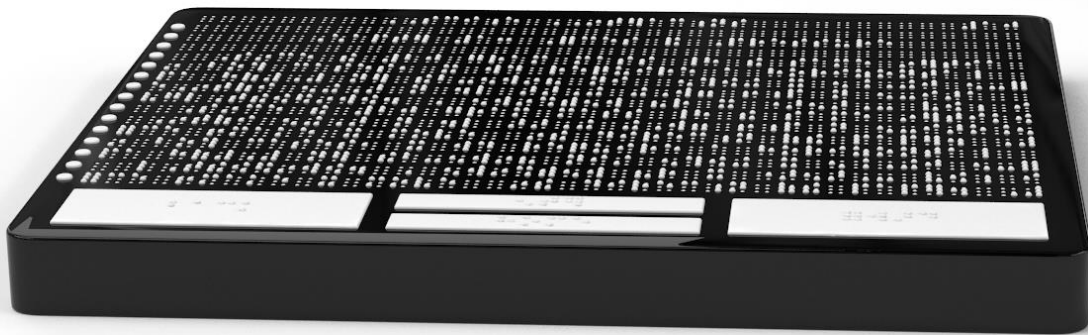THE UNIVERSITY OF ROCHESTER

UREAD BRAILLE

CORNELL CUP 2014

ABREVIATED BUSINESS PLAN

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1. EXECUTIVE SUMMARY

1.1. COMPANY AND TECHNICAL BACKGROUND

URead Braille Inc. aims to empower individuals with little or no vision by granting them access to virtually limitless reading material. Our product, the **BrailleShape**, is a full page refreshable braille display—an ebook for the blind.

While Braille displays currently on the market use piezoelectric actuators to actuate braille pins, this technology is expensive and bulky. We have developed a new technology that uses solenoid actuators allowing for a cheaper and more compact device. This patentable technology (Patent Pending) makes our product unique compared to those available on the market, and we believe it could revolutionize the digital world for the blind.

1.2. MARKET OPPORTUNITY

Currently there are approximately 16 companies that produce up to 70 kinds of braille displays on the US market. The difference between the BrailleShape and these products is that we offer the *only* multiline braille reading device. Instead of displaying only one line at a time, our product proposes 10-15 lines of refreshable text giving the reader a more immersive experience. Furthermore, while the devices on the market are about $4000 for a single line, our device can be sold at $3000 for a full page. Our target Market includes:

- Individual Braille users
- Non-profit organizations for the blind
- Schools and Universities
- Libraries

1.3. FINANCIAL SUMMARY

To date we have participated in the Cornell Cup 2013(received Honorable Mention award) and currently in the Cornell Cup 2014. We have received funding and sponsorship from the competition and the University of Rochester totaling approximately $10,000. These funds have been used for travel as well as to test and experiment with different technologies for creating such a device. Our current proposal is the most viable solution found.

The following table is a summary of the financial forecast URead Inc. expects in the first 5 years as a start-up:

SUMMARY OF FINANCIAL FORECAST					
	YEAR 1	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**
Executive Summary Table					
Sales	$0	$500	$29,500	$59,000	$141,000
Gross Margin	($199)	($48)	$19,888	$39,947	$96,984
Operating Profit	($1,399)	($2,503)	$14,483	$32,377	$79,594
Percent of Sales	*0%*	*-501%*	*49%*	*55%*	*56%*
TOTAL HEADCOUNT	6	12	24	34	72
Cumulative Stock Sold - Venture Capital	$1,900	$4,100	$4,100	$4,100	$4,100

1.4. MISSION STATEMENT AND VISION

In the age of technology there is a digital divide between those that can use all the available technologies, and those who cannot. While the sighted can use tablets, e-readers, computer screens and access the internet, for the blind community these technologies are still out of reach. Our full page refreshable braille device would make braille more convenient and accessible for the blind and make available the on-demand access to information that the rest of the modern world takes for granted. URead is driven by the mission and vision to bring this technology to the visually impaired community and by doing so bridge this digital divide.

2. BUSINESS IDEA

The URead Braille project was started in September 2012 as an entry for the Cornell Cup competition[1]. During the Cornell Cup 2013, the team received an honorable mention[2]. The URead Braille project has be publicized in the University of Rochester's Campus Times[3], Ithaca College's Ithaca Week[4], and mentioned in the Huffington Post blog[5]. We believe that our business idea can bring about a digital braille revolution.

2.2. NEED AND OPPORTUNITY

While there are currently over a dozen braille devices on the market, these devices are limited to one line displays that stretch to a maximum of 32 characters. Due to the resolution of braille, this display may fit an average of 4-6 words at a time. Speaking with local braille users[6], we have noted the need for a higher resolution screen.

Our BrailleShape aims to solve exactly this problem that none of our competitors are solving. With our full page display, the BrailleShape is able to show 6 pin braille, 8 pin braille, graphics and maps as necessary. These functionalities exceed those of our competitors. With our current technology, we can reduce the manufacturing price of the device down to $3000-4000, which is much cheaper than the alternatives.

BRAILE SHAPE REQUIREMENTS

Speaking with Braille users and a local Rochester Braille professional[7], we determined that the market is looking for the following specifications from the BrailleShape:

Requirement	Worst case limits
Affordability	$2000-$4000
Resolution	40 Columns by 25 Rows
Portability	14"x10"x1.5", 7lbs
Robustness	The device should not break if dropped or shaken
Usability	The goal is to maximize Learnability, Efficiency, Memorability, Errors, Satisfaction. This ensures the average user can pick up and easily and enjoyably use the device.
Refresh Speed	The whole page refreshes within 4 seconds.
Energy Consumption	The power consumption is comparable to other portable devices.

2.3. PRODUCTS AND SERVICES

URead inc. will be the only company on the market to be able to offer a multiline braille display. Our main product is the BrailleShape. We will also offer a large library of ebook translations to braille. Lastly we will sell advertising space on the Braille device in order to generate revenue.

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[1] For more information please see: http://www.systemseng.cornell.edu/se/intel/
[2] For more information please see: http://www.pinterest.com/pin/271060471295012550/
[3] For full article please see: http://www.campustimes.org/2013/11/07/two-teams-selected-for-cornell-cup/
[4] For full article please see: http://www.ithacaweek-ic.com/cornell-competition-addresses-real-world-needs-with-braille-e-reader-entry/
[5] For full article please see: http://www.huffingtonpost.com/gary-m-kaye/college-seniors-designing_b_3272748.html
[6] Please see Appendix A for examples of interviews taken
[7] Please see Appendix A

2.3.1. PRODUCT AND SERVICE DESCRIPTION

The key products and services that URead will offer are listed below:

1. BrailleShape—This full-screen ebook will have inbuilt functionalities to translate text files to braille, inbuilt features such as audio assistance and help menus, etc. See Section 2.2.
2. Electronic Braille Books—URead will provide a library of books specifically translated to braille with the correct formatting. URead will ensure that the book is translated and formatted correctly as opposed to importing a pdf which may not always be properly formatted.
3. Advertisements—URead will also sell advertising space on the device. Due to the nature of the device, the screen can be set to some text and the device can be turned off while maintaining this text. We will be able to sell the advertising space of the screen when the device is powered down.

