TIM 105
Group 7

Text.book

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Executive Summary 1.1

Our Mission:

University students typically spend as much as $1,200 a year total on textbooks (College Board). 65% of students say they have skipped buying a textbook because it was too expensive (U.S. Public Interest Research Group). We strive to provide an affordable electronic textbook alternative to all students by minimizing many of the distracting features in tablets today, stripping down our product to the bare minimum.

The Market:

Based on our competitive analysis using Porter's 6 force model we have determined that the industry is attractive. The industry has few new entrants and existing competitors include Amazon and Barnes & Nobles. Typical consumers in the market will include teachers, students, libraries, and schools. Complementors of our product include cloud storage providers as well as stylus producers. Current substitutes for our products include other e-readers as well as traditional note taking supplies and textbooks.

Our Competitive Advantages:

The core technology of our company product is that our product will be similar as tablet but only focus on textbook. The users may use take notes on anytime and anywhere of the E-textbook pages. The product will be have long battery life as Apple battery. Since our product only features the core technologies for note taking, we can eliminate the need for expensive luxuries to run unnecessary applications thus reducing our costs significantly.

Financial Projections:

Our Expected Profits based on a 4-year NPV Analysis with a 10% discount factor rate will be equal to $12.6 million. Based on our research we were able to conclude that we would be selling approximately 300,000 units each year at a price of $75. We would be producing these units for $40, while spending $15,000,000 on development over 4 quarters, $ 2,500,000 in ramp up costs over 2 quarter, and $2,400,000 in Marketing and support costs over 11 quarters. We completed this analysis to convey an overall idea of how the company's cash flow will fluctuate over the four year period of development and release. Using our sensitivity analysis we are also able to show that the project will be safe, and will have very little risk.

Work Distribution Table 1.2

P = Primary S = Secondary							
	Pranav Lodha	**Lemuel Chan**	**Junyan Mak**	**Susana Esparza**	**Xiaochen Zhang**	**Eric Walker**	**Huiting Zhu**
Proposal	S	S	**P**		S	S	
Company Analysis and Strategies	S	S	S	S	S	**P**	S
Competitive Strategies	S	S	S	S	**P**	S	S
Product/ Market Strategy	S	S	**P**	S	S	S	S
Development Strategy	S	**P**	S	S	S	S	S
Aggregate Project Plan	**P**	S	S	S	S	S	S
Phase 1 Revision	S	S	P	S	S	S	S
Reverse Engineering	S	S	S	S	**P**	S	S
House of Quality	S	**P**	S	S	S	S	S
Conceptual Design	S	S	**P**	S	S	S	S
Utility Function	S	S	S	S	**P**	S	S
Product Platform Strategy	S	**P**	S	S	S	S	S

FMEA Analysis	S	S	S	S	S	**P**	S
Financial Modeling	**P**	S	S	S	S	S	S
Presentation	S	S	S	S	S	**P**	S
Compile Project	**P**	S	**P**	S	**P**	**P**	S

Section 2.0 Business Strategy

Statements 2.1

Vision: Text.inc aims to make sure that each and every student has access to textbooks at an affordable cost.

Mission: Eliminate the need for pricey textbooks by supplying alternatives.

Industry Analysis 2.2

Competitive Strategy 2.2.1

Competitive analysis (Porter Analysis)

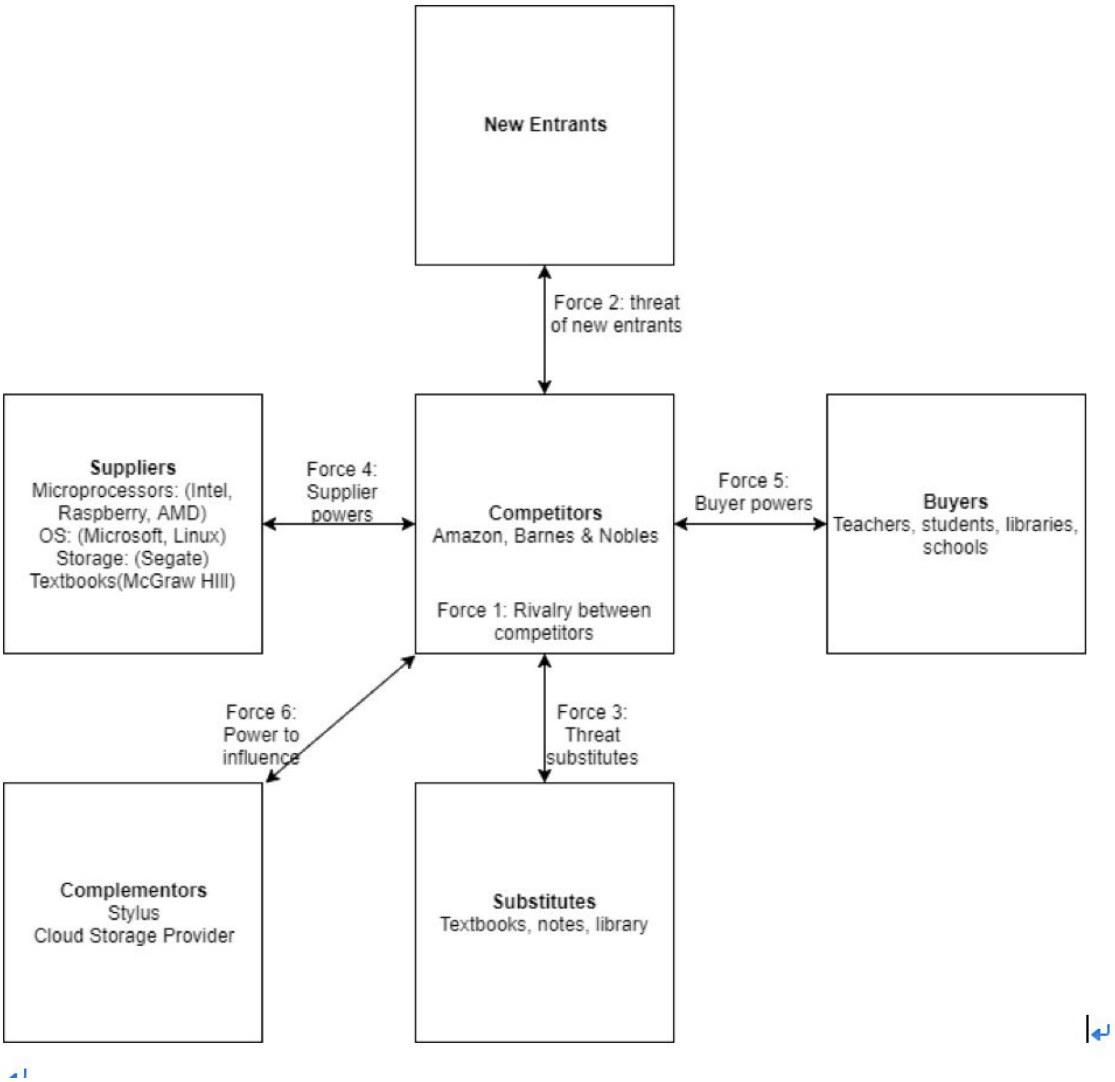
New Entrants: Text.Book
Competitors: Amazon Kindle Paperwhite, Apple iPad pro 10.5, Nook Tablet 7", Asus Zenpad S 8.0, Sony Xperia 224 Tablet
Buyers: Teacher, Students, Schools, Libraries
Suppliers:

- Microprocessors: Intel, Raspberry, AMD
- OS: Microsoft, Linux
- Storage: Segate
- TExtbooks: McGraw Hill

Complementors: Stylus, Cloud storage provider
Substitutes: Textbooks, Notebooks, Libraries

Explanation: The above statements will allow us to conduct a porter five force analysis for the e-textbook industry. As you can see, this industry has a large variety of competitors, with relatively few new entrants and substitutes. We will use this information to decide force strength.

Figure 2.2.1 Porter Model



Explanation: The above porter five(six) forces model will frame the following analysis of force strength and allow us to gauge the intensity of these forces. It has also allowed us to research into complementary products, such as utility companies and other EBooks technology industry.

Porter Analysis of Smart Home Industry

Forces	Key Determinants	Influence/Threat	Level
Force 1: Rivalry Between Competitors	Number of Firms, Size of Firms	The competing products are having more functionalities, and features. If the competitors also corporate with textbook suppliers. Buyers might choose their product.	High
Force 2: Barriers to Entry	Barriers to Entry, Branding, Capital needed	It seems that there are no new entrants this time. If the new entrants make a product that's clone from us, but sell with lower price, it influences us.	Low
Force 3: Threat of Substitutes	Functionality, Cost to switch	Some buyers like to use pen and highlight actual write on a paper. They might still choose paperback textbook	Low
Force 4: Supplier's powers	Size, Quality, Price, Etc.	Supplier have influence that provide us resource of textbook and notebook. The number of textbooks depends on how many resources will suppliers gave to us.	High
Force 5: Buyer Power	Volume of Consumers	Our market is focus on education area such as teacher, students and libraries. They are the one who buys our product. Not involve with other market	High
Force 6: Power to Influence	Availability, Other Factors	Stylus is like a pen that allow users take and mark notes on our tablet. This increase the purchase rate since is easy for users carry around and has large storage.	High

Attractiveness of Industry

Determine the attractiveness (as measured by profit potential, in particular the return on invested capital of the industry).

A. From Figure 2.3, which shows the qualitative strength of each force for the E-book industry, the cumulative strength or attractiveness of this industry is medium to high.

1. Strongest force are rivalry between competitors, Supplier's powers, Buyer Power, and Power to Influence.

Conclusion:

● We conclude that our Competitive Strategy reflects the following

- We will act as a new entrant in the E-book industry
- We will represent our Competitive Strategy as one that is focused within the marketplace.
- Our Force analysis tells us:
  - **Rivalry between competitors → High**
  - **Barriers to entry → Low**
  - **Threat of Substitutes → Low**
    - **Supplier Power → High**
  - **Buyer Power → High**
  - **Influence of Complements → High**

Technology Strategy 2.2.2

A. What are the core technologies that give the company a technological advantage over its competitors?

The core technology of our company product is that our product will be similar as tablet but only focus on textbook. The users may use take notes on anytime and anywhere of the E-textbook pages. The product will be have long battery life as Apple battery.

B. What is the company's approach to product & technology development?

Collect competitors technologies/product informations, and make a comparison to of our own designed product.

Product / Market Strategy 2.2.3

A. What differentiates the company's products from its competitors?

Our products only focus on school market (basically college). The product is only for access eTextbook and taking notes or other school needs

B. What markets does the company serve?

Student/School/Teacher/Libraries/Education system

Developmental Goals 2.3

a. Developmental Goals for the company:
   i. Make textbooks cheaper and affordable
   ii. Reduce waste by not having to print the large textbooks.
   iii. Make student life easier
      1. Reduce backpack weight (Portability)

b. Functional Maps
   i. Company name: text.

(Apple's market size 2017 Q3) $752 billion / 300 million (text) = 2,506 (scalar))
Total Market Size for 2017: 300 M Growth : 5% per annum

Enterprises	$ 75 M 1%	$20 M 1%
Commercial	$ 50 M -2%	$10M 0%
Consumer	$ 100 M 3%	$45M 2%
	[text. book]	[text.message]

Business Goals 2.3.1

Business Goals (value predict from large company and invert to medium size company):

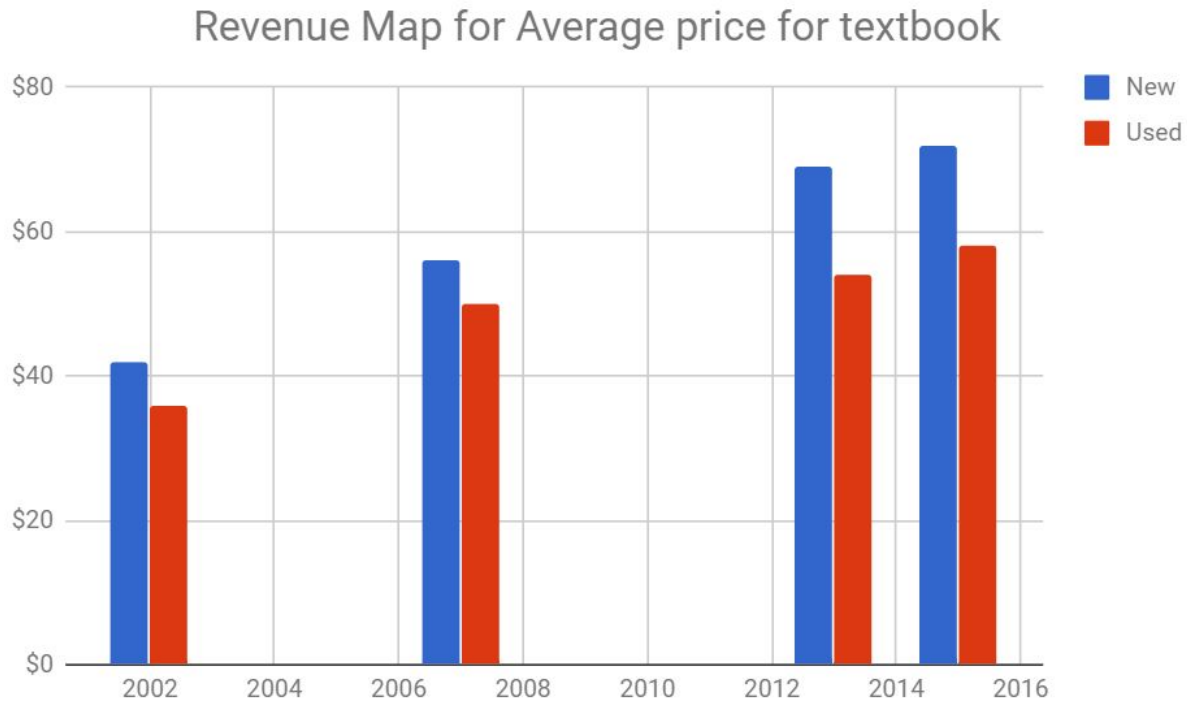
i. Start a beta program at a University or any established college institution.
ii. Expect Annual sales Revenue ($)
    1. 2017: 59M
    2. 2018: 68M
    3. 2019: 71M
    4. 2020: 92M
iii. Expect Growth (%)
    1. 2017 vs 2018: 13.3%
    2. 2018 vs 2019: 5.88%
    3. 2019 vs 2020: 27.78%
iv. Expect Profit ($) or Net Income ($)
    1. 2017: 26M
    2. 2018: 27M
    3. 2019: 28M
    4. 2020: 35M
v. Expect Profit margin (%) = (Net Income/Sales Rev)*100%
    1. 2017: 44%
    2. 2018: 40.35%
    3. 2019: 39.28%
    4. 2020: 38.70%

