BIONICA

Engineering The Future

Junior Project Final Report & Annotated Bibliography

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Contents:

Overview

In this report I'll be explaining a bit about my project process, evidence for how everything came together, critical insights I gained through this process, the main limitations I faced, and finally, what this all means for my future. I may have talked about some of this in my oral presentation, but this is definitely a more detailed report.

General Methodology For The Project

The original plan was to have three components to my project. There was going to be a research component, a product development component, and a marketing component. For the research component, I was to look up information about the process of creating a startup and entrepreneurship. I would also look into what real entrepreneurs had to say and compare that to how the media portrays startup life. For the product development component, I would create a useful, intuitive product that helps a specific audience. I would have people 'invest' in my product by using it or recommending it to others. Finally, for the marketing component, I would market my company and my product to the public, or my peers, and gather feedback.

Things played out a little differently for me, however. For the research component, I went into far more depth than anticipated. I decided to look into ethical business and corporate social responsibility in addition to the topics I mentioned above. I decided to omit the product development component, more on that later. Finally, for the marketing component, it went through some iterations. I decided that my final presentation should be my chance to 'market' my company. Therefore, I tried to make my presentation aesthetically appealing. From the

beginning, I had decided that creating a website for my company would be part of the marketing aspect, so I did that as well.

Here's the link to website: https://thegiraffe.github.io/Bionica/index.html

I wish that I had enough time to ask everyone for feedback as the original idea included a survey portion at the end of the presentation. I didn't git commit in time to link it on the Bionica website. I considered sending out the link this coming week just for the feedback.

If you're interested, here's the link to survey: https://goo.gl/forms/RG4fJ5Yk1KNbpfZE2

Process Of Creating The Website

When working on my company website, I looked into examples & strategies that other company websites have used. This luckily wasn't the most difficult part of my project, as I had worked on company websites in the past in addition to having a fair amount of website programming experience. However, nonetheless, I still learned so much from this experience. With all the websites I looked at, I realized that everyone had a fairly simple design scheme. There were often one to two base colors, then perhaps some slight tweaks on those base colors for accent. Another common theme was lots of stock images, sometimes taking up much of the screen. I tried to incorporate parts of both themes into the Bionica website.

The website itself was partially based off of the Adafruit website. Adafruit is one of my favorite companies and the CEO, Limor "LadyAda" Fried, is one of my biggest rolemodels.

For comparison, here's the link to the Adafruit site: http://adafruit.com/

Another thing I learned was that gifs don't have to just be for memes or cheesy 90's sites; when used appropriately they can add a bit of style or pizzazz to a professional website. In general, I tried to make my website interactive. I animated the navbar buttons to make website engaging for the users. I also made sure that, when someone hovers over any buttons, the buttons acknowledge their presence. Finally, I created a sort of interactive image gallery setup for the Projects pages.

The languages I used were HTML/CSS and Javascript with the Jquery library. For HTML/CSS, I used HTML to make the physical website. But, CSS is really what makes the HTML interesting. You see, HTML is actually considered a programming language but there's only so much you can do with it alone. It doesn't have conditionals, functions, etc. CSS, on the other hand, isn't really a language; it's basically just a set of rules for how the website should be styled. It's a sort of accessory to HTML but it has its own syntax. I actually used some CSS to make the website interactive. You can change the styling on items in response to whether the mouse pointer is hovering over an item. You can also use it for animations. CSS may not be a real 'language' per-say, but it must not be underestimated. It's still extremely powerful. Also, whether or not it's a real language is technically debatable; not all programmers agree with me.

However, the real deal for this project was Javascript and the jQuery library. These are the real languages. In addition to CSS, I used a lot of Javascript to make the website interactive.

The Javascript was mainly for the interactive Projects pages. jQuery, on the other hand, is a very useful Javascript library that many applications use. I used it to incorporate the image carousel on the homepage. The carousel code[1] I used needed jQuery to work and to be able to change around the settings (which I did, a lot. I don't like to just take other people's free code, I like to manipulate it so that it does what I want it to do).