2.3.3. FUTURE PRODUCTS AND SERVICES

The BrailleShape currently acts as an e-book and only translates text to braille, however in the future additional functionalities to the device may include but are not limited to:

- Translation from other sources to braille. Other formats include popular e-book formats such as the KF8 or AZW, images or scanned pages, websites/webpages, audio etc.
- Translation to other formats: The translator can translate to many dialects of braille or other languages
- External keyboard: In the future we would like to create an external keyboard to allow the user input.
- Browser capabilities: Our dream is to create a device that will act as a braille browser and represent websites including navigation through the sites.

The first three services will be accomplished in the first two years, the last service is a 5-year goal for the company.

2.4. TARGET CUSTOMERS

The primary product we are offering is the BrailleShape, naturally, four target market segments have been identified for BrailleShape users:
1. Individual Braille users
2. Non-profit organizations
3. Schools and Universities
4. Libraries

The Braille library service offering will target these same markets, and the advertising space will only target the organizations, schools and libraries. We interviewed some individual braille users in order to determine the initial specifications for the device.

2.5. VALUE PROPOSITION

The proposed BrailleShape will give our target customers an immersive reading experience that none of our competitors can provide. After the first few development years, when the product reaches the market, we expect to provide not just a reading experience but also the ability to take notes with an extensive library of books.

The BrailleShape will be cheaper than 80% of the displays currently on the market giving the consumers high value for low cost. Furthermore, compared to printed braille books, which can cost thousands for a single novel, the BrailleShape is cheap. Through our positioning strategies, we aim to market this value to our customers.

3. STRATEGY AND MILESTONES

The industry for refreshable braille displays is a relatively new and growing one. The first braille display was developed in 1980 with piezoelectric actuators[8]. This has remained the dominant technology on the market to this day. Because of this there are only over a dozen popular braille display producing companies.

3.1. INDUSTRY (SWOT) ANALYSIS

In order to effectively position our brand, we have computed a detailed industry analysis for the device. The following table summarizes the Strengths, Weaknesses, Opportunities and Threats that URead faces:

Strengths	• BrailleShape will open up a new branch of a mature braille display market. This will cater to a new marketing segment in comparison to the existing companies on the market. • We will offer one of the few devices on the market that can cost around $3000 and offer these functionalities. This gives us a price advantage over existing companies. • Unlike a lot of European based companies selling in the United States, our company will be a domestic manufacturer and supplied that is more connected to our target market. • Government programs, funds and charities exist to promote the usage of braille devices. This could further enable us to subsidize the device and lower cost.
Weaknesses	• URead is entering a market that is currently shrinking. With the advent of screen readers the usage of braille is on the decline. We expect this to go back up in the future. • As a start-up, URead lacks the capital to start developing and prototyping products. We have much fewer resources than existing braille companies for R&D. • Our current technology is currently in the process of being patented, however we suspect that the device could easily be reverse engineered suggesting that IP might be difficult to protect. • Because this is a mature market, there is a risk that the current customers are already dedicated to the brands and products that are currently on the market.
Opportunities	• Government Law gives a lot of support to special education so our target customers such as schools and institutions will be subsidized in order to meet the needs of special students. • The BrailleShape can potentially substitute printed braille books. The bulk and expense of full page braille books is overwhelming and a full page display would be economically smarter to use. • Many braille schools could use the BrailleShape as a substitute for existing teaching materials and allow for a larger variety of teaching material. • Derivative services such as a book store and the advertising space can also bring profit to URead.
Threats	• Currently we are facing an unstable supply chain and fluctuated cost of product parts. This can be improved by developing the product parts by ourselves, but would require initial setup costs. • Larger companies experience higher economies of scale in comparison to a start-up such as URead. We expect that as the company grows over the years this threat will diminish. • If the intellectual property is not properly protected, dominating companies in the market coule easily replicate our technology and release the same product at a lower price.

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[8] Please see this for more information: http://kscitech.com/BC/D/Becker.htm

3.2. COMPETITION

There are 8 major competitors in the braille market. Four of major manufacturers and suppliers are from Europe. Two of our largest competitors are Perkins and HumanWare, here are a few reasons:

1. Both are fast developing technology companies where it releases new product at a fast rate.
2. They both have history and are large companies. For example: Perkins[9] was founded in 1829, has $280M net assets and in 2011 received over $6M revenue from sales of braille devices and accessories.
3. Humanware has a relatively low price in the braille display market and our product's catch is low price. Besides the price, a full range of assistive products give the customer a suggestively better experience.
4. The company has a large base of loyal customers that are more likely to buy products from them because they believe they have better quality and more reliable services.

The largest challenge we will face when breaking into this market is existing brand loyalty—From speaking with our local Braille contact we found that people are dedicated to the brand that they are currently using because of the learning curve associated with using a new product. In order to alleviate this disadvantage, we are focusing on user experience to make the device usable and easily learnable allowing users to switch to our brand.

3.3. UNFAIR ADVANTAGE

The BrailleShape has several points of competitive advantage over existing technologies available to the customer currently. The following lists some of these advantages:

- Price: The BrailleShape has an approximate cost of goods per device of
- Functional Flexibility: The BrailleShape has the ability to not only display 6-pin braille, but also 8-bin braille, graphics and even maps. With the large grid of dots we are able to use the same technology for multiple purposes. On top of these features, we plan on implementing many of the features that existing displays use such as screen reader audio, file import from USB drives etc.
- Resolution Flexibility: Due to the technology we are using to actuate the braille pins, the resolution and dimensions of the screen can easily be modified. We can also easily adjust the size and spacing of the dots to provide other (larger) braille standards.

3.4. STRATEGY

The market that we are entering into already has many large competitors that we will be facing. The goal of our strategy and implementation is to maximize the areas of unfair advantage that we have by using specific differentiation and positioning techniques. The aim is to enter the market fast enough that these competing companies do not have the resources to produce the goods or services comparative to the ones we are offering.

