Google Health: Develop, Acquire, or Defer

Strategic Investigation into Machine Learning Products

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Table of Contents

1. Executive Summary

When Google Health launched in 2006, it seemed like Google's track record of success would result in a swift take-over of the entire medical fields IT needs. However, these ambitions quickly crashed against the rocks. Since inception, Google Health has been unable to launch more than a few small technical products and the Fitbit, which has been utilized in many healthcare clinical studies.[i] Penetrating the medical industry has proven incredibly challenging for many of the largest tech firms on the planet, struggling to overcome entrenched competition, complex integrations with massive hospital systems, and sizeable technical challenges and regulatory burdens. Despite these failures, and the failures of other major tech companies, for Google and its competition at Microsoft and Amazon, finding a stable foothold in the multi-trillion healthcare industry is an existential requirement to sustain their relentless growth.

For this exercise, I am imagining a scenario in which the brain trust at Google Health is considering developing a machine learning powered voice transcription service that doctors can utilize in their appointments to reduce paperwork burden. This would be marketed directly to hospital systems to be used in their doctor's appointments. Alternatively, Google Health may also choose to acquire a start-up in the same field or defer on this decision for now and pursue other opportunities. In order to broker a decision, I constructed an AHP model utilizing a Benefits, Cost, Opportunity, and Risk construction underneath four primary strategic criteria. These strategic goals are competitive advantage, new growth, innovation, and corporate reputation

2. Background

a. Industry Background

Physician burnout is a constant strain on the medical system. As 2019 study found that of 29 different medical disciplines, 49% of doctors reported experiencing burn-out in their work.[ii] A large contributor this is the paperwork burden. In a 12 hour workday, it is believed that a doctor may spend upwards of half that updating health records.[iii] Any technical solutions that could help reduce this burden and improve efficiency could provide enormous value to the national medical care system. One major solution that has been tried is the development of machine learning voice transcription. The ideal workflow would be a platform that can include the conversation between a physician and patient, entering the prescription into an electronic health record (EHR) system, and electronically sending the order to the pharmacy. There have been several shots on goal for this problem from the institutional electronic health record platforms such as Cerner or Epic, but results have been tepid. These firms, despite their iron grip on much of the medical system, lack the internal engineering and scientific knowledge to properly innovate in this field and deliver a functional product.

b. Competitive Environment

Google and its Google Cloud Platform has many products and services that are on the bleeding edge of machine learning technology that can be utilized in the development of this product, representing a huge potential advantage. However, there is a race to market with both Microsoft and Amazon for these tools. Microsoft has already launched the partially automated Nuance platform and Amazon is working on launching a transcription platform soon as part of their larger Amazon Health push. True to their monopolist tendencies, there is tremendous value placed on arriving early and aggressively boxing out the competition. There are also several smaller ventures backed firms that have developed proprietary software that is being piloted in hospital systems across the country.

3. The Model

a. Strategic Criteria

The AHP model utilized in this decision problem relies on 4 strategic criteria over top a BOCR model structure. The four strategic criteria we utilized were competitive advantage, new growth, innovation, and corporate reputation. These strategic criteria were pair-wise compared into the super decision model that we constructed, as seen below in Figure 1. Our BOCR is not connected directly to the Strategic Criteria at this level of the model but is further explored in the next section.