Fun fact, the entire Bionica website is open source! You can copy & redistribute my code if you want. You don't even have to attribute it to me.

Here's the link to all the code: https://github.com/TheGiraffe/Bionica

Evidence Of The Process

For evidence of my research process, I have my annotated bibliography, and all of my web sources bookmarked in my browser. Furthermore, I took physical notes on many of my resources. For some sources, such as the book The Tipping Point by Malcolm Gladwell, I had dialectical journal style notes. I often printed out my web sources and took notes on the margins of the page.

Here's the link to one of my dialectical journals for that book: https://drive.google.com/open?id=1plmjM1cDOr1n_i1B4u4GGS7IcgDF_4PjbxH-9EQ85bM

For evidence of the website process, there are a couple things you can look at. First…

Here's the list of the git commits for the website: https://github.com/TheGiraffe/Bionica/commits/master

Please note that I tend to code in giant chunks before git committing, just to make sure everything works well. Also, for the website, here's ALL of the code below (the same link is in the previous section as well). I didn't add many comments, as I hope the class & variable names are straightforward enough. If you have any questions about sections of the code, feel free to email me about it and ask what it does!

All the code: https://github.com/TheGiraffe/Bionica

Alternate Choices & Results:

I had originally wanted to create a web app, but I had to abandon that plan due to several constraints. First, there was the time constraint. I was short on time, as I didn't realize how little time I would end up having on my hands this semester. I had a lot of other classes to juggle & was barely keeping up with everything. Also, I found out that the webapp idea would have required me to learn Object Oriented PHP, a completely new language for me. It would have taken a lot of time out of the research process and the rewards wouldn't have been sufficient compared to the amount of time I'd lose.

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[1] That carousel itself is a free code library from a programmer named Ken Wheeler. The name of the library/carousel code is "Slick". Ken Wheeler gives away a lot of his code for free, which is what I aim to do in the future when my code is good enough. http://kenwheeler.github.io/slick/

Despite not everything going the way I wanted them to, I still had many of my goals fulfilled by these alternate choices. Since I decided to make this project more about research than product implementation, I managed to learn a lot more about the startup process than I would have. I had originally meant for the research to be a partial component, not the main component. However, I realized that there was so much to learn and I feel that it's a positive outcome that I got to focus more on research.

You see, deciding to scrap the webapp idea gave me enough time to pursue in depth research about the aspects of business that were very important to me, not just the typical 'how do you run a startup?' content. Furthermore, I still got the type of hands-on kinesthetic learning that I prefer by putting more effort into the UI/UX of the Bionica website. All in all, I completed my project goals of doing research on how to run a startup and of 'marketing' my company to an audience using some of the strategies I learned. I didn't do the product development part, but that failure to do so was a blessing in disguise.

Critical Insights

This project gave me several critical insights about entrepreneurship. However, it did more than that. It also gave me some critical insights about my role as a consumer in the global market and how we are all responsible for the choices we make.

Startups Are Full Time (All The Time) Jobs

First, I didn't completely comprehend that having a startup is a full time job, meaning that it has to occupy every aspect of your life. For my dad, with his startup, his investor/best friend has tried to make sure that he focuses on other things like his health, exercise, etc. He has given my dad an easier path just because he doesn't want my dad to make the same mistakes that he did when he was first starting out. Most people aren't that lucky. They have to eat beans and rice every day for dinner for years just to make it. My dad is older for a startup entrepreneur; he has a lot of years of managing experience under his belt.

I don't expect to be as lucky as my dad, as I plan on starting the entrepreneurship life much earlier than he did. However, I probably won't have a family to take care of that early in my life either, so I should have a lot more time to devote to my business. Through my research, I've realized that my plan is more of the traditional path for startup entrepreneurs. They often start relatively young, devote all of their time and energy to it, either make it or break it, then they settle down at some point to have a family.

