From KickSmart to BabyLoop
A Design Process
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Introduction

Our Design & Innovation team was fortunate enough to work together with the KickSmart co-founders. In this project report, we suggest that KickSmart changes the presentation of its product, a fetal monitor band, from a medical device to a consumer product without changing the basic function (monitoring a baby’s movement) and its target market segment (pregnant mothers and her family). We think this product shift will increase mothers’ enjoyment during her nine months of pregnancy beyond the original concept. We believe our new product, titled “BabyLoop,” creates a unique feedback loop between a pregnant mother and her baby. Moreover, we believe that “BabyLoop” may help produce a deeper relationship between a mother and her baby after birth.

The initial proposal that KickSmart approached us with aimed its focus on market research and identifying potential market segments. However, our user interviews revealed that most healthy mothers do not consider it necessary to monitor fetal movement continuously, which KickSmart originally suggested. Also, most of them felt that continuous monitoring would increase their uneasiness during an already stressful time.

In addition, we talked with clinicians and realized it is difficult and undesirable for them to receive alerts based on the fetal monitor band because they are very busy, and there would be the potential for mothers to worry unnecessarily and repeatedly contact their doctors. Also, it was stated multiple times that clinicians do not place a
high value on fetal movement, as it is only one of the measurements of fetal health.

Through our market research, potential consumers are segmented into two groups, those who prefer professional and highly accurate medical devices and those who prefer low cost consumer products which enable them to communicate with their babies. We did our best to blend the two concepts with this product, to develop a highly-functioning, but cost-effective product, with intelligent design choices.

KickSmart’s fetal movement monitoring technology can make it possible to produce the high-functioning band with relatively low cost. However, in order to truly meet the current market needs, we felt it necessary to not only produce a low cost monitoring band, but also to design a comprehensive phone application, and incorporate more features into the band, such as heart rate tracking and speakers. We believe our suggestion will increase KickSmart’s chances of success in the highly competitive maternity marketplace.
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Initial Concept

When we were approached by the KickSmart team, they had developed a highly sensitive technology, which they hoped to apply in a fetal movement monitor. With the high quality of this sensor, it was strongly considered as a medical device, with the potential to go so far as being a prescription product. However, although the technology had been developed and understood, there was very little knowledge about the potential markets, or the final design features which should be incorporated.

In their initial request, the KickSmart team asked us to assess the various potential markets, in order to identify the most strategic market strategy. Additionally, it was requested that we determine what information should be communicated by the device, and to whom. The identification of the customer, and their specific needs, was an insight that they hoped our team would be able to provide so they could proceed with the development and launch of their product.

After assessing their initial requests, it was decided that the scope of the project would be slightly adjusted. Although we agreed that market research would be advantageous, we decided to focus mostly on the design issue at hand, which was centered around determining the customer’s needs, and using these to complete the design process, and build a strong and compelling case for it based on primary and secondary research.
Primary Research

To quickly gain a solid insight on the feelings of the customers regarding the product, for either the medical or consumer market, we proceeded to interview a broad range of potential customers. Our scope included clinicians, expecting mothers, and mothers with children three years old or less. We also requested the opinions of the mothers’ husbands, to see how the fathers weighed the value of the technology.

When interviewing the clinicians, it was anticipated that they would support the validity of kick counting for fetal monitoring, as well as provide some advice in terms of potential design changes. However, after speaking with them, it became clear that they did not see the value of the device, and would not be supporting this product. First, based on previous preliminary research conducted by the KickSmart team, doctors had stated that they were not interested in receiving the data collected by the technology, and would not want to be approached constantly by worried mothers. Additionally, they stated that although kicks were a good sign of fetal health,

“[They are] only one of the measurements of fetal health.” – Lisa, OB Clinician

When discussing the product with fathers, there was very little excitement about the monitor. Although fathers were concerned about the well-
being of their babies, they did not see significant value in a product that would only monitor kicks. Because of this, the price point desired for this product was very low, generally less than $50. As fathers can have a notable influence on the purchase of maternity products, we felt that their input was very valuable and worth considering.