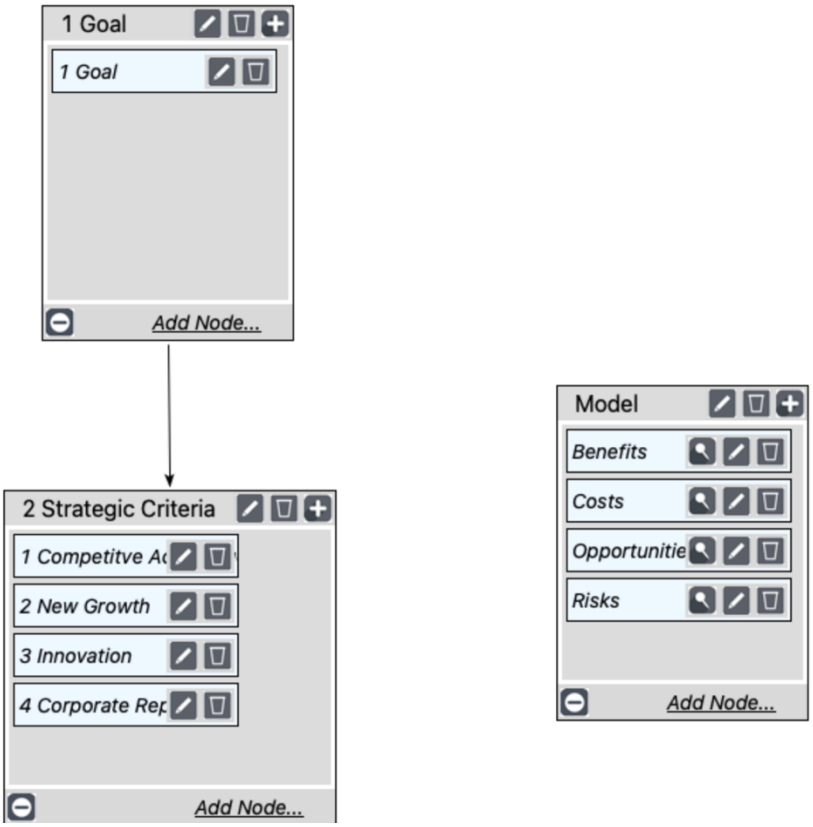


Figure 1 Google Health AHP Model

b. Benefits-Costs-Opportunities-Risks

Benefits

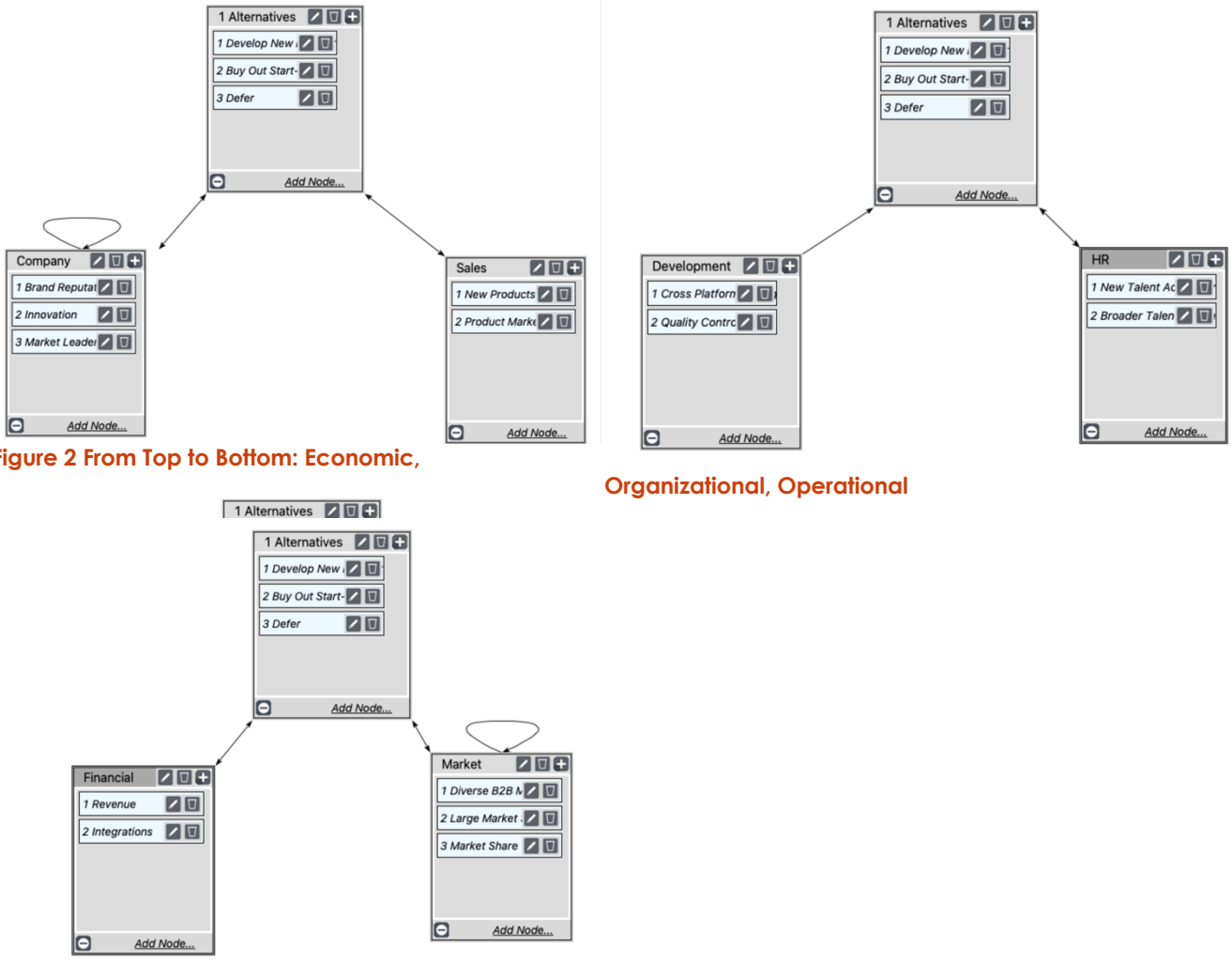


Figure 2 From Top to Bottom: Economic, Organizational, Operational

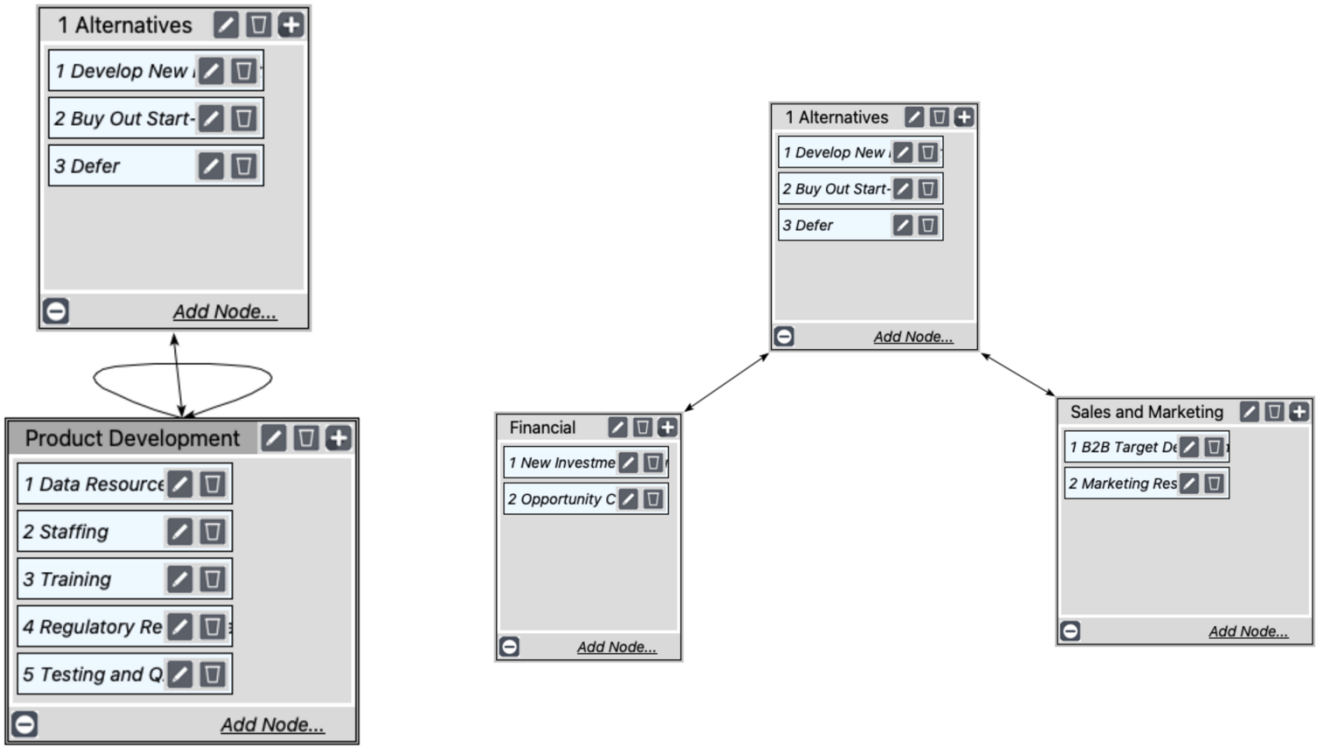
In the benefits network of our model, we have three major control criteria: Economic, Organizational, and Operational. These three major areas of concern for Google Health as it relates to the different benefits for each alternative. In Economic, we have two clusters for financial considerations and strategic impact. For Finance, included were Revenue and Market Share and in Strategy, Diverse B2B Market, Large Market Size, and Vertical Integration.