However, there's also the interesting phenomenon of serial entrepreneurship. When a founder sells their startup and cashes out, they often miss the excitement that comes with startup life and they get back into it. They start businesses then make them big enough to sell and cash out. Then, they reinvest that money into new businesses and the cycle goes on.

I perhaps have a more Mark Zuckerberg approach to business. I'm not really interested in serial entrepreneurship; I want to keep one business and not sell it for as long as I can for a variety of reasons. First of all, my product ideas are all related to each other and fall under the

same 'genre'. It would be silly for me to keep creating different companies that basically do the same thing. Second of all, despite all my research, I still support an alternative approach to business that not all STEM related companies would like to follow. The last thing I want is for all of my ideas and hard work to be hoarded by some big company that bought my startup. I want my ideas to be shared property and I tend to like defensive publishing more than patents.

My dad has a lot of patents and I can see where he's coming from with his support for them. He's an old school engineer. Some may argue that not patenting your ideas means that you don't value them enough to protect them. For me, it's the opposite. If you truly value your ideas, perhaps you would share them with the world so that other people can benefit from them too. There's always the issue of someone else claiming them as their own but, if you practice defensive publishing, those risks are minimized. This of course is my personal philosophy, but it has a lot of ties to the philosophies of the Free Software/Free Culture movement.

Ethical Business

This leads me to the second major insight, which was that ethical business doesn't have to be an oxymoron. I realized that ethical business is possible, and it's possible to make a profit while doing good things for the world. It's definitely a niche market, however it's been starting to catch on among more consumers. I looked at a lot of case studies, from search engines that plant trees to ethical fashion partnerships. Then, I decided to not just research it, but to get involved. I followed ethical businesses and organizations on social media so that I can keep up to date on the issues[2]. I also started trying to support ethical businesses. More on that in the next section.

I also found out that making your products open source has a lot of benefits. I didn't realize that before - I just thought it was the right thing to do. Nobody would really go into ethical business just for the money, which is part of makes it work. Passion is a huge component of any successful business. These types of businesses definitely have the passion, so they don't have to worry about that being the limiting factor.

When it comes to ethical business, it's not about being the next Facebook. It's about making a difference in the world. Many people go into business to make their own lives better, but some go into business to make the world better. Some may start off in the first group, then they decide that they want to give back to the world (for example, Bill Gates).

I used to not like business as much; mostly because I associated the field with big, greedy companies. I can see where other people are coming from when they say that they don't like business. As a society, I don't think we focus enough on ethical business or the sides of business that help people. That observation, of course, may be a little biased because of where I'm from. My family's from DC, which is sort of a center for shady business practices.

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[2] A good example of this would be Eco-Age. I love Eco-Age's Instagram. Their posts have a very vibrant community that I'm proud to be a part of. http://eco-age.com/

Consumer Responsibility

The final critical insight is even more deep and personal. I realized that, when I choose to use a product or service, I am choosing to support the philosophies of the companies behind them. Like everything, it's a personal choice. You can choose to support a sleeker service that doesn't respect the user's rights, or you can choose a clunkier product from a company that tries to make a positive difference in the world. You can sacrifice your freedoms for the sake of convenience, or you can choose a program with a higher learning curve that respects your freedom. You can choose to buy new clothing from a company that supports sweatshop labor, or you could be more environmentally friendly by buying used clothing from thrift shops.

This project has made me more conscious of the decisions I make as a consumer. It has even caused me to change my actions. For example, because of this project, I was inspired to switch search engines to one that uses the money generated from my searches to plant trees. Either way, your search engine is going to collect data on you (unless you're using DuckDuckGo, I guess). You can choose whether that data is used to line people's pockets, or if it's used to make a difference in the world.