The mother’s opinions, while coming from a very diverse and international group of women, all conveyed a very similar message. Most stated that a fetal movement monitoring device was not viewed as being particularly useful, as one mother put it:

“[I] personally [am] not very interested in the product at all, due to strong fetal movements throughout [my] pregnancy.”
– Kim, Expecting Mother

In addition to this message, the mothers encouraged us to look at other features, such as additional sensors, due to their experiences with the current products on the market. They all saw value in tracking heart rate, and wanted more than just a kick count—they wanted a product which would foster an experience with their baby, not just provide data. As stated by another mother:

“I am happier [when] receiving messages from [my] baby...” – Kaori, Recent Mother
The personal and honest responses that we received during our interviewing processes were invaluable, and gave us tremendous insight.

**Secondary Research**

In addition to our extensive primary research, secondary research was conducted in order to validate the initial claims stating that kick counting was a medically supported method of fetal monitoring. In addition to a wealth of support and information provided on the website CountTheKicks.org, we gleaned the most information from a report by the Society of Obstetricians and Gynaecologists of Canada, titled “*Fetal Health Surveillance: Antepartum and Intrapartum Consensus Guideline.*” In this report, it validated our claims that kick counting is a medically recommended method of monitoring fetal health, as well as stating that “*maternal perception of fetal movement may be beneficial in all pregnancies.*” From this document, and various other resources regarding fetal health, we felt confident that KickSmart technology did retain medical validity, and could be used as a valuable fetal monitoring device.

**Insight**

One of the most valuable activities that we took part in during this project was the preliminary research. We spent a great deal of time speaking to mothers and clinicians, in hopes of learning the true voice of the customer, in regard to the initial concept of the product. After speaking to 3 clinicians, 15 mothers, and 10 fathers, it was clear that the initial product concept, with the KickSmart technology being
utilized as a medically-targeted device, was not seen as valuable.

Although the concept of counting kicks and tracking fetal movement is well supported as an easy, non-invasive monitoring method, it is not viewed as a priority in the eyes of the mothers and clinicians. Most of the mothers had no issues feeling their babies move, and the clinicians we spoke to perceive the data as being useful, but did not desire a device to monitor it. Overall, it was made clear to us that other metrics, such as heart rate, were viewed as being more valuable as a medical signal, as well as being more highly valued by the mothers themselves.

Lastly, one of the most important insights we had was the identification of a message communicated by most of the mothers interviewed. In a time where mothers are already stressed and worried about the health of their baby, one mother put it well:

“I will become too sensitive from the data.”
– Rie, Recent Mother

With similar thoughts conveyed by multiple mothers, we were struck with the how the unintended consequence of increased stress on the mother’s behalf, due to the data provided by the KickSmart technology, is in direct contrast with the overall mission of KickSmart:

“Healthy pregnancy, reduced anxiety, in a clinically-validated, clever way”
-Jen Boland, KickSmart
After our interviews, it was clear to us that we would need to make serious changes to the concept behind our design. This was necessary both to stay aligned with the company’s mission, but also for the technology to be developed into a successful product.

Although our sponsors believed there to be potential in the medical device market, perhaps moving as far as having the device be prescribed by doctors, we quickly realized that this was not the best way to succeed. One of the major issues with this path to market is the complete lack of medical support. In addition to the great amount of regulatory hurdles that are required to enter the market as a medical device, professional backing is key to achieving market success. As was apparent from our primary research, it would be very difficult to gain the support of the medical community necessary to make this a successful device.

However, it was clear to us that this technology had a too much potential to be cast aside as being yet another irrelevant and unwanted product in a crowded market. With the high degree of sensitivity available with the KickSmart technology, there is great potential to serve as a high-quality sensor device in the maternal market.
Hypothesis

Upon the revelation that our product was not viewed as being valuable, and our decision to make changes to the product design in order to make it a relevant and successful consumer product, we had to strongly reconsider how we were going to proceed with the product, and how it should be marketed to the customers.

When examining the initial concept, it became apparent to us that most of the issues involved the intended medical application of the technology. The lack of clinician backing, and the issue of stressed mothers, would theoretically be less of an issue with a purely consumer product. Because of this hypothesis, we determined to move away from the original decision to be a medical device, and shift into the true consumer market. Additionally, we believed that we could enhance the value and positive nature of the product through the addition of new features and capabilities, such as a heart rate monitor, a music playing function, and a comprehensive phone application.