In Organizational, we are considering Company Goals and Sales. Regarding Company Goals, building brand reputation, innovation, and market advantage were all included. In Sales we have new products, and product marketing.

For Operational, we considered Engineering and HR. For Engineering considerations, cross-platform integrations, quality control, and integrated product development. For HR, the nodes were new talent acquisition and broadening Google's talent pool.

Costs

Figure 3 Costs: Operational (L), Economic (R)

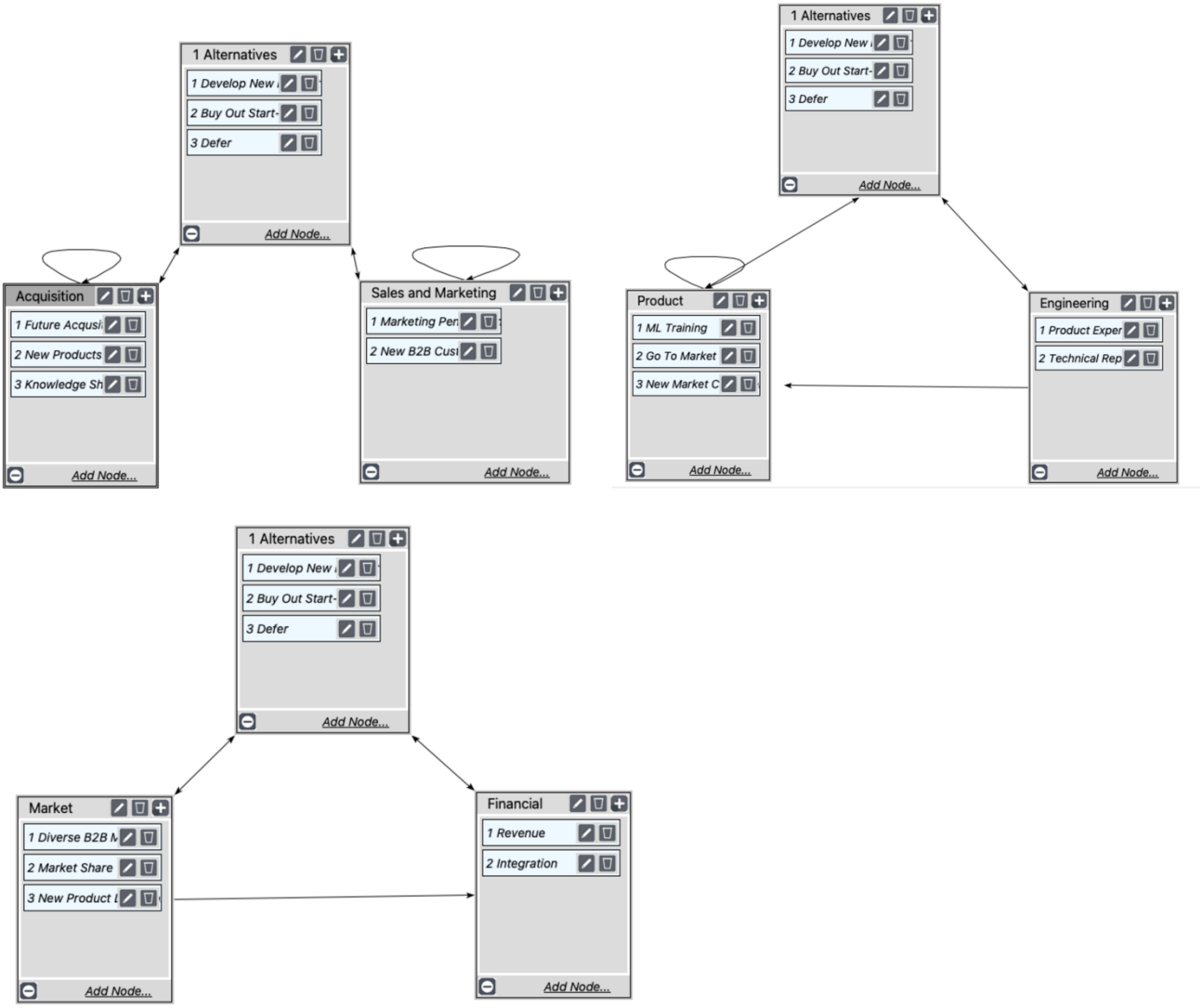


For our Cost model, we had utilized two different control criteria, Operational and Economic. In Operational, we are considering several different OpEx considerations such as data resources, staffing, training, regulatory requirements, and Testing & QA. Under Economic, we considered both Financial

and Sales and Marketing. Under Financial, the cost of new product investment and the subsequent opportunity cost were considered. Under sales and marketing, we factored in the necessary research and resources for sales and marketing.