The search engine: https://www.ecosia.org/

Limitations

However, I still feel like there is much to learn. This research was a starting point; an opportunity to look into something that interests me before deciding whether or not I want to go in depth learning about it. Within my project there were two main limitations, both related to time. First, there was not enough time to read every single book on the topic. Most of my resources were web resources, which only goes so far. Second, it would have been great to put what I learned into action more effectively, by creating and marketing a real product. However, since this was a one-semester project, it would have been too much. That plan was initially distracting me from the real purpose of the project, which was to learn about the startup process. Creating and marketing a product takes a lot longer than I had anticipated, so I'm ultimately glad that I cut that portion out.

It's no secret that I struggled a lot this semester trying to manage all of the rigorous college courses I was taking. It really made things tough, and I missed so many projects deadlines as a result. While I probably wouldn't have signed up for everything knowing how busy I would end up being, I still feel like this was an important learning opportunity. In some weird way, it's a little like living the 'startup life'. You may miss a lot of deadlines, you may be overwhelmingly busy and things may not go exactly as planned, but the important thing is to just keep hustling even in the midst of your failures.

The Future

This project has made me consider what type of internship I would like to do during the summer before senior year. I realized that I would love to intern at a local tech startup because it

would be a very real hands on experience. Also, it's important to know what it's like to be an employee for a startup, which is something I didn't focus on much for this project. The employees and office culture are often the lifeblood of the company, so it's very important to know how to keep employees happy and willing to work hard.

It's also given me some insight into my senior project. I would love to create and market a real product that helps people for my senior project. I would prefer for this product to be tangible and perhaps (best case scenario) related to biomedical engineering. Therefore, I should look into people and organizations I can partner with to make that happen. In addition to all this, I would like to contribute something to the Free Libre Open Source community.

Finally, this project made me reflect on my career goals. I want to continue researching more about business and entrepreneurship. However, for the time being, this feels like a very promising field for me to go into. I really value creative freedom and I believe that ethical business is a very effective way of contributing to the world. Therefore, I'm really excited about pursuing this in the future. I've always wanted to make a positive change in the world, and I feel like business is a very good medium for this.

Start-Up & Marketing Research: An Annotated Bibliography

Gladwell, Malcolm. *The Tipping Point.* 2000. Back Bay Books/Little, Brown and

Company, 2002.

Summary

This book is about how to create a social epidemic. It's an important piece of

literature for people in advertising, or anyone that wants to spread a message to their

audience. The main takeaway from this book is that little things can make a big difference,

and small movements can change the world. The author explains how tweaking the small

things about the presentation of your message, choosing the right messengers, and

creating the right context for the message can make it spread like a wildfire. To help

illustrate his points, the author presents case studies of other social epidemics, including

some about advertising campaigns that were successful because they were different.

According to this book, the three laws about social epidemics are the law of the few,

which is about the messengers; the stickiness factor, which is about the presentation of the

message; and the power of context, which is about the environment that the message is

presented in. From stickiness factor, we learn how to make the message engaging and

meaningful to the audience. From the law of the few, we learn to appeal to the "connectors,

mavens, and salesmen". Basically, you give these certain types of people the message and

let them spread it. (More intelligent advertising, if you ask me). From the power of context,

we learn that we can be different people depending on our environment and certain

environments can help a message spread better.

Credibility

This book is a credible resource because the author is considered an expert in the

genre and it has been reviewed by numerous other authorities in the field. The author,

Malcolm Gladwell, is a well respected journalist for the New Yorker that writes a lot about sociology and psychology. He's also the author of numerous other books about social psychology including "Outliers", "Blink", "David and Goliath", and "What The Dog Saw". The book has been republished and looked over by numerous editors, which adds to the credibility. The author also cites many academic works in his books and makes it possible for his readers to dig deeper into the studies he describes. The endnotes of his book are very extensive, further explaining concepts and providing citations for where he received the information (the majority of those sources being the original research/studies).

How it's useful to my project

As part of my project, I've been doing research on marketing. I started reading this book in my Research Writing class and it made such a giant impact on me and how I approach the field of advertising. It showed me that making small changes could create a huge difference in whether your ideas and products catch on, and it's often the smaller aspects of the message that fuel the epidemic. I learned that, rather than wrapping a net around a big audience and hoping that some fraction of that audience adopts my product, I should really be targeting certain individuals that would do the work for me.