Market Sizing and Customer Needs 2.3.2

- The average student spending for a semester of course material is $509
- The percent of students who say they have skipped buying a textbook because it was too expensive is around 65%
- Average college bookstore profit margin for a new book is 21.1%
- Percent of students who buy their books at their college bookstore is 47%
- The Average price of New Textbook and Average Price of Used Textbook:
    -

	New	Used
2002	$42	$36
2007	$56	$50
2013	$69	$54
2015	$72	$58

Figure 2.3.2: Revenue Map for Average Textbook Price



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- Note: It seems that the price of the textbook is more expensive compared from 2015 to 2002. And it can predict that will gets more expensive in the future. The student will cost more on buying the textbook in the future.

a. Market need Analysis
    i. Teachers
        1. Needs multiple edition of the textbook
        2. Needs instructor edition of the textbook
        3. Able to connect projector
            a. bluetooth or wireless
    ii. Schools
        1. Needs us to pay for promotion
        2. Needs all textbook that satisfy all course
        3. Reduce waste
        4. Not free for student
        5. GPS location tracking
            a. For rent to the student
    iii. Libraries
        1. Needs as many as edition

2. Needs large amounts of books
3. GPS location tracking

iv. Students

1. Needs textbook that satisfy all courses
2. Cheap price
3. Light weight
4. Able to download directly
    a. Wi-fi
    b. Books database

2. Customer Needs

Make a structured and prioritized list of customer needs (1) and assess the importance of each need (2)

(1) (2)

Customer Needs	**Importance**
Light Weight	7/10
Long Battery Life	7/10
Stylus - dexterity	5/10
Simple User Design	8/10
High Brightness Spectrum	8/10

3. Technical Metrics

Make a list of technical metrics (3) and assess the importance of each need using a convenient scale (4)

(3) (4)

Technical Metrics	**Importance**
Ounces	7/10
mAh	7/10
Tracking force	5/10
Satisfaction	8/10
Brightness Nits	8/10

Waterproofness	7/10
Power to run screen	6/10

4. Customer Needs vs Customer Needs

Customer Needs	Light Weight	Long Battery Life	Stylus-Dexterity	Simple User Design	High Brightness Spectrum
Light Weight	High	Low	Medium		
Long Battery Life	Low	High			Medium
Stylus Dexterity	Medium		High		
Simple User Design				High	
High Brightness Spectrum		Medium			High

5. Technical Metrics vs Technical Metrics

Technical Metrics	Ounces	MaH	Tracking Force	Satisfaction	Brightness Nits	waterproofness	Power to run screen
Ounces	High	Low					Low
MaH	Low	High			Medium		Medium
Tracking Force			High	Medium			
Satsifaction			Medium	High			
Brightness Nits		Medium			High		
Waterproofness						High	

Power to run		Medium					High

6. Customer Needs vs Technical Metrics

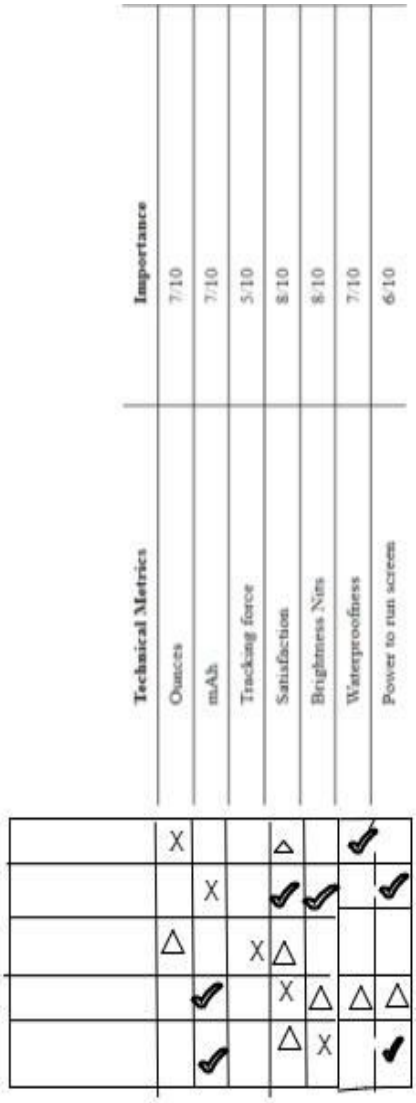
Correlate customer needs and technical metrics (5)

	Weight	Battery Life	Stylus	Simple User Design	Brightness	Force to Break Screen	Water-proof-ness	Maximum Display Colors	Power to Run Screen
Weight	✖	△	△	△	△	△	△	△	✔
Battery life	△	✖	△	△	△	△	△	△	✖
Stylus	△	△	✖	△	△	✔	△	△	△
Simple User Design	△	△	△	✖	△	△	△	✔	△
Brightness	△	△	△	△	✖	△	△	✔	✖

Correlation Scale

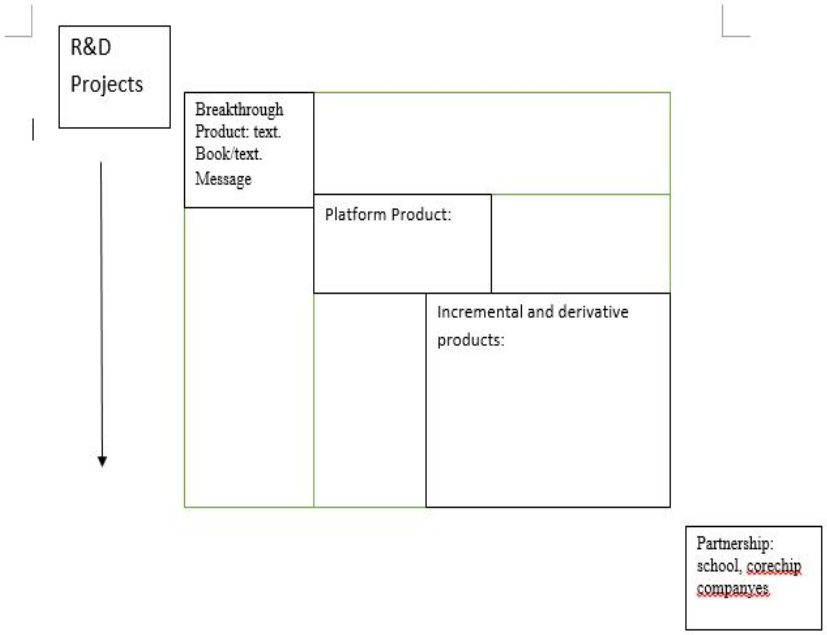
- ✖ Strong Correlation
- ✔ Moderate Correlation
- △ Weak Correlation
- No Correlation

Customer Needs	Importance
Light Weight	7/10
Long Battery Life	7/10
Stylus - dexterity	5/10
Simple User Design	8/10
High Brightness Spectrum	8/10



Aggregated Project Plan 2.4

a. Identify a set of n potential products

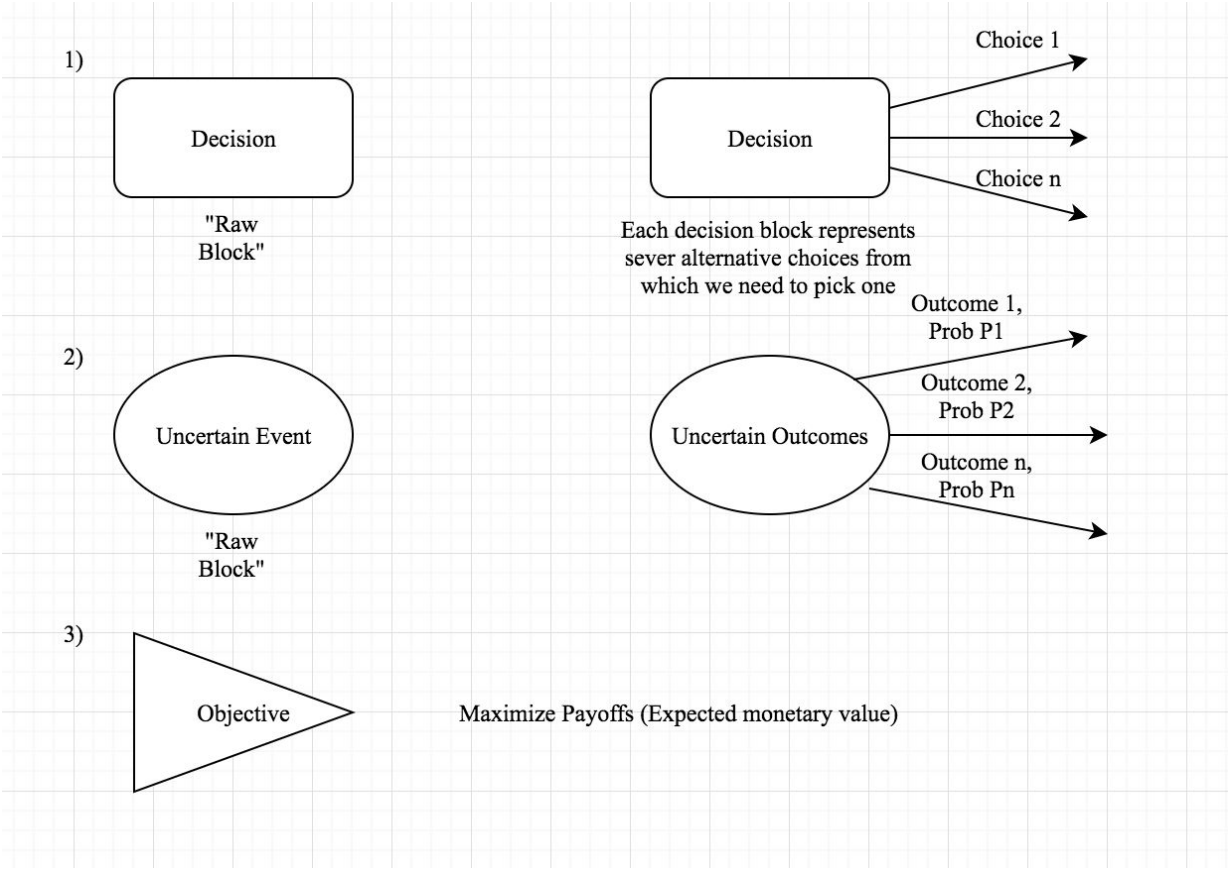


i. Research & Development: eReader or eTextbook Reader
ii. Breakthrough or core Product: Text.book (eTextbook Reader)
iii. Platform product: Text.book (eTextbook Reader)
iv. Incremental & Derivative Product: new version/generation of the Text.book
v. Partnership & acquisitions: School/universities, Textbook supplies.

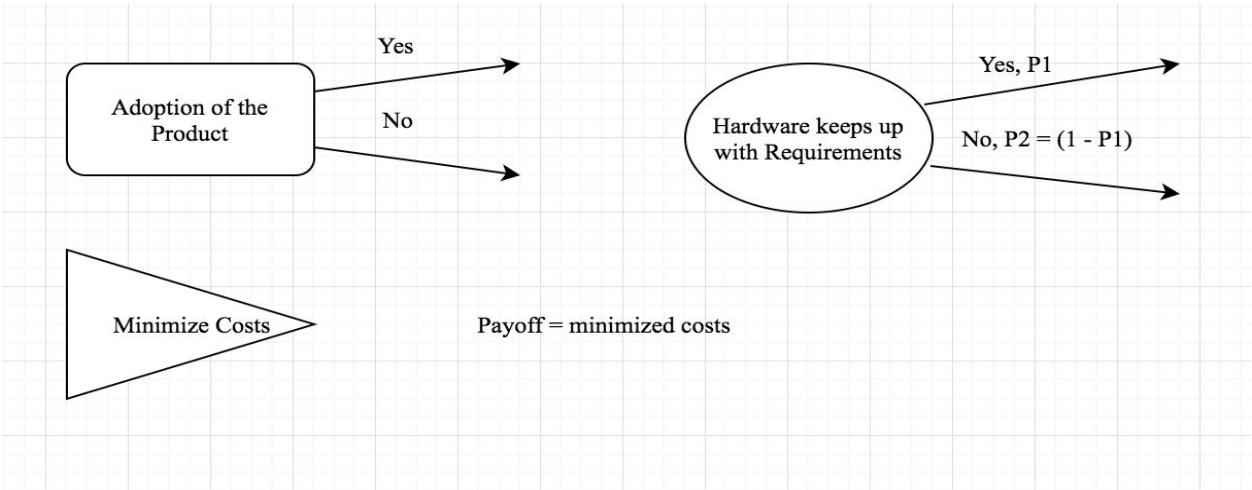
b. For each potential project we need to estimate cost, and using DA to compute the EMV
   i. Expect Cost: The estimate cost of the project is about $50M
c. Decision Analysis (DA)
   i. Expected profit: 100M
   ii. The project should the company work on during next 3 years: R&D project
   iii. DA process
      1. Define Variable: Ai
         a. Ai = 0 then reject the project
         b. Ai = 1 then select the project.
      2. Ct = A1*C1 + A2*C2
      3. Vt = A1*V1 + A2*V2
      4. Ct(total cost) less than or equal to Cb(available capital budget)
      5. Decision Analysis

i. Expected profit: 100M
ii. The project should the company work on during next 3 years: R&D project
iii. DA process