Figure 1: Hypothesis--Shift from Medical to Consumer
Final Product

Description

BabyLoop comprises of a band, designed to be worn around the stomach of pregnant mothers. It would be made of a stretchable material in order to accommodate various stages of pregnancy. Multiple patterns and colors would be available, since some of the pregnant mothers suggested during our primary research that if the product is fashionable enough, they would be more willing to use it long-term, as a fashionable maternity accessory along with their regular clothes.

The product would be in the form of a slip on/off band, potentially including Velcro to fasten around the waist. There includes multiple sensors, two speakers, and a Bluetooth transmitter and receiver. The sensors would allow us to capture information about the number of kicks made by the fetus, as well as tracking the fetal heart rate. The Bluetooth functionality would allow us to transfer the information to a mobile device to be viewed by the pregnant mother and potentially the fathers and physicians as well. The speakers would allow us to send music into the stomach, while the sensors allow for observation of the response of the child. The kind of response witnessed to a specific song could be tracked, and utilized to determine which songs the baby “likes”, or responds more to. Our main concept is that this functionality allows for a unique feedback loop and bonding experience between the baby and mother.
Purpose

We believed that to stay in line with the core mission of KickSmart, we should develop a product that enhances the pregnancy experience. There are numerous products in the market which monitor fetal signals. However, none of them focus on the experience of the mother, and how their product enhances the experience of pregnancy as a whole.

Although wearable data sensors are seeing an overall rise in the technology market, our belief is that although data can be beneficial, excess data can also be stressful, as it may make mothers more prone to worry about small changes in fetal activity. Most pregnant mothers visit physicians a number of times during their pregnancy, and our discussions with physicians implied that the information gathered during those visits is substantial enough to maintain and monitor the health of the fetus.

However, fetal monitoring products are developed to create a sense of security among pregnant mothers at times when they are away from their physician. We believe that this potential for an increased sense of security could be improved upon by enhancing the overall experience of the product, which is why we decided to include a feedback loop.

This product has the potential to help fill pregnancy with beautiful memories for the mothers by creating a unique and positive experience via mother-baby communication. BabyLoop aims to
connect both the mother and the child through the music used in a feedback loop, while also serving as a high-quality fetal monitoring device.

**Key Features**

There are three main physical features that make up the BabyLoop band. First, there is the original KickSmart technology, utilized to track and monitor not only the fetal movements, but also the heart rate of the baby. Secondly, there are two speakers in the band, which we utilize to play the music for the baby. Lastly, there is a Bluetooth receiver/transmitter device, to communicate the data to the phone application.

However, one of the main features of this product is not a physical one, but a conceptual one. As stated before, the unique feedback capabilities created by these physical features allow for communication and bonding between the mother and fetus, which cannot currently be achieved with the existing technologies. The feedback loop is demonstrated in the image below:

*Figure 2: Mother-Baby Feedback Loop*
We believe that this feature has the potential to extend beyond the nine months of pregnancy by fostering a long-lasting and beautiful relationship.

The final key aspect of our product is the application that goes along with the wearable band. This application serves as a crucial part of the product, as almost all of the mothers we spoke to were currently using pregnancy applications, and requested that our product also incorporate their smart phones. The products currently available for download are often unrefined, require entirely manual inputs, and cover only small topics of information. All mothers that we spoke to who utilized applications during their pregnancy had tried many different ones, and used around three on average on a regular basis. The initial concept for the application can be found in the following figure:
Figure 3: BabyLoop App Design---Initial Concept
Physical Design

Figure 4: BabyLoop Blueprint

We have designed the product such that it looks and feels no different than any other fashionable maternity band. The product is made of a high-quality and comfortable stretch material, and will sit on the lower portion of the stomach. The design was based around the ability to function as either a short-term or long-term wearable device, to meet the needs and desires of mothers, as expressed during our interviews.

Rather than being heavy, cumbersome, or inconvenient, we have strived in our design to be comfortable and adjustable, to fit the lifestyles of many different individuals. We hope to fulfill the concept of a fun, enjoyable sensor, which can be easily incorporated into mothers’ daily lives, while still providing great benefits. By keeping it high-tech, but also fashionable, we believe our design makes the product much more desirable for pregnant mothers to use, as it helps them feel beautiful while at the same time giving them a sense of security by providing quintessential
information about the most important aspect of their lives at that moment.