Furthermore, this book highly stresses the value of being resourceful in our endeavors to spread a message and shows many examples of people that used 'band-aid' solutions to their problems. While I sometimes have trouble adopting the ideas of "easy" and "band-aid solutions", I agree that they're often what it takes to make an idea work and I have a new appreciation for such approaches. Finally, this book made such a meaningful impact on me because it disproved the idea that you need a lot of money or power to make a difference; sometimes money and power could even be a crutch. Tying this back into my project, all of these ideas made me feel more confident in the ability for a small business to

make a big difference and the book itself almost feels like an instruction manual for any 'small person' that wants to do so.

Henley, Will. "New breed of ethical startups are taking on the giants of the internet".

> *The Guardian.* Guardian News and Media Limited, 2013 9 July. Web. 3

> November 2016.

Summary

This article features a lot of case studies of ethical startups that target eco friendly and ethically conscious consumers. The article features eco friendly search engines, handbag companies that donate bags to schoolchildren in developing countries, and a health/wellbeing centered social network. The article talks about a lot of the ethical beliefs of the featured startups. Many of those beliefs stem from valuing privacy to wanting to give back to the world. The one thing all of these businesses have to keep in mind is that they have to lure people away from products that they are familiar with in order to give them the more ethical and sustainable alternatives. This in itself is a very difficult feat, therefore, the companies have to use several different strategies to sway the consumers over to their side. That includes partnering with big charities and well known organizations.

Credibility

This article appeared on the website of The Guardian, which is a fairly well known British newspaper. The author, Will Henley, has written quite a number of tech and business related pieces for the Guardian. However, he doesn't exactly have much of an online presence other than that. Therefore, the credibility of this article would be somewhat ambiguous. The source didn't appear biased, however that may be due to the nature of the content.

How It's Useful

This article was an important starting point in my research about ethical business. I looked into all of the websites that were featured and even decided to switch to the eco friendly search engine. From here, I had a lot more questions and a lot more things that I'd like to look into. It also provided some insight into the business models of a lot of ethical startups.

Mc Gowan, Natasha. "What is an ethical business?". *Startups.* Startups.co.uk, 29

September 2015. Web. 18 October 2016.

Summary

From this article, I learned that an ethical business is one that considers the impact its decisions have on other humans, the planet, and animals. Important tenants include outsourcing production in ways that empower workers rather than hurts them. You also have to be conscious of what goes into your products and how those materials may affect the world around you. Basically, ethical businesses have to follow a lot of standards, and this article points out a lot of them.

Credibility

This appears to be a fairly reliable source, as it's an entire website dedicated to Startup news. The website itself provides resources and information for people that want to get into the startup business. However, I couldn't find any information on the author, therefore the credibility of the resource is still questionable.

How It's Useful

This website is useful for my research because it goes into detail about the process of being a real ethical business. It pointed out some factors that I hadn't even realized. I really

appreciate that the authors are trying to simplify the complicated topic for small businesses that still want to make a difference in the world.

Ozawa, Ryan. "Civil Geeks: 2 Experts Explain Why It's OK For Startups To Leave

      Hawaii". *Honolulu Civil Beat*. Peer News, LLC, 9 September 2016. Web. 23

      September 2016.

And the second part of this two-piece series:

Ozawa, Ryan. "Civil Geeks: Money And Exposure Lure Startups Away From Hawaii".

      Honolulu Civil Beat. Peer News, LLC, 22 September 2016. Web. 23 September

      2016.