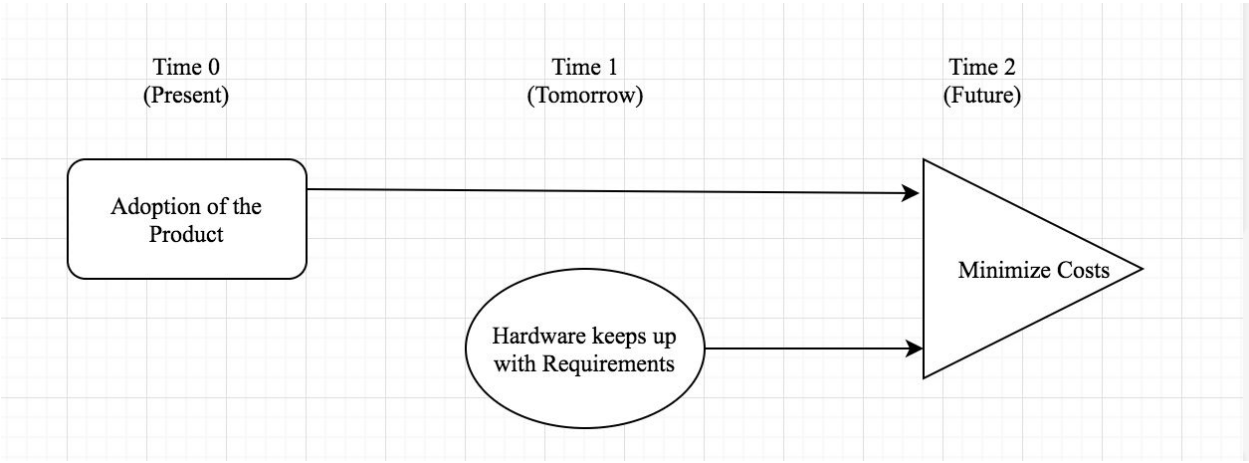
- Instruction



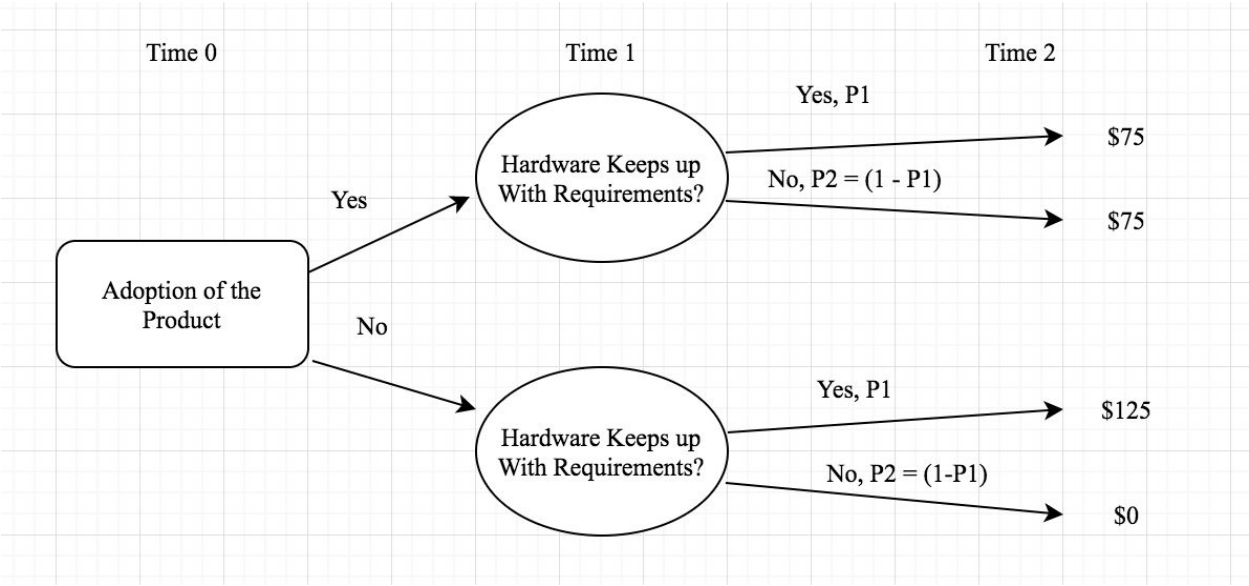
- Step 1



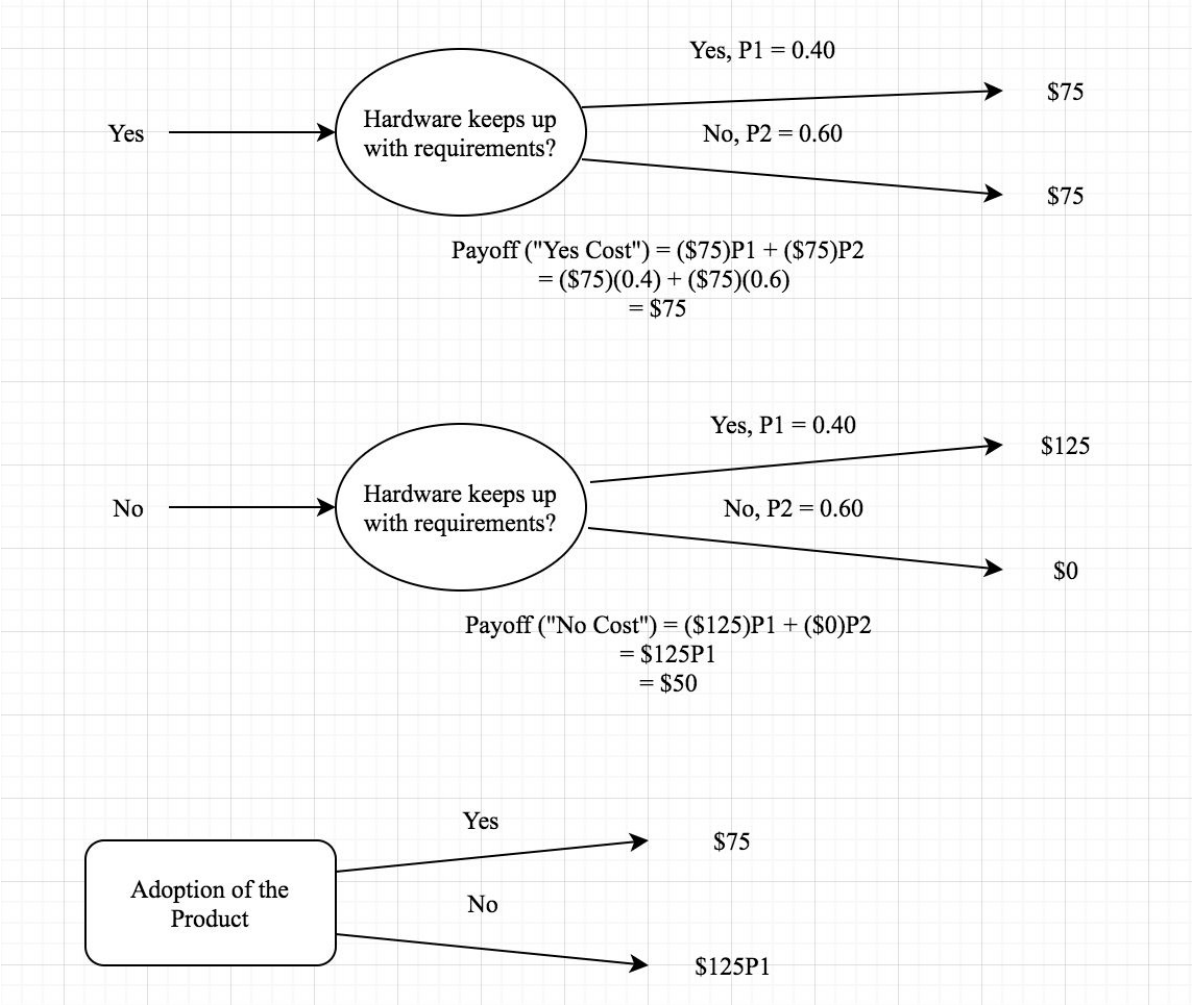
- Step 2:


Time 0
(Present)
Time 1
(Tomorrow)
Time 2
(Future)
Adoption of the Product
Hardware keeps up with Requirements
Minimize Costs

- Step 3


Time 0
Time 1
Time 2
Adoption of the Product
Yes
No
Hardware Keeps up With Requirements?
Yes, P1
No, P2 = (1 - P1)
$75
$75
Hardware Keeps up With Requirements?
Yes, P1
No, P2 = (1-P1)
$125
$0

- Step 4



b. Optimization
   i. The product will be adopted
      1. With a profit of $75

2.5 Project Planning

Our clearly stated mission and vision lead helped us determine our business strategy. To get an idea of where our company and product stands against our competitors, we performed an industry analysis. Furthermore, we developed a solid competitive, technology, product/market strategy and business goals. This process helped us determine our customer needs and perform an in depth aggregate project plan.

Figure 2.5.1 Activity Matrix

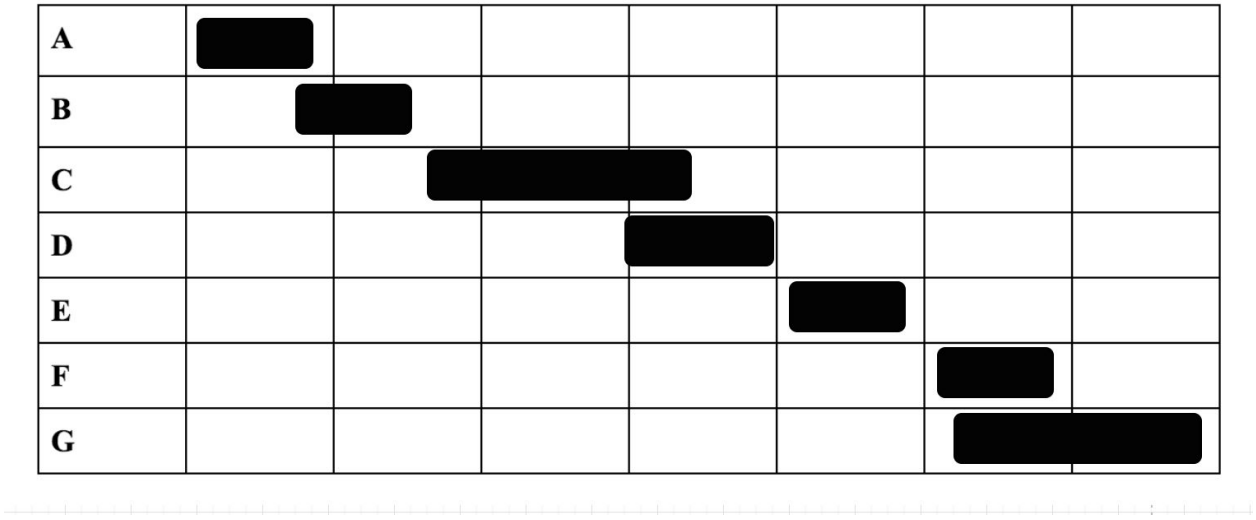
	A	B	C	D	E	F	G
A	**A**						
B		**B**					
C	**X**	**X**	**C**				
D	**X**	**X**	**X**	**D**	**X**		
E				**X**	**E**	**X**	
F					**X**	**F**	
G							**G**

Activity Matrix: shows the dependencies between the subtasks in our report (noted by the "x" symbol). Some tasks may have more than one connection to other tasks.

A - Aggregate Project Plan
B - Reverse Engineering
C - House of Quality
D - Conceptual Design
E - Product Platform/Line Strategy
F - Failure Modes and Effects Analysis
G - Economic/Financial Analysis

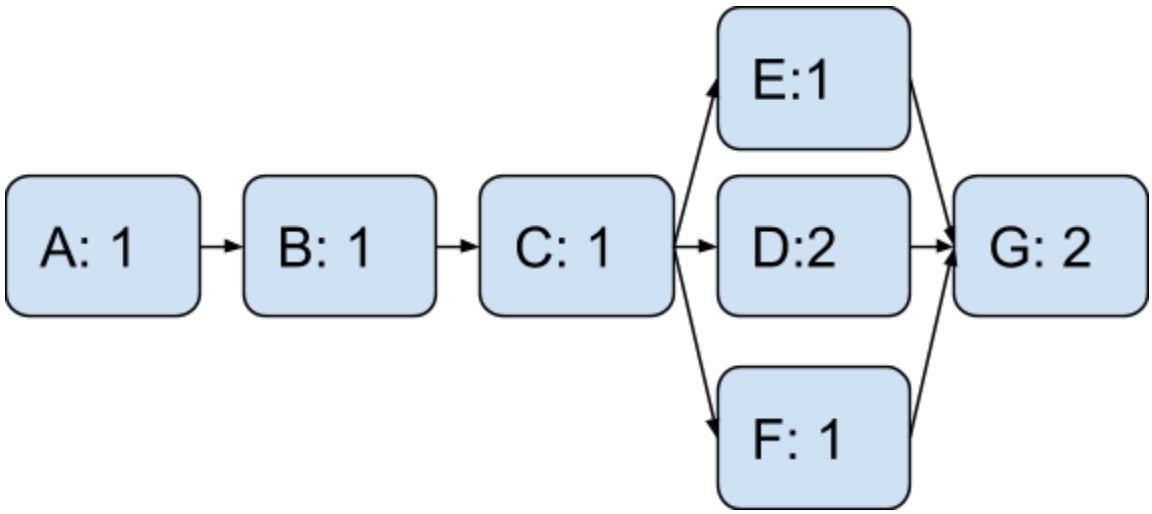
GANTT Chart: shows our proposed start and end date(s) for the project and shows our progress, planning, and completion of every section A-G over the course of 8 weeks. The black bars indicate that the task has been completed.

Figure 2.5.2 GANTT Chart



PERT Chart and Critical Path Method: shows our thinking process of what areas need the most focus. We chose our path towards producing a more concrete product.