As can be seen in this diagram, we value our Customer, and our marketing strategy strongly depends on what our customer want. In order to differentiate ourselves from the other companies, our marketing strategy varies in each one of these subsections.

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[9] Notes from 2011 Financial statements: http://www.perkins.org/assets/downloads/giving/perkins-audited-financial-statements-2011-12.pdf

3.4.1. PRODUCT STRATEGY

It was mentioned in the previous section that our product has a very flexible range of functionalities and resolutions. This can be used towards our advantage in order to horizontally and vertically differentiate our products. Some of the editions of the BrailleShape that can be produced in the future are:

Horizontal Differentiation (display resolution)	Vertical Differentiation (braille resolution)
Full Page display (original)	Standard braille spacing (2.5mm between dots)
Longer line display for table top	Jumbo braille spacing (3mm between dots)
Half-page portable display	
Single or double line display	

Using horizontal deepening we can market specifically to the different professionals that use braille—an on-the-go professional might want a more portable Half-page display in comparison to the full page display. An office work desk might want a longer display for faster reading.

Using vertical deepening we can market to the different age groups of the braille demographic—a young child learning braille might prefer the jumbo braille display that has lower display resolution but is easier to read, similarly a braille user that has desensitized feeling might prefer jumbo braille for reading clarity.

3.4.2. POSITIONING STRATEGY

For organizations that provide high braille accessibility and availability to people who read braille, BrailleShape is a technology that offers affordable device that give instant access to open reading resource such as pdf and txt. Unlike other existing technology companies, URead offer a combination of fastest access to reading material and affordable price.

For example, for World Wide Web users who enjoy books, Amazon.com is a retail bookseller that provides instant access to over 1.1 million books. Unlike traditional book retailers, Amazon.com provides a combination of extraordinary convenience, low prices, and comprehensive selection. Similarly URead aims to enter the market specializing in a large library of reading materials and imported materials.

3.4.3. PROMOTION STRATEGY

The BrailleShape was built keeping the customer in mind. In order to promote the product we plan on including key customers in our development process. All the promotions in first year are going to advertise for our product and to test human interface for the future project. By setting up a reward system such as product discounts for usability testing volunteers we can engage the community in an exciting new technology.

On a secondary way by observing how customers interact with the device earlier on will help us test systems quickly and bring in features as needed.

3.4.4. PRICING STRATEGY

The product will be competitively priced. Currently the projected cost of the raw materials for the device is $1500, if the device is sold at $3000 then the net profit from sales will be approximately $1000 (subtracting the

manufacturing cost). The price of $3000 was based on the price of our top competitor's products. The following table summarizes this research:

Company	Product	Cells	Cost	Functionality
Perkins	Braille Display	40	$2595	Only Display
	Braille Mini	16	$1549	Keyboard Input
HumanWare	BrailleNote Apex	32	$6350	Note taking
	Brailliant	40	$3450	Note taking
Freedom Scientific	Focus Blue	40	$2795	Keyboard Input
	PAC Mate	40	$2695	Only Display

This rate is healthy for company growth but is competitive in comparison to the products currently offered considering that these are one line displays. Note that the price for the device will change depending on the number of pins displayed on the screen similarly to the products offered on the market.

3.4.5. PLACE STRATEGY

Initially URead will target the US market starting in Boston MA and Rochester NY where the company will have the most contacts. In the future URead can explore international geographic locations such as India, China, or Europe. Targeting government and school buyers in developing countries will open up a new target market in the long term.

3.5. MILESTONE CHART

In the first two years of the startup we plan on continuing to develop the BrailleShape and make it ready to use in the market. The following chart shows the key milestones for the project for the first year of development.
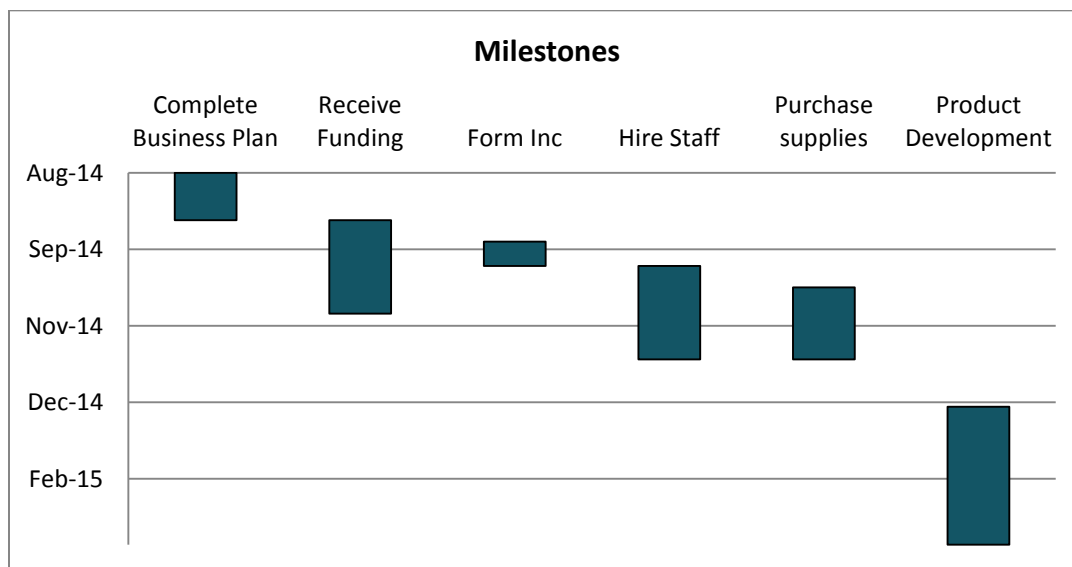
Product Development will continue for the next two years. At the beginning of the product development period a milestones or timeline chart will be created for the development of the product over the course of the next years.