**Design Process**

Our project was initiated on 20th of January. We decided to meet with our sponsor as soon as possible, and were fortunate enough to discuss the project with Jen Boland by the end of the month. This meeting was extremely beneficial as we were able to discuss what our sponsor had already done, what their goals were, and how we could add value to their entire project.

Initially, our sponsor wanted us to focus on market research and customer identification, which led us to initiate a major primary research initiative with potential customers. We made a list of pregnant mothers, doctors, recent mothers and nurses to reach out and quickly began speaking with them. During the interview process, we realized that there was a tremendous difference between what our sponsor was planning on offering and what exactly the stakeholders and customers were looking for in terms of product features and design.

On 25th of February, we decided to dramatically alter the concept and convert to a solely consumer device, based on our research findings. After this point, various design iterations were discussed, until we determined a design that would meet the discussed needs of the customers.
Business Case

We believe there is immense potential for this product. Our differentiator is the offering of the feedback loop. There is no product currently in the market that allows pregnant mothers to observe the response of the child to the music she plays into the fetus. This feature will likely encourage more pregnant mothers to support this product since it is more than just a monitoring device.

The health and personal care sector within the babies and children industry is bound to reach $40 Billion by 2016. We believe our product would be a very successful in this sector with tremendous market potential. We believe with our first mover advantage for this concept, we can see significant growth and expansion quickly after entering the market. Factors which will affect this include the price point, and the marketing approach.

In terms of cost, if the product is too expensive, it will not be received well in the marketplace, no matter how useful it is. However, pricing the product too low may also give it the perception of being inaccurate, or being disposable. We plan to keep the price of the product around $120 to begin with in order to attract as much of the market as possible. This pricing fits well into the range of prices currently on the market, and therefore should be reasonable in the eyes of the customer, and boost success in the market. An advantage we have by launching the initial product release in the United States, is that the United States of America has the highest annual household disposable income of any country in the world. This allows for
higher price points for high quality products than could be allowed elsewhere.

Another major factor to consider is how we portray the product in the market. Although the initial idea was to market it as a medical device, with strong clinical backing, our redesign will not allow for that. Additionally, we must be careful about the degree of medical responsibility taken on, as there are FDA regulations and liabilities which may arise if we claim that BabyLoop can be used in a medical fashion. Because of these risks, and our lack of medical backing, it is important that this product is marketed as being a fun, highly sensitive device, to be used as a supplement to regular physician visits and general healthy lifestyle activities.

**Market Analysis**

Upon the initial request of the KickSmart team, we investigated the marketplace in order to better understand the market demand and where our product might be successful.

After determining our approximate price point, we felt it important to go beyond the customer feedback we received, and look at what the median income would be for the families we would be targeting in the marketplace. We found a chart which displayed the average amount of disposable income, against the number of children under the age of five, by
country. On the chart, the United States has the largest amount of disposable income, indicating that a high quality maternity product would likely succeed, even with a moderately high price point.

Figure 5: Population Under 5 vs. Disposable Income, by Country

Another market assessment we considered was the size of the market itself. We found a chart which displayed the global sales of products for babies and children. The overall market is massive, worth around $330 billion projected for 2015. Around $40 billion of that consists of toys, health, and personal care products. The market for maternity devices is massive, and is growing steadily on a global scale, so the potential for growth and success is high.
Figure 6: Global Retail Sales of Products Specified for Babies and Children

Note: Estimate/forecast from 2012
Source: Euromonitor International
**Competitive Analysis**

When considering the development of any product, it is crucial to consider the competition and understand how the new product will add value over the other products. Since the BabyLoop band is a comprehensive device, with three main physical features, competitive devices included fetal listening systems and monitors, fetal heart rate monitors, and pregnancy stomach headphones. These products, covering a wide array of products, were analyzed based on functionality, cost, and user ratings, in order to assess how they are performing in the marketplace.

**Fetal Listening Devices**

Two of the main fetal listening devices on the market presently are the Summer Infant Heart-to-Heart system and the Graco Prenatal Listening system.