Figure 2.5.3 PERT Chart and Critical Path Method



Critical Path Method : A → B → C → F → G

Section 3.0 Concept Design

Reverse Engineering 3.1

Dissect existing products which are similar to the proposed new product using the Function Analysis Systems Technique (FAST)

1. Amazon Kindle Fire
    a. How does Amazon Kindle works?
        i. Amazon Kindle is a series of e-readers that enable users to browse, buy,k download and read e-books, newspapers, magazines and other digital media via wireless networking to the Kindle store.
    b. Important subsystems and components
        i. Rechargeable lithium-polymer battery
        ii. Compactive Touch Screen
        iii. LEDs light guide
        iv. Adaptive light sensor
        v. E ink Display innermost layer
    c. Primary function and key sub functions
        i. Main function: Read on the go
        ii. Sub functions: Provided Power, Read Files, Process information, portable

2. Apple pen for Apple iPad Pro
    a. How does Apple Pen works
        i. Expands the power for iPad Pro and opens up new creative possibilities. It's sensitive to pressure and tilt so user can easily vary line weight, create subtle shading, and produce a wide range of artistic effects just like a conventional pen, but with pixel-perfect precision.
    b. Important subsystems and components
        i. ProMotion technology
        ii. Multi-touch technology
        iii. Palm reject technology
        iv. Bluetooth connections
    c. Primary function and key sub functions
        i. Main Function: Write on the display
        ii. Sub functions: Recognized more than one point of contact, When pencil connected with, reject other user interface.

Relate FAST Diagram 3.2

Figure 3.2.1: Amazon Kindle Fire FAST Diagram

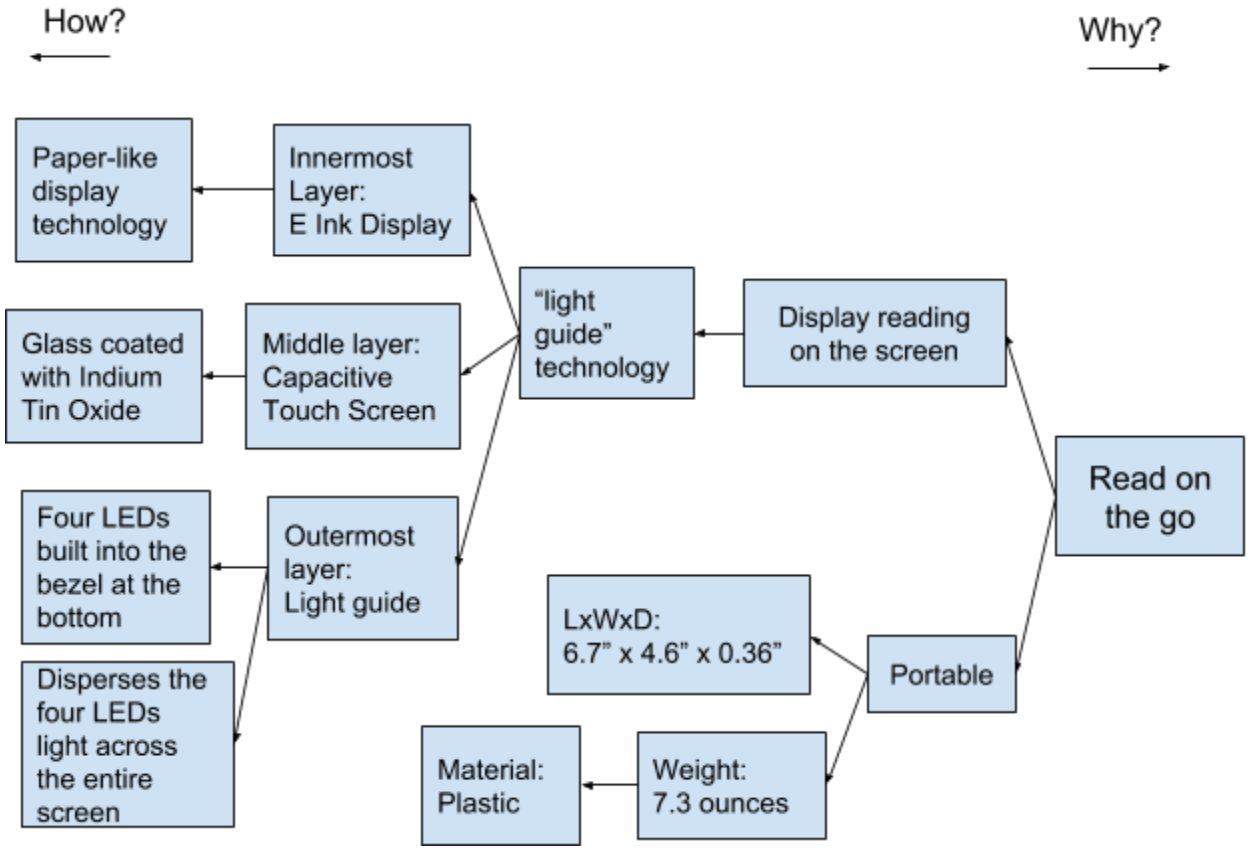
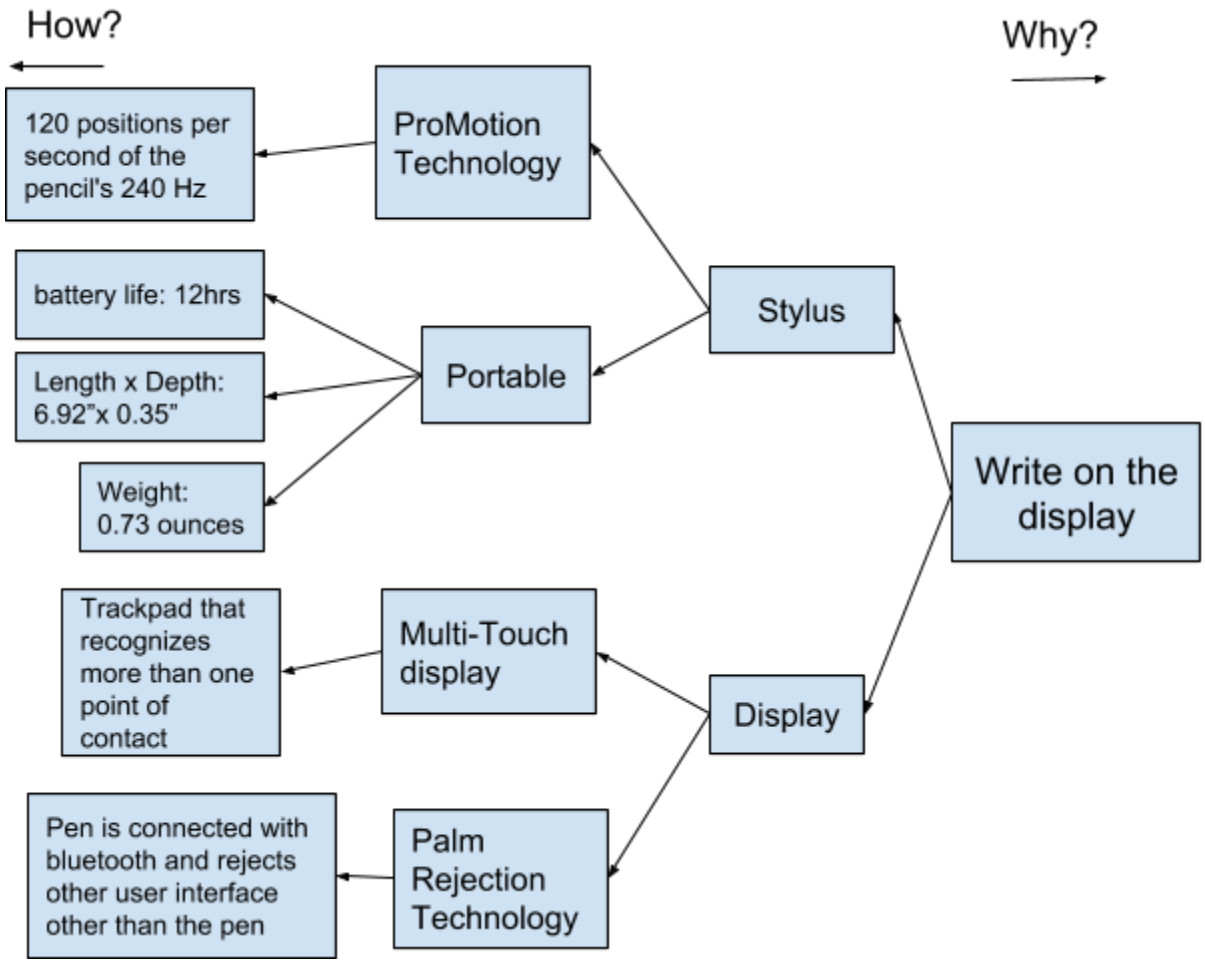


Figure 3.2.2: Apple Pen for iPad Pro FAST Diagram



House of Quality (HOQ) 3.3

Target customer needs (scale 1-5)

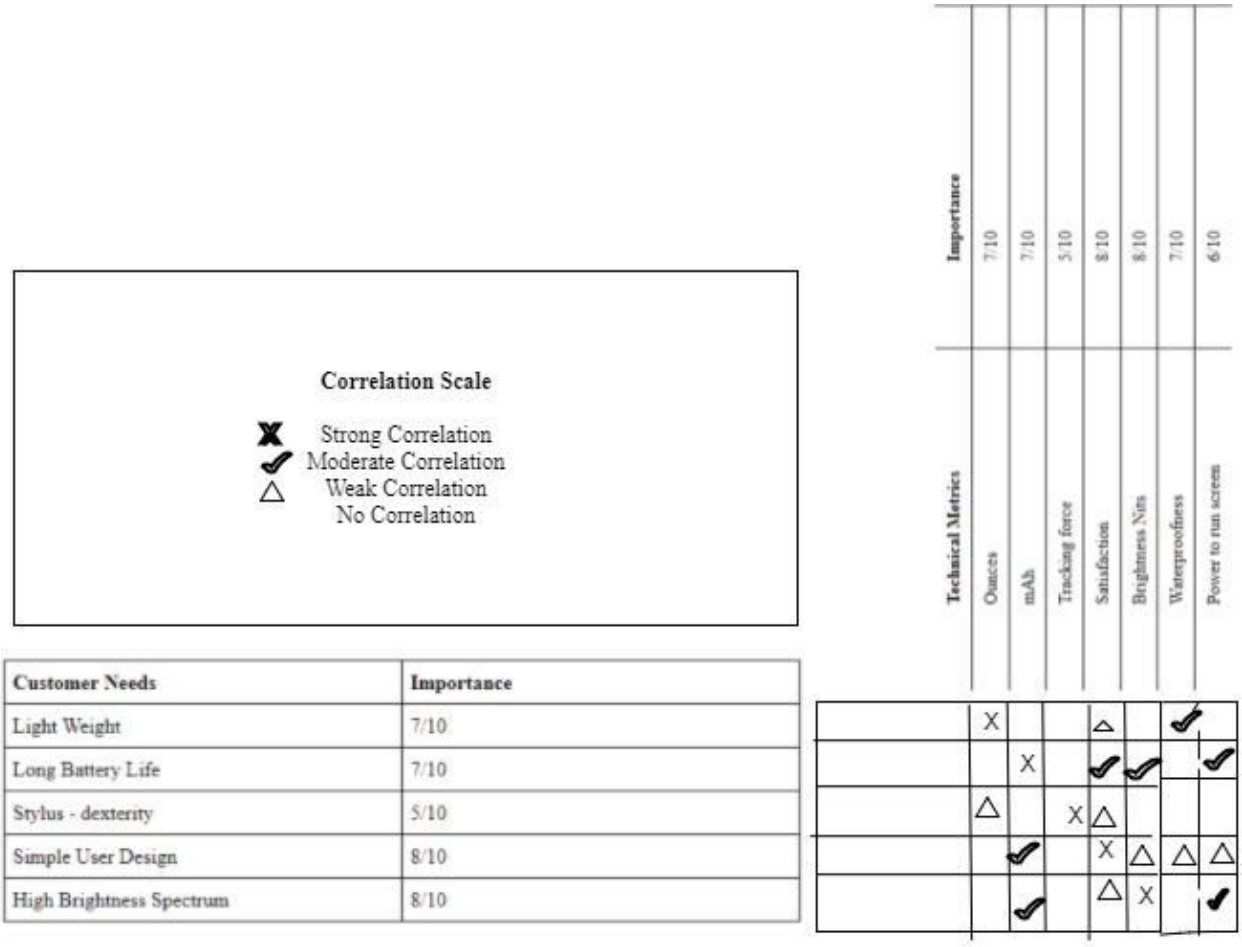
1. Lightweight: ⅘
2. Battery life: 5/5
3. Stylus: ⅗
4. Simple user design: 5/5
5. Brightness: ⅗

Target Technical Specifications

1. Weight (ounce): 14
2. Battery Life (hours): 16 hrs/ 7000 mAh
3. Stylus (w/wo): with
4. Simple user design: 4

5. Brightness (ppi): 264
6. Waterproofness (ingress protection rating): IP68
7. Power to run display: 3 watts

Figure 3.3.1 House of Quality



	Weight	Battery Life	Stylus	Simple User Design	Brightness	Force to Break Screen	Water-proof-ness	Maximum Display Colors	Power to Run Screen
Weight	✖	△	△	△	△	△	△	△	✔
Battery life	△	✖	△	△	△	△	△	△	✖
Stylus	△	△	✖	△	△	✔	△	△	△

Simple User Design	△	△	△	✗	△	△	△	✓	△
Brightness	△	△	△	△	✗	△	△	✓	✗
Force to Break Screen	△	△	✓	△	△	✗	△	△	△
Waterproofness	△	△	△	△	△	△	✗	△	△
Maximum Display Colors	△	△	△	✓	✓	△	△	✗	✗
Power to run Screen	✓	✗	△	△	✗	△	△	✗	✗