4. MARKETING AND SALES

The four major target market segments have been identified:

1. Individual Braille users
2. Non-profit organizations for the blind
3. Schools and Universities
4. Libraries

In these sections we examine the marketing segmentation for consumers of the BrailleShape as well as analyze the current market and industry for Braille e-reader devices.
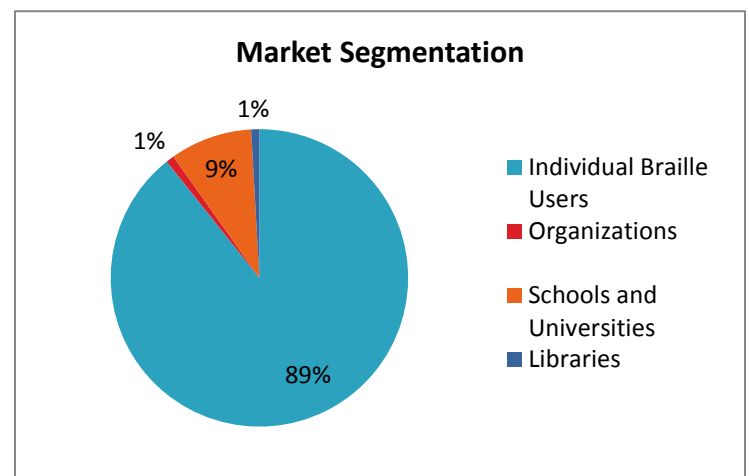
4.1. MARKET

We have identified 4 segments of the population that will use the BrailleShape. The table below summarizes the predicted growth and percentage of our market that each one of these segments occupies. Note that these years begin after sales are started and do not include the two years of research and development.

Market Analysis							
		Year 1	Year 2	Year 3	Year 4	Year 5	
Potential Customers	Growth						CAGR
Individual Braille Users	100%	5000	10,000	25,000	50,000	100,000	80.00%
Organizations	100%	200	400	600	800	1000	40.00%
Schools and Universities	100%	500	1000	2000	5000	10,000	80.00%
Libraries	100%	200	400	600	800	1000	40.00%
Total	100%	5,900	11,800	28,200	56,600	112,000	80.00%

There are approximately ~300,000 Braille Users in the United States. Note that this is not the total population of users that already use braille. We estimate that we will be able to reach approximately 30% of this population—a total of 100,000 users. In the future as we expect the usage of Braille to increase, this target market will also increase. Due to the versatility of the BrailleShape, the market will target all age groups. In the future we might distribute devices with different braille spacing, such as jumbo braille[10] to target the 5-15 age group as well as the 65+ age group in order to allow them to more easily learn braille or to cater to desensitized feeling resolution for seniors. The pie chart below shows the segments of our target market divided between these segments.

Age	Total Population	Braille Users
5-15	417,759	41,776
16-20	211,006	21,101
21-64	1,727,327	172,733
65+	510,247	51,025
Sum	2,866,339	286,634

Market Segmentation

- Individual Braille Users: 89%
- Organizations: 1%
- Schools and Universities: 9%
- Libraries: 1%

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[10] Braille dot to dot spacing is at a standard 2.5mm, jumbo braille is 3 – 3.5 mm in between dots

There are approximately 1700[11] Braille organizations in the United States alone. We estimate that we will be able to 1000 of these organizations. There are currently over 100,000 schools[12] in the United States. Many schools offer assistance to the visually impaired population of their school. We expect to reach approximately 10% of this segment 10,000 schools. Approximately 10,000 public libraries exist in the United States[13] to date. We expect to reach 10% of this segment. Organizations, schools or library might purchase more than a single BrailleShape.

4.2. SALES MODEL

4.2.1. SALES STRATEGY

The Sales strategy for the BrailleShape involves two key components:

1. Sales through promotional events and existing institutions
   By reaching out to existing institutions for the visually impaired, we are able to advertise the device to the market through sources that we trust. This will involve strong ties with such existing institutions.
2. Sales through stores both online and physical

Furthermore, sales will also occur for advertisement space on the device. This will also be advertised through existing braille institutions and channels.

4.2.2. SALES FORECAST

The following graph summarizes the sales of the braille e-reader over the first 5 years of the company. This shows the number of expected units sold and the expected target market.
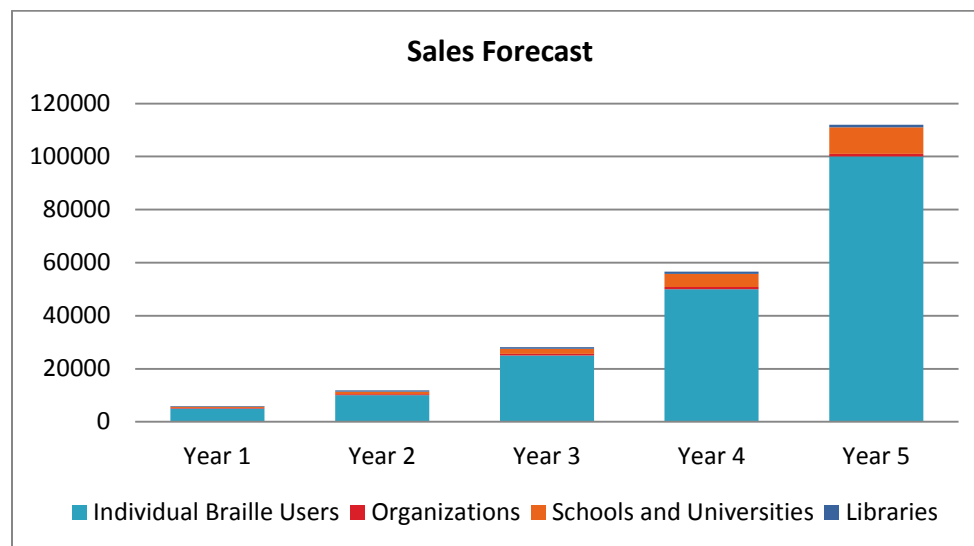
Sales Forecast

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[11] Please see this for more details: http://www.afb.org/directory.aspx?action=results

[12] Please see this for more details: http://nces.ed.gov/fastfacts/display.asp?id=84

[13] Please see this for more details: http://www.ala.org/tools/libfactsheets/alalibraryfactsheet01

4.2.3. SALES MODEL

Uread Braille Inc.	$ in 000				
Year	1	2	3	4	5
SALES MODEL					
SALES: Products					
Average Sales Price $ per Unit	$4.00	$4.00	$4.00	$4.00	$4.00
Sales Units in 000	0	100	5,900	11,800	28,200
Sales: Products	$0	$400	$23,600	$47,200	$112,800
SALES: Advertising on Product					
Nr. Of viewers in 000	0	100	5,900	11,800	28,200
Average Ad Price $ per Unit	$1.00	$1.00	$1.00	$1.00	$1.00
Sales: Ads	$0	$100	$5,900	$11,800	$28,200
Sales All	**$0**	**$500**	**$29,500**	**$59,000**	**$141,000**
COST OF GOOD SOLD					
Production Cost per Unit Sold $/Unit	$1.50	$1.50	$1.50	$1.50	$1.50
Sales Units in 000	0	100	5,900	11,800	28,200
Production Cost of Units Sold	$0	$150	$8,850	$17,700	$42,300
Manufacturing/Ops/Website - Headcount	1	2	4	8	10
Mfg/Ops/Website - $/HC	$130	$130	$130	$130	$130
Manufacturing / Operations - Dept Expenses	$130	$260	$520	$1,040	$1,300
Other Expenses - Mfg/Ops/Web	$1	$2	$3	$4	$5
Cost of Goods/Services Sold	**$131**	**$412**	**$9,373**	**$18,744**	**$43,605**
Year	1	2	3	4	5
Sales All	$0	$500	$29,500	$59,000	$141,000
Cost of Goods/Services Sold	$131	$412	$9,373	$18,744	$43,605
Gross Margin	**($131)**	**$88**	**$20,127**	**$40,256**	**$97,395**