Summary

These two sources are part of a two part column on startups in Hawaii and why even startups that relocate to the mainland are beneficial to our island community. In the first part of the series, the author interviews two startup experts and CEOs about why it's not a bad thing for startups to move to the mainland. The experts' first argument is that the fact that a startup is moving to the mainland means that the startup is thriving. Moving to the mainland allows that startup to network with many other people in the bigger startup scene and business in the islands that have connections to the startups that move now have an extended startup network. You see, not all startups move to the mainland but those that do can, by default, bring connections from the outside world to the local startup community. Finally, a lot of startups CEOs end up coming back to the islands after they cash out. In the spirit of serial entrepreneurship, they often want to create new business and give back to their local community. They also often want to help the smaller local businesses make it big just like they did.

The second part of the series builds upon some of the ideas presented in the first part. It ultimately argues that, while startups may eventually be 'lured' elsewhere, Hawaii is still a great place for a startup to begin. They compared Hawaii as a sort of creative petri dish where businesses can test their ideas and see if they have a shot at making it outside of Hawaii. From there, the businesses that do well can move or, more appropriately 'expand' to the mainland.

Credibility

This website is a local web newspaper in Hawaii. It's extremely well respected and well known, even outside of Hawaii. The author of the article is a well known co host of a show on Hawaii Public Radio, a former newspaper editor, and the communications director for a local tech firm. Basically, this is a person that has had both experience in the tech startup scene and journalism. Therefore, I would determine this article to be a fairly reliable resource. Bias is always an issue, however it technically is an opinion piece.

How it's useful.

These articles were very useful in my research because they brought my topic even closer to home by adding a local spin to it. These are issues facing Hawaii right now, and it's important for me to think about it in the future. I love Hawaii and I would love to stay here in the future, however I'm not too sure about all of the opportunities here for me. This set of articles, however, has shown me that there are other options and that Hawaii can be a great starting ground for my potential future startup.

Graham, Paul. "What Startups Are Really Like". *Paul Graham*.

Summary

This source basically went into detail about things that startup founders didn't originally think about when they got into business. The types of things the article touches on includes cofounder relationships, the fact that startups are full time jobs that take over your life, the harsh truth that it usually takes a long time to do well, and how important it is to build a community using your product, just to name a few. The author interviewed a lot of startup founders that were funded by his famous startup incubator, the Y Combinator. From the feedback, one could identify a lot of common themes, however the author admits that there is one striking super pattern that he noticed. This pattern is that, although all of these 'revelations' had been things the startup owners had been warned of before, they didn't truly understand them until they were living the real experience. They had subconsciously expected being a startup CEO to be similar to having a job. However, that is completely not the case. Reiterating what I mentioned above, being a startup CEO takes over your entire life. It is your life for however many years it takes to become 'successful'.

Credibility

The author of the article, Paul Graham, is a well respected startup CEO and the cofounder of one of the most famous startup incubators ever, the Y Combinator. He now teaches 'Startup School' through the Y Combinator and has written several books. I would say that his personal blog is a very credible resource for multiple reasons. First of all, while the information in this article may be subjective, it's ultimately just feedback from real startup CEOs that this entrepreneur funded. The author also tends to steer clear of 'persuasiveness' in favor of being more informative. Second, and most importantly, he is an authority on the subject; if there's such thing as a startup expert, it would be Paul Graham.

How it's useful

This has proved to be a very useful resource in my project. There are many things I didn't realize before I read this. The first one was the fact that startups take up so much of a CEO's life. While I was aware of the immense time commitment, I had looked at it as more of a full time job rather than a lifestyle. The fact that a startup is a lifestyle actually fascinates me even more, and it makes me even more interested in creating one someday. There were some other interesting insights that this resource provided me with. I loved the part about building a community around your product; that's such valuable marketing advice that some businesses manage to forget. There are so many services out there that are probably offering the same thing you are; if you don't provide the extra community, culture, or 'feel' to the product, the users won't subscribe to it. The idea that it takes a while for a startup to catch on was also interesting, as startups tend to move so fast that CEOs sometimes expect everything else surrounding them to move fast as well. Overall, this was a fascinating article that provided a lot of food for thought. It has also further guided my research, as it had spawned plenty of questions the first time I read it.