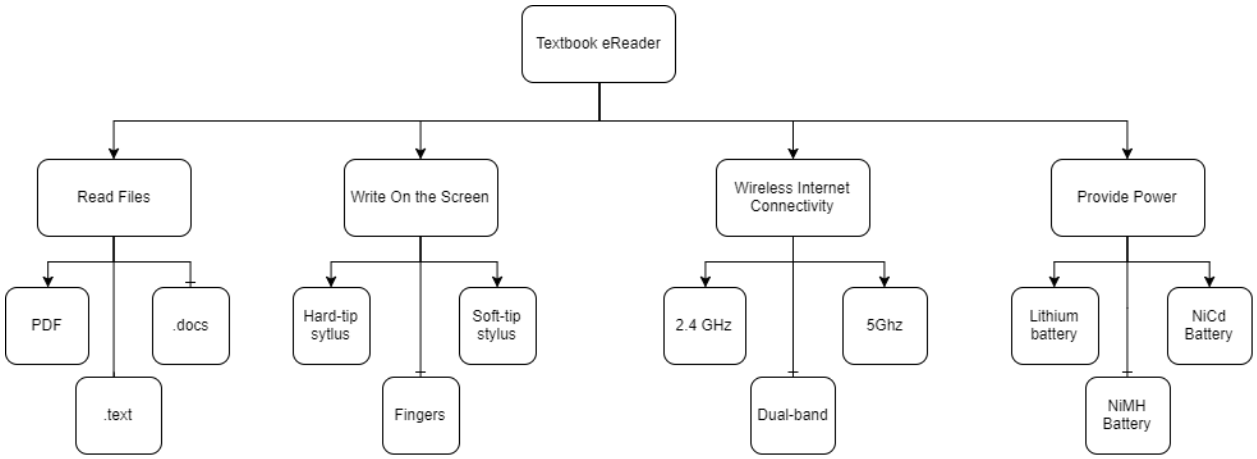
Functional Structure 3.4

Primary function: Textbook eReader

Sub functions:

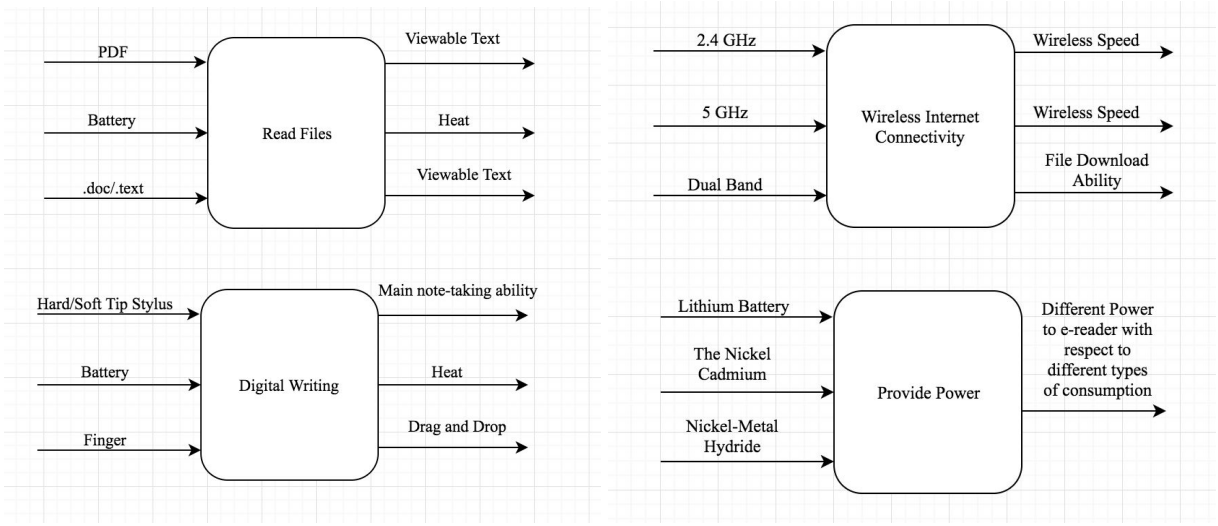
1. Read files
    a. PDF
    b. .docs
    c. our own filetype (.text)
2. Write on the screen
    a. Hard tip stylus
    b. Soft tip stylus
    c. Finger
3. Wireless Internet Connectivity
    a. 2.4 Ghz
    b. 5 Ghz
    c. Dual-band
4. Provide Power
    a. Lithium battery
    b. The Nickel Cadmium (NiCd) battery.
    c. The Nickel-Metal Hydride (NiMH) battery

Figure 3.4.1: Function Structure for Textbook eReader



Input and output flows

Figure 3.4.2: Input and output flows for sub-functions



Morphological Matrix 3.5:

Figure 3.5.1: Morphological Matrix displaying three solution principles for each sub-function

Solution Principles Sub-Functions	Solution Principle 1	Solution Principle 2	Solution Principle 3
Read Files	PDF	.doc	new filetype (.text)
Digital Writing	Hard tip stylus	Soft tip stylus	Finger
Wireless Internet Connectivity	2.4 Ghz	5 Ghz	Dual-Band
Provide Power	Lithium Battery	The Nickel Cadmium	The Nickel-Metal Hydride

In concept#1, dissecting pre-exting products using FAST Amazon Kindle. Which included principle of Read files, Write digitially, wireless internect connectivity and provide power. In concept #1, the product uses PDF as files reader, use hard tip stylus to write, has 2.4 GHz wireless, and provide power by lithium battery.

- Concept 1 is a cheap product

a. PDF file type is a universal format that allows us to sales cheap.
b. Hard tip stylus is easy to replace and is cheap to replace.
c. 2.4 GHz wireless has longer range than 5.0

Solution Principles Sub-Functions	Solution Principle 1	Solution Principle 2	Solution Principle 3
Read Files	PDF	.doc	new filetype (.text)
Digital Writing	Hard tip stylus	Soft tip stylus	Finger
Wireless Internet Connectivity	2.4 Ghz	5 Ghz	Dual-Band
Provide Power	Lithium Battery	The Nickel Cadmium	The Nickel-Metal Hydride

d. Lithium battery is a cheap product but works goods. In concept#2, product uses PDF, Finger, 5 GHz, and The Nickel Cadmium
    a. We used a pdf format in-order to make it easily accessible to all student if they needed to be able to upload their own files.
    b. 5ghz would allow the user to have faster internet access to download textbooks
    c. We would use a soft tip stylus in-order to not damage the screen
    d. A nickel cadmium battery would be used to keep the weight of the table light.

Solution Principles Sub-Functions	Solution Principle 1	Solution Principle 2	Solution Principle 3
Read Files	PDF	.doc	new filetype (.text)
Digital Writing	Hard tip stylus	Soft tip stylus	Finger
Wireless Internet Connectivity	2.4 Ghz	5 Ghz	Dual-Band
Provide Power	Lithium Battery	The Nickel Cadmium	The Nickel-Metal Hydride

In concept#3, the product uses new filetype(.text), Soft tip stylus, Dual-Band, and the Nickel-Metal Hydride.

a. .text file type would be expensive but protect the book publishers from copyright
b. A soft tip stylus would allow us to keep the screen from getting scratched

c. A dual band adapter would allow the user to access and download textbooks anywhere quickly and efficiently.
d. Nickel-Metal Hydride: would allow us to keep the cost of the table low.

Solution Principles Sub-Functions	Solution Principle 1	Solution Principle 2	Solution Principle 3
Read Files	PDF	.doc	new filetype (.text)
Digital Writing	Hard tip stylus	Soft tip stylus	Finger
Wireless Internet Connectivity	2.4 Ghz	5 Ghz	Dual-Band
Provide Power	Lithium Battery	The Nickel Cadmium	The Nickel-Metal Hydride

In concept#4, the product uses .doc, soft tip stylus, 5Ghz, and the nickel cadmium.

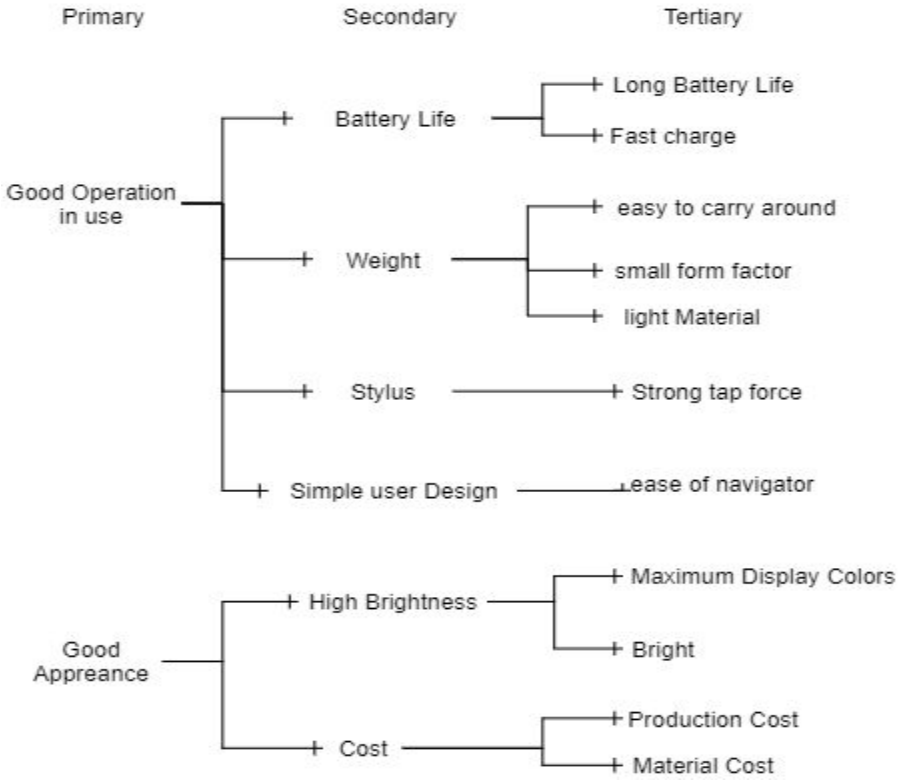
- Doc format allow user to edit it
- Soft tip stylus would keeps the screen from scratches and is reuseable
- Nickel Cadmium Battery would be used to keep the weight of the table light.

Solution Principles Sub-Functions	Solution Principle 1	Solution Principle 2	Solution Principle 3
Read Files	PDF	.doc	new filetype (.text)
Digital Writing	Hard tip stylus	Soft tip stylus	Finger
Wireless Internet Connectivity	2.4 Ghz	5 Ghz	Dual-Band
Provide Power	Lithium Battery	The Nickel Cadmium	The Nickel-Metal Hydride

a. Identify an appropriate set of selection criteria to assess or compare the alternatives (from step f); and use these criteria to create a utility function (UF). The function will be used to compare, rank, and select from these alternatives.
    1. Organize the selection criteria that will be used to compare the design alternatives, as a hierarch

Utility function 3.6:

3.6.1 Utility function Selection Criteria



Explanation: the diagram displays our thought process on what the primary, secondary, and tertiary criteria for our product should focus on. The resulted to a conclusion that our product needs to be accurate, effective and cost efficient.