The *Summer Infant Heart-to-Heart* system, designed to allow you to listen to the heartbeat, kicks, and hiccups of the baby, and sells for around $30. Although affordable, this device has a rating on both Amazon.com and BabiesRUs.com of only 1 star, out of 50 ratings. Reviews of the product repeatedly state that it is ineffective, unreliable, and has a great deal of static and interference. Although affordable, the majority of users do not feel it is worth keeping.
The **Graco Prenatal Listening** system claims to not only amplify the sounds made by the baby, but also allow the heartbeat, kicks, and sounds to be recorded and sent through email. Although this product also sells for around $30 and sounds like a great product, it also has poor reviews on Amazon.com and the Graco Baby website, with users stating that all that can be heard is static, and that they do not recommend the product at all.

As these are the two most prominent competitors in the fetal listening market, it is clear that there is not customer satisfaction with the current products, and that there is a large opportunity in this sphere.

**Fetal Heart Rate Monitors**

In the market of fetal heart rate monitors, outside of a few handheld monitors sold for $10 or less, with very low accuracy. There are two high quality monitors on the market presently, named the MommyDop and the BabyBeat.

The **MommyDop**, a high grade fetal Doppler system, is available in select locations, for around $160. This product advertises itself as a high-quality 3MHz Doppler system, which aims to ease the worries of mothers by assuring them of their baby’s
health when they are away from their physicians. It has fairly high ratings, with users stating that it is highly effective, and that it helps them feel closer with their baby.

The other major fetal Doppler system on the market is the BabyBeat display/recorder fetal Doppler. BabyBeat provides a number of Dopplers on their website for rent or for sale, but this device was chosen as the closest match in competition for the BabyLoop. The manufacturers advertise high-sensitivity sensors for fetal heartbeat tracking and listening, in order to provide “peace of mind” for mothers, at the cost of $600. The ratings, however, are great, with users describing it as lightweight and easy to use, as well as being a good value, despite the high cost.

Both of these products, priced much higher than the BabyLoop band, have outstanding ratings, and truly demonstrate the value of hearing the baby’s heart rate. Mothers are clearly willing to pay high prices for products that work, and help them to check in on their baby’s well-being.

**Pregnancy Stomach Headphones**

Our last competitor segment was the pregnancy stomach headphones, which have seen great success in the maternity marketplace in recent years. The three main products in this sector include BellyBuds, Sound Beginnings, and Nuvo Ritmo. These products are very popular in the
market, in large part because of the studies which indicate that playing music to fetuses may be beneficial for their development. On the BellyBuds website, it states that fetal hearing begins at 20 weeks, with memories beginning to develop at 30 weeks. This opportunity to bond and form memories with the baby before birth is very exciting for mothers, as they provide great value at relatively low costs.

**BellyBuds**, potentially the best known product in this market, is a set of headphones which adhere to a pregnant mother’s stomach, and play music to the fetus. For sale at around $50, this product has outstanding consumer reviews, with mothers really appreciating the ability to play music for their babies, and multiple users commented that they felt that the baby was not only responding to the music in utero, but also seemed to remember the songs after they were born. Ratings for this product average at 4.4 stars, and less than 13% of ratings were below 4 stars. This product is clearly valued by the customers, and is viewed as a serious competitor for our product.
Another main player is the **SoundBeginnings** band, also sold for around $50. This product, although larger than BellyBuds, also has received great reviews. There are some minor complaints, but overall the mothers have expressed great satisfaction with the performance of the product, and truly believe that there are clear benefits and responses to the music played.

Lastly, we also examined the **Nuvo Ritmo** device, which claims to not only aid in fetal development, but also help calm babies and form a bond between mother and child. This product, for sale between $70 and $130, also has great reviews, praising its high quality materials and unique design. This design is very different from those offered, and has received positive feedback as a result. Additionally, Nuvo has begun to develop products for use after birth, trying to use music as a connection between their products.
Summary
After examining these products, it is clear that value is present in all of these technologies. However, there are some market gaps in terms of quality and cost, which we hope to fill with our combination product. All of these competitors are listed in the following figure, which compares them all on price and user rating. BabyLoop is projected to land in a reasonable price range, with high value and high performance, as shown by the orange circle. We hope that by incorporating all of these features, for a reasonable price, we may meet the needs of the market, and truly stand out as a valuable product.
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Figure 7: Competitive Product Comparison Chart
Rebranding

Although the title of “KickSmart” was logical and related to the initial concept of the product, with the concept adjustment and addition of new features, we felt that it would be important for the product, and potentially the company, to be rebranded.