Opportunities

Figure 4 Opportunities: (Top to Bottom) Economic, Operational, Organizational

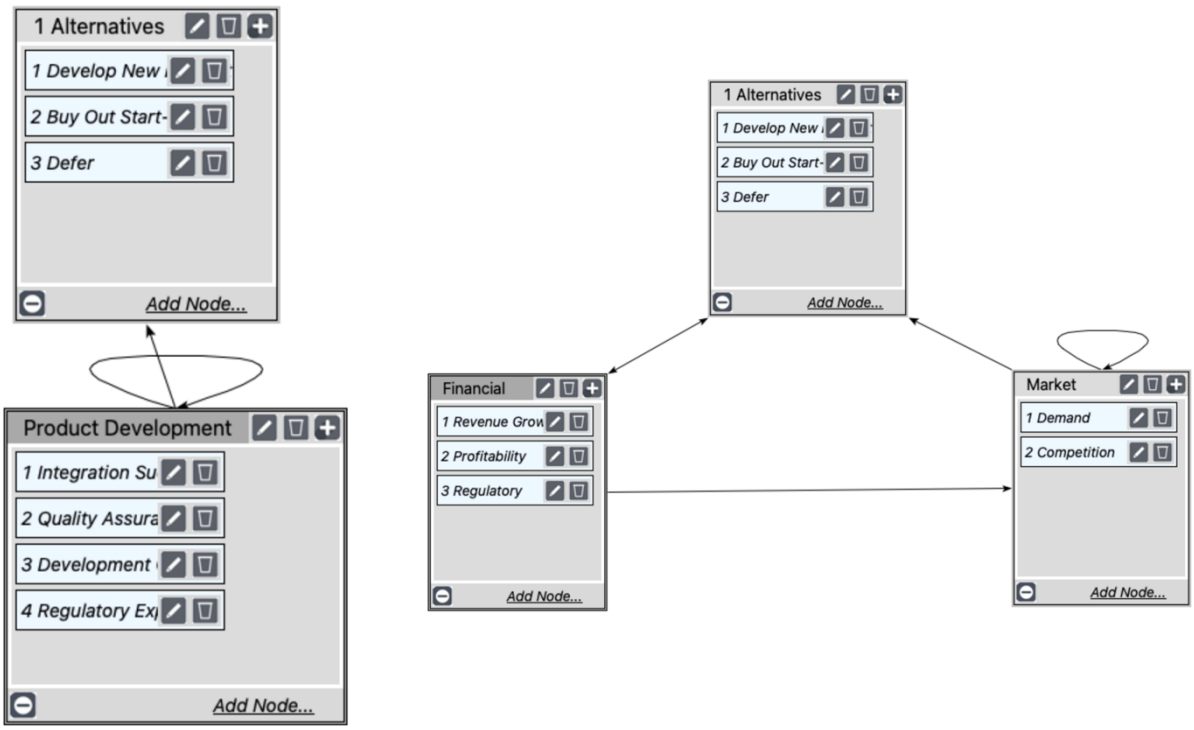


The Opportunities portion of our model contains Economic, Operational, and Organizational control criteria. Underneath Economic, I included two subclusters for Market and Financial considerations. Of

note is the importance of revenue in revenue towards overall market share. In the Organizational subnet, the two clusters are Acquisition and Sales & Marketing. Notably, both have self-enforcing sub-nodes included for new product opportunities driving more future acquisitions and marketing penetration driving the uncovering of additional B2B sales opportunities. Finally, the Organizational subnet has subclusters for both product and engineering. Of note, it is reasonable to assume that the firm's technical reputation will allow increased competencies in new markets through hiring and talent retention.

Risks

Figure 5 Risks: Operational (L), Economic (R)



In our Risks control criteria, we have two subclusters for Product Development and Economic. Product development concerns, ranging from the success of product integration with clients to long term development costs are included as nodes under the Product Development subnet. Under Economic, we

have to clusters for Market concerns, such as demand and competition and under Financial, nodes for revenue growth, profitability, and regulatory concerns.

4. Model Evaluation

Our first step was to complete the pairwise comparisons of the four strategic criteria critical to Google Health. Below, we can see the normalized results for these strategic priorities.

Strategic Criteria	
1 Competitive Advantage	52.01%
2 New Growth	24.52%
3 Innovation	6.13%
4 Corporate Reputation	17.34%

Based on our comparisons, gaining a competitive advantage has most of the prioritization at 52%. New growth is less than half this at 25%, followed by corporate reputation and innovation. These results may sound surprising but given the highly competitive environment these monopolies behave in and the importance of uncovering new growth opportunities in the market place, the low innovation results may be less an issue of de- prioritization innovation and more about the importance of cornering the market and revenue.