Utility function Relative Weight

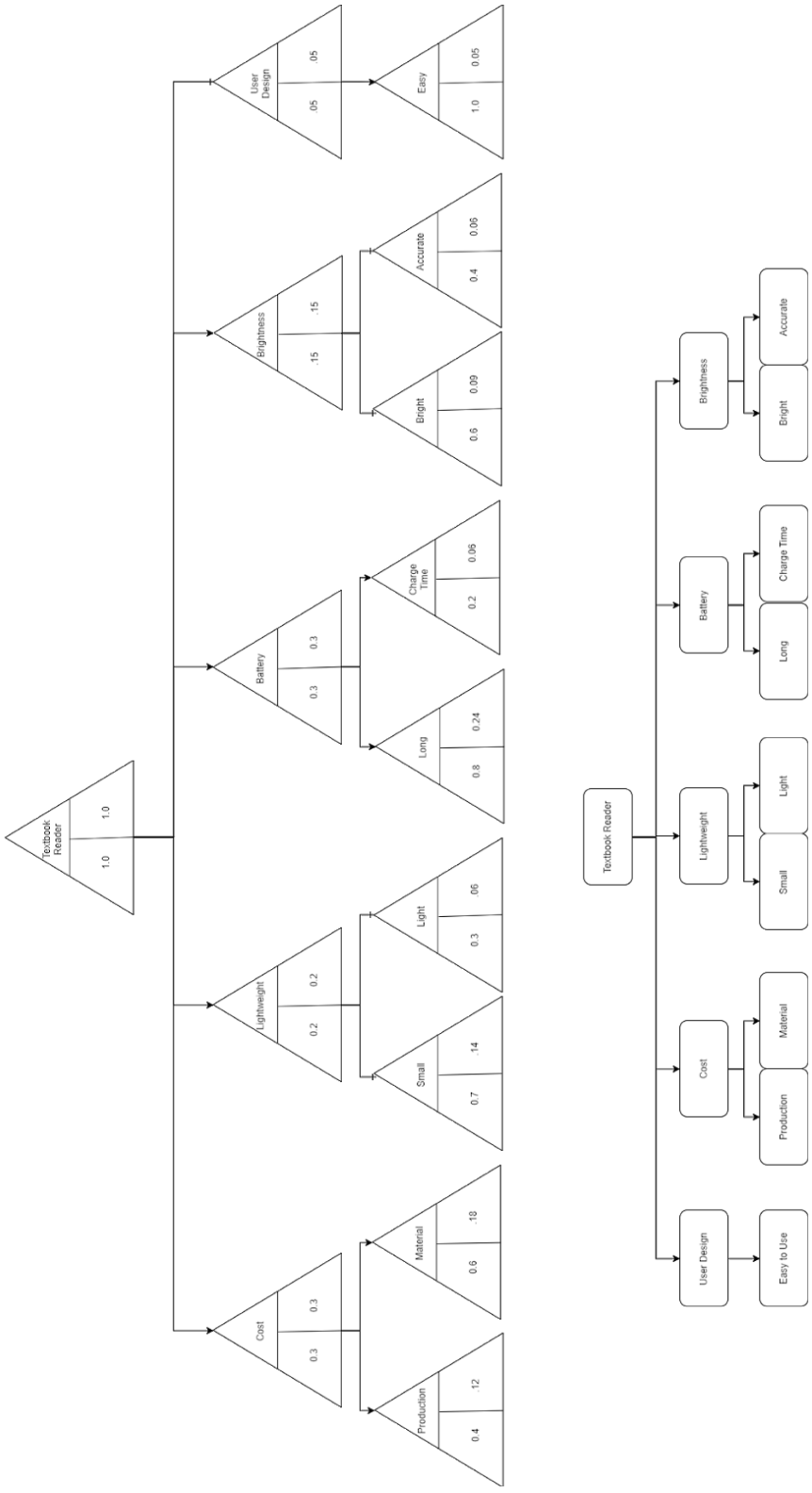


Figure 3.6.2: Utility Function Relative and Absolute Weights

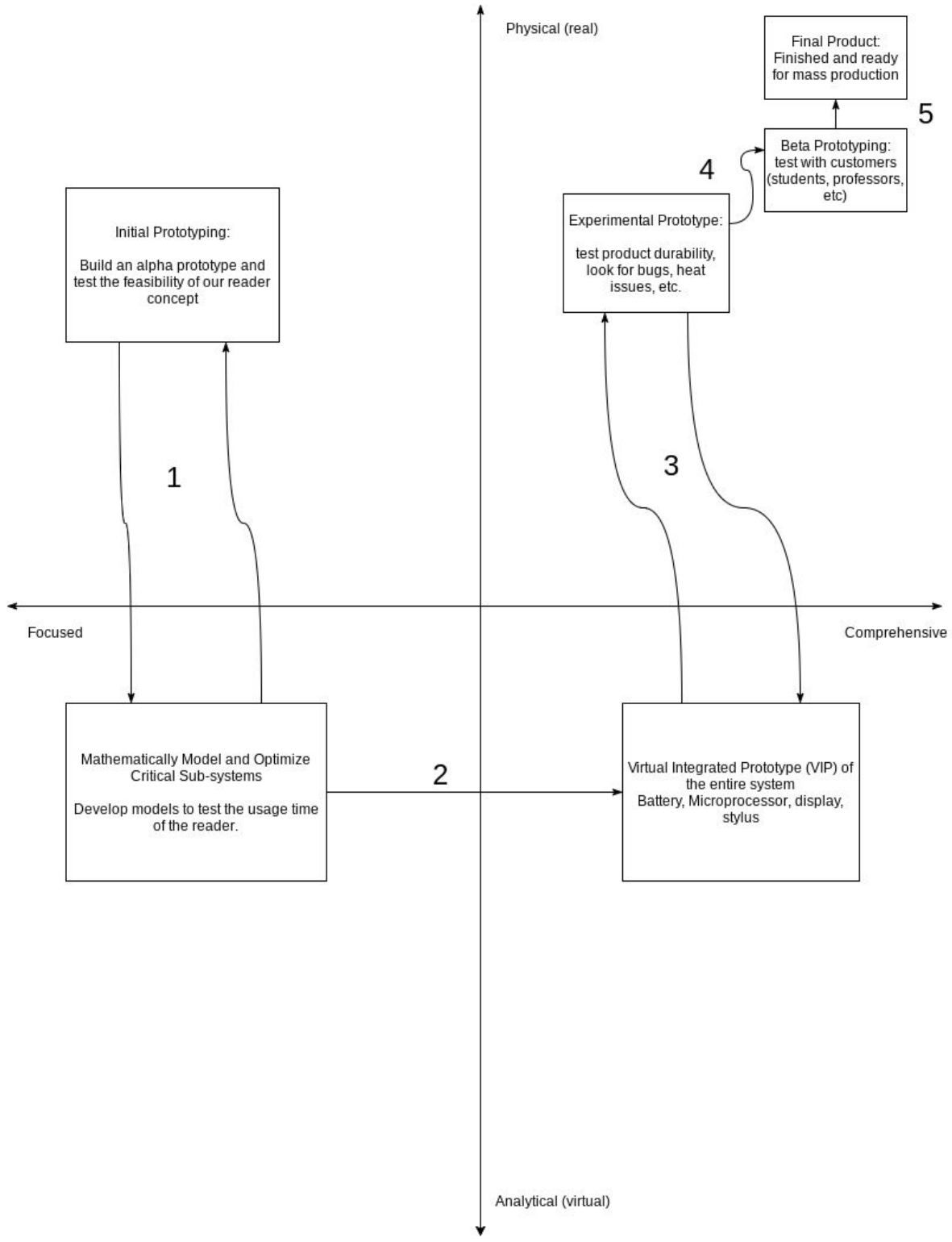
Scale of 1-10 for Concept Ratings

Selection Criteria	Absolute Weight	Concept Rating (Concept 1)	Utility (Concept 1)	Concept Rating (Concept 2)	Utility (Concept 2)	Concept Rating (Pt 3)	Utility (Concept 3)	Concept Rating (Concept 4)	Utility (Concept 4)
Production Cost	0.12	3	= 0.36	5	=0.6	3	= 0.36	3	= 0.36
Material Cost	0.18	3	= 0.54	4	=0.72	3	= 0.36	3	= 0.36
Small Stylus	0.14	4	= 0.56	2	=0.28	3	= 0.42	4	= 0.56
Light Weight	0.06	4	= 0.24	3	=0.18	3	= 0.18	4	= 0.24
Long	0.24	3.5	= 0.84	3	=0.72	3	= 0.72	3	= 0.72
Fast	0.06	2	= 0.12	2	=0.12	3	= 0.18	2	= 0.12
Bright	0.09	4	= 0.36	4	= 0.36	3	= 0.27	4	= 0.36
Accurate	0.06	3	= 0.18	3	= 0.18	3	= 0.18	3	= 0.18
Ease of Use	0.05	3	= 0.15	3	= 0.15	3	= 0.15	3	= 0.15
Total:			= 3.35		=3.31		= 3		= 3.23

Explanation: based on our appropriate set of selection criteria, we assessed and compared Text.Book's alternative concepts and concluded that concept 1, is our selected feasible concept for further development, produced the highest utility. We assess the alternative concepts through a Utility Function and calculated the utility based on concept ranking and absolute weight.

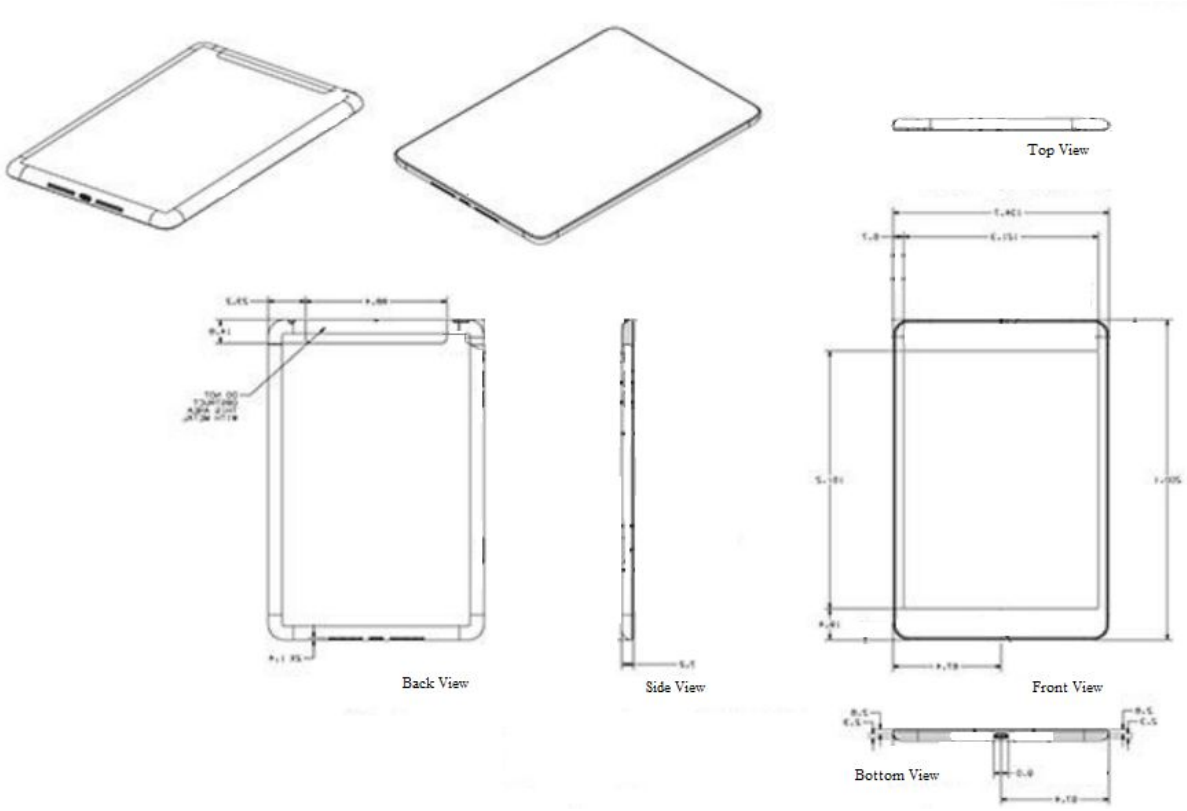
Prototyping Strategy 3.7

Figure 3.7.1 Prototyping Space



- The Prototyping Strategy defines a recommended path in the prototyping space for Text.book
- For our Prototyping Strategy the path is 1-2-3-4-5
- Once the analytical prototype is properly calibrated and validated with respect to a real prototype, then the analytical prototype can be used for virtual prototypes, a quick and inexpensive way to pursue prototyping

Figure 3.7.2



Product Strategy 3.8

1. Integrated Product Management Strategy (platform/line strategy)
    a. Establish (define) the underlying elements of the product platform core technology elements and supporting technology elements
        i. Determine the core technology
            1. For the Text.Book, the core or defining technology:
                a. Interactive Technology
                    i. Interactive learning of how things behave for all subjects.
                b. ProMotion Technology
                    i. Experience of a real writing with the Text.Book

c. Paper-like display Technology
    i. Gives the Text.book a feel of a textbook
d. Multi-Touch Technology
    i. Use multiple forms of user interface with the Text.book

ii. Determine the supporting technology element.
1. For the Text.Book, the supporting technology elements are:
    a. Stylus
    b. Intel Microprocessor
    c. Memory storage
    d. USB 3.0 port that allow user to insert external drive.

Segment the market based on competitive strategy and product market strategy and then prioritize the target market segment for the product

Product Platform 3.8.1

Figure 3.8.1: Product Platform

Text.Book	
Customer Segment	**Enterprise/Facility Segment**
● Professors	● School and Universities
● College Students	● University Libraries
● High School Students	● High School Libraries

Explanation: The college students are our target market segment due to the wide range of textbook offerings at a much cheaper price with our partnerships with big textbook companies

b. Establish product lines to address (meet the needs of) the different target market segments

Product Lines 3.8.2:

Product line for Text.Book/Text.book Plus	
Market Segments	● Enterprise such as Universities.
High-End Segments (Text.book Plus)	● Accept multiple format of file, so user may open/read different format textbook ● Hard-tip stylus that may wireless connect to tablet. Allow user to take note anytime by one click ● User may takes notes on textbook pages ● Figures in textbook are able to move around, and graph line able to change by data.
Market Segments	● College Student (target Market) ● Professor
Mid-Range Segments (Text.book)	● Hard-tip stylus that allow users to write better on screen ● Accept multiple format of file ● Users may take notes on textbook pages
Low-ends Segments (Text.book)	● Accept PDF format only ● Soft-tip stylus that allow user to write on the screen or take notes on textbook

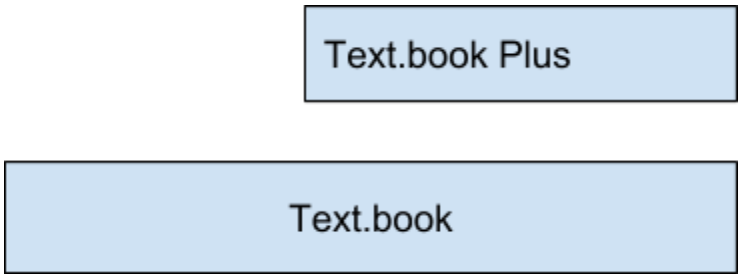
Text.book and Text.book Plus. Text.book will be targeted towards the student segment of the market while the Text.book Plus will be targeted towards more of the enterprise segment.

c. For each product line, create the necessary project plan to introduce the product to the target market segment

   i. Text.book
      1. Planning Stage
         a. Start on the R&D, create the FAST diagram and the HOQ. By doing we should know the functions of our product
      2. Development Stage
         a. By using the technical metrics from the HOQ, to get the Function Structure. Once the function structure is complete, multiple product ideas are laid out. Finally, the Utility Function is applied and a product is chosen with the numbers.
      3. Testing Stage
         a. Finally, a prototype is created and the prototype is tested with people.

   ii. Text.book Plus
      1. Planning Stage
         a. In this planning stage, we will include the corrections from the testing of Text.book. Since this product is the higher end, the R&D with be on higher end product from the market. Do the same as before, create the FAST diagram and the HOQ.
      2. Development Stage
         a. By using the technical metrics from the HOQ, to get the Function Structure. Once the function structure is complete, multiple product ideas are laid out. Finally, the Utility Function is applied and a product is chosen with the numbers.
      3. Testing Stage
         a. Finally, a prototype is created and the prototype is tested with people.

d. Introduce the product lines (to the market) in a time-phased manner to “cover” (reach) all the desired target market segments



	2020	2024
Text.book	X	X
Text.book Plus		X

Explanation: This two charts show our company will release our new products in four years. After we release Text.book in 2020, we will begin to develop the Text.book Plus by keep improving the Text.book functions and adding more utilities. In 2024, Text.book Plus will comes out.