4.3. BUSINESS MODEL

The business model that URead follows is to break into the market fast before our competitors are able to react. Because we would be the sole supplier of such a device we would monopolize the market. As a startup URead is currently not partnered with any company. However in order to break into this existing market, we would like to partner with one of our top competitors that already has a strong hold on the market. We believe that of our competitors Perkins School for the Blind will benefit from a partnership with us as their braille displays are popular but fall behind HumanWare. Because Perkins offers many external services, it would help URead in order to reach the same goals of empowering the visually impaired society.

4.4. PUBLIC RELATIONS AND SALES

In order to sell the device we will be using a combination of audio and visual advertisements. Due to the target market, the primary form of advertisement will be through audio based advertisements on the radio and television[14]. Secondary forms of advertisement will be through pamphlets and brochures[15] that have braille text and information imprinted on them. These will be target distributed to libraries, schools and centers for the visually impaired in order to reach our focus market.

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[14] Please see Appendix B for drafts of these advertisements
[15] Please see Appendix B for drafts of these advertisements

5. OPERATIONS

URead Inc. consists of a talented interdisciplinary team of professionals who are supportive and cooperative. We all come from different majors and backgrounds bringing unique sets of skills to the table. Christina and Samantha have been deeply involved in the project since 2013 and have the technical skill necessary to lead technical development of the device. They will be the founders of the company.

5.1. ORGANIZATIONAL STRUCTURE

URead Braille uses a decentralized Organizational Structure in order to promote constant innovation through research and development. Because of this the structure of the company is tightly and closely organized. The main branches of the company are listed in the figure to the right. The following spread will examine the three pillars of the organizational Structure.

1. Decision Rights

Decision Rights at the company are localized to each branch of the company. For example, if a software engineer wants to make a change to the software that will benefit some algorithm for the device, that engineer should have the power to make the decision with approval of the Software Engineering lead. This allows the decisions regarding software to be exclusive to that branch of the company. Each employee will have the ability to make decisions that affect only their level or hierarchy of the company. The following table in Appendix B summarizes these roles in more detail.

2. Performance Assessment
In order to increase the productivity of each employee, several forms of the performance assessment are used. These are summarized in the list below:
- Annual performance appraisal forms:

    At the beginning of the review cycle each employee and manager writes up a performance plan and a development plan. The performance plan contains information of what goals the employee has over the course of the next review cycle (year). The development plan outlines skills that the employee can develop in over the next year.
    Throughout the duration of the year the employee receives feedback about their performance and development judged against the plans developed at the beginning of the year.
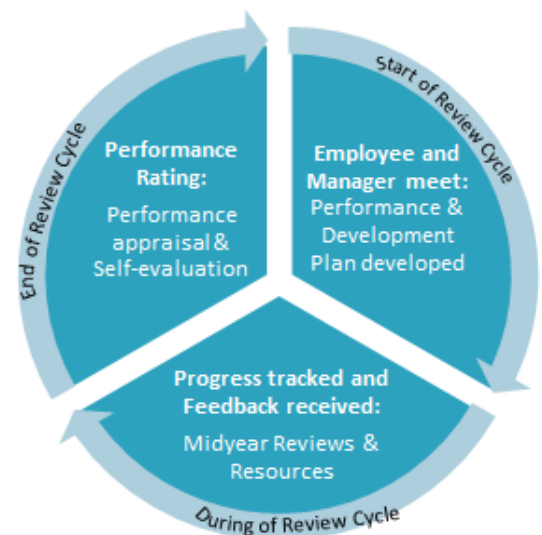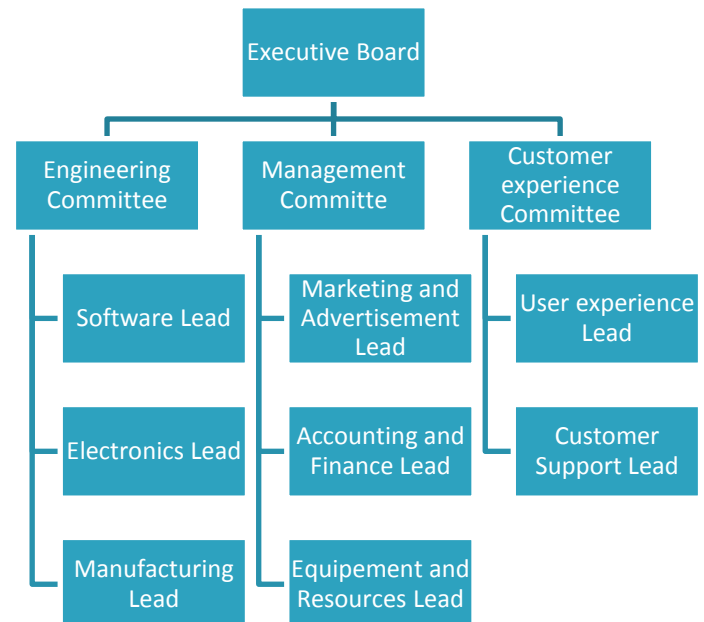
At the end of the year the manager fills the employee appraisal form. The employee know where he or she can continue developing and receives feedback from their manager.

- The secondary form of appraisal is through quarterly peer evaluation forms. Every quarter peers working in the same group will fill out anonymous evaluation forms in order to list the strengths and weaknesses of the employee.

3. Reward System

The reward system for employees is used to create short and long term incentives for employees. In the long term, employees with good performance reviews and development are eligible to earn raises and bonuses. In the short term each subsection of the organizational hierarchy has an annual budget to organize reward challenges for employees. This will be decided by each department to increase either company profitability or reach localized goals.

In combination, the organizational structure allows URead to build a strong foundation for company growth and development. Spending time to work out these plans is useful in the long run to keep employees efficient, organized and motivated.

5.1.1. PERSONNEL PLAN

This Decision Rights structure allows the company to rapidly evolve in its earlier stages. In the earlier years of the company, each Lead will not have a team working under them, however the same organizational structure will be kept. As the company expands, each lead will be able to handpick and hire a team of professionals that could serve under them.