For our BOCR model, we can see our prioritization in the table below:

Benefits				
	1 Economic	2 Operational	3 Organizational	
Alternatives	59%	25%	16%	
1 Develop New Product	55%	16%	56%	48%
2 Buy Out Start-Up	30%	75%	34%	40%
3 Defer	14%	10%	10%	13%
Costs				
	1 Economic	2 Operational		
Alternatives	25%	75%		
1 Develop New Product	65%	70%	69%	
2 Buy Out Start-Up	25%	19%	20%	
3 Defer	11%	11%	11%	
Opportunities				
	1 Economic	2 Operational	3 Organizational	
Alternatives	59%	25%	16%	
1 Develop New Product	62%	73%	51%	62%
2 Buy Out Start-Up	28%	13%	38%	27%
3 Defer	10%	14%	11%	11%
Risks				
	1 Economic	2 Operational		
Alternatives	75%	25%		
1 Develop New Product	68%	66%	68%	
2 Buy Out Start-Up	22%	18%	21%	
3 Defer	9%	16%	11%	

Across the board, developing a new product in house dominated the prioritization for each category. This is an interesting result when put into words: developing a new product offers the best benefits and opportunities, but also presents the biggest risk and highest potential costs. Unsurprisingly, deferring this market has the lowest rankings on against all criteria. It is worth noting here that the benefits for buying a start-up are not far behind new product development and have significantly lower potential for costs as well.

These results were then added to our Rating Matrix model that incorporates our strategic criteria and their prioritizations, as well our BOCR matrix and these prioritization results. A variety of ratings criteria were utilized to compare these matrices based on their applicability to each dimension. Benefits were evaluated as being most important to Google Health, as well as Opportunities in this matrix. The potential negative outcomes were de-emphasized, taking into consideration Google's considerable resources to absorb losses and risk.

