



Innovation Ecosystems for Health: A Learning Approach to Public Health Implementation

Permanent link

<http://nrs.harvard.edu/urn-3:HUL.InstRepos:37945629>

Terms of Use

This article was downloaded from Harvard University's DASH repository, and is made available under the terms and conditions applicable to Other Posted Material, as set forth at <http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA>

Share Your Story

The Harvard community has made this article openly available.
Please share how this access benefits you. [Submit a story](#).

[Accessibility](#)

INNOVATION ECOSYSTEMS FOR HEALTH:

A “LEARNING APPROACH” TO PUBLIC HEALTH IMPLEMENTATION

CHRISTOPHER J. WHEELAHAN

A DELTA Doctoral Thesis Submitted to the Faculty of

The Harvard T.H. Chan School of Public Health

in Partial Fulfillment of the Requirements

for the Degree of *Doctor of Public Health*

Harvard University

Boston, Massachusetts.

May, 2018

Innovation Ecosystems for Health:

A “Learning Approach” to Public Health Implementation

Abstract

This Thesis describes the DELTA Doctoral project and experience for Harvard DrPH Candidate Chris Wheelahan. The DELTA Doctoral project work focused on a nonprofit, digital health startup founded by the student called *Huntington Health Innovations*. The startup’s stated purpose was to help empower individuals and families make the best decisions regarding health insurance. It was to achieve this through a new class of product: a “digital health insurance navigator” called PlanShepherd. This thesis elucidates the experience of bringing PlanShepherd through the new venture “idea stage”, including the values, baseline frameworks, and initial value hypothesis for the business; the experience of a “social startup” incubator program; the evolution of the project’s value hypothesis and business plan; and the successes and failures of the project.

The thesis is premised on three key themes: the Innovation Ecosystems framework, “Learning Approaches” to project management, and the project’s “Framework for Change”. The Analytical Platform of this document describes these themes in detail and elucidates background research relevant to the development of a digital health insurance navigator in the context of the U.S. Health System. The Results Statement of the thesis applies the Innovation Ecosystems framework to the context of

Southeast Louisiana’s health innovation ecosystem, and narrates the experience of the student launching *Huntington Health Innovations* and developing the PlanShepherd product.

The DELTA Doctoral project described herein achieved both generalizable results, applicable to organizations, innovators, and systems-leaders; as well as specific learning goals relevant to the DELTA Doctoral student. Significantly, this project represents the first productive, real-world application of the Innovation Ecosystems framework as both an analytical tool and implementation framework for innovation. Secondly, it demonstrates how “learning approaches” represent a viable – and in many cases superior – alternative to traditional methodologies of project management. Finally, the project represents the growth of the student as a skilled and competent practitioner in the field of digital health, a public health leader, and a student of innovation across sectors and contexts.

Table of Contents

ABSTRACT	II
LIST OF FIGURES WITH CAPTIONS	V
LIST OF TABLES WITH CAPTIONS	VI
ACKNOWLEDGEMENTS	VII
INTRODUCTION	1
ANALYTICAL PLATFORM	5
ANALYTICAL FRAMEWORK - INNOVATION ECOSYSTEMS	6
LEARNING APPROACHES TO PROJECT MANAGEMENT	12
FRAMEWORK FOR CHANGE	16
GENERAL LITERATURE REVIEW	18
PROCEDURAL LITERATURE REVIEW	25
ANALYTICAL SYNTHESIS	33
RESULTS STATEMENT	38
GOALS FOR THE DELTA PROJECT	38
SOUTHEAST LOUISIANA’S HEALTH INNOVATION ECOSYSTEM	40
INITIAL BUSINESS PLAN	51
VALIDATING THE VALUE HYPOTHESIS	57
IMPLEMENTATION	66
FUTURE LEARNING ITERATIONS	74
RESULTS SYNTHESIS	78
APPENDICES	85
APPENDIX A – PROCEDURAL LITERATURE REVIEW METHODOLOGY	85
APPENDIX B – JSTOR JOURNAL DISCIPLINES INCLUDED IN PROCEDURAL LITERATURE REVIEW	87
APPENDIX C – INITIAL PLAN SHEPHERD PROJECT BUDGET	88
APPENDIX D – ADDITIONAL DELIVERABLES FOR THE DELTA PROJECT	89
APPENDIX E – PLAN SHEPHERD TECHNOLOGY STACK AND SOFTWARE PACKAGE	90
BIBLIOGRAPHY	91
INDEX	91

List of Figures with Captions

Figure No.	Title	Page No.
Figure 1	Example of Apollonian Gasket with Labeled Tangent Circles	7
Figure 2	Generalized “Learning Approach” Cycle	12
Figure 3	Initial DELTA Project “Framework for Change”	16
Figure 4	Parish Map of Louisiana with Area of Geographic Scope Shaded in Red.	40
Figure 5	Web API Architecture	69
Figure 6	PlanShepherd Navigation User Story Workflow	71

List of Tables with Captions

Table No.	Title	Page No.
Table 1	Sources of Health Insurance Coverage in the United States, 2015	19

Acknowledgements

In reflection at the conclusion of this DELTA journey, it has become apparent to me that the project described herein would not have been remotely as successful, or even possible, without the help and guidance of many individuals along the way. Firstly, tremendous thanks to all of my colleagues at *Propeller*, including Stefan Dienstag, Sara Houston, Jessica Allen, Alessandra LeDoux, and all of the inspired entrepreneurs from the Fall 2017 Startup Cohort. I would like to especially thank Rick Rizzo for his always astute and compassionate counsel throughout the incubator experience.

I wish I could individually thank the litany of teachers and professors whose instruction and patience directly influenced this work and my journey as a student and professional. I have been blessed with a remarkable history of teachers and professors, but Diego Gonzalez and Jeria Quesenberry deserve special recognition in this group.

I would also like to express my sincerest gratitude to my thesis committee: Mary Finlay, Rick Siegrist, and David Bates, whose patience, enthusiasm, and encouragement were crucial to this project's success. I could not have imagined a better group of mentors for this project.

Of course, the richest part of the Harvard DrPH experience is the cohort experience. Nowhere else could one find such an intelligent, industrious, humble, compassionate, and kind group of twenty-six insecure overachievers to share this experience with. Thanks to each and every one of you.

Finally, thanks to all of my friends and family for your love and support. You know who you are. Thanks especially to Dad, whose unwavering patience and love made this experience possible for me.

Innovation Ecosystems for Health:

A “Learning Approach” to Public Health Implementation

Introduction

This DELTA Thesis describes the analytical basis, theoretical intent, and results of Harvard DrPH Candidate Chris Wheelahan’s DELTA doctoral immersion experience. The purpose of a DELTA project is to provide a conduit for doctoral-level learning and engagement with leadership practices and translational knowledge in order to enable meaningful change in public health. Contrary to a purely academic dissertation, the DELTA project and this DELTA thesis provide a theoretical and analytical framework for change and, rather than using these frameworks to empirically analyze the current state of public health, employ the frameworks to contribute to public health scholarship through practice and action. The DELTA project, as described in this thesis, achieves that goal through entrepreneurship, systems thinking and analysis, and methodological rigor.

This DELTA Thesis describes the founding and idea-stage development of a “social startup” called Huntington Health Innovations (HHI). HHI’s mission was to create digital products that empower consumers to make the right decisions for themselves and their families related to their health and, in particular, their health insurance. Specifically, HHI hoped to achieve this goal through development and implementation of a “digital health insurance navigator” called ***PlanShepherd***, which would walk users through the process of purchasing exchange-eligible health insurance plans in the individual insurance market. The DELTA project would consist of developing a business plan and value hypothesis for PlanShepherd, validating that value

hypothesis within the context of a regional health ecosystem, and developing a first version of the product. Specifically, the DELTA project had three explicit goals: first, to develop PlanShepherd into a testable “version 1.0” or “beta-“ product; second, to validate PlanShepherd’s initial value hypothesis; and third, to evaluate the implementation context (or “health innovation ecosystem”) – for PlanShepherd.

This document is divided into two main sections: the analytical platform and the results statement. The analytical platform section is intended to define and clarify the theoretical basis of this DELTA project, including analytical frameworks, background research, and application of the analytical frameworks to the context of the PlanShepherd project. The results statement describes how the analytical platform applied (or did not apply) to the practical development and implementation of PlanShepherd, including describing the baseline assumptions of the project, a project narrative, and conclusions and results of the project’s implementation. The first three sections of the analytical platform represent key themes intended to constitute the theoretical basis of this document and, more importantly, provide continuity and guidance to the practical aspects of the entire DELTA project. The remaining sections of this thesis are independent chapters that describe the work of the DELTA project itself and how that work relates to one or more of the key themes.

The first key theme of this thesis describes the analytical framework for both the DELTA thesis and DELTA project. The “Innovation Ecosystems” framework was researched and designed specifically for the purposes of this thesis, but also to have broad applicability outside academia and public health. The framework, in its essence, provides analysts, executives, public leaders, and innovators with an analytical basis to evaluate the enabling conditions for innovation within their time, space, jurisdiction,

and/or organization. It posits that an innovation ecosystem *is based on an entity's culture, characterized by the entity's innovative practices, and affected by features external to the entity itself*. The framework also explicitly states what these practices and features are so that stakeholders can enable more (or less!) innovation within entity.

The second theme of this thesis is the learning approach to project management. While this document establishes the phrase “learning approach” to describe iterative methodologies of project and product management, it does not represent entirely original thought on the subject. Rather, it intended to synthesize numerous other works from a variety of disciplines that describe a process methodology characterized by developing and testing hypotheses within the context of management then adapting subsequent work to the results of those tests. The chapter demonstrates that adoption of a learning approach becomes increasingly important as ambiguity increases, and in instances of complex social, economic, and political change – such as digital and public health projects – a learning approach is comprehensively more appropriate than a traditional approach to project management.

The final key theme of this document and the DELTA project is the framework for change. The framework for change for this project was initially proposed during the Oral Qualifying Examination, before the project had begun. Its grounding metaphor is a building. This building consists of a foundation of clear hypotheses, baseline resources, a strong set of advisors, and an explicit business plan; and structural pillars representing “real-world” implementation, the learning approach, and engagement with the digital health community of practice; all of which support an ultimate vision (a roof) of demonstrating the viability of the learning approach in public health and providing new insights into the area of digital insurance consumer support tools. This aspect of the

DELTA project is the key theme that changed most profoundly during the course of the immersion experience, as described throughout the course of this thesis. Additionally, while the framework for change effectively framed and constrained the activities of the project itself, it has little external relevance outside the context of this particular DELTA project. Because it was designed specifically for the PlanShepherd project in the context of the DELTA experience, the individual elements of the framework for change – while often relevant and good practice in many contexts – in combination are too constrained to the opportunities and limitations of the PlanShepherd DELTA project to be generalizable.

The remainder of the analytical platform provides background research relevant to the implementation of a digital health insurance navigator. The general literature review describes relevant studies and findings related to health insurance in the United States, existing modalities of consumer support for health insurance, and the impact that health insurance coverage has on overall health. The procedural literature review describes a systematic approach to comprehensively reviewing literature related to health insurance preferences and behaviors from two databases of medical/health scholarship: PubMed and JSTOR.

The results statement of this thesis describes the practical application and implementation of the analytical platform to the DELTA project. Moreover, it represents a synthesis of how lessons and skills related to multidisciplinary management, leadership, communications, and innovation thinking learned in the DrPH program were (or were not) applied during the course of the DELTA experience. The section begins with the initial business plan for the PlanShepherd project. This business plan represents a list of assumptions and hypotheses held at the outset of the DELTA project.

The second section is the validation of these hypotheses and describes how the first “learning iteration” of the PlanShepherd project proceeded, including the student’s experience with the *Propeller* social startup incubator program and a narrative of the learning iteration. The section continues with details on the technical implementation of the PlanShepherd application, considerations for future iterations, and concludes with a synthesis of the project implementation and its relation to the three key themes described above.

This DELTA project is the culmination of a comprehensive learning experience across the three years of the Harvard DrPH program. While it took a non-traditional approach to the DELTA format, it nonetheless provided results equal to or surpassing the requirements and standards of a DELTA experience in terms of lessons learned, skills developed, and potential for large-scale, meaningful change in public health. This document describes that journey. It proposes a new framework for evaluating innovation, evangelizes important concepts in project and product management, and evaluates an experience of entrepreneurship and leadership uncommon to academic public health scholarship. While not all aspects of the project were successful, and indeed many were failures by design (consistent with hypothesis testing in the learning approach), it nonetheless became a rich and innovative learning experience representative of the goals of the DELTA project and the Harvard DrPH program.

Analytical Platform

Analytical Framework - Innovation Ecosystems

The following “Innovation Ecosystems” framework was developed for the purposes of this thesis. The framework is an analytical framework based on the principle that certain enabling conditions can be cultivated to make an organization more (or less) innovative - innovation is not the product of random chance or luck. The framework is designed to help a particular organization, institution, or geopolitical jurisdiction – referred to in this section as an “entity” – characterize their enabling conditions for innovation in an effort to more deliberately and effectively advance their values and make progress towards their goals. The framework is also created partially in frustration with overuse of the concept of innovation as a buzzword, rather than as a deliberate tool to achieve institutional goals.

An innovation ecosystem is defined generally as the culture, practices, and external structures affecting the process of innovation within a given time, space, and entity. ***An innovation ecosystem is foundationally based on an entity’s culture (i.e., their goals and values) with regard to innovation, characterized by the entity’s innovative practices, and impacted by external features affecting the process of innovation within the entity.***

Every organization has an innovation ecosystem, although some are more explicitly defined than others. The innovation ecosystem determines how free members of the institution are to experiment, evaluate, learn, disrupt, and fail. Every innovation ecosystem also exists ***both concomitantly with*** other innovation ecosystems ***and within*** larger (metropolitan, regional, national, global) innovation ecosystems. As such,

this framework can be applied at nearly any resolution of analysis, from small project teams to regional or global innovation ecosystems.