When thinking about the company name, KickSmart, it limits their product line to a singular device, centered on fetal kick monitoring. However, we believe that by broadening the title, to a less specific “MOMSmart.” This title hints at the key mission of the initial KickSmart company—allowing mothers to be more aware and educated about their baby’s well-being, and therefore less stressed or anxious. Because it is no longer specific to kicks, there is potential for the company to expand into other products, potentially for post-birth markets.

The title BabyLoop came about when discussing the concept of the product. When discussing the product, we wanted the title to be clearly indicative of the product and its features. Because the device is focused solely on pregnancy and fetal well-being, the term “baby” was desired for clear identification. When considering the broader concept, and physical representation of the product, terms significant of
motion, feedback, and the physical design, circular themes arose, and so the term “loop” was added to the title.

Lastly, we altered the logo and color scheme to be more representative of the products and the current market trends. Music notes were added to the logo, to represent our incorporation of music functionality, but the simple outline was kept to maintain a clean image. Additionally, the colors of blue and pink, which are traditional colors for baby products, were reconsidered.

Color analysis studies completed by the Color Association of the United States describe pink and blue as standard colors, which may attract women, but which do not represent the future of the marketplace. However, they ranked green as a current trend, with “new, positive associations” and suggested using it with another rising color, orange. A report by Carey Jolliffe Graphic Arts describes bright pink as positive, but occasionally gaudy, while bright blue maintains a generally positive reaction. However, light green, signifying calmness and freshness, in combination with a bright orange, conveying fun, energy, and happiness, truly represents how we want mothers to feel about BabyLoop. Based on these reports, we feel that it is in the best interest to change the color scheme to green and orange along with the rebranding, in order to best convey the emotions desired.
Conclusion

We believe our “BabyLoop” fetal monitoring band will be generally accepted by pregnant mothers and their families. This Design and Innovation project started at the meeting with Jennifer Boland, where she shared with us KickSmart’s simple but strong mission statement "Healthy pregnancy, reduce anxiety, in a clinically-validated, clever way". We thought that KickSmart’s fetal monitor band would easily achieve this mission at the time. However, our interviews from recent mothers, expectant mothers and clinicians led us to an unexpected direction.

KickSmart’s product is designed for the constant measurement of fetal movement because the company believed that the data from the constant measurement would reduce pregnant mother’s anxiety and it would be used for feedback from clinicians. However, most recent mothers and expectant mothers, even clinicians do not see the need for constant movement measurements, either because they did not want the data, or feared that they would become overly sensitive from it.

Because of our findings, we realized that we needed to change the presentation of the product. Our ultimate design concept was prompted by comments from the mothers interviewed. We found that many of them mentioned that they wanted to experience reactions of their babies at the time of pregnancy. We changed the idea from just increasing awareness, and potentially causing negative feelings, to increasing the celebration
aspects, and fostering positive emotions. This led to our ultimate decision to change the product from a medical device to a consumer product.

After completing our initial designs, we looked to the competition, to see how our concept compared. Although there are a great deal of sensors in the marketplace, our market assessment determined that our device is unique, and will stand apart among the others. Our hope is to deliver a high-quality monitoring device, which will serve to nurture positive emotions in the mothers, and meet their desires to connect with their unborn children in a meaningful and convenient way.

We believe “BabyLoop” will be used enthusiastically by pregnant mothers, but we need to be careful of the presentation. Our product is a consumer product but it has a medical component (fetal kick counter and heart rate monitor). So, if we misrepresent the product, consumers who need high accuracy monitoring may use our product unintentionally and may become medical cases. Also, we need to create good relationships with clinicians to recommend our product. The reputation from them is very powerful to the success of our product.
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*KickSmart*

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*Co-founder*  
*KickSmart*