17	£ 368,089.08	£ 372,501.03

Appendix 7.3: Labour Timings

Reference (MI)	Part	Quantity	Time in minutes to complete/ operator grade														Skilled Total Minutes	Semi Skilled Total Minutes
			Skilled Labour								Unskilled Labour							
	Total		Set Up	Tear Down	Tig Welder	Plasma Cut	Pipe Bend	Sheet Bend	Grinding	Paint	Vacuum Forming	Pillar Drill	Trimmer	Wiring	Rivoting	Assembly	8644.56	5075
MI-01	Heat Sink Connector	1	1.71	1		17.4											20.11	0
MI-02	RHS Seat Support	1	1.71	1		31.6											34.31	0
MI-03	LHS Seat Support	1	1.71	1		31.6											34.31	0
MI-04	Connector Bar	1	1.71	1		12											14.71	0
MI-05	Seat Panel	1	5	3		167.6											175.6	0
MI-06	Backrest Panel	1	5	3		132.8											140.8	0
MI-07	Headrest Panel	1	5	3		61.7											69.7	0
MI-08	Left Armrest Panel	1	5	3		69.9											77.9	0
MI-09	Right Armrest Panel	1	5	3		69.9											77.9	0
MI-10	Footrest Panel	1	5	3		41.2											49.2	0
MI-11	Left Side Support Panel	1	5	3		43.9											51.9	0
MI-12	Right Side Support Panel	1	5	3		43.9											51.9	0
MI-13	Front Motor Plate	2	1.71	1		7.4											20.22	0
MI-14	RHS Tubing	1	60	60					8								128	0
MI-15	LHS Tubing	1	60	60					8								128	0
MI-16	RHS Tubing	3	120	80			60										780	0
MI-17	LHS Tubing	3	120	80			60										780	0
MI-18	RHS Tubing	5	15	15								45					0	375
MI-19	LHS Tubing	5	15	15								45					0	375
MI-20	RHS Seat Support	2	20	10				6									72	0
MI-21	LHS Seat Support	2	20	10				6									72	0
MI-22	Seat Panel	3	20	10				6									108	0
MI-23	Backrest Panel	3	20	10				6									108	0
MI-24	Headrest Panel	2	20	10				6									72	0
MI-25	Left Armrest Panel	2	20	10				6									72	0
MI-26	Right Armrest Panel	2	20	10				6									72	0
MI-27	Footrest Panel	1	20	10				6									36	0
MI-28	Left Side Support Panel	2	20	10				6									72	0
MI-29	Right Side Support Panel	2	20	10				6									72	0
MI-30	Front Motor Plate	2	40	5				60									210	0
MI-31	Front Motor Plate	8	20	0											5		0	200
MI-32	Harness	12	20	0											5		0	300
MI-33	Battery Casing	4	20	0											5		0	100
MI-34	Left Side Support Panel	3	20	0											5		0	75
MI-35	Right Side Support Panel	3	20	0											5		0	75
MI-36	Battery Casing	1	160	10											5		0	175
MI-37	Front Motor Casing AL	1	160	10											5		0	175
MI-38	Front Motor Casing BL	1	160	10											5		0	175
MI-39	Front Motor Casing AR	1	160	10											5		0	175
MI-40	Front Motor Casing BR	1	160	10											5		0	175

MI-41	Battery Casing	1	10													0	0	
MI-42	Front Motor Casing AL	1	10													0	0	
MI-43	Front Motor Casing BL	1	10													0	0	
MI-44	Front Motor Casing AR	1	10													0	0	
MI-45	Front Motor Casing BR	1	10													0	0	
MI-46	Chassis Sides LHS	4	36	10						0						0	0	
MI-47	Chassis Side RHS	4	36	10						0						0	0	
MI-48	Front Wheels	8	432	10						0						0	0	
MI-49	Caster Wheels	8	432	10						0						0	0	
MI-50	Seat Support Frame	4	12	10						33						220	0	
MI-51	Cross Beam	4	12	10						33						220	0	
MI-52	Heat Sync Plate	4	12	10						33						220	0	
MI-53	Foot Plate	4	12	10						33						220	0	
MI-54	Seat Frame	4	12	10						33						220	0	
MI-55	Back Rest Frame	4	12	10						33						220	0	
MI-56	Arm Rest Frame	8	24	10						33						536	0	
MI-57	Head Rest Frame	4	12	10						33						220	0	
MI-58	Side Support Frame	8	12	10						33						440	0	
MI-59	Play Panels	8	108	10						198						2528	0	
MI-60	Product Assembly	1	0	0												2700	0	2700