A visual metaphor for the Innovation Ecosystems framework familiar to theoretical mathematicians is the Apollonian Gasket. In the second century B.C.E., Apollonius of Perga posited that, by drawing three circles tangent to one another (C_1 , C_2 , and C_3); one could draw two additional circles (C_4 and C_5) tangent to all three of these. Because C_1 , C_2 , and C_5 are tangent to one another, two circles

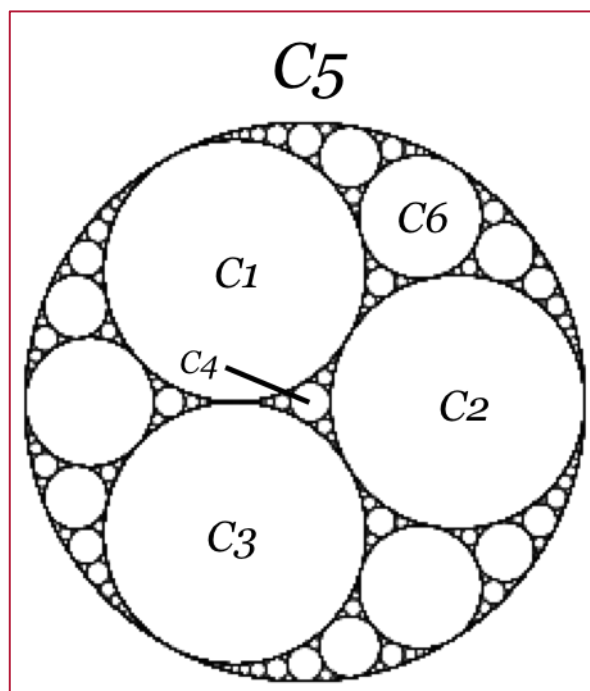


Figure 1: Example of Apollonian Gasket with Labeled Tangent Circles

can be drawn tangent to these three (C_3 , which already existed, and C_6). Repeating this process for each new circle drawn, ad infinitum, one creates a recursive fractal pattern that is identical at any level of inspection (Mackenzie, 2010). If one imagines analyzing the innovation ecosystem of a large health provider (C_1), there will be innovation ecosystems (of other health providers, biotechnology companies, research universities, etc.) of varying sizes and levels of influence impacting, or lying tangent to, it (C_2 , C_3 , C_4 , etc.). It also exists within and is influenced by the larger innovation ecosystem of the city, state, and/or national government (C_5).

When discussing innovation ecosystems, it will become important for this DELTA Thesis to use a consistent definition of “innovation”. Many definitions for the concept of innovation have been proposed, all with their own strengths and drawbacks.

Significantly, authors diverge in their discussion of innovation by referring to it alternatively as either a process or a result. Michael Raynor represents the latter, and defines an innovation as “...anything that breaks a constraint or changes trade-offs.” (Chokshi, 2015). This provides a suitably constrained but generalizable definition of an innovation, but fails to consider the process by which the innovation was created.¹ Conversely, Mark Z. Taylor in *The Politics of Innovation* defines innovation as “...the discovery, introduction, and/or development of new technology, or the adaptation of an established technology to a new use or to a new physical or social environment” (Taylor, 2016). While this definition is sensitive to the process of innovation, it overly restricts innovation to the field of science and technology, leaving out process, structural, civic, social, and other important forms and arenas of innovation.

The Innovation Ecosystems framework is conceived for the purpose of evaluating how a particular organization or larger system functions with regard to innovation. Accordingly, attention must be paid to not only the inputs and outputs of a system, but also the structures in place within the system itself. Said another way, definitions that refer to innovation as an output or result (i.e., “an innovation”) necessarily treat the process whereby the “innovation” was created as an un-knowable black box; or worse, as irrelevant. The Innovation Ecosystems framework is specifically designed to characterize and evaluate that black box and thus *must* define innovation as a process. Borrowing and adapting Raynor’s definition of innovation: ***innovation is the process by which trade-offs are changed and/or constraints are broken.***

¹ In fairness to Mr. Raynor, his writings refer to the process of creating innovations as “disruption”, so his work and the Innovation Ecosystems framework are not anathema to one another.

In evaluating an innovation ecosystem, one must be intentional in characterizing the **culture** of innovation within an ecosystem; that is, the ecosystem's explicit and implicit values and goals as they relate to innovation. In many (if not most) cases, an entity will not have been explicit in stating their values and goals for innovation. Nonetheless, it remains important to infer what these cultural aspects may be, as evaluating and recommending change in an innovation ecosystem becomes irrelevant if the results are insensitive to the culture of the entity. It is with this in mind that the Innovation Ecosystems framework is built on a foundation of culture, with methodological evaluation of practices and features occurring only with the foundational aspect of culture in mind.

In the Innovation Ecosystems framework, the ability to innovate is directly affected by the **practices** in place within a given innovation ecosystem. Practices can be explicitly related to innovation (e.g., “new procedures must be approved by management”) or affect innovation in more subtle ways (e.g., “employees must bill so-many hours to a project;” leaving less time for free experimentation). In this framework, there are nine practices that directly impact the internal innovation ecosystem. They are:

1. *Funding for research and innovation*: the amount of funding directed towards experimentation and innovative activities.
2. *Talent*: the amount of staffing in an organization, the skills and character of that staff allowing them innovate effectively, and whether managers effectively direct such activity.

3. *Convening bodies*: the presence of organizational structures (such as institutes, hubs, conferences, etc.) to help encourage, direct, and manage innovation.
4. *Collaborators*: the effectiveness with which an organization builds and uses outside partnerships to promote and manage innovation.
5. *Procurement*: organization's ability to effectively evaluate whether new procurements should be purchased, co-developed with a partner, or built from within.
6. *Credit and recognition*: how members of an organization receive credit for the innovative work they produce and whether such credit is consistent with the organizations values.
7. *(Un-)Reliability of incentives*: whether the aforementioned credit and recognition is consistent over time and across the organization.
8. *Symbolic gestures*: actions taken by the organization that demonstrate their values with regard to innovation.
9. *Demand-side incentives*: whether the target stakeholders of innovation have sufficient incentive to actually use or leverage innovative work.

An internal innovation ecosystem is also directly and indirectly impacted by larger, distal factors in the ecosystem. These factors are referred to as **features**. These factors can be determined at many levels, but one can think of them as regional, national, or global factors that affect innovation within the ecosystem. It is important to note that five features and their relation to innovation are each extraordinarily complex and could be the topic of an entire thesis on their own. These features are:

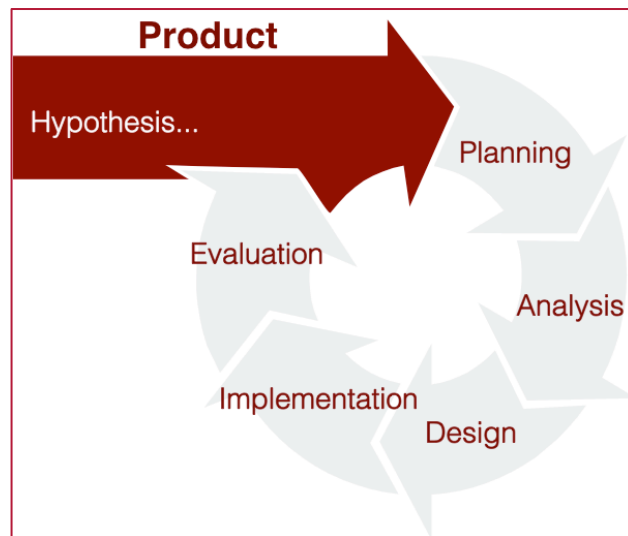
1. *Markets*: the economic incentives that encourage or discourage individuals and organizations to engage in innovation.
2. *Networks*: the professional, social, and political arrangements that can be leveraged to promote an organization or region's values with regard to innovation.
3. *Spatio-temporal factors*: whether innovation is consistent with the resources and constraints present in a particular time and space.
4. *Politics*: how power dynamics and political activity are able to facilitate or hinder innovation.
5. *Social factors*: whether the process of innovation is consistent with the values, needs, and culture of a society.

Considering and evaluating the practices and features present in an innovation ecosystem in the context of the culture of the ecosystem allows a systematic approach to enabling change within an entity. In the estimation of this author, executives and leaders too often look to innovation as the solution to organizational ineffectiveness without consideration of how to undertake such innovation or of what impact the enabling of that innovation may have for the entity in question. Application of this framework allows these executives to evaluate the enabling characteristics for innovation within and around their entity and adopt new, considered practices and policies to enable more (or less!) innovation.

Learning Approaches to Project Management

In numerous fields related to business, economics, and administration, there exists a concept of project or product management based on iterative hypothesis testing and adaptive response based on the results of those tests. This DELTA project proposes the term “learning approach” to encompass these concepts.

A learning approach to project management has been proposed in many different fields for many kinds of work, although the body of literature cannot be traced back to a single author or paper. Rather, the various learning approaches seem to have evolved separately based on the needs of particular industries or organizations. In the first stage of any learning approach framework, a



**Figure 2: Generalized
“Learning Approach” Cycle**

hypothesis is defined. Broadly, hypotheses can be categorized into “value hypotheses,” which relate to defining the value a particular product or service brings to a user base; and “growth hypotheses,” which relate to expanding the market share or user base of the product or service. Second, a series of steps related to preparation of the hypothesis test is conducted including planning, analysis, and design of the test. Finally, the test is implemented and evaluated. Generally, the intent is that these tests are completed in a short timeframe, and repeated as often as necessary. Importantly, these frameworks occur iteratively, with the results of one hypothesis test feeding into a new hypothesis to be tested. A generalized methodology is depicted in figure 2.

The earliest example of a methodologically rigorous learning approach is Bayes' Theorem (Bayes, 1763). In Bayesian statistics, one has a prior estimate (an *assumption*), conducts a study (based on a *hypothesis*), and updates the prior estimate based on the new information. This process can be repeated ad nauseum. More contemporary examples of learning approaches include "Agile" ("Agile Manifesto," n.d.) or "SCRUM Development" for software (Schwarber, n.d.), PDIA for international development (Andrews, Pritchett, & Woolcock, 2017), "Lean" for business management (Eisenmann, Ries, & Dillard, 2013), and "PDSA cycles" for quality improvement (Deming, 2000). While each of these varies in methodology and vocabulary based on context and goals, all are representative of the generalized learning approach cycle depicted above.

Learning approaches represent methodologies for product or project management that, in many instances, are theoretically more efficient as they eschew many of the erroneous process constraints often associated with traditional management methodologies. Most significantly, by promoting an adaptive project scope and timeline, they avoid the perverse incentives associated with adhering to a project plan based on assumptions that are no longer valid. Additional, potential advantages to a learning approach over a traditional project management approach are multitudinous, and are outlined below (Lotz, 2013):

- Prevents optimism bias
- Prevents confirmation bias
- Encourages early stakeholder engagement
- Early delivery of products
- Avoids the "planning fallacy"
- Avoids the "sunk cost fallacy"
- Supports greater transparency
- Welcomes late-stage changes

- Continuous delivery
- Encourages face-to-face work
- Continual attention to product excellence
- Effective user of talent
- Limited time spent on planning

Learning approaches, however, are not always ideally suited to a particular project or context. Organizations tend to be averse to learning approaches because of the ambiguity they introduce to project timelines and budgets. Because assumptions are tested empirically during the course of the project, outcomes and “project pivots” (in the parlance of Agile development, (“Agile Manifesto,” n.d.)) cannot be predicted ahead of time. The disadvantages of a learning approach as compared to a traditional approach follow (Lotz, 2013):

- Deliverables and documentation often suffers
- Requires content experts
- Planning is less concrete and communicable
- Can disintegrate in long-term development cycles
- Difficult to assess time/cost, a priori
- Projects can easily get “off track”
- “Failure” and mistakes are common
- Final product can be very different from the initial concept

When deciding between a traditional or learning approach, managers should be most sensitive to the amount of uncertainty inherent in the assumptions of the project’s development, value hypothesis, and growth hypothesis. Said another way, The main

criterion for deciding between a traditional or learning approach to project management should be whether the project's purpose includes sufficient uncertainty to justify the tradeoffs related to a learning approach (Eaves, 2016). Projects whose scope, target market, inputs, and outputs are well defined and understood, such as a bridge-building project, would likely benefit from a traditional approach. In this context, managers would be able to effectively plan and communicate project expectations, timelines and budgets to clients or other stakeholders in the project organization. In cases where outcomes cannot be reasonably predicted, or the project is dependent on key, insufficiently validated assumptions, traditional project management may prove unsuited to adapt to changing circumstances and a learning approach would be justified.

Finally with regard to learning approaches, it is worth noting that value and growth hypotheses are very rarely clear in the early stages of public health and digital projects. In the context of this DELTA project, where the primary conduit for translating doctoral learning and leadership into impact is a digital health application, a traditional approach to project management is especially unsuitable. Uncertainty in the political landscape of health policy, the health innovation ecosystem, and the sheer velocity of change in digital practice all constitute risks to current assumptions and project plans. Therefore, a learning approach, where plans and assumptions could be adapted in the context of uncertainty, became a key aspect of the project's framework for change, as described below.

Framework for Change

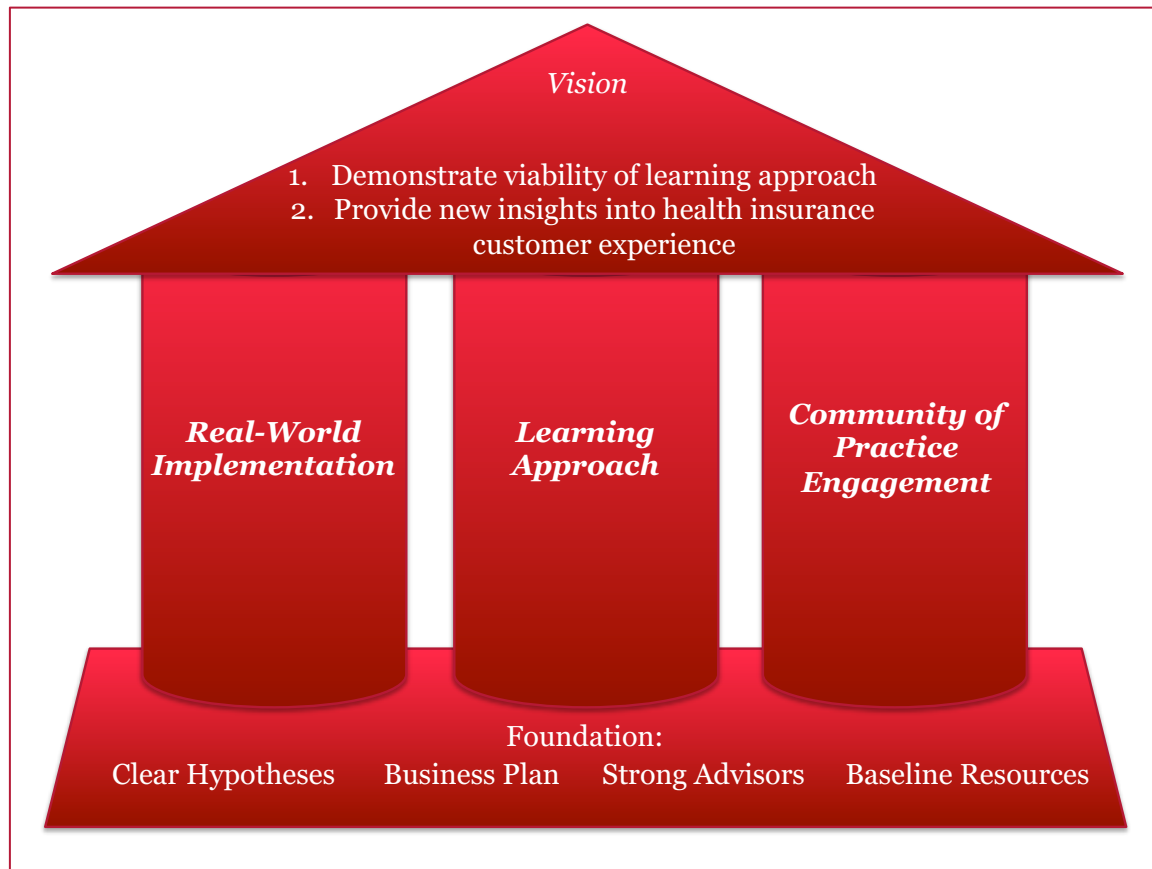


Figure 3: Initial DELTA Project “Framework for Change”

At the outset, the vision for this DELTA project was two-fold. First, it was to demonstrate that in conditions of uncertainty or ambiguity – which are rife when solving complex and adaptive social problems – alternative project/product management approaches can be as effective or *more* effective than traditional, step-wise methodologies. Second, the project intended to provide new insights into the health insurance consumer experience through in-depth user research, implementation, and evaluation of a digital solution to purchasing health insurance.