For example, the software lead, once the company is developed, will be able to have a full set of development team behind them. However in the first two years of the company, they will be the only developer on the team. This allows us to minimize the number of employees in the early years of the company, and expand as we have the resources.

The table below summarizes the projected number of employees:

PEOPLE SUMMARY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Headcount	Headcount: End of Year				
Manufacturing / Operations / Website	1	2	4	8	10
R&D/Engineering	2	4	8	12	36
Sales & Marketing & Customer Support	2	4	8	8	16
Finance General & Adminstrative	1	2	4	6	10
TOTAL HEADCOUNT	6	12	24	34	72
$Sales / (Total Headcount)	$0	$25	$738	$1,041	$1,175

Sales and Headcount

	1	2	3	4	5
$Sales / Headcount	$0	$42	$1,229	$1,735	$1,958
Sales All	$0	$500	$29,500	$59,000	$141,000
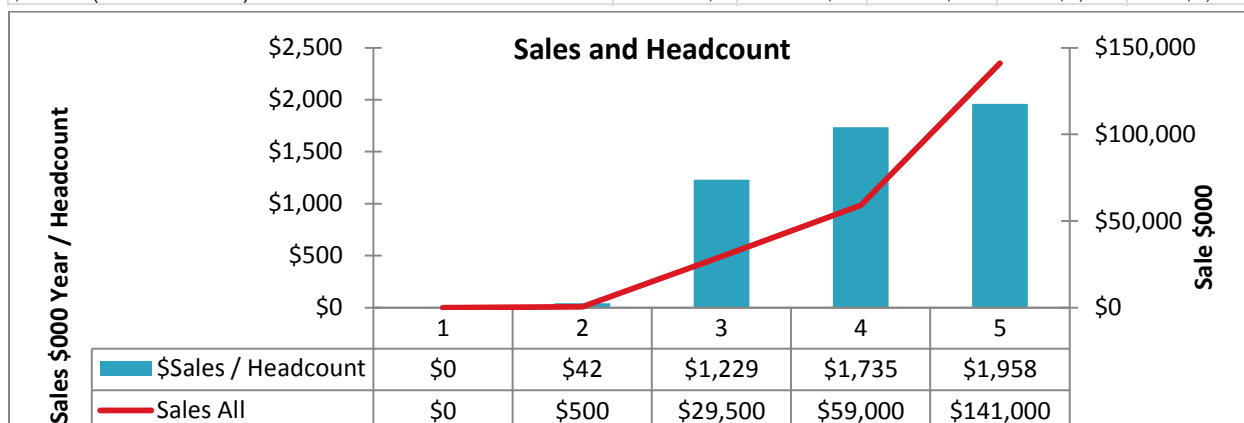
5.2. MANUFACTURING PROCESS

5.2.1. BREIF TECHNOLOGY OVERVIEW

The basic operation of the BrailleShape can be boiled down to a high density solenoid actuator array with a solenoid actuator per braille dot. For every braille dot on the device, the BrailleShape is able to control the position of the pin individually because there are solenoid actuators corresponding to each pin.

However due to the density of standard braille, the BrailleShape uses an innovative methodology to create the solenoid actuators. Instead of physically winding the actuators individually and then compiling them, we used a Printed Circuit Board in order to create the coil. By using an interconnected multi-layer printed circuit board, we are able to put a loop of copper on each layer to create a coil like structure. The unconventional use of the printed circuit board allows us to drastically reduce the manufacturing process.

In the recent years, the technology involved with manufacturing printed circuit boards has become more and more efficient, reducing the overall cost of manufacturing these boards. As time passes, this technology will only become more accessible and cheaper. This will directly affect our manufacturing costs—as the technology for printed circuit boards improves, the cost of raw materials of our device drops. Rather than becoming obsolete, the technology that we are using will only become more and more practical in the future.

5.2.1. MANUFACTURING PROCESS OVERVIEW

The following list describes the manufacturing process in general:

1. Assemble the bistable block: Using additive methods the main drivers are assembled. This process could be done in mass production
2. Assemble the case: Cold form pins and add to the bistable block and put it inside the casing

The following Manufacturing machinery will be needed:

- Cold Forming Machine: 10,000-20,000 (could be outsourced add 100$ to raw materials cost)
- CNC mill: 20,000-30,000 (could be outsourced add 100$ to raw materials cost)
- Work stations: 10,000 (work benches, electronics testing equipment etc)
- Maintenance: 10,000 per year

As can be seen because the manufacturing process is outsourced the assembly process is minimal.

6. FINANCIAL PLAN

Our financial plan depends strongly on investors and loans received. Because the BrailleShape has not been completely developed and we are currently in the stage of the first prototype, the first two years of URead will be spent on developing the device. We expect to break even at the end of the second year of the company.
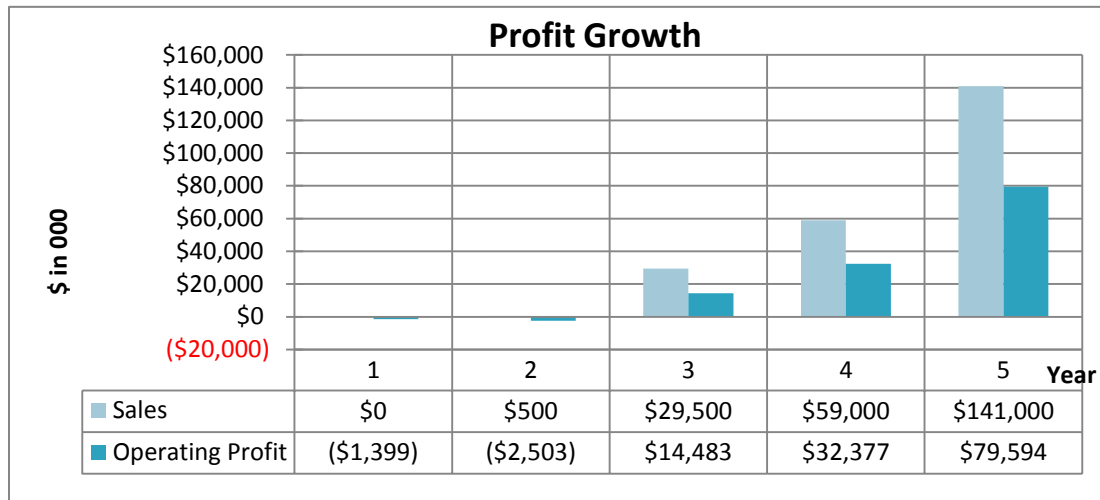
7.1 IMPORTANT ASSUMPTIONS