Failure Modes and Effects Analysis (FMEA) 3.9

Figure 3.9.1 FMEA Rating Chart

Rating	Severity (S)	Occurrence (O)	Detection (D)
1	Exceed specification but not noticed by customer	Never	Very high - programme design process will detect failure
2	Noticed by customer but does not affect the product function	Very occasionally	High - programme design process is likely to detect failure
3	Noticed by customer, minor effect on product function, customer accepts condition		

4	Customer dissatisfied with function of product	Occasionally	Medium- programme design process may detect failure
5	Significant effect on customer satisfaction		
6	Significant inconvenience to customer	Frequently	Low - programme design process is unlikely to detect failure
7	Significant annoyance to customer		
8	Customer endangered	Very frequently	Zero- programme design process will not detect failure

FMEA

Part	Function	Potential Failure Mode	Potential effects of Failure	Severity	Potential causes of failure	Occurrence	How will the potential failure be detected?	Detection	RPN	Actions
Processor	Executes programs	Heat	Device will not boot	6	Total failure	2	Stress tests	4	48	Ensure proper heat sink is used to disperse heat
Lithium Ion Battery	Provide power	Poor sealing	Device will not boot	6	Total failure	2	Inspection checks	2	24	Introduce more rigid sealing of battery
Lithium Ion Battery	Provide power	Not holding a charge	Shortened usage time	3	Overcharging or cell degrading	3	Check voltage	2	18	Introduce higher quality batteries
Micro USB port	Transfer data and charge battery	Pins damaged	Device will not charge	4	Incorrect plugging in of cables	2	Look at pins on port	1	8	No action required
Display	Output text and graphic images	Not connected properly	Device will not display anything	3	Cables not plugged into motherboard	1	During assembly	2	6	No action required
Wifi	Connects to wireless router	Wifi adapter not finding network	No internet connectivity	2	Bad adapter	1	Inspection check	2	4	No action required

FMEA Explanation:

According to our RPN values, we should be prioritizing the processor and lithium ion battery technologies. Afterwards, we can look at the USB port, display, and wifi connectivity to ensure that everything works properly. In order to combat these failures modes we will ensure that heat is adequately dispersed with a proper heat sink as well as ensure we are using high quality batteries.

Section 4.0 Financial Analysis

Scenario Parameters 4.1

Figure 4.2.1 Scenario Parameters

SCENARIO INPUT PARAMETERS	
Sales & Production Volume (units/year)	300,000
Development Cost (total $)	15,000,000
Unit price ($/unit)	75
Unit Production Cost ($/unit)	40
Ramp-up cost (total $)	2,500,000
Marketing & support cost ($/year)	2,400,000
Annual Discount Factor (%)	10

Base Case 4.2

Figure 4.2.1 Base Case WorkSheet

Base Case																
	Year 1				Year 2				Year 3				Year 4			
period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
($ values in thousands)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
Development Cost	-3750.00	-3750.00	-3750.00	-3750.00												
Ramp-up cost				-1250.00	-1250.00											
Marketing & support cost					-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00
Production cost						-400.00	-1200.00	-2000.00	-2800.00	-4000.00	-10000.00	-16000.00	-10000.00	-4000.00	-1200.00	-400.00
Production volume						10000	30000	50000	70000	100000	250000	400000	250000	100000	30000	10000
Unit production cost						-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Sales Revenue						750.00	2250.00	3750.00	5250.00	7500.00	18750.00	30000.00	18750.00	7500.00	2250.00	750.00
Sales volume						10000	30000	50000	70000	100000	250000	400000	250000	100000	30000	10000
Unit price						0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Period Cash Flow	-3750.00	-3750.00	-3750.00	-5000.00	-1850.00	-250.00	450.00	1150.00	1850.00	2900.00	8150.00	13400.00	8150.00	2900.00	450.00	-250.00
PV Year 1,r-10%	-3750.00	-3658.54	-3569.30	-4643.00	-1676.01	-220.96	388.03	967.46	1518.38	2322.11	6366.77	10212.74	6059.98	2103.72	318.48	-172.62
Project NPV,$	12,567															

Figure 4.2.2 Base Case WorkSheet Explanation

NPV for Text.Book Base Case = $12,567,240

- For our 4 year financial model and projection we used the numbers from the scenario parameters worksheet.
- Our Sales and Production Volumes were estimated using our decision analysis and the historical data of other companies such as Amazon, and Apple
- Our Development Cost and Unit Production Cost were based on companies such as Apple, Barnes and Nobles, and Apple.
- Our Ramp up cost were dependant on the average cost of the various machines that were used to develop the products.
- Marketing Costs are based on industry trends of marketing and service costs.

Developmental Cost Projections 4.3

Figure 4.3.1 +10% Developmental Cost Worksheet

Developmental Cost Analysis	10%															
	Year 1				Year 2				Year 3				Year 4			
period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
($ values in thousands)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
Development Cost	-4125.00	-4125.00	-4125.00	-4125.00												
Ramp-up cost				-1250.00	-1250.00											
Marketing & support cost					-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00
Production cost						-400.00	-1200.00	-2000.00	-2800.00	-4000.00	-10000.00	-16000.00	-10000.00	-4000.00	-1200.00	-400.00
Production volume						10000	30000	50000	70000	100000	250000	400000	250000	100000	30000	10000
Unit production cost						-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Sales Revenue						750.00	2250.00	3750.00	5250.00	7500.00	18750.00	30000.00	18750.00	7500.00	2250.00	750.00
Sales volume						10000	30000	50000	70000	100000	250000	400000	250000	100000	30000	10000
Unit price						0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Period Cash Flow	-4125.00	-4125.00	-4125.00	-5375.00	-1850.00	-250.00	450.00	1150.00	1850.00	2900.00	8150.00	13400.00	8150.00	2900.00	450.00	-250.00
PV Year 1,r-10%	-4125.00	-4024.39	-3926.23	-4991.22	-1676.01	-220.96	388.03	967.46	1518.38	2322.11	6366.77	10212.74	6059.98	2103.72	318.48	-172.62
Project NPV,$	11,121															

Figure 4.3.2 -10% Developmental Cost Worksheet

Developmental Cost Analysis	-10%															
	Year 1				Year 2				Year 3				Year 4			
period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
($ values in thousands)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
Development Cost	-3375.00	-3375.00	-3375.00	-3375.00												
Ramp-up cost				-1250.00	-1250.00											
Marketing & support cost					-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00
Production cost						-400.00	-1200.00	-2000.00	-2800.00	-4000.00	-10000.00	-16000.00	-10000.00	-4000.00	-1200.00	-400.00
Production volume						10000	30000	50000	70000	100000	250000	400000	250000	100000	30000	10000
Unit production cost						-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Sales Revenue						750.00	2250.00	3750.00	5250.00	7500.00	18750.00	30000.00	18750.00	7500.00	2250.00	750.00
Sales volume						10000	30000	50000	70000	100000	250000	400000	250000	100000	30000	10000
Unit price						0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Period Cash Flow	-3375.00	-3375.00	-3375.00	-4625.00	-1850.00	-250.00	450.00	1150.00	1850.00	2900.00	8150.00	13400.00	8150.00	2900.00	450.00	-250.00
PV Year 1,r-10%	-3375.00	-3292.68	-3212.37	-4294.77	-1676.01	-220.96	388.03	967.46	1518.38	2322.11	6366.77	10212.74	6059.98	2103.72	318.48	-172.62
Project NPV,$	14,013															

Figure 4.3.3 +20% Developmental Cost Worksheet

Developmental Cost Analysis	20%															
	Year 1				Year 2				Year 3				Year 4			
period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
($ values in thousands)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
Development Cost	-4500.00	-4500.00	-4500.00	-4500.00												
Ramp-up cost				-1250.00	-1250.00											
Marketing & support cost					-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00
Production cost						-400.00	-1200.00	-2000.00	-2800.00	-4000.00	-10000.00	-16000.00	-10000.00	-4000.00	-1200.00	-400.00
Production volume						10000	30000	50000	70000	100000	250000	400000	250000	100000	30000	10000
Unit production cost						-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Sales Revenue						750.00	2250.00	3750.00	5250.00	7500.00	18750.00	30000.00	18750.00	7500.00	2250.00	750.00
Sales volume						10000	30000	50000	70000	100000	250000	400000	250000	100000	30000	10000
Unit price						0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Period Cash Flow	-4500.00	-4500.00	-4500.00	-5750.00	-1850.00	-250.00	450.00	1150.00	1850.00	2900.00	8150.00	13400.00	8150.00	2900.00	450.00	-250.00
PV Year 1,r-10%	-4500.00	-4390.24	-4283.16	-5339.45	-1676.01	-220.96	388.03	967.46	1518.38	2322.11	6366.77	10212.74	6059.98	2103.72	318.48	-172.62
Project NPV,$	9,675															

Figure 4.3.4 -20% Developmental Cost Worksheet

Developmental Cost Analysis	-20%															
	Year 1				Year 2				Year 3				Year 4			
period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
($ values in thousands)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
Development Cost	-3000.00	-3000.00	-3000.00	-3000.00												
Ramp-up cost				-1250.00	-1250.00											
Marketing & support cost					-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00
Production cost						-400.00	-1200.00	-2000.00	-2800.00	-4000.00	-10000.00	-16000.00	-10000.00	-4000.00	-1200.00	-400.00
Production volume						10000	30000	50000	70000	100000	250000	400000	250000	100000	30000	10000
Unit production cost						-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Sales Revenue						750.00	2250.00	3750.00	5250.00	7500.00	18750.00	30000.00	18750.00	7500.00	2250.00	750.00
Sales volume						10000	30000	50000	70000	100000	250000	400000	250000	100000	30000	10000
Unit price						0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Period Cash Flow	-3000.00	-3000.00	-3000.00	-4250.00	-1850.00	-250.00	450.00	1150.00	1850.00	2900.00	8150.00	13400.00	8150.00	2900.00	450.00	-250.00
PV Year 1,r-10%	-3000.00	-2926.83	-2855.44	-3946.55	-1676.01	-220.96	388.03	967.46	1518.38	2322.11	6366.77	10212.74	6059.98	2103.72	318.48	-172.62
Project NPV,$	15,459															

Figure 4.3.5 +30% Developmental Cost Worksheet

Developmental Cost Analysis	30%															
	Year 1				Year 2				Year 3				Year 4			
period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
($ values in thousands)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
Development Cost	-4875.00	-4875.00	-4875.00	-4875.00												
Ramp-up cost				-1250.00	-1250.00											
Marketing & support cost					-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00
Production cost						-400.00	-1200.00	-2000.00	-2800.00	-4000.00	-10000.00	-16000.00	-10000.00	-4000.00	-1200.00	-400.00
Production volume						10000	30000	50000	70000	100000	250000	400000	250000	100000	30000	10000
Unit production cost						-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Sales Revenue						750.00	2250.00	3750.00	5250.00	7500.00	18750.00	30000.00	18750.00	7500.00	2250.00	750.00
Sales volume						10000	30000	50000	70000	100000	250000	400000	250000	100000	30000	10000
Unit price						0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Period Cash Flow	-4875.00	-4875.00	-4875.00	-6125.00	-1850.00	-250.00	450.00	1150.00	1850.00	2900.00	8150.00	13400.00	8150.00	2900.00	450.00	-250.00
PV Year 1,r-10%	-4875.00	-4756.10	-4640.10	-5687.67	-1676.01	-220.96	388.03	967.46	1518.38	2322.11	6366.77	10212.74	6059.98	2103.72	318.48	-172.62
Project NPV,$	8,229															

Figure 4.3.6 -30% Developmental Cost Worksheet

Developmental Cost Analysis	-30%															
	Year 1				Year 2				Year 3				Year 4			
period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
($ values in thousands)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
Development Cost	-2625.00	-2625.00	-2625.00	-2625.00												
Ramp-up cost				-1250.00	-1250.00											
Marketing & support cost					-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00
Production cost						-400.00	-1200.00	-2000.00	-2800.00	-4000.00	-10000.00	-16000.00	-10000.00	-4000.00	-1200.00	-400.00
Production volume						10000	30000	50000	70000	100000	250000	400000	250000	100000	30000	10000
Unit production cost						-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Sales Revenue						750.00	2250.00	3750.00	5250.00	7500.00	18750.00	30000.00	18750.00	7500.00	2250.00	750.00
Sales volume						10000	30000	50000	70000	100000	250000	400000	250000	100000	30000	10000
Unit price						0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Period Cash Flow	-2625.00	-2625.00	-2625.00	-3875.00	-1850.00	-250.00	450.00	1150.00	1850.00	2900.00	8150.00	13400.00	8150.00	2900.00	450.00	-250.00
PV Year 1,r-10%	-2625.00	-2560.98	-2498.51	-3598.32	-1676.01	-220.96	388.03	967.46	1518.38	2322.11	6366.77	10212.74	6059.98	2103.72	318.48	-172.62
Project NPV,$	16,905															

Sales Volume Projections 4.4

Figure 4.4.1 +10% Sales Volume Worksheet

Sales Volume Analysis	10%															
	Year 1				Year 2				Year 3				Year 4			
period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
($ values in thousands)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
Development Cost	-3750.00	-3750.00	-3750.00	-3750.00												
Ramp-up cost				-1250.00	-1250.00											
Marketing & support cost					-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00
Production cost						-440	-1320	-2200	-3080	-4400	-11000	-17600	-11000	-4400	-1320	-440
Production volume						11000	33000	55000	77000	110000	275000	440000	275000	110000	33000	11000
Unit production cost						-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Sales Revenue						825	2475	4125	5775	8250	20625	33000	20625	8250	2475	825
Sales volume						11000	33000	55000	77000	110000	275000	440000	275000	110000	33000	11000
Unit price						0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Period Cash Flow	-3750.00	-3750.00	-3750.00	-5000.00	-1850.00	-215.00	555.00	1325.00	2095.00	3250.00	9025.00	14800.00	9025.00	3250.00	555.00	-215.00
PV Year 1,r-10%	-3750.00	-3658.54	-3569.30	-4643.00	-1676.01	-190.03	478.57	1114.68	1719.46	2602.37	7050.32	11279.74	6710.59	2357.62	392.79	-148.45
Project NPV,$	16,071															