Alternatives	Priorities	Totals	1 Competitve Adv... (0.3144)	2 New Growth (0.1511)	3 Innovation (0.0512)	4 Corporate Repu... (0.4833)
Benefits	0.3474	0.7846	Attractive	High	Yes	High
Opportunities	0.3474	0.7846	Attractive	High	Yes	High
Costs	0.1526	0.3448	Not Attractive	Low	No	Average
Risks	0.1526	0.3448	Not Attractive	High	No	Average

Finally, the entire model was synthesized in considerations for both short- and long-term outcomes, utilizing additive negative and multiplicative formulas respectively. The final synthesized results are below:

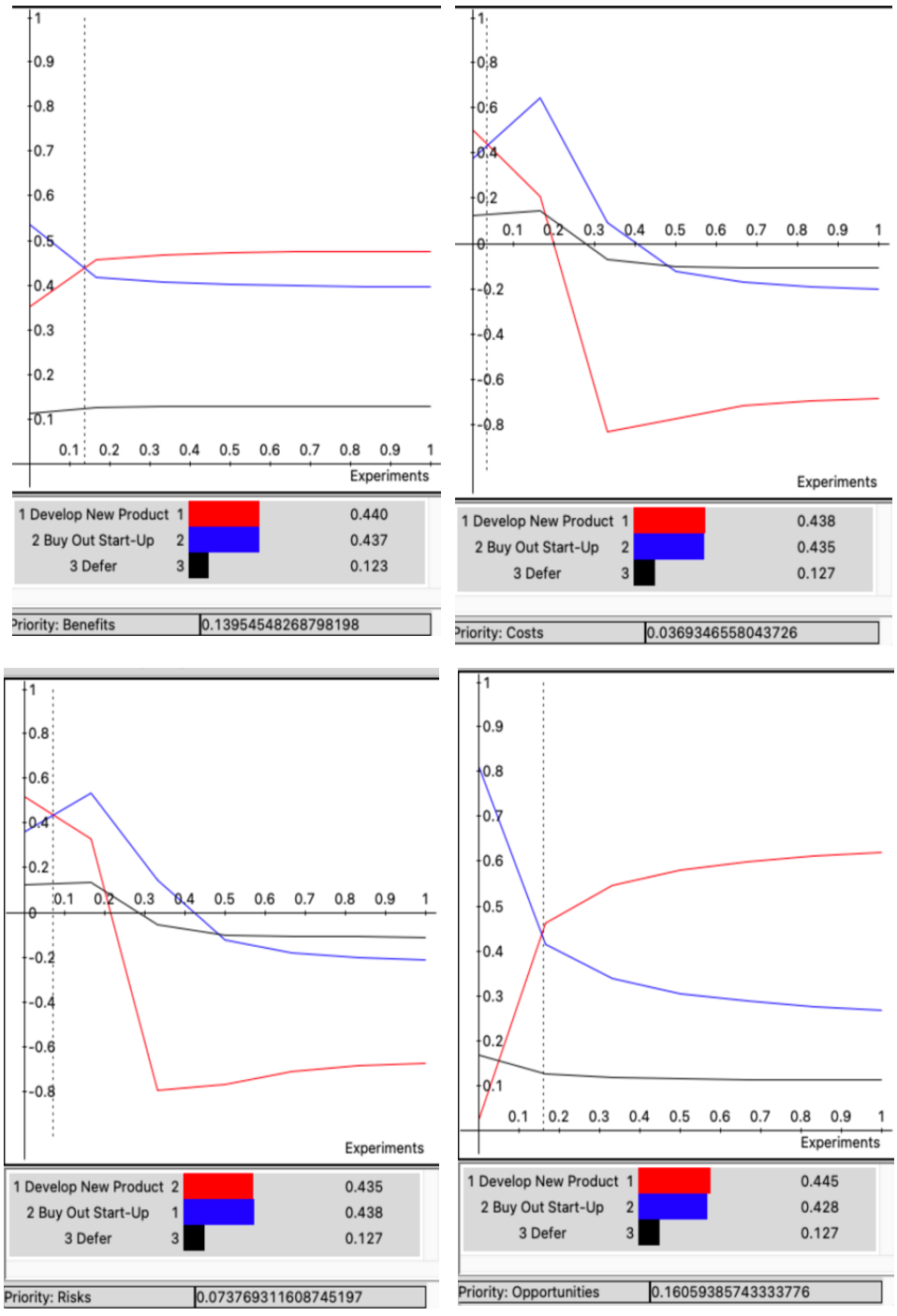
Alternatives		Long Term	Short Term
1 Develop New Product		46.0%	15.02%
2 Buy Out Start-Up		41.5%	57.69%
3 Defer		12.6%	27.29%