The following assumptions were made when calculating financials

1. Provision for Income Taxes is taken as 40% of the operating profit
2. Cost of Goods Sold is decreased each year
3. R&D/Engineering is targeted to double each year till five years
4. Number of employees is targeted to double each year till five years
5. Inventory is calculated as 30% of the cost of the goods.
6. Balance Sheet Assumption (number of days):
   a. Receivables, to collect from customers—45
   b. Payables, to suppliers of goods and operating expenses—30
   c. Inventory, cost of goods sold on hand—15
   d. Tax payable—90

7.2 PROJECTED INCOME SATEMENT

Year	1	2	3	4	5
Income Statement	$ in 000				
Sales	**$0**	**$500**	**$29,500**	**$59,000**	**$141,000**
Cost of Goods Sold	$199	$548	$9,612	$19,053	$44,016
Gross Margin	**($199)**	**($48)**	**$19,888**	**$39,947**	**$96,984**
Percent of Sales	*0%*	*-10%*	*67%*	*68%*	*69%*
R&D/Engineering	$320	$680	$1,320	$1,920	$5,760
Sales & Marketing & Customer Support	$580	$1,175	$3,285	$4,570	$9,830
Finance General & Adminstrative	$300	$600	$800	$1,080	$1,800
Operating Expenses	$1,200	$2,455	$5,405	$7,570	$17,390
Operating Profit	**($1,399)**	**($2,503)**	**$14,483**	**$32,377**	**$79,594**
Percent of Sales	*0%*	*-501%*	*49%*	*55%*	*56%*
Total Interest Expense	$20	$38	$64	$0	$0
Income Before Taxes	($1,419)	($2,541)	$14,420	$32,377	$79,594
Provision for Income Taxes	0	0	4,207	12,951	31,838
Net Income	**($1,399)**	**($2,503)**	**$10,276**	**$19,426**	**$47,756**
Percent of Sales	*0%*	*-501%*	*35%*	*33%*	*34%*

7.4 PROJECTED PROFIT AND LOSS

Profit Growth

	1	2	3	4	5
Sales	$0	$500	$29,500	$59,000	$141,000
Operating Profit	($1,399)	($2,503)	$14,483	$32,377	$79,594

7.5 PROJECTED CASH FLOW

The following table and graph shows the projected cash flow:

Year	1	2	3	4	5
Cash Flow	$ in 000				
Checking Account	$2	$3	$4	$5	$6
Balancer: Surplus Cash	$531	$283	$8,683	$26,855	$70,884
TOTAL CASH	$533	$286	$8,687	$26,860	$70,890
Change in Cash	**$533**	**($247)**	**$8,401**	**$18,173**	**$44,029**
Financing:					
Change in Stock Sold	$1,900	$2,200	$0	$0	$0
Change in Bank Debt	$0	$0	$0	$0	$0
Change in Leasing	$112	$112	$174	($398)	$0
Change in Financing	**$2,012**	**$2,312**	**$174**	**($398)**	**$0**
Cash Flow from Operations	**($1,479)**	**($2,559)**	**$8,227**	**$18,571**	**$44,029**

Cash Flow

	1	2	3	4	5
Stock Sold this Year	$1,900	$300	($2,200)	$0	$0
Ending Cash Surplus	$531	$283	$8,683	$26,855	$70,884
Cash Flow from Operations	($1,479)	($2,559)	$8,227	$18,571	$44,029
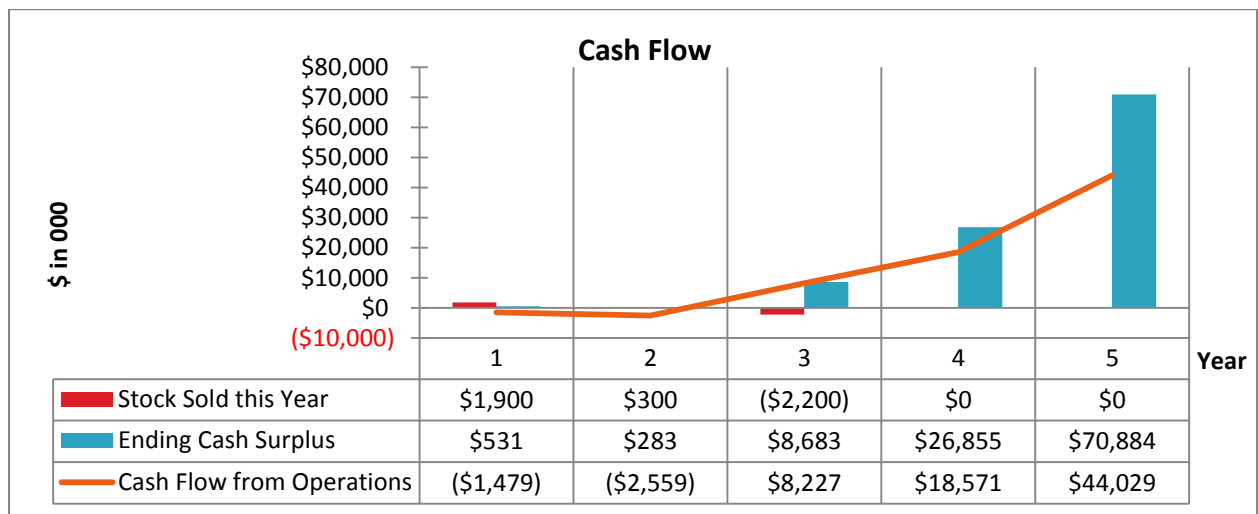
7.6 PROJECTED BALANCE SHEET

Year	1	2	3	4	5
Balance Sheet	$ in 000				
Assets					
Checking Account	$2	$3	$4	$5	$6
Balancer: Surplus Cash	$531	$283	$8,683	$26,855	$70,884
Receivables	$0	$62	$3,637	$7,274	$17,384
Inventory	$8	$23	$395	$783	$1,809
Current Assets	**$541**	**$370**	**$12,719**	**$34,917**	**$90,082**
Equipment	$224	$448	$796	$1,236	$1,888
Cumulative Depreciation	$75	$224	$489	$827	$1,307
Net Equipment	**$149**	**$224**	**$307**	**$409**	**$581**
Total Assets	**$691**	**$594**	**$13,026**	**$35,326**	**$90,663**
Liabilities and Equity					
Bank Debt	$0	$0	$0	$0	$0
Leases - Current Portion	$37	$75	$133	$0	$0
Accounts Payable	$115	$247	$1,234	$2,188	$5,047
Taxes Payable	$0	$0	$1,052	$3,238	$7,959
Current Liabilities	**$115**	**$247**	**$2,286**	**$5,426**	**$13,006**
Leases - Long Term Portion	$75	$149	$265	$0	$0
Total Liabilities	**$190**	**$396**	**$2,551**	**$5,426**	**$13,006**
Stock Sold - Venture Capital:					
Preferred Series A	$1,900				
Preferred Series B		$2,200			
Preferred Series C			$0		
Preferred Series D				$0	
New Stock Sold in This Year - Venture Capital	$1,900	$2,200	$0	$0	$0
Cumulative Stock Sold - Venture Capital	$1,900	$4,100	$4,100	$4,100	$4,100
Beginning Retained Earnings	$0	($1,399)	($3,902)	$6,374	$25,801
Net Income this period	($1,399)	($2,503)	$10,276	$19,426	$47,756
Cumulative Retained Earnings	($1,399)	($3,902)	$6,374	$25,801	$73,557
Total Shareholders' Equity (Stock + Retained Earnings)	**$501**	**$198**	**$10,474**	**$29,901**	**$77,657**
Total Liabilities and Equity	**$691**	**$594**	**$13,026**	**$35,326**	**$90,663**
Total Liabilities and Equity	$691	$594	$13,026	$35,326	$90,663
Total Assets less Surplus Cash	$160	$311	$4,343	$8,471	$19,780
Difference	$531	$283	$8,683	$26,855	$70,884

Difference goes to Surplus Cash.

7.7 RETURN ON INVESTMENTS

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
STOCK AND INVESTORS SUMMARY					
Cumulative Stock Sold - Venture Capital	$1,900	$4,100	$4,100	$4,100	$4,100
"Post-Money" = Total Company Value in Millions	$12,000	$55,000	$135,000	$265,000	$350,000
Post-Money Co Value / Share Fully Dilluted	$1.01	$3.17	$7.79	$15.29	$20.19
Investors' Return on Investment					
Investors' ROI (Percent per Year) % p.a.	111%	85%	61%	32%	0%
Investors' Multiple (Times $1 Invested)	20.0	6.4	2.6	1.3	1.0

APPENDIX A—INTERVIEWS WITH POTENTIAL CUSTOMERS

RECIPIENT 1

Q1: What is your age?

21 to 64

Q2: What is your average annual household income?

$25,000-$49,999

Q3: How much time do you spend reading braille each day?

less than 1 hour

Q4: How often do you read for fun?

everyday

Q5: What is your preferred reading method?

braille book

Other (please specify)audio

Q6: Where do you go to purchase reading material?

Bookshare and the BARD NLS website

Q7: How difficult is it for you to locate reading material?

somewhat difficult

Q8: Would you be interested in a full page, refreshable, and portable braille display that reads PDF documents and books? (The display is a reading device only, but it offers the most up-to-date books and converts online documents to braille.)

I would be interested in purchasing it, depending on the price.

Q9: How much would you be willing to pay for this portable braille e-reader?

$500-$1000

Q1: What is your age?

21 to 64

Q2: What is your average annual household income?

$0-$24,999

Q3: How much time do you spend reading braille each day?

3-6 hours

Q4: How often do you read for fun?

everyday

Q5: What is your preferred reading method?

braille display

Q6: Where do you go to purchase reading material?

www.braillesuperstore.com

Q7: How difficult is it for you to locate reading material?

There are a lot of PDFs that are not accessible, so if it doesn't work with my iPhone, I don't usually read it unless it is through audible or the Victor Reader

Q8: Would you be interested in a full page, refreshable, and portable braille display that reads PDF documents and books? (The display is a reading device only, but it offers the most up-to-date books and converts online documents to braille.)

I would be interested in purchasing it, depending on the price.

Q9: How much would you be willing to pay for this portable braille e-reader?

$0-$500

Q10: At what email address would you like to be contacted?

xxx

Q1: What is your age?

21 to 64

Q2: What is your average annual household income?

$100,000 and up

Q3: How much time do you spend reading braille each day?

more than 6 hours

Q4: How often do you read for fun?

2-4 times a week

Q5: What is your preferred reading method?

braille book

Q6: Where do you go to purchase reading material?

I very rarely purchase reading material. I receive braille books from our local National Library Service lending library. Any material that is not available from the library I have transcribed into braille by our local rehab agency for the blind, but this is very rare.

Q7: How difficult is it for you to locate reading material?

The lending library has books that I enjoy, but wish they had more best sellers and current fiction and nonfiction.

Q8: Would you be interested in a full page, refreshable, and portable braille display that reads PDF documents and books? (The display is a reading device only, but it offers the most up-to-date books and converts online documents to braille.)

I would be interested in purchasing it, depending on the price.

Q9: How much would you be willing to pay for this portable braille e-reader?

$500-$1000

Executive Board	Makes decisions regarding the overall future of the company. The Executive board is responsible for interacting with investors and banks in order to receive funding as well as being in charge of the three branching committees.		
	Engineering Committee	The Engineering Committee consists of the Leads of t Software, Electronics and Manufacturing. The purpose of the committee is to collectively be able to decide on the major changes and decisions in each of the three branches.	
		Software Lead	The Software Lead is a developer that is in charge of all the software engineers. Each software lead has the decision rights to make changes to software that does not influence the other components of the device.
		Electronics Lead	Similar to the Software lead, but in charge of the electronic engineering for the device.
		Manufacturing Lead	Similar to Software Lead but in charge of manufacturing process of the device.
	Management Committee	The Management Committee is in charge of the organizing the resources of the company. The committee consists of the leads for each of the subcategories.	
		Marketing and Advertisement Lead	This lead is in charge of marketing and advertisement of the BrailleShape as well as sales made to customers. This lead will be responsible for a team of Marketers and Advertisement Designers.
		Accounting and Finance Lead	This lead is responsible for all accounting and financial decisions for the company. This person would lead a team of people that keep track of all of the logistics and resources.
		Equipment and Resources Lead	Because the company will invest in manufacturing machinery as well as office equipment, a team of experts that are able to take care of the equipment will be needed.
	Customer User Experience	One of the major ways that other companies differentiate themselves is through their well-known and trusted brands. In order to position ourselves from these competitors, we will focus on excellent customer experience and this will be a large part of the company. This will enable the customers to switch over to our device as they like.	
		User Experience Lead	In order to optimize learnability and usability o the device, a team of user experience professionals will be put together to do research on this usability.
		Customer Support lead	As the amount customers increases, a base of quality customer support call centers will be set up.