Figure 4.4.2 -10% Sales Volume Worksheet

Sales Volume Analysis	-10%															
	Year 1				Year 2				Year 3				Year 4			
period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
($ values in thousands)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
Development Cost	-3750.00	-3750.00	-3750.00	-3750.00												
Ramp-up cost				-1250.00	-1250.00											
Marketing & support cost					-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00
Production cost						-360	-1080	-1800	-2520	-3600	-9000	-14400	-9000	-3600	-1080	-360
Production volume						9000	27000	45000	63000	90000	225000	360000	225000	90000	27000	9000
Unit production cost						-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Sales Revenue						675	2025	3375	4725	6750	16875	27000	16875	6750	2025	675
Sales volume						9000	27000	45000	63000	90000	225000	360000	225000	90000	27000	9000
Unit price						0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Period Cash Flow	-3750.00	-3750.00	-3750.00	-5000.00	-1850.00	-285.00	345.00	975.00	1605.00	2550.00	7275.00	12000.00	7275.00	2550.00	345.00	-285.00
PV Year 1,r-10%	-3750.00	-3658.54	-3569.30	-4643.00	-1676.01	-251.90	297.49	820.23	1317.30	2041.86	5683.22	9145.74	5409.37	1849.82	244.17	-196.78
Project NPV,$	9,064															

Figure 4.4.3 +20% Sales Volume Worksheet

Sales Volume Analysis	20%															
	Year 1				Year 2				Year 3				Year 4			
period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
($ values in thousands)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
Development Cost	-3750.00	-3750.00	-3750.00	-3750.00												
Ramp-up cost				-1250.00	-1250.00											
Marketing & support cost					-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00
Production cost						-480	-1440	-2400	-3360	-4800	-12000	-19200	-12000	-4800	-1440	-480
Production volume						12000	36000	60000	84000	120000	300000	480000	300000	120000	36000	12000
Unit production cost						-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Sales Revenue						900	2700	4500	6300	9000	22500	36000	22500	9000	2700	900
Sales volume						12000	36000	60000	84000	120000	300000	480000	300000	120000	36000	12000
Unit price						0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Period Cash Flow	-3750.00	-3750.00	-3750.00	-5000.00	-1850.00	-180.00	660.00	1500.00	2340.00	3600.00	9900.00	16200.00	9900.00	3600.00	660.00	-180.00
PV Year 1,r-10%	-3750.00	-3658.54	-3569.30	-4643.00	-1676.01	-159.09	569.12	1261.90	1920.55	2882.62	7733.86	12346.75	7361.20	2611.51	467.10	-124.28
Project NPV,$	19,574															

Figure 4.4.4 -20% Sales Volume Worksheet

Sales Volume Analysis	-20%															
	Year 1				Year 2				Year 3				Year 4			
period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
($ values in thousands)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
Development Cost	-3750.00	-3750.00	-3750.00	-3750.00												
Ramp-up cost				-1250.00	-1250.00											
Marketing & support cost					-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00
Production cost						-320	-960	-1600	-2240	-3200	-8000	-12800	-8000	-3200	-960	-320
Production volume						8000	24000	40000	56000	80000	200000	320000	200000	80000	24000	8000
Unit production cost						-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Sales Revenue						600	1800	3000	4200	6000	15000	24000	15000	6000	1800	600
Sales volume						8000	24000	40000	56000	80000	200000	320000	200000	80000	24000	8000
Unit price						0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Period Cash Flow	-3750.00	-3750.00	-3750.00	-5000.00	-1850.00	-320.00	240.00	800.00	1360.00	2200.00	6400.00	10600.00	6400.00	2200.00	240.00	-320.00
PV Year 1,r-10%	-3750.00	-3658.54	-3569.30	-4643.00	-1676.01	-282.83	206.95	673.01	1116.22	1761.60	4999.67	8078.73	4758.76	1595.92	169.85	-220.95
Project NPV,$	5,560															

Figure 4.4.5 +30% Sales Volume Worksheet

Sales Volume Analysis	30%															
	Year 1				Year 2				Year 3				Year 4			
period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
($ values in thousands)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
Development Cost	-3750.00	-3750.00	-3750.00	-3750.00												
Ramp-up cost				-1250.00	-1250.00											
Marketing & support cost					-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00
Production cost						-520	-1560	-2600	-3640	-5200	-13000	-20800	-13000	-5200	-1560	-520
Production volume						13000	39000	65000	91000	130000	325000	520000	325000	130000	39000	13000
Unit production cost						-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Sales Revenue						975	2925	4875	6825	9750	24375	39000	24375	9750	2925	975
Sales volume						13000	39000	65000	91000	130000	325000	520000	325000	130000	39000	13000
Unit price						0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Period Cash Flow	-3750.00	-3750.00	-3750.00	-5000.00	-1850.00	-145.00	765.00	1675.00	2585.00	3950.00	10775.00	17600.00	10775.00	3950.00	765.00	-145.00
PV Year 1,r-10%	-3750.00	-3658.54	-3569.30	-4643.00	-1676.01	-128.16	659.66	1409.12	2121.63	3162.88	8417.41	13413.75	8011.81	2865.41	541.41	-100.12
Project NPV,$	23,078															

Figure 4.4.6 -30% Sales Volume Worksheet

Sales Volume Analysis	-30%															
	Year 1				Year 2				Year 3				Year 4			
period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
($ values in thousands)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2		
Development Cost	-3750.00	-3750.00	-3750.00	-3750.00												
Ramp-up cost				-1250.00	-1250.00											
Marketing & support cost					-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00	-600.00
Production cost						-280	-840	-1400	-1960	-2800	-7000	-11200	-7000	-2800	-840	-280
Production volume						7000	21000	35000	49000	70000	175000	280000	175000	70000	21000	7000
Unit production cost						-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Sales Revenue						525	1575	2625	3675	5250	13125	21000	13125	5250	1575	525
Sales volume						7000	21000	35000	49000	70000	175000	280000	175000	70000	21000	7000
Unit price						0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Period Cash Flow	-3750.00	-3750.00	-3750.00	-5000.00	-1850.00	-355.00	135.00	625.00	1115.00	1850.00	5525.00	9200.00	5525.00	1850.00	135.00	-355.00
PV Year 1,r-10%	-3750.00	-3658.54	-3569.30	-4643.00	-1676.01	-313.77	116.41	525.79	915.13	1481.35	4316.12	7011.73	4108.15	1342.03	95.54	-245.12
Project NPV,$	2,057															

Sensitivity Analysis Charts 4.5

Figure 4.5.1 Sensitivity Analysis for Dev Cost Table

Base Dev Cost,$	Change in Development	Development Cost, $ Thousands	Change in Development Cost, $ Thousands	NPV, $ Thousands	Change in NPV, %	Change in NPV, $ Thousands
15000	30%	19500	4500	8,229	-34.52%	-4,338
15000	20%	18000	3000	9,675	-23.01%	-2,892
15000	10%	16500	1500	11,121	-11.51%	-1,446
15000	**0**	15000	0	12,567	0.00%	0
15000	-10%	13500	-1500	14,013	11.51%	1,446
15000	-20%	12000	-3000	15,459	23.01%	2,892
15000	-30%	10500	-4500	16,905	34.52%	4,338

Figure 4.5.2 Sensitivity Analysis for Dev Cost Graph

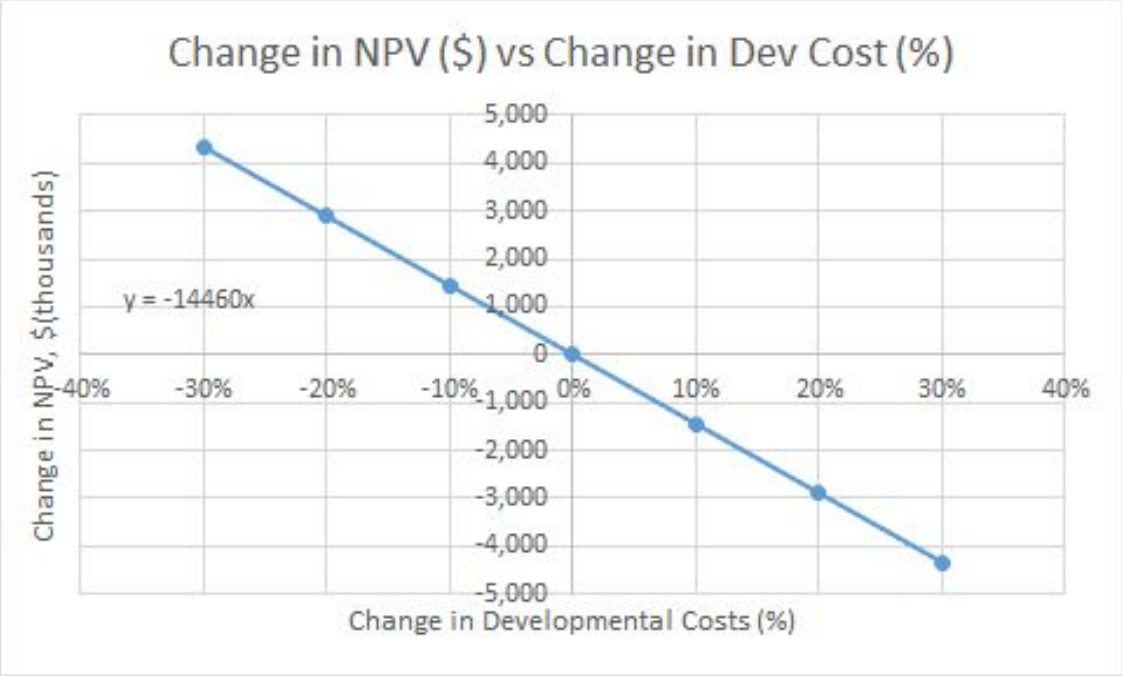


Figure 4.5.3 Sensitivity Analysis Development Cost Explanation

Development cost has an inverse relationship with NPV. We were able to calculate that as our developmental costs fall the larger our expected profit is. This can be shown via the linear equation y = -14,460x

Figure 4.5.4 Sensitivity Analysis for Sales Volume Table

Base Sales Volume, Qty	Change in Sales Volume, %	Sales Volume, Qty	Change in Sales Volume, Qty	Change in NPV, %	NPV, $ Thousands	Change in NPV, $ Thousands
75000	30%	75225	225	84%	23,078	10,511
75000	20%	75150	150	56%	19,574	7,007
75000	10%	75075	75	28%	16,071	3,504
75000	**0**	75000	0	0%	12,567	0
75000	-10%	74925	-75	-28%	9,064	-3,504
75000	-20%	74850	-150	-56%	5,560	-7,007
75000	-30%	74775	-225	-84%	2,057	-10,511

Figure 4.5.5 Sensitivity Analysis for Sales Volume Graph

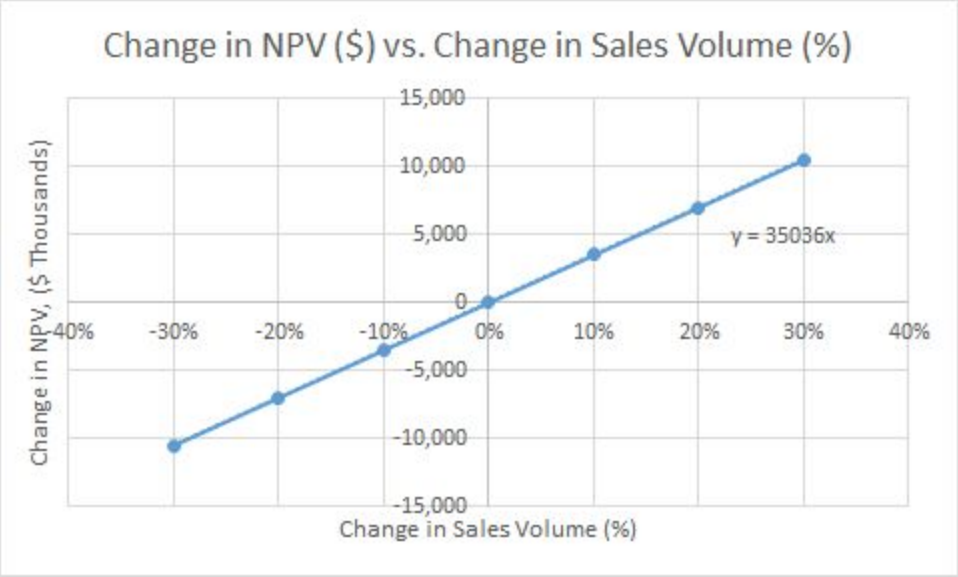


Figure 4.5.6 Sensitivity Analysis Sales Volume Explanation

Sales volume is directly proportional with NPV and this can be shown via the linear equation y= 35,036x.

Expect Profit Summary 4.6

Figure 4.6.1 NPV Results

SCENARIO INPUT PARAMETERS	
Sales & Production Volume (units/year)	300,000
Development Cost (total $)	15,000,000
Unit price ($/unit)	75
Unit Production Cost ($/unit)	40
Ramp-up cost (total $)	2,500,000
Marketing & support cost ($/year)	2,400,000
Annual Discount Factor (%)	10
Base-Case NPV (Expected Profit)	12,567,240

Figure 4.6.2 Results Explanation

Our Expected Profits based on a 4-year NPV Analysis with a 10% discount factor rate will be equal to $12.6 million.

Based on our research we were able to conclude that we would be selling approximately 300,000 units each year at a price of $75. We would be producing these units for $40, while spending $15,000,000 on development, $ 2,500,000 in ramp up costs, and $2,400,000 in Marketing and support costs.

We completed this analysis to convey an overall idea of how the company's cash flow will fluctuate over the four year period of development and release. Using our sensitivity analysis we are also able to show that the project will be safe, and will have very little risk.

Appendix