The results of our additive negative formula, our long-term perspective, indicates that developing the product in-house would be the best use of resources. Buying out a start-up with the type of product however is only a few percentage points behind. Deferring is not viable option. These results do make sense considering our model, which heavily favors benefits and opportunities, of which developing a product in house is the strongest option. However, given the limited risk and cost presented by acquisition, it also make sense that it would be such a viable option.

Acquisition becomes an even stronger consideration in our short-term model. Under the multiplicative model, we can see an overwhelming preference for this route. Surprisingly, under this calculation developing a product in house is lower preference than simply not engaging in this market all. While it is not entirely surprising that buying out a start-up is preferred, given the speed it lends to Google in trying corner the market and the way it mitigates potential costs and risk, it is unexpected to see deferring and investing resources elsewhere to be preferred to developing a new product. This could be because the way in which the multiplicative model disfavors large capital investment.

As previously mentioned, Google is not short on resources. While time to market is critical and it is competing against equally well-resourced firms, it is my advice that Google focus on developing their own product in house. However, if there is an attractive and compatible start-up available to purchase that can be quickly integrated into Google Health, it could be advantageous to take the short-term perspective.

Our final step is to perform a sensitivity analysis on these long-term results, believing this is the best course of action. This is an important house-keeping measure to reflect the effect changing the prioritization of our control criteria (BOCR), will have on our final synthesized prioritized results.



Benefits: Our sensitivity analysis of benefits indicates an inflection point at 0.139. Provided the benefit priority does not dip below 0.139, developing a product in house will still be a more beneficial course of action than purchasing a start-up. These two factors remain closely tied however even after this point, indicating that the go to market speed offered by acquisition may be affecting results.

Costs: We see that 0.0369 developing a model in house becomes the costliest option. There is very little margin in which in house development is not the most expensive option between the three choices.

Risks: In our ratings model, the risk priority is 0.2, at which developing in house becomes the riskiest selection. A risk priority of 0.21 or less would make deferring the riskiest choice.

Opportunities: In our ratings model, the opportunity priority is 0.16, at which developing in house becomes the most opportune selection. priority of 0.159 or less would make acquisition the better choice.

Figure 6 Synthesis Analysis: Benefits, Costs, Risks, Opportunities

5. Conclusions

Based off our analysis, we recommend that Google Health pursue the development of their own in-house machine learning platform for clinician use. Using the long-run formulation of model, we can see a notable advantage for this strategy as opposed to the direct acquisition of a germane start-up. However, this recommendation is tenuous as indicated by our sensitivity analysis. If cost and risk concerns were to develop at Google Health, it is recommended instead that they pursue an acquisition model instead to guard against these downsides. Both options are highly reliant on Google's own assumed competitive requirement to keep pace with the other major monopolies that are threating to enter this marketplace over the next several years as well. If this were to change or if Google would instead choose to reorganize or spin-off Google Health entirely, this could further shift ideal strategy.

As parting recommendations, it is critical for Google Health to keep a close eye on the development of a similar platform at their major competitors regarding their time-to-market. In addition, it would be valuable to investigate potential options for partnership with existing EHR platforms to potentially develop a "plug-in" option that could expedite deployment and development.

[i] https://www.statnews.com/2021/08/24/google-health-david-feinberg-reorganization/
[ii] https://www.medicalnewstoday.com/articles/physician-burnout-running-on-an-empty-tank
[iii] https://www.beckershospitalreview.com/ehrs/physicians-were-burnt-out-long-before-ehrs-according-to-this-2002-report.html