Three paths were proposed to achieve this vision. First, the DELTA proposal posited that implementation of a real product in the real world is the only way to

definitively demonstrate progress towards the vision described above. The implementation of PlanShepherd was at the center of the work for this DELTA project, and its implementation is discussed in the results statement of this thesis.

Second, it was proposed that adopting a learning approach to product management would demonstrate a viable alternative to traditional project management methodologies in public health. This DELTA project rigorously adhered to learning approach principles except when to do so would have compromised Huntington Health Innovations or the DELTA educational experience. One instance where the learning approach was abandoned was in creating an explicit, one-year project plan. While this activity is not endorsed by a learning approach, it is often a necessary step to building stakeholder support in the endeavor of a project – in this case, the Propeller incubator team. Overall however, the project was rigorous in its learning approach and the few activities inconsistent with iterative implementation were not detrimental to the project.

Third and finally, the proposal included openness, transparency, and engagement as crucial elements in providing new insights into the health insurance consumer experience. As such, the project also proposed a publication component. While the insights of the project may or may not have been appropriate for formal publication in academic journals, other opportunities for digital engagement with the community of practice related to digital insurance products were proposed. Blogging, video-blogging, and/or other means of digital engagement were to be utilized throughout the DELTA project.

The entire framework for change was to be enabled by a foundation consisting of a clear set of key hypotheses, a robust business plan, a strong team of core advisors, and a baseline amount of financial and other resources.

While this framework for change effectively contextualized the goals of the DELTA project during the proposal and constrained its activities throughout the experience, it also underwent a number of changes during the duration of the project. Most significantly, the DELTA project's vision was extended to include consideration and application of the Innovation Ecosystems framework to the PlanShepherd project. Further, the "community of practice engagement" pillar matured to include direct engagement with stakeholders in Southeast Louisiana's health innovation ecosystem, rather than indirect engagement via social media and digital publications. These changes represented more productive and focused efforts for the DELTA project based on changing circumstances and adaptation of the project plan consistent with a learning approach.

General Literature Review

Health Insurance in the United States

The United States has a fragmented system of health coverage unique to the developed world. While most high-income countries treat health coverage and care as a fundamental human right, the United States has not committed to that vision. As such, piecemeal programs that cover individual segments of the population have been established but remain disjointed and uncoordinated, leading to higher costs, confusion, and ultimately lower rates of insurance and utilization of necessary care.

In 2010, the Affordable Care Act (ACA) established a bold vision for near-universal health insurance coverage, health care quality improvement and lower healthcare costs in the United States. That vision has been met with mixed results. Studies from 2015 estimate the number of uninsured at up to 32.2 million (Families

USA, 2017). A March 2016 Congressional Budget Office report indicates that in 2016 approximately 27 million Americans remained uninsured and 15.3 million were *underinsured* (meaning they had coverage, but could still not meet cost-sharing obligations) (Congressional Budget Office, 2016). In the US, health coverage is dominated by employer-sponsored (also called “small-group”) coverage, although government programs such as Medicare and Medicaid cover large segments of the population as well. Below is the breakdown of how individuals received their health insurance in 2015 according to the Kaiser Family Foundation (The Henry J Kaiser Family Foundation, 2016a).

	Employer-Sponsored	Non-Group	Medicaid	Medicare	Other Public Insurance	Uninsured	Total
Number	155,965,800	21,816,500	62,384,500	43,308,400	6,422,300	28,965,900	318,868,500
Percent	49%	7%	20%	14%	2%	9%	100%

Table 1: Sources of Health Insurance Coverage in the United States, 2015

Several of these populations represent customer segments for PlanShepherd:

- **The “Non-Group” population** represents those individuals and families who choose to purchase insurance on the individual market. The current policy landscape encourages this population to visit healthcare.gov or another insurance marketplace and chooses an individual/family plan each year. This population could benefit greatly from using PlanShepherd to find their health plan, and in particular from PlanShepherd’s recommendation engine based on the user’s health preferences and behaviors.
- **The “Medicaid” population** is generally satisfied with the quality and cost of care they receive (Barnett & Sommers, 2017). There is, however, a segment of the

Medicaid population known as the “churn” population – those who are seasonal workers or are otherwise intermittently employed and thus “churn” between individual, employer-sponsored, and Medicaid coverage (Roberts & Pollack, 2016). PlanShepherd would benefit this group when transitioning from Medicaid to private insurance.

- **The “Uninsured” population** would obviously be a target segment for PlanShepherd. If the product can identify cheaper plans than the users had previously realized existed, or provide an accessible, approachable experience, more of the uninsured population may be able to enroll in coverage.

While the number of uninsured has gone down significantly under the Affordable Care Act, there is still a large segment of the population that remains uninsured. This population is disproportionately comprised of people of color and lower socioeconomic status. In the KFF Health Tracking Poll conducted December 1-7, 2015, 11% of respondents stated that the reason they were uninsured was that they “tried to get insurance but were unable”. A further 20% stated that they didn’t know about the individual mandate or didn’t believe the individual mandate applied to him or her, and 14% cited “some other reason” (The Henry J Kaiser Family Foundation, 2016b).

Applying the rate of uninsured people who stated that they “tried to get insurance but were unable” to the total number of uninsured Americans, one can estimate that more than 3.1 million Americans were not able to receive coverage simply because they couldn’t navigate the system. While this does not perfectly map with the intended user segment for PlanShepherd – many individuals who currently have health insurance could benefit from using PlanShepherd, for example – it does demonstrate the scale of

the empowerment gap present between the health insurance plans offered in the individual market and the general public's ability to find the appropriate one.

Health Insurance Enrollment Specialists

As insurance status has become a uniquely complex and important aspect of medical care in the United States, many organizations employ insurance enrollment specialists. These specialists are trained to assist health consumers to make the right decisions with regard to health insurance for themselves and their families, and represent part of the community of practice referred to by the third pillar of this DELTA project's framework for change. These enrollment specialists may have slightly different roles depending on the sponsoring agency or organization, but all are tasked with educating consumers about their choices in the marketplace and helping them choose and enroll in health insurance plans.

Patient care coordinators are generally found in large, integrated healthcare provider settings. As providers are increasingly reimbursed based on quality and population health metrics rather than traditional fee-for-service models, a business case for ensuring high-quality care on a patient-by-patient basis becomes evident. This business case only becomes stronger when a provider has a large portion of a region's healthcare market share, or provides a complete range of health services, including health insurance, for their patients (Moore, Peterson, Coffman, & Jabbarpour, 2016) Patient care coordinators are tasked with tracking individual patients – generally high-cost or high-risk patients likely to be re-admitted to the hospital with some regularity – and helping those patients make appointments, fill prescriptions, arrange transportation and other common challenges that interfere with quality care. One of these tasks often involves arranging for and enrolling these patients in health insurance.

Financial and Insurance Enrollment Assistors are also provider-based employees. These specialists perform some of the same functions as patient care coordinators; however, they are generally responsible only for coordinating the payment of services rendered. By having patients enrolled in health insurance, hospitals are able to reduce out-of-pocket accounts receivable and increase net patient service revenues from insurance companies and public insurance, which are more reliable sources of revenue than individual payment of medical bills (Gooch, 2017)

Health Insurance Navigators were initially conceived and funded as part of the ACA in an effort to increase sign-ups under the new law. They are funded through federal grants to the states in order to conduct public education about plans, facilitate enrollment in qualified plans, and provide fair, impartial information about the plans that are available (CMS, 2016). While funding for current grants runs through September 1, 2018, the Trump administration announced in late August 2017 that funding would be slashed from \$62.5 million to \$36.8 million (Alonso-Zaldivar, Ricardo, 2017).

Certified application counselors serve many of the same functions as the health insurance navigators but are not official grantees of the navigator program. These individuals generally work within community-based organizations such as community health centers, social-service organizations, and community-engaged religious entities. Notably, many patient care coordinators and financial and enrollment assistors are certified application counselors (CMS, 2016).

Finally, **Insurance agents and brokers** are individuals privately funded by insurance agencies and other for-profit entities for many of the same purposes above. While brokers are unaffiliated professionals that simply receive commissions for new

members enrolled in any available health plan, agents are “captive” to a particular health insurance carrier and only enroll new members for plans by that company. Regardless, these individuals still serve a critical role in outreach, education, and enrollment. Agents and brokers serve a particularly critical role in enrolling small business employees through the Small Business Health Options Program (SHOP) (CMS, 2016).

The Impact of Insurance Coverage on Health ²

Despite vigorous debate since President Obama’s election in 2008, there remains little political consensus on what effects – if any – health coverage status has on financial protection, health, and mortality. Politics, however, is not evidence-based. Immediately before and since the passage of the ACA, numerous high-quality studies on the effects of health insurance have been published in reputable journals.

The most conclusive evidence of the effects of health insurance comes from the Oregon Health Insurance Experiment (Finkelstein et al., 2012). The value of this study comes from its randomized design – a nearly impossible study design for a health insurance experiment made possible by what, in essence, amounted to a health insurance lottery in the State of Oregon. This landmark study showed a virtual elimination of bankrupting out-of-pocket expenses and a statistically significant decrease in the number of bills sent to collection for those individuals selected into Oregon’s Medicaid program. Further, the Oregon study shows significant increases in the access and utilization healthcare – especially primary care. Of course, this is a two-sided coin: more access and utilization ultimately means greater expense in the medical

² This section is largely based on and extended from a paper in the New England Journal of Medicine by Sommers, Gawande, and Baicker (2017).

system (Squires & Anderson, 2015). Further, questions must be raised regarding the virtue of increased healthcare access if it does not actually improve health.

Ever since the emergence of primary care as a distinct aspect of the health delivery system, literature has explored whether primary care can prevent illness and death. In short, it does. Systematic reviews of literature establish two key findings: epidemiologic evidence shows that health is better in regions with more primary care physicians (Atun, 2004), and people who receive regular primary care are generally healthier than those who do not (Engström, Foldevi, & Borgquist, 2001).

Finally and most significantly (in statistical terms), subjects selected into insurance in the Oregon experiment were 25% more likely to self-report positive health status: a critical measure of overall health status. Other studies support similar findings in the context of the ACA and of other public insurance expansions in the United States. Studies of the 2006 Massachusetts health care reform and numerous ACA-related quasi-experiments show outcomes in financial protection, utilization, and well being similar to those found in Oregon.

Crucially, however, the Oregon experiment was unable to show an empirical relationship between insurance status and most medical outcomes (Baicker et al., 2013). Direct links between health insurance status and improvement of disease status or certain biomarkers have been historically difficult to establish. While a few rigorous studies have shown causal links, for the most part, these studies – including the Oregon experiment – prove insufficiently powered (either due to sample size or duration) to directly show that health insurance leads to better medical outcomes (Keating, Kouri, He, West, & Winer, 2013; Robbins et al., 2015; Torres et al., 2017). One important exception exists in outcomes between insurance status and depression – the third-

leading cause of disability in the United States (Institute for Health Metrics and Evaluation, n.d.; Murray, 2000).

Critics of public spending on health insurance coverage grasp onto the tenuous link between coverage and health as justification for their skepticism. While a direct link between insurance status and health outcomes has not been conclusively established, the Oregon experiment and other literature establish a link between coverage and access/utilization, and systematic reviews of literature establish a link between access and better health status. Further, strong epidemiologic evidence shows that areas and populations with higher insurance coverage rates have better health outcomes (*Care Without Coverage*, 2002; Sommers, Baicker, & Epstein, 2012; Wilper et al., 2009). In short then, while a direct link between coverage and health status has proved difficult to establish due to ethical, methodological, and political impediments, evidence nonetheless overwhelmingly demonstrates important links between health insurance coverage and health status, access, utilization, mortality, financial security, and overall well being.

Procedural Literature Review

The analysis phase of this DELTA project also included a methodical review of peer-reviewed literature. While not a comprehensive “systematic review”, the process described in Appendix A, is intended to mimic many characteristics of one while not detracting from the practical nature of the DELTA project. ***The essential question of this research was to elucidate individual behaviors and preferences with regard to health insurance, as they would relate to creating a digital health insurance navigator.*** Such insights would help inform the design and

development of the DELTA product and allow for more comprehensive and knowledgeable discussion of the product over the course of the DELTA project.

Relevant Literature - Behavior

Fifty-four articles proved useful in describing how individuals may make decisions related to health insurance, elucidating either the behaviors or preferences individuals might have regarding health insurance. The plurality of these 54 articles concentrated on the question of who is more or less likely to purchase health insurance. A number of authors take a simple demographic approach to this question, although some do so in unique contexts. Pfarr and Schmid in their 2016 analysis come to the that the poor are more likely to be willing pay for insurance than those who would be “net payers” into the system (2016). Abihiro et al. and Ozawa et al. provide detailed assessments of insurance preference literature tabulated by various demographic characteristics in Malawi and more generally in low-middle income countries, respectively (Abihiro, Torbica, Kwalamasa, & De Allegri, 2016; Ozawa, Grewal, & Bridges, 2016). Finally with respect to demographics, Fan and Davlasheridze, in their 2011 analysis, provide strong evidence that age, ethnicity, race, educational attainment and prior exposure to risk help to explain risk perception and thus insurance habits and “willingness to pay” for flood insurance – a conclusion with likely crossover into the health insurance question (Fan & Davlasheridze, 2016).

While demographic trends may be helpful in describing where efforts to increase health insurance advocacy may be best directed from a socio-geographical perspective, other trends provide equal or greater insight into individual behaviors in the health insurance market. Individual risk-taking/risk-averse tendencies proved significant in four analyses and show that additional outreach, education, and/or policy steps should

be taken to increase insurance rates among populations that exhibit risky behaviors (e.g., HIV-positive populations) (Akter, Krupnik, Rossi, & Khanam, 2016; Barseghyan, Molinari, O'Donoghue, & Teitelbaum, 2013; Barseghyan, Prince, & Teitelbaum, 2011; Cutler, Finkelstein, & McGarry, 2008). Other behavioral trends include differentiation of behaviors based on employer benefits (Monheit & Vistnes, 1999, 2008) and adverse/propitious selection of health plans based on perceived risk (Fang, Keane, & Silverman, 2008; Handel, 2013).

A number of articles provided insight not only into whether an individual is likely to enroll, but also into how and what kinds of health insurance they are likely to purchase. Factors proving significant in explaining these behaviors included knowledge about the health system and an individual's patience. Trend analyses by Szrek and Bundorf (analyzing age patterns) and Iwasaki et al. (analyzing older Japanese-Americans) demonstrate that cultural and educational differences can, in part, explain enrollment and the kinds of plans one might purchase (Iwasaki, Pierson, Madison, & McCurry, 2016; Szrek & Bundorf, 2011). Politi et al. undertook a critical analysis of the best ways to present information to consumers. They conducted a randomized trial, presenting information on available plans to participants in one of three possible modalities: a plain language table, an interactive visual format, or in narrative form. Those with low levels of health literacy showed no preference for how the information was presented, and those with higher levels showed a preference for the table over the visual format, and the visual format over the narrative (Politi et al., 2016).

One final and intriguing finding related to health insurance behaviors came from Sonnenholzner and Wambach. Their 2009 analysis approached the question of individual levels of patience when purchasing health insurance. When controlling for

many of the factors discussed above, they find that individuals exhibiting high levels of patience exert more effort in the insurance purchasing process and buy an insurance contract with high levels of coverage while impatient consumers use low effort and buy insurance plans with low coverage or do not purchase at all. While this finding is important from an economic perspective, as it explains why some studies find anti-adverse selection (propitious selection) in some markets and shows that effort should be controlled for in future analyses, it is also important in describing the behavior of potential consumers. Any solution must be flexible enough to satisfy the needs of high-effort consumers while also providing a streamlined workflow for impatient users.

Relevant Literature – Preferences

When discussing the key preferences that individuals and groups have when choosing health insurance plans, the key tradeoffs to be made are between cost and covered services. Of the 16 articles found relating to preferences, three relate only to choosing services based on a fixed price, and three relate only to cost sharing preferences while keeping a benefits package constant. The majority remaining articles discuss tradeoff between cost and benefits. Seven of the articles are focused on preferences among consumers in the United States, and nine discuss preferences in the context of other national health systems similar to the “Bismarckian” health system seen in the United States – notably Germany and Switzerland.

Analyses of preferences related specifically to plan features (benefits) show that, controlling for cost, individuals are consistently most concerned with additional benefits (on top of services that are required to be covered – “essential benefits” in the context of the Affordable Care Act), access to care or proximity to the nearest place of care, increased choice, and perceived quality. Pendzialek, Simic and Stock find that, while

overall price is the most important consideration, additional benefits and proximity to place of care are most important for German consumers (Pendzialek, Simic, & Stock, 2017). Becker and Zweifel provide further evidence that these preferences are consistent across similar countries, conducting a discrete choice experiment among Swiss study participants and adding perceived quality as a strong determinant of preference, and Rice et al. validate the findings of both studies in the US context, studying Medicare Advantage and Part D beneficiaries (Becker & Zweifel, 2008; Rice, Jacobson, Cubanski, & Neuman, 2014). It is important to note that while quality is an important determinant in insurance preferences, both studies that include quality as a variable discuss *perceived* quality; not quality as measured by plan quality metrics such as those published by the US Centers for Medicare & Medicaid Services (Centers for Medicare & Medicaid Services, 2017). While perceived quality and actual quality are generally consistent, this generalization may not be true in all contexts.

When controlling for cost, studies show heterogeneity with regard to cost-sharing preferences; that is, preferences between total cost, premiums, deductibles, and copayments/co-insurance. A 1994 analysis by Barringer and Mitchell published in the *Industrial and Labor Relations Review* elucidates these preferences fairly comprehensively. Using data from four plants of the same company in 1989, they analyze the differences in enrollment among four possible plans: a high-premium, prepaid plan (HMO), and three traditional, fee-for-service plans with varying distributions cost-sharing between premiums, deductibles, and co-insurance. They find that a 10% increase in FFS premiums results in a 4-9% decrease in enrollment, almost entirely in favor of the high premium, pre-paid plans. Similarly, doubling the FFS plan deductible resulted in a 3-4% decrease in market share in favor of the pre-paid plan. In

the opposite case, the addition of a miniscule deductible to the pre-paid plan resulted in an outsized decrease in market share of 3-4%. These results suggest that, among industrial workers in the Midwest and Western US – a population representative of the same population that would be eligible for coverage under an ACA marketplace plan – uncertainty in medical expenses may drive insurance preferences more than the total cost of a plan. Workers, when presented with greater uncertainty in yearly medical expenses in the form of coinsurance and deductibles, would switch to plans with higher premiums even in instances where their total yearly costs would increase (Barringer & Mitchell, 1994). Studies by Siskou et al.; Ryan and Vaithianathan, Rice et al.; the previously mentioned literature by Becker and Zweifel; and Kerssens and Groenewegen all support a similar “cost-uncertainty” hypothesis in different contexts (Becker & Zweifel, 2008; Kerssens & Groenewegen, 2005; Rice et al., 2014; Ryan & Vaithianathan, 2003; Siskou, Kaitelidou, Economou, Kostagiolas, & Liaropoulos, 2009).

Two additional relevant insurance preference findings come from writings related to benefit flexibility and firm-loyalty or inertia. Kate Bundorff discusses in her working paper that greater availability of choice in healthcare plans results in overall lower premiums for employer-sponsored coverage and an increase in enrollment rates. Most of the reduction in premiums resulted from a shift from family- to individual-coverage by the employee (where, presumably, the rest of the family purchased insurance separately, although she does not research this specifically), and from less generous benefits. While less generous benefits are, in general, detrimental to the insured population, in the context of group coverage with multiple coverage options among a single group, less generous benefits can represent a more efficient use of resources as members are more able to choose less expensive plans that cover more of

the benefits need and less of those they don't (Bundorff, M. Kate, 2003). Biglaiser and Ma also address the subject of flexibility through the question of optimality related to joint vs. separate provision of services. They show that with large purchase economies of scope – that is, a large base of consumers with diverse needs – the quality of the good provided increases with separate provision of goods. In the context of health insurance, their findings support that a diverse population with diverse health needs would benefit from multiple firms providing separate products for different health needs (preventive care, emergency care, dental, mental health, etc.) (Biglaiser, Gary & Ma, Ching-to Albert, 2003). Finally, Kerssens and Groenewegen; Ben-Arab, Mounira, and Schlesinger; and Marquis and Holmer discuss the notion of firm-loyalty or product inertia. Unsurprisingly, they show that consumers are most price sensitive when comparing plans that are most similar to the plan they have already. That is, they are willing to pay slightly more to keep the coverage they already have rather than switch to a similar, slightly less expensive plan.

Brief Commentary on the Relevant Literature

The preceding literature review shows that there is a multitude of relevant literature from many different fields of study that is relevant for consideration in the context of building a digital health insurance navigator. At a high-level, individuals' behavior when purchasing health insurance (or not) can be, to some extent, predicted not only by demographics, but also by more complex psychosocial factors such as risk-averseness, employment status, and the well-known phenomenon of adverse selection. Relating this research to the implementation of a digital health insurance navigator, the following factors prove important to consider:

1. consciousness of demographic trends in the targeted user markets, including and especially employment status, education levels, poverty rates, and exposure to previous risks (e.g., natural disasters);
2. providing flexibility to address the needs of both patient and impatient consumers;
3. providing recommendations that are sensitive to an individual's attitudes towards risk, and;
4. providing different experiences for users that have differing facilities with regard to health insurance and healthcare.

In relation to insurance preferences, the preponderance of literature analyzes the relationship between cost and benefit packages, while additional analyses provide insight related to product-inertia and flexible benefit packages. Analysis of these preference trends can be used to more effectively provide efficient and effective health insurance plans to those who are willing and able to purchase, thereby not only increasing insurance enrollment but also increasing enrollment into the appropriate plans. Specifically, this DELTA project should consider:

1. providing information on benefits, care network, and quality for each recommended plan;
2. attempting to determine user preferences for trade-offs between total cost, premiums, deductibles, and copayments/co-insurance, and;
3. giving information on costs of specific medications and procedures for each plan.

With these considerations in mind, it was hypothesized that PlanShepherd was to be well suited to provide a sufficiently differentiated product experience based on academic research and the realistic needs and desires of users.

Analytical Synthesis

This analytical platform has provided a theoretical basis for the DELTA project and this DELTA thesis, shown that there is an economic and social imperative to expanding health insurance coverage through innovation and collaboration, and provided empirical evidence that a user-centered digital health insurance navigator product could be viable in the context of the U.S. health system.

The Innovation Ecosystems framework defines innovation as the process by which constraints are broken and trade-offs are changed. A comprehensive literature review is not necessary to demonstrate the multiplicity of ways that the US Healthcare system could benefit from innovation. Through the nine practices and five features outlined in the framework, actors affect the ways in which innovation can be promoted (or not) both within their internal innovation ecosystems and across organizational, regional, or global innovation ecosystems. The subsequent results statement in this DELTA thesis focuses specifically on impacting the regional health innovation ecosystem in Southeast Louisiana and how those lessons can be extended to other regional innovation ecosystems.

The implicit assumption in the undertaking of this DELTA project is that increasing rates of health insurance coverage is a social and/or economic benefit. For reasons previously discussed in this work, establishing a link between health insurance coverage and better health outcomes is difficult to establish. What critics of health

expansion efforts fail to acknowledge is the strongly demonstrated, positive empirical relationships between coverage and healthcare access, and access and health outcomes. Epidemiological evidence also supports these results by demonstrating better health outcomes in areas with high rates of coverage. Additional results show the positive effects of health insurance coverage on mortality, financial security, and qualitative evaluations of overall well-being. Based on these conclusions, the baseline assumption of this DELTA project is well justified.

The other implicit assumption in undertaking the development of a digital health insurance navigator is that there is sufficient value in such a product for a sufficient number of individuals. A digital health insurance navigator could benefit those Americans who are currently enrolled in non-group (individual) coverage and anyone who remains uninsured or underinsured – estimated populations of 29 million and 15 million, respectively. Clearly there is a large enough population of potential users for a health insurance navigator. The value hypothesis of a digital health insurance navigator will be discussed in detail in the subsequent results statement of this DELTA thesis, but in essence it was hypothesized that a user-centered approach to design, key usability features based on insights from academic research, and a nonprofit business model would be adequate to establish a sufficiently differentiated and sustainable product.

Reviewing the relevant literature provides a number of crucial insights that will impact development and planning of a digital health insurance navigator. Analysis of insurance behavior literature shows a number of important demographic trends in insurance uptake, but more importantly also demonstrates the importance of individual traits such as risk-averseness, patience, and health system literacy. Key conclusions from these analyses are that a digital health insurance navigator product should:

1. be conscious of demographic trends in the targeted user markets, including and especially employment status, education levels, poverty rates, and exposure to previous risks (e.g., natural disasters);
2. be flexible in addressing the needs of both patient and impatient consumers by providing customizable experiences with varying levels of comprehensiveness;
3. provide recommendations that are sensitive to an individual's attitudes towards risk, and;
4. provide different experiences for users that have differing facilities with regard to health insurance and healthcare.

Additionally, preference literature provides some insight into what consumers actually desire in a health insurance plan. The most important tradeoff in plans is between total cost and comprehensiveness of the benefit package. When teasing these two aspects apart, however, some trends become clear. Firstly, keeping costs constant, consumers prefer plans that provide benefits on top of the minimum essential benefits, that offer convenient options for place of care, and that are perceived to be of high quality. Keeping benefit packages constant and analyzing cost-sharing options, consumers are actually willing to pay more in total cost for a plan that provides certainty in what the total costs will be – in other words, users prefer premiums to deductibles and copayments/co-insurance. Other literature establishes consumer preferences for plans with greater flexibility in care provider, medications, and procedures, and for plans they are familiar with (product inertia). Key conclusions from these analyses are that a digital health insurance navigator product should:

1. provide information on benefits, care network, and quality for each recommended plan;
2. attempt to determine user preferences for trade-offs between total cost, premiums, deductibles, and copayments/co-insurance, and;
3. give information on costs of specific medications and procedures for each plan.

Any effort to innovate will inevitably have impacts on individuals and institutions across the innovation ecosystem. Implementation of a digital health insurance navigator would most directly affect the actual users of the product, but also would impact and be impacted by insurance enrollment specialists. While resistance from these actors to such a product is, no doubt, to be expected, this product has the potential to be a net positive both across the health system and for the very actors who may initially oppose it. No digital health insurance navigator could be comprehensive enough to replace enrollment assisters – a profession whose expertise is already stretched too thin. Rather, this product would serve to provide some of the basic services of enrollment assisters to users with some amount of computer literacy. Users who are disinclined or unable to use a digital product, as well as those whose individual or family circumstances may be too complex for a digital product to evaluate would still require the expertise of enrollment assisters. Moreover, this product would allow the assisters to concentrate more of their efforts on those clients requiring more hands-on assistance while still providing sufficient assistance for those who are able to use the product.

In conclusion, the preceding research comprehensively indicates that innovation is a viable approach to addressing the challenge of increasing health insurance coverage. This DELTA Thesis proposes that the literature implies implementation of a digital

health insurance navigator would be well suited to applying the concept of innovation to improve health coverage rates in a real world setting. By applying a learning approach to developing this digital health insurance navigator, deploying this navigator in the real world, and engaging the health coverage and digital health communities of practice, the DELTA project will translate the preceding research and framework for change into action.

Results Statement

Goals for the DELTA Project

The DELTA project is the culminating experience of the Harvard Doctor of Public Health degree program. From the DrPH DELTA Handbook:

*“The Harvard DrPH **DELTA** learning method realizes an integrated **Doctoral Engagement in Leadership and Translation for Action**... The pedagogical intent behind the DELTA Doctoral Project’s design is to provide an opportunity to the DrPH degree candidate to practice and develop their personal leadership skills while engaging in a project that contributes substantively to public health results.”*

This DELTA project was constructed to achieve these goals through creating a digital health startup called Huntington Health Innovations (HHI). This startup would be founded with the purpose of creating digital products that help individuals and families navigate the health system, and health insurance in particular.

Huntington Health Innovations’ first product would be called PlanShepherd. PlanShepherd was to be positioned as a new class of product: a “digital health insurance navigator”. This product was intended to provide a user-centered alternative to existing products that helped individuals and families find exchange-eligible health insurance plans. In the DELTA student’s experience, public solutions such as healthcare.gov and the state-based insurance exchanges did not give sufficient consideration to the needs and behaviors of users and instead focused on the policy needs of their sponsoring

organization. Private solutions, including those from health insurance companies and independent services, often find profit motives in conflict with the goal of enrolling the largest number of members. Insurance carriers, for example, do not list plans from competitors on their own websites. A private nonprofit would not be subject to such policy restrictions and would be free from profit-motives, and as such, it was hypothesized, would constitute a superior baseline organizational structure to existing solutions.

This DELTA project would achieve the goals of the DELTA methodology outlined above first, by creating an environment whereby the DELTA student could experience significant and unique challenges related to entrepreneurship in a public health context and second, by providing the potential to enable significant change in public health outcomes related to insurance coverage rates.

Specifically, this DELTA project had developed three primary goals. The first and most practical goal was to found HHI, produce a value hypothesis for the PlanShepherd product, and develop PlanShepherd sufficiently to constitute a “version 0.1” or “beta” product. Secondly, the project endeavored to validate the PlanShepherd value hypothesis through engagement with stakeholders, user research, and application of the learning approach to project management. Finally, during the course of the DELTA, the student was to apply the Innovation Ecosystems framework to evaluate the ecosystem in which PlanShepherd was to be implemented. Initially, the

Goals for DELTA Project

- 1. Develop PlanShepherd sufficiently to constitute a “version 0.1” or “beta” product**
- 2. Validate the PlanShepherd Value Hypothesis**
- 3. Evaluate Southeast Louisiana’s Health Innovation Ecosystem**

scope of the implementation was left vague; however, as the DELTA project progressed, the scope narrowed to implementation in Southeast Louisiana due to the networking opportunities available during the project.

The first of these three goals ties directly to the framework for change of the DELTA project. By establishing a real-world implementation of PlanShepherd as key scope, the project would realize the first pillar of the framework. The second goal of the project embodies both the framework for change and the learning approach of the project. The learning iteration associated with validating a product’s value hypothesis was intended to engage stakeholders and the community of practice related to digital health insurance products and apply the learning approach to project management by validating the value hypothesis itself. The third goal directly applies the Innovation Ecosystems framework in the context of the DELTA project.

Southeast Louisiana’s Health Innovation Ecosystem

Due to the networking opportunities and constraints available during the implementation of this DELTA project, which are described more thoroughly in the “Validating the Value Hypothesis” section of this thesis, the geographic scope of this DELTA project was limited to Southeast Louisiana.

Southeast Louisiana, as a geographic

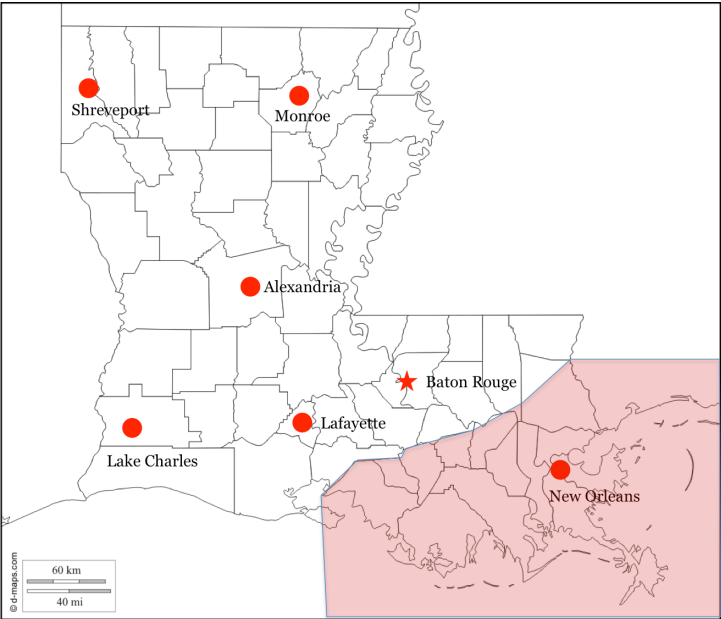


Figure 4: Parish Map of Louisiana with Area of Geographic Scope Shaded in Red.

area, is roughly analogous to the New Orleans metropolitan area, but generally is also considered to include parts of Acadiana (parishes along the Gulf coast from Lafayette to New Orleans), the River Parishes (St. Charles, St. James and St. John the Baptist Parishes), and those parishes south of New Orleans to the Gulf Coast, as well as parts of Mississippi's coastal counties from the Louisiana border to near Bay St. Louis.

It is important to consider the regional health system rather than that of metropolitan New Orleans because Louisiana does not have separate public health departments on a county-by-county (or in Louisiana, parish-by-parish) basis. Instead, the Louisiana Department of Hospitals, based in Baton Rouge, operates 79 parish health units across the state. Only the New Orleans Health Department operates as a separate entity ("Health Department - City of New Orleans," 2017; "OPH-Public Health Units | Department of Health | State of Louisiana," n.d.). As a result of this arrangement, health systems in rural areas are generally dependent on the health resources of the closest city. One could reasonably consider Louisiana to have seven distinct health systems with New Orleans, Baton Rouge, Lafayette, Alexandria, Shreveport, and Monroe as their respective nexuses.

Innovative Culture

Considering the Innovation Ecosystems framework, the **innovative culture** and a number of the **practices** and **features** become important to analyze specifically in the context of Southeast Louisiana's health system. The goals and values of Southeast Louisiana in relation to innovation could generally be considered ***economically conservative but experiencing the beginnings of transition***. Established social and commercial interests in Southeast Louisiana are encouraging of innovation in economic terms but fall short of supporting change when existing social and economic

structures are jeopardized. For example, while support of disruptive business and economic models is widespread (as discussed later in this section), SB107 – a bill that was originally intended to support law enforcement – was amended to include prohibitive restrictions on direct-to-customer sales of new vehicles. The amendment was specifically crafted by the Louisiana Auto Dealers’ Association in order to protect entrenched interests against Tesla Motors expanding to the state. The bill passed easily and was signed into law by the State’s Democratic governor on June 30th, 2017 (White Jr., 2017).

Political leadership in Southeast Louisiana, however, has pursued rapid and wholesale endorsement of civic, social, and economic innovation. The New Orleans City Council and Mayor Mitch Landrieu have enabled controversial new economic models, such as ride-sharing and apartment-sharing, to thrive in the area despite entrenched political and social interests (Adelson, 2015; Walker, 2016). The city also has adopted controversial positions on current, social policy issues, particularly those on Confederate monuments and Sanctuary Cities, in an effort to promote new, progressive social norms (Stole, 2017; Wendland, 2017). Finally, new economic growth and incentives have attracted businesses and developments not traditionally associated with Southern economies, including movie production and information technology (Pitts, Smith, & Effron, 2014; Sayre, 2017). Political leadership and innovation in Southeast Louisiana extends also to health and medicine, with leadership drawing a new Veterans Affairs Medical Center, a new level 1 trauma center, and innovative models for community healthcare around the region (Catalanello & Times-Picayune, n.d.; “Health Department - Data and Publications - City of New Orleans,” n.d.; Sadick, 2017).

Discussion of Southeast Louisiana’s culture of innovation would be incomplete without also mentioning the significant economic, social, and demographic changes associated with the impact of Hurricane Katrina in 2005. Since that time, the city has experienced the loss and replacement of many social, economic, and physical structures, as well as significant federal investment in infrastructure, profound economic recovery, and the influx of the “boomerang-generation”: a population of young-to-middle-aged professionals who moved to New Orleans in the wake of Katrina. Outlets including The Atlantic, Forbes, and NPR have documented the region’s recovery and transformation from an economically languishing city to a to a social, cultural, and economic/entrepreneurial center in the American South (Elliot, 2015; Kotkin, 2015; Thompson, 2013; Williams, 2017).

Innovative Practices

In planning a digital health insurance navigator, a number of practices in Southeast Louisiana’s Health Innovation Ecosystem should be considered as they pose either opportunities or risks to the development or viability of the project. In general, as a result of the political leadership and demographic changes in the area, many of the innovative practices in Southeast Louisiana are changing rapidly. Generally, these changes are positive for innovation.

Funding in the health innovation ecosystem predominantly still follows traditional modalities of community engagement and activism. Funding for innovative health activities is, thus, rather limited. According to ProPublica’s “Nonprofit Explorer,” religious groups, family foundations, and corporate charities make up the majority of health related grant-making in Southeast Louisiana, investing predominantly in conventional health infrastructure projects such as parks, community gardens, and

upgrades to existing gyms and health centers, rather than efforts in health innovation (Tigas, Wei, & Glassford, 2017). One notable exception to traditional giving is the Greater New Orleans Foundation, which invests considerably in insurance enrollment activities, community and behavioral health initiatives, and coordination of social services. The Greater New Orleans Foundation is the largest donor organization in the area, although its efforts and funding are divided among a multiplicity of diverse sectors and initiatives. The remainder of the funding available for health innovation in Southeast Louisiana comes from several, key innovation centers.

A number of **convening bodies** in the greater New Orleans area focus innovative activities and provide networking and technical assistance to those engaged in them. In the health innovation ecosystem, there are several key innovation centers. *The Idea Village* is the most established in the area and focuses on for-profit, entrepreneurial activities taking place in the area. As an incubator program, they are focused on start-ups in all sectors, including health, and focus specifically on impacting the greater **features** of Southeast Louisiana's economic innovation ecosystem. Their major program is New Orleans Entrepreneur Week, which convenes local partners and entrepreneurs to celebrate innovation and entrepreneurship in a week-long, city-wide festival ("Our Purpose | Idea Village," n.d.). *Propeller* is another start-up incubator focused on social impact ("Propeller - About Us," n.d.). Their program will be discussed in more detail in the results statement of this thesis. The only considerable corporate innovation hub is *iO* at Ochsner Health System. *iO* is an accelerator for medical ventures and, while focusing on the needs and goals of Ochsner Health System, also provides support to external ventures through grants and technical support ("iO - Innovation Ochsner | Ochsner Health System," n.d.). Finally, a number of innovation centers and

hubs based at universities in the area provide support for entrepreneurial students. Most notable among these is the *Phyllis M. Taylor Center for Social Innovation and Design Thinking* at Tulane University (“Phyllis M. Taylor Center for Social Innovation and Design Thinking at Tulane,” n.d.). All of these centers and hubs provide opportunities for grants through competitions, grant applications and other means, but their greater impact can be found as networkers and conveners within the innovation ecosystem. Through their activities, they not only affect how the ecosystem practices innovation, but directly impact ecosystem **features** by identifying and invigorating markets, facilitating networking, providing means for political advocacy, and promoting the social response to innovation.

Talent in Southeast Louisiana poses several key positive and negative pressures on the region’s health innovation ecosystem. One positive talent trend that is likely to yield dividends in the coming decade is the much higher rate of educational attainment in the city since Hurricane Katrina. With the city’s shift to a charter school model for primary and secondary education, Orleans Parish and the surrounding areas have transitioned from being one of the worst areas of educational attainment in the state, to on par with the rest of Louisiana (James, 2015). Further, population recovery post-Katrina has leveled off, resembling demographic trends consistent with an established metropolitan region rather than a recovering one. The 2000 Census placed the City of New Orleans itself at a population of 484,674, and while official U.S. Census numbers will not be available until 2020, the Census estimates 230,172 had returned by July 2006 (9 months after the storm, a decrease of over half the city’s population), and 386,617 living in the city by 2015 (“Facts for Features: Katrina Impact | The Data Center,” n.d.). With population demographics reaching a more-or-less steady state,

stakeholders in the health innovation ecosystem, both public and private, can better predict trends and direct resources for employment, infrastructure, and social programs.

Some trends in the talent pool pose negative pressures on Southeast Louisiana's health innovation ecosystem. Hurricane Katrina severely compromised the New Orleans area's middle class - in particular the black middle class. While the percentage of black residents has remained largely the same since before the storm, Black New Orleanians are less likely to be working and more likely to be living below the poverty line than before 2005 (US Census Bureau, n.d.). Middle class workers in New Orleans represent the largest population of healthcare providers and support staff in the area; including and especially nurses, respiratory therapists, and custodial staff specialized in maintaining healthcare facilities. Additionally, despite advances in primary and secondary education in the region, the number of college graduates relevant to innovation in health has decreased dramatically since 2005. Tulane University's "Renewal Plan", published just three months after Katrina, announced the elimination of undergraduate and graduate education in mechanical, civil, electrical, computer, and environmental engineering, as well as computer science. The University also eliminated 27 of their 45 doctoral programs ("Survival to Renewal: Tulane University," n.d.). LSU Health Sciences Center (based in New Orleans, rather than Baton Rouge) permanently closed Charity Hospital: the largest teaching hospital in the area and the only Level 1 Trauma Center in Louisiana. Other universities in the region, including the University of New Orleans, Southern University, and Loyola University, underwent similar reorganizations of their academic programs and all five declared "force majeure" terminations of faculty contracts, including for tenured faculty – universally

contravening established university policies and contract commitments (O’Neil et al., 2007). These changes to secondary education represent long-term threats and necessitate creative solutions to addressing the talent needs of the region’s health innovation ecosystem.

Other practices in Southeast Louisiana’s health innovation ecosystem, including and especially the (un-)reliability of incentives, collaboration, and demand-side incentives, would prove significant in a purely academic analysis of the ecosystem, but are not meaningful in the context of developing a digital health insurance navigator.

*Innovative Features*³

The **features** of Southeast Louisiana’s Health Innovation Ecosystem are complex and, like its innovative practices, are experiencing a period of transition and generational transformation. Largely as a result of unexpected shocks and crisis events in the region, beginning with Hurricanes Katrina and Rita, and continuing through the economic crisis of 2008, subsequent tropical weather events, and the Deepwater Horizon oil spill in 2010; Southeast Louisiana has undergone profound changes to its economic and social makeup.

New Orleans and the surrounding region exhibit a number of crucial **market strengths** that bolster and catalyze its health innovation ecosystem. Ironically, Hurricane Katrina became a protective factor against the 2008 economic crisis. Large-scale investment in the region’s recovery from the federal government (FEMA, in particular), insurance payments, and philanthropic donations led to a significant

³ This section, except where otherwise cited, is based on analysis from The Data Center. Their seminal report is titled “The New Orleans Index at Ten: Measuring Greater New Orleans’ Progress Towards Prosperity”, which was published immediately before the 10-year anniversary of Hurricane Katrina’s landfall (Plyer, Shrinath, & Mack, 2015).

injection of capital into the region's economy that would not, otherwise, have existed. That, combined with the region's outsized service economy, rather than a manufacturing economy, meant the region lost 1% of jobs in response to the 2008 financial crisis compared with the national average of 5%. By 2014, the region was 5% *above* 2008 job levels, compared with a national rate of 1%. Additionally, much of this investment is in green infrastructure and water management, which are crucial in protecting the region's resiliency. The region also increasingly supports growing knowledge-based clusters including in construction, video production, and electric power generation, which have experienced 14%, 90%, and 22% growth, respectively. Importantly for the health innovation ecosystem, due to the construction of the new VA Medical Center and University Medical Center, one could reasonably expect a similar knowledge-cluster increase in healthcare over the coming years. Finally in terms of economic strengths, the region has seen massive growth in entrepreneurship and venture capital. In the Data Center's 2015 analysis, the region saw a startup rate of 471 per 100,000 adults, which is 64% higher than the national average. Venture capital investment, similarly, doubled between 2010 and 2014.

The region also has a number of key **social strengths** that contribute to the health innovation ecosystem. Southeast Louisiana has one of the highest rates of nonprofit investment in the nation. Revenues for arts and culture nonprofits in the region were at \$428 per capita in 2014, which is four times the national average and twice the region's rate before the storm. Youth development nonprofit revenues tripled over the same timeframe, and are at double the national average at \$85 per capita. Such investments represent a strong public engagement in social causes, which could be leveraged by the health innovation ecosystem and digital health startups like HHI. Less

tangibly, but perhaps no less importantly, the greater New Orleans area shows, both qualitative and quantitatively, profound “love of place” among its citizens. While many would consider such a measure irrelevant to innovation, “love of place” has consistently and empirically been shown to contribute to philanthropy, resiliency, and civic engagement across all levels and strata of society. If an innovation ecosystem is to be developed and advanced across a region or political jurisdiction, regional pride and love of place is an important factor to consider in the analysis.

In contrast, the **socioeconomic weaknesses** of the region provide significant downward pressures on the region’s ability to effectively innovate, and particularly its ability to innovate in the complex health sector. Most significantly, the economic and racial disparities present in the region’s economic and social fabric have a profound impact on its ability to grow, and thus, to dedicate new resources to innovation. 77% of white men and 63% of white women are employed in Southeast Louisiana, which is on par with the fastest growing Southern cities. In contrast, only 57% of black men and women are employed; significantly lower than in the same group of Southern metros. The percentage of White New Orleanians occupying the top income quintile, nationally, grew from 25% in 1999 to 30% in 2013, whereas the proportion of blacks in the same income bracket remained steady at 7%. Poorer families are also moving from Orleans Parish (the City of New Orleans) to the suburban parishes, indicating they are facing increased pressure in housing and commute costs, and are able to contribute less to home and community functions. Further, Southeast Louisiana’s education gap with the U.S. average is growing. The city was average in the United States in percentage of the population with a Bachelor’s degree in 1990. This number has fallen in each subsequent U.S. census since that time, with 27% of citizens achieving that goal in 2010 compared

to a national average of 30%. Finally, New Orleans has one of the highest incarceration rates in the country. The city incarcerates its citizens at three times the national rate. All these pressures result in fewer citizens being available to participate in the innovation ecosystem, fewer financial resources to dedicate to health spending, and a less-educated and less-specialized workforce than would be required to support growth of a health innovation ecosystem.

Regarding **spatiotemporal factors**, because innovation in health is generally not limited by resource constraints – one does not need a supply of a particular mineral or access to a unique, natural resource to innovate in healthcare – consideration of spatiotemporal factors is largely unwarranted; however, one threat to the region remains important to consider. Global climate change and, in particular, wetland and biodiversity loss in Southeast Louisiana pose an existential threat to the region and its long-term resiliency. In the 78 years between 1932 and 2010, the Mississippi Deltaic Plain lost 29% of its landmass: over 1,000 square miles, or an area roughly the size of Rhode Island. It continues to lose landmass at a rate equal to approximately one football field per hour (Couvillion et al., 2011). Measurements taken from *within* the levee barriers in New Orleans since 1958 show increases in groundwater salinity, signaling the erosion of wetlands that have historically protected the city from tropical weather events. Impact of another storm to the region will certainly devastate the area once again and has the potential to do damage the region, including its health innovation ecosystem, that could prove unrecoverable.

In relation to the final two features in the Innovation Ecosystems framework – **networking and politics** – Southeast Louisiana does not exhibit attributes that are significant or unique enough to merit further analysis. While networks within the

regional health innovation ecosystem are generally strong based on the innovation centers in the area, networks with other regional health innovation ecosystems are not significant. Political trends in Southeast Louisiana largely mirror national political trends and, while this has an effect on certain practices in the ecosystem such as funding and symbolic gestures, do not merit specific consideration in this context. In short, while academic analysis of the remaining features would prove interesting and useful as an academic exercise, it ultimately remains less relevant to this particular DELTA project.

Initial Business Plan

Before beginning the PlanShepherd project, it was important to define a baseline set of assumptions and plans for the duration of the DELTA project. While this plan was subject to (and almost certainly would) change based on the project's learning approach, creating an initial plan of action was nonetheless a crucial step in beginning to actively work towards the goals and vision of the DELTA project.

Business Model

The initial HHI **Team** would consist of the student, Chris Wheelahan, as well as the DELTA Thesis Committee – Mary Finlay, Rick Siegrist, and David Bates – serving as HHI's Board of Directors. Additional mentors and advisors would be brought on as necessary, feasible, and appropriate. Finally, additional contractors to assist with user experience design and code quality assurance were accounted for in the initial PlanShepherd project budget.

HHI initially planned for a 100% philanthropic **revenue model**. A combination of private and institutional grants, funding from accelerator/incubator programs, and

crowdfunding were identified as potential sources of revenue for the project. Special consideration was to be given to small-scale sources of revenue (\$25,000 or less). These smaller grants generally feature faster timelines and less administrative burden during the application process, which better fits the short timeline of the DELTA project. The initial PlanShepherd project budget included funding for personnel – by far the largest budget item – hardware, materials and supplies, travel, and an additional 8% allowance for indirect overhead costs (Appendix C).

The **distribution model** for PlanShepherd was to be tightly controlled for an initial implementation. Because the scoped “quick-screen” workflow (described later in this thesis) was to be a bare-bones product, created specifically for user testing and research, lingering bugs and issues were to be expected. Further, the user interface would likely not have been reflective of the final product. To keep donor and user confidence high, the initial product was to be treated as a test application. A second release of PlanShepherd was scoped to include both the Screen and Navigate workflows and be available to the public. Specific advice was to be sought out during implementation of “version 2.0” to think about the best channels for distribution, although a blended model of direct-to-consumer advertising through Google AdWords and other media, as well as promotion with state Insurance Navigators and other entities was expected.

Like many user-centered, digital support products, PlanShepherd was scoped to forego a hands-on **user support model**. Evidence-based user research through back-end analytics was considered the predominant methodology for logging issues, tracking user abandonment, informing incremental improvement, and reporting to stakeholders. Additionally, hands-on user testing and focus groups were considered both at the outset

of the project and throughout the implementation of the PlanShepherd project. Plans were also made for a bug-reporting feature.

Identified Risks and Issues

First and foremost, **funding** was identified early on as the greatest risk to HHI and PlanShepherd's viability in the market. Two approaches were implemented to mitigate the risk associated with fundraising. First, raising funds from a diverse set of actors was intended to spread financial risk across a number of different potential funding sources. Reaching out to private individuals and foundations; innovation, start-up, and social project grants; incubator/accelerator programs; and crowdfunding allowed for leeway in case one avenue did not prove fruitful. Second, project phases requiring more significant amounts of capital (e.g., software development, code review, web design) did not begin until at least two months into the project, providing some time to gather additional funding and/or allow for contingency planning.

There was also the risk that the project, as described in the initial proposal, would not be completed **on time**. This risk was also mitigated in two ways. First, the greatest value of the project was built into the very first stage – the user research and engagement with experts. Because the user research and insight was built in from the very start, it was much more likely that doctoral-level insight could be realized from the project. Second, the learning approach of this project mitigated this risk. Because the nature of a learning approach is that hypotheses are tested quickly and incorporated into the project, rather than having phase dependencies like in a traditionally managed project, it was more likely that some work will be delivered, even if it did not realize the full potential of the project. Also, the iterative nature of a learning approach means that the approach and execution of the second iteration was not prescribed ahead of time.

Thus, plans could be (and were) adapted at a later date to accommodate shorter timelines.

Competition from existing start-ups engaged with the same problem statement as PlanShepherd was to be expected. This introduced risk that the project may be overwhelmed by other players in the market who are farther along, better resourced, or simply had stronger value/growth hypotheses than PlanShepherd. Because PlanShepherd was to offer value in different aspects of the health insurance purchasing experience, the major efforts taken to make it a success were complimentary of other efforts in addressing the insurance navigation problem, rather than duplicative. As such, PlanShepherd could be valuable to those entities as an acquisition.

PlanShepherd's competition came primarily from established, government-sponsored products (i.e., healthcare.gov and the state-based marketplaces), and from a small number of solutions from private start-ups. healthcare.gov was, at the outset of the DELTA project, the market standard for screening of health insurance plans, nationwide. The Plan Finder from healthcare.gov gathered the most basic information possible from users, and then displayed a list of health plans available to individuals and families in their area. Stride Health – a healthcare startup based in California – had also released a screening tool that assessed exchange-eligible plans, but included a recommendation engine to users based on the estimated costs for the year based on basic demographics as well as medical behaviors and habits. PlanSherpa – another digital health startup – provided essentially the same service as Stride Health with a distinct distribution model. Finally, Clear Health Analytics provided a plan screening service with a distinct recommendation engine based on machine learning. Clear Health had not yet released a publicly available product at the outset of this DELTA project.

PlanShepherd's Initial Value Hypothesis

Initially, there were several key aspects that constituted the total value hypothesis for the PlanShepherd application. Briefly stated, the key value hypothesis for PlanShepherd was that **a user-centered approach to design, key usability features based on insights from academic research, and a nonprofit business model would be adequate to establish a sufficiently differentiated and sustainable product that would better meet the needs of insurance consumers.**

A user-centered design approach is, principally, the application of learning approach to software design. This approach would allow the initial development of the product to be conducted with the needs and “pains” of the user foremost in mind. Additional enhancement of the product in future iterations would then be driven by user feedback and behavior. User-centered design contrasts with the design approaches of government-sponsored solutions such as healthcare.gov and the state based exchanges primarily in that government-sponsored solutions are focused primarily on the policy needs of the agency. Due to these agencies’ policy needs, application processes become confusing and inaccessible to much of the population using the tool. For example, because eligibility for financial assistance is based on taxable income, these solutions *must* ask users to build their “modified adjusted gross income” (MAGI) through a number of obscure, income-related questions; or alternatively ask users to have their previous tax returns available. A private solution can, in contrast, informally ask, “how much money did your family make last year” without creating liability, empowering users to get the answers they need with minimal anxiety and confusion.

In addition to the user-centered approach distinguishing PlanShepherd from government-sponsored solutions, PlanShepherd would also need to be sufficiently differentiated from other, private solutions. As such, a uniquely academic approach to preliminary product research and a nonprofit business model would be leveraged as competitive opportunities against solutions from Stride Health and others. While there are creative ways to conduct user research before creating even a beta-stage product, the initial, minimally viable product for any venture will have to make assumptions about the needs of the user base. In the case of PlanShepherd, the student conducted the preceding “procedural literature review” to glean key lessons from academic research. Crucially, it was understood from this research that certain consumers are willing to pay more for flexibility, predictability, and to maintain the status quo of their health behaviors. This led to initial decisions to recommend insurance products based not just on total cost (like other solutions), but on the needs and preferences of the consumer. Specifically, the application would ask users which of their doctors they wanted to keep and whether they would be willing to pay more for flexible/predictable insurance products – that is, products with higher premiums and lower copayments/co-insurance. Finally, it was hypothesized that the adoption of a nonprofit organizational model would provide access to avenues of capital investment not ordinarily available to for-profit start-ups. Through grant applications, investment from foundations and other sources available only to nonprofits, PlanShepherd would extricate itself from competition for venture capital, and provide an innovative, differentiated product for grant-makers to support.

Validating the Value Hypothesis

The preliminary step in the DELTA project was to validate and hone the initial value hypothesis for PlanShepherd. In order to validate this value hypothesis, it was necessary to apply the framework for change by engaging a number of different stakeholders in discussions regarding the viability of such an approach. Additionally, significant work would need to be undertaken to more specifically define PlanShepherd's vision and goals, cost and revenue structures, customer and user segments, key performance indicators and outreach channels. For help with such activities, it became clear that engaging with a startup incubator program would be highly productive.

Propeller

Propeller is an accelerator and incubator program based in New Orleans and focused on addressing social inequities through entrepreneurship. While the ventures may be nonprofit or for-profit, all of the ventures focus to some extent on social benefit and reducing inequities ("Propeller - About Us," n.d.). The ventures are grouped into four sectors – food, water, health, and education.

The Startup Accelerator program at Propeller offers a number of services to idea- or development-stage ventures that are accepted into the program. The keystones of the program are weekly meet-ups, which feature workshops on professional and business development, and the matching with a lead-mentor for the venture.

Huntington Health Innovations was accepted into the Startup Accelerator program and matched with Rick Rizzo as a lead mentor. Mr. Rizzo was previously President of Consumer Healthcare (Europe) at Pfizer, President of Global Consumer Healthcare at Johnson and Johnson, and CEO at Fleet Laboratories. He was an ideal

partner and mentor for HHI. In addition to his laudable professional credentials and skills, his expertise was highly complementary to the skills of the HHI team. With the help of Mr. Rizzo and the Health team at Propeller, refinement of the project scope and value hypothesis for PlanShepherd could begin in earnest.

Iteration Narrative

When employing a learning approach, the learning iterations for a project generally have goals and timelines; however, the practical beginning and end of the iteration and the work products associated with it often occur more organically as the team becomes more comfortable with the results of their hypothesis tests and ascertains what pursuits have the most utility to the project. The first learning iteration for PlanShepherd was scheduled for completion in time for 2018 open enrollment on November 1, 2017. This iteration would consist primarily of initial user research, technical environment setup, development of a minimally viable PlanShepherd application, and evaluation of the completed “beta” product. The reality of this iteration however, would prove to be much more focused on developing the business and new partnerships.

Early in the Propeller program, meetings with the HHI and Propeller Health teams made clear that the initial value hypothesis was not going to be sufficient to create a viable product and business. It also became clear that, based on the networking opportunities and familiarity of both Propeller and the DELTA student, the geographic scope of the project would be best narrowed to Southeast Louisiana. Evaluating the area’s health innovation ecosystem would, therefore, be beneficial to the project’s development.

Idea validations with the Propeller team and health system experts clearly demonstrated that, without any operating finances to build a marketing operation, partnerships would have to be developed in order to scale the PlanShepherd product to an appreciable number of users. While the team was confident of PlanShepherd's viability as a product in competition with other applications in the space, they also had to acknowledge that a comparable or even superior product is not, on its own, sufficient to drive market share. As such two separate marketing operations were considered – one to “customers” or potential partners to implement the PlanShepherd application, and a separate operation focused on the end-user.

Concurrently, stakeholders were engaged to discuss both the value hypothesis for PlanShepherd and the surrounding context (or innovation ecosystem) for the business. Early conversations were with stakeholders who had general knowledge of the overall ecosystem. Discussions with representatives from the Louisiana Department of Health, the Tulane University Furtell Health Clinic, and 504HealthNet (an advocacy and assistance association of primary care clinics in the area) proved helpful in refining the business model and in elucidating the surrounding context. These conversations were strictly informational in nature – not focused on developing partnerships – and were intended to help gauge the viability of such a product in the context of Southeast Louisiana's Health Innovation Ecosystem. Categories of customers were also evaluated including primary care clinics, specialty clinics, large healthcare providers, university health services, religious and community groups, and insurance carriers. Among these, primary care and specialty clinics were seen as the most viable target for partnership as they featured high mission congruence with the goals of HHI, relatively little administrative or bureaucratic burden, and high levels of access and interaction with

potential end-users. Clinics also proved the most accessible for initial meetings based on the networks of the student and the Propeller team. The most significant challenge identified in working with clinics was their potentially limited ability or willingness to invest in a digital solution.

Because the marketing focus for PlanShepherd had shifted to partnering with clinics rather than marketing directly to end-users, new value hypotheses based on the needs and constraints of these clinics were required. Instead of distributing PlanShepherd directly to the user, distribution to the end-users would be through partner-clinics, using their established networks of patients as a conduit to drive end-usage. HHI would be required to market PlanShepherd only to a limited set of potential partner-clinics rather than to large populations of end-users. Partner-clinics would, however, need some incentive to invest their time, energy, and funding in creating new care- and coverage-models for their patients. While driving up insurance rates among their patients would theoretically reduce bad-debt and was congruent with these partner-clinic's missions, it was not clear that these incentives were sufficient to justify the up-front cost of implementing PlanShepherd. The technical design of PlanShepherd was thus re-thought such that it could be integrated into partner-clinic's public facing websites as their own health insurance navigator, "powered by PlanShepherd". This would provide additional incentive to the partner-clinics by building brand equity and provide enough marginal benefit to them that some would choose to implement PlanShepherd. While never explicitly stated, the value hypothesis at this stage became: **integrating a digital health insurance navigator into their public facing websites would sufficiently justify the direct and indirect costs associated with implementation by allowing partner-clinics to realize new brand-**

equity, reduce bad-debt, and advance their missions to promote the overall health of their patients and communities.

At this same time, the HHI and Propeller teams discovered that the majority of philanthropic grant-making activities required the grantee organization to be a registered 501(c)3 nonprofit, which is a process often requiring several years of application, follow-up, and approval. HHI had, at this point, several options to address the financial needs of the organization. First, it could find a fiscal sponsor – essentially a preexisting, registered 501(c)3 that would adopt the accounting functions and provide “parent organization” status such that the “child organization” (Huntington Health Innovations, in this case) could apply for grants. Fiscal sponsors, in exchange, would take a certain percentage of all grant funding. Second, it could adopt a new, for-profit organizational structure and compete for venture capital. Or third, it could develop a sustainable earned revenue model to become fiscally independent on its own. Given the new direction the business was taking related to its distribution model, a new, earned revenue model was decided on where, in exchange for implementing PlanShepherd into the partner-clinics’ websites, a monthly or yearly subscription fee would be charged. Additionally, custom functionality could be negotiated in exchange for an additional consulting fee. This proved appealing to one potential partner, Planned Parenthood Gulf Coast, as they expressed interest in having a function that would screen plans based on a patient’s preferred method of birth control.

As additional conversations with potential partner-clinics took place, the student received positive feedback regarding the PlanShepherd product and its intended use. The clinics were generally supportive of the potential revenue impacts of implementing the product, but were even more enthusiastic about PlanShepherd’s underlying purpose

– to increase coverage rates and support overall population health. Unfortunately, these potential partners’ ability and willingness to invest time and capital into a new, digital product, while initially acknowledged as a risk, were still underestimated. Again, the revenue model would have to be reconsidered.

Approximately six weeks into the Propeller Incubator program, Propeller had coincidentally arranged for “expert office hours” with representatives from Blue Cross/Blue Shield of Louisiana and New York Life Insurance Company. At the same time, the HHI and Propeller teams had begun the process of approaching another, new revenue model. Meetings with these experts elucidated that the insurance broker and captive agent market was a largely untapped opportunity for the individual market. Due to the combination of the ACA’s emphasis on enrollment assisters and navigators and the weak economies of scale in the individual market, the business model for agents and brokers had remained largely unchanged from before 2010. Brokers are able to claim a much greater number of commissions operating in the small-group market, working with businesses, unions, and trade associations. And because insurance companies experience monetary losses in the individual market, they have no incentive to have captive agents promote individual plans. Based on this feedback, it was hypothesized that PlanShepherd, partnered with primary care and specialty clinics, could create a built-in economy of scale in the individual market and thus could receive commissions from each new member registered through PlanShepherd. These commissions could then be shared with the new members and/or with the partner clinics.

A number of logistical questions would then have to be answered regarding this model. First, is such a structure legally permitted? As it turns out, sharing commissions with new members is a practice called “rebating” and presents two key issues to the

health system. First, it allows and promotes unfair trade practices among brokers including but not limited to anti-trust issues and exploitation of vulnerable clients. Second, actuarial calculations for insurance plans are, in large part, dependent on and very sensitive to the predicted income of the group's members. Rebating would disturb these calculations and result in more expensive plans over time. Fortunately, "rebating" part of the commission to the partner clinics is not at all prohibited either by the letter or the spirit of the Louisiana insurance statute.

The second logistical question to pursue would be what regulatory requirements are placed on insurance brokers and would any of those requirements exclude a "low-touch" approach to registering new members? In the expert meetings, it was discovered that most insurance companies would only issue commissions to brokers with three years or more of experience writing insurance plans. This problem is easily solved by partnering with or hiring an individual with an existing broker's license. The expert was not aware of or concerned with any other legal or regulatory requirements.

Finally, there was the question of politics. Who would be resistant to this new brokerage model? The team conducted a stakeholder analysis. Obviously nonprofit clinics and patients would react positively to PlanShepherd providing new, incremental revenue. Existing brokers may be made uncomfortable by a new business model entering their market; however, because PlanShepherd is focused specifically on the individual market rather than the group market, and because insurance brokers are not particularly powerful in a political or economic context, they were considered not a major threat. Insurance companies may be resistant to seeing an increase in membership in the individual market since non-group, exchange-eligible plans are, almost universally, unprofitable. The solution to this issue, however, is to increase

membership and, in particular, healthy membership in the individual market, which PlanShepherd was equipped to do. As such, it would become important for PlanShepherd to convince the large carriers that the new members being brought to the non-group market were healthier than the current average, non-group member. This assumption nevertheless remained a risk to be validated in the next learning iteration.

Given these considerations, PlanShepherd's value hypothesis became: **by operating as a licensed-insurance broker, PlanShepherd could help partner-clinics realize incremental revenue, help carriers of exchange-eligible insurance plans reduce actuarial losses, and promote the public health by increasing rates of insurance coverage, thereby becoming a viable, sustainable product.** Having reached this value hypothesis by the end of the Propeller program, sufficiently narrowed the geographic scope of the PlanShepherd project to Southeast Louisiana, and evaluated Southeast Louisiana's Health Innovation Ecosystem sufficiently to understand the key players, opportunities, and threats, the first learning iteration for PlanShepherd was considered complete. Future learning iterations would need to be conducted to validate the value hypothesis of the brokerage model, but the student was left confident of the viability of the PlanShepherd product at this point and enthusiastic about developing a product to beta-test with potential partner-clinics.

Iteration Work Products

During the course of the Propeller incubator program, a number of deliverable work products were produced for the benefit of the incubator experience and the PlanShepherd project. These products are submitted as additional deliverables alongside this thesis and are described briefly below and in Appendix D.

The incubator program required a **work plan** for the project. This work plan was based on an initial, goal-setting exercise, which set out 12-month goals and quarterly milestones to achieve these goals. The work plan was then set out for the 12 weeks of the incubator program to achieve each of the milestones in the first quarter, including action steps, action begin and end dates, and what additional support would be needed to achieve each milestone. Given the learning approach of the project, this work plan was adapted and updated three additional times over the course of the Propeller program.

Propeller also provided consulting services focused on branding and marketing of the product with Growhaus studio (“Marketing & Design For Your Business Growth,” n.d.). Growhaus was contracted by Propeller to provide both **digital assets and a branding guide** for PlanShepherd. As the team began meetings with potential partner-clinics, Growhaus also provided services to format a “**marketing 2-pager**” consistent with the branding guide.

During the orientation and group exercises for the full cohort of incubator start-ups, each venture was required to produce a **Lean Business Canvas**. The Lean Business Canvas is a common tool in start-up ventures that forces a start-up team to be concise and explicit about their business model and how they plan to achieve commercial viability through their value and growth hypotheses. There are a number of published versions of the lean business canvas, but generally they include sections for the problem, solution, value proposition, key metrics, unfair advantage, customer segments, distribution channels, cost structure, and revenue streams. The lean business canvas submitted with this thesis is from an early stage in the incubator program, and is thus representative of the earliest value hypothesis for the PlanShepherd product.

Finally, two additional deliverables were derived from individual meetings between the student, Rick Rizzo, and the Propeller health team. The first is a **Partnership Matrix**, which was used early in the process of identifying potential partners. The framework used for this process assessed potential categories of partners with relation to the number of potential users served, the HHI team's access to decision-makers within the organization, the administrative burden of working with the potential partner, their ability to invest in the PlanShepherd product, and whether their mission was congruent with the mission of PlanShepherd and HHI. As conversations continued, the categories of potential partners were narrowed to large providers, small providers, university health services, and insurance carriers; then finally narrowed to focus only on small providers (primary care and specialty clinics). The second deliverable from these meetings is a **Revenue Model Projection** that was intended to forecast revenues in three scenarios described in the preceding section of this DELTA Thesis: adopting a subscription-only revenue model, adopting the insurance broker model, or adopting a blended model of the two. This exercise provided further justification for adopting the insurance-broker model, as the marginal benefit of either the subscription-only or blended model was not sufficient to justify the additional cost of implementation.

Implementation

While the actual development and implementation phase of the project should not be considered a separate "learning iteration" in terms of a learning approach since little to no hypothesis testing occurs, it nonetheless constituted a distinct phase of the DELTA project due to the redirected emphasis of the first learning iteration on business development rather than implementation of a minimally viable product. This redirected

emphasis, while directly responsible for a much stronger value hypothesis for HHI and PlanShepherd and a more constructive DELTA project, did somewhat detract from the overall refinement of the PlanShepherd product by the end of the project timeframe. Nonetheless, the PlanShepherd product met the initial goals and requirements set forth in the DELTA proposal and provided a strong platform for continued development and refinement. This section of the DELTA Thesis describes the development and implementation of the PlanShepherd application, while Appendix E presents the specific details of the PlanShepherd technical environment and software configuration.

PlanShepherd Technical Environment

Shortly after the beginning of the incubator program work began on establishing the PlanShepherd technical environment. Two software development frameworks are well suited for the purposes of prototyping a small-scale, web-based application: *Django*, which is a Python web framework, and *Ruby on Rails*, which is Ruby-based (Django Software Foundation, 2018; MIT, 2018). While the DELTA Student had experience developing software in Python, he had never engaged web-based software development using Python and Django. Additionally, Django has the reputation for being more difficult to configure and less suitable for rapid prototyping than Rails. As such, the decision was made to develop PlanShepherd in Ruby on Rails.

For the purposes of data integrity and partner/user-confidence, the data for PlanShepherd would have to be exactly the same as the data used for healthcare.gov and the Centers for Medicare and Medicare Services (CMS). As such, the database used for PlanShepherd would 100% mimic the data published by CMS. CMS publishes “Public Use Files” with complete information on exchange-eligible plans, as well as Data Dictionaries describing each field and how they are used in the data schema, which

would form the data foundation of the PlanShepherd application (Centers for Medicare and Medicaid Services, 2018). These data are published as comma-separated-values files, which would have to be imported into the PlanShepherd app. A rake task was written which would automatically import these data to the PlanShepherd development database once triggered by a system administrator.

Once the data model and data were seeded in the PlanShepherd application, web development could begin in earnest. Ruby on Rails is developed on a Model-View-Controller framework, in which database actions and characteristics are defined in the models, the web-based displays are defined in the views, and interactions between the model and view are defined by the controllers. While considerable time and effort allowances were made for the Student to dedicate to re-learning the MVC framework, the framework proved simpler to adopt than anticipated. As such, PlanShepherd web development proceeded much more quickly, in terms of person-hours dedicated, than projected. Despite the rapid progress, changes to the HHI business model resulted in changes being required to the PlanShepherd architecture.

While PlanShepherd was originally scoped to be a 100% native application, with all components existing within one application instance, it became clear as the business model changed that an application programming interface (API) architecture would more easily and flexibly support the changing needs and value hypotheses of the business. An API allows an application to expose its functionality to external users, and thus, is more responsive to changing business requirements than a native application. Developing PlanShepherd as an API would allow PlanShepherd to adapt to a product-based business model, a partner subscription-based model, or the broker model with little or no replication of effort. In an API architecture, the business logic of the

application exists separately from whatever application a user is interacting with. It is application-agnostic in that it is not dependent on what language or

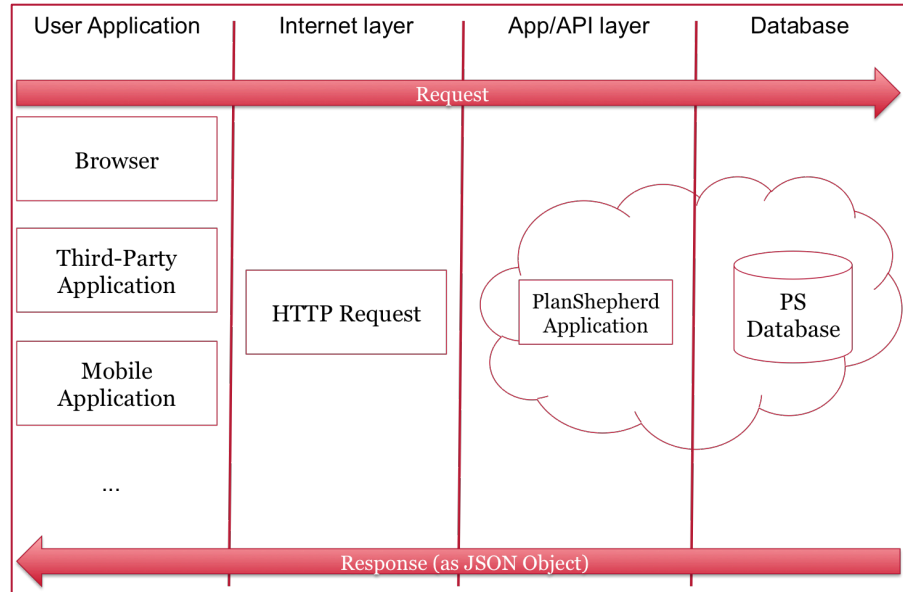


Figure 5: Web API Architecture

framework the user-application is using –

it simply takes a request from the user-application and provides the relevant data as a response for the user-application to parse. Ruby on Rails supports the API architecture; however, considerable changes would have to be made to the PlanShepherd application to facilitate this change.

In addition to the business logic developed in the API, the user interface for PlanShepherd would have to be separated into a distinct, “front-end”, user application that would invoke the PlanShepherd API services. While the web development could easily be copied to the new application from the pre-API PlanShepherd App, considerable effort would be required to develop the request/response framework for the (now-separated) PlanShepherd API.

User Story Development

In “Agile” and user-centered application development, the accepted term for a set of software requirements or use-case is a “user story”. One aspect of the PlanShepherd product that did not change, and which actually received positive reinforcement through user research, was the inclusion of two primary user stories in the scope of the initial product – a “quick search” story, and a “navigate” story.

The quick search story was based on the perceived need to quickly estimate an individual or family’s total coverage costs for a year. While the full navigate story was intended to provide a more comprehensive user experience and recommend the most appropriate, exchange-eligible plan for an individual or family based on their medical needs and preferences, the quick search story was designed to take the bare minimum amount of information from a user and, in less than one minute, show them a projected cost per month or per year. The value of this user story was validated in informal user research sessions during the DELTA project. When discussing with potential users, the general sentiment was that, while at some point a full navigation story would be helpful and indeed necessary, a tool that simplified the process and allowed a user to get a general idea of their healthcare costs would be greatly valued.

During the development of the quick search story, it was discovered that while the plans available in an area are defined by ZIP code, the premiums associated with a plan are defined by county. Because ZIP codes do not always conform to county lines, one delay in development of the quick search story became the need to create a mapping function whereby users could select their county when their ZIP code crossed county lines. A new database table had to be added for these mappings, based on mappings from the U.S. Postal Service, the Department of Housing and Urban Development, and

the 2010 U.S. Census Bureau (“HUD USPS ZIP Code Crosswalk Files | HUD USER,” n.d.; US Census Bureau, n.d.). By far the most complex development task in the quick search story, however, was developing the database query to correctly return the plans available in a user’s home ZIP code. Mapping the correct plans and rates to a user’s ZIP code requires no less than three database tables and six plan attributes, plus complex lookup conditions based on state, county, and ZIP code. Despite these difficulties, the quick search story, including both the user-facing application and the API development, was completed by the end of December 2017.

The development of the navigate story was approached in a piecemeal fashion. The workflow for the navigation story was more complex than that of the quick search story and, as such, was built as three modules: basic information, medical information, and financial preferences.

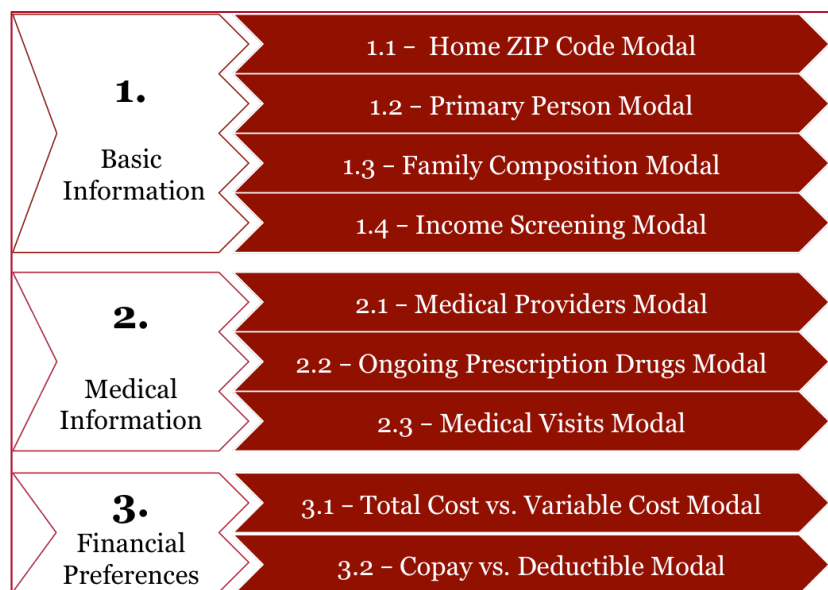


Figure 6: PlanShepherd Navigation User Story Workflow

Each of these modules consisted of between two and four “modals” or screens. First, front-end interfaces for all ten modals were developed. Then, API functionality for the ZIP, Primary Person, Family Composition, and Medical Visits modals were built. This stage of development allowed essentially the same functionality as the quick screen story, only with the addition of family members and addition of

copay/co-insurance information to the business logic and financial calculations. Then, more complex, API functionality for Income Screening, Medical Providers, and Ongoing Prescription Drugs was developed. The Income Screening web service is a service exposed by PlanShepherd that screens an individual or family's eligibility for premium assistance subsidies and/or cost sharing reductions. The Medical Providers and Ongoing Prescription Drugs web services are provided by CMS and allow PlanShepherd (and other applications) to recommend plans based on the cost of prescription medications and which of a user's current medical providers will be in-network. Finally, the proprietary Financial Preferences modal was developed based on the research described in the analytical platform section of this thesis, which found that many individuals would be willing to pay more in total cost for a year in exchange for certainty in what medical expenses they would have over a given year.

Ancillary user stories for PlanShepherd were also developed as part of the DELTA project. The functionality allowing PlanShepherd to search for current medical providers in the navigation story allowed for simple adaptation into a "network screening" user story, which allowed a user to see the plans for which their current provider was considered in-network. Similarly, the Ongoing Prescription Drugs modal allowed for adaptation into a "Search Drug Costs" user story. These were both incorporated into the home page for the PlanShepherd web interface.

Future Implementation Tasks

Two implementation tasks remain incomplete as of the completion of the DELTA project. First and most significantly, every API requires a Web Services Description Language (WSDL). These are standardized documents that specify the expected format of a web service call to the API, as well as the format of the response package. A WSDL is

required so that developers of user-applications that plan to use the PlanShepherd services are aware of how to make a proper request to the PlanShepherd API and of how to process and parse the response data. The WSDL for PlanShepherd is scoped for creation shortly after the DELTA project and will be published on PlanShepherd's Github page (see Appendix E).

Secondly, PlanShepherd needs to be deployed to a production environment. As of the completion of the DELTA project, both the PlanShepherd API and web interface exist only on the DELTA Student's personal laptop, with source code backed-up to Github. Shortly after the completion of the DELTA project, it is expected that PlanShepherd will be deployed to Heroku – a web-hosting platform. Heroku was chosen because it is free, although Amazon Web Services is a superior option for hosting should additional funding become available. The intent for deployment is to create a standard, “Continuous Deployment” pipeline, where application changes are made to an application instance on a developer's local machine, then version controlled through Github, and propagated to a protected test environment for thorough validation. Only after application validation are changes deployed to a separate, production environment for use by user applications.

Because the business plan for PlanShepherd no longer proposes an independent application instance, and instead will be invoked from partner-clinics' websites, the PlanShepherd web interface will not be deployed to a production environment. Instead, the source code for the web interface will be uploaded to Github and available on an open-source basis. This code will serve as the basis for partner-clinic implementation of the PlanShepherd application, but will not be used directly by users.

Future Learning Iterations

Crucial in the application of a learning approach to project management is that the organization continues to iterate and conduct hypothesis tests throughout the life of the project; not simply during the initial implementation phase. The PlanShepherd product must experience continuous improvement if it is to be successful. Thoughtful user-research in the form of technical analytics, hands-on user feedback sessions, and focus groups will provide insight into the usability of the product. As with all technical product development, these insights should be consistently analyzed and used to enhance the PlanShepherd product. Developing PlanShepherd as a project and HHI as a business should experience similar, iterative improvement. This section describes the approach and hypotheses of two future learning iterations in the PlanShepherd project.

Implementing the Broker Model

Concluding PlanShepherd's first learning iteration, the value hypothesis for the product was: **by operating as a licensed-insurance broker, PlanShepherd could reach more consumers, help partner-clinics realize incremental revenue, help carriers of exchange-eligible insurance plans reduce actuarial losses, and promote the public health by increasing rates of insurance coverage, thereby becoming a viable, sustainable product.** Several key factors of this value hypothesis require further testing and validation in the real world. First, it is assumed that PlanShepherd and HHI can build and maintain the required back-office functions of a licensed insurance broker. While key logistical questions were answered before settling on this value hypothesis, including the legal and regulatory viability of such a model, significant work remains to understand the key activities and functions of successful brokers. Key considerations include:

- Is a “low-touch” model of client-interaction consistent with the activities and functions of a broker?
- Can a digital broker for the individual market bypass existing delays between application and issuance of a policy present in the small group market? If not, does that present a terminal limitation of the broker model?
- What staffing is required to meet the requirements of adopting a sustainable broker model?

In addition to defining the required back-office functions of the broker model, PlanShepherd’s financial viability and sustainability under the broker model must be established. As such, PlanShepherd’s revenue model must be better defined. This process would include creating a pricing model, revised budgeting, and financial projections under various scenarios in the broker model. Are commissions sufficient to fund HHI’s activities and how much of these commissions can realistically be shared with partner-clinics? How many patients would need to be enrolled to remain financially solvent? If cursory revenue estimates made in during the first learning iteration prove erroneous, the sustainability of the broker model may be put in jeopardy.

Finally, the second learning iteration for PlanShepherd should define how HHI interfaces with the various insurance carriers in Southeast Louisiana, from both a business-partner and technological perspective. The crucial aspect of this investigation is determining what information is given to carriers by an insurance broker and how that information is delivered. Further, the process to identify new members referred by a broker and how their associated commissions are delivered must be defined. If these interfaces are digital in nature, the software impacts on the PlanShepherd product and business model must also be determined.

Answering these key questions about the broker model represent the most crucial stage in the PlanShepherd endeavor. Answers to these questions will be pursued in much the same manner as the first learning iteration: through networking and discussion with expert stakeholders. Contacts built through the Propeller program include representatives from Blue Cross/Blue Shield of Louisiana and the BCBS-LA Foundation, a former health insurance broker from New York Life Insurance Company, and a financial consultant experienced in building financial models for start-up businesses; all of whom proved helpful during the first learning iteration and offered continued assistance as the PlanShepherd project moves forward. Engaging with these contacts again and building additional networking opportunities through them, along with additional assistance from the Propeller team, will form the basis of this learning iteration. While these conversations may support or reject the viability of the broker model, they will certainly provide answers to the key considerations above.

Developing a Growth Hypothesis

Subsequent to validating the broker model, and possibly subsequent to additional learning iterations deemed necessary as a result of those validations, PlanShepherd will require a growth hypothesis. Several potential partners were identified during the Propeller incubator program and could prove helpful in beta-testing the PlanShepherd application and business model; however, for PlanShepherd to realize widespread and meaningful social impact, the project must eventually expand beyond its projected scope of services in Southeast Louisiana. Key considerations in expansion include:

- How scalable is the effort required in setting up brokerage arrangements in new markets?

- How can PlanShepherd best expand to states that do not participate in healthcare.gov and thus do not provide their plan data to CMS? What are the technical ramifications?
- What characteristics of other, regional health innovation ecosystems should be leveraged or avoided during growth efforts?
- Are there political or market ramifications to becoming a larger player in the market of digital health insurance support products?

While the broker model shows promise in Southeast Louisiana, building brokerage arrangements in new markets could prove unsustainable due to insufficient economies of scale in the effort involved. If expansion to new markets under the broker model proves unsustainable or insufficiently scalable, other options may include building new services specific to the Medicare and Medicaid populations, expanding to partners beyond non-profit clinics, or concentrating HHI's efforts on developing a new product entirely. All of these considerations must also be made in the context of HHI's business model, staffing, and finances.

Developing a growth hypothesis for PlanShepherd will mark a crucial period in the development of HHI as a business. As such, this learning iteration should be approached with particular care and attention. The specific approach to developing a growth hypothesis will depend on PlanShepherd's social impact and financial success in Southeast Louisiana. In the most optimistic scenarios, HHI will be able to support an internal business development team, including business analysts and managers who can develop a growth plan. More conservatively, innovative approaches to developing growth hypotheses are expected. A number of innovation centers, including Propeller, in addition to hosting incubator programs for idea-stage startups, also support growth

programs for organizations with employees and earned revenue. Alternatively (or additionally), PlanShepherd has garnered some interest from MBA Case Workshops in Southeast Louisiana and could gain valuable insight and recommendations from participating. Regardless of the avenue for developing and validating a growth hypothesis, this learning iteration will be one of high-risk and should be approached with cautious optimism.

Results Synthesis

The goal of the DELTA project is to provide a culminating experience in leadership and transformative action in public health for degree candidates in the DrPH program. The project described in this results statement more than achieved that goal. While founding a digital health startup is a non-traditional approach for a DELTA project – eschewing the customary host organization and supervisor relationship described in the DELTA manual – the planning and execution of the PlanShepherd project provided comparable, and in many ways superior, learning and transformative opportunities. Conceptualizing and refining the key themes of this DELTA project – the Innovation Ecosystems framework, the learning approach to project management, and the framework for change – proved helpful and necessary in defining the scope of the project. Applying these themes not only to this document, but also to the practical aspects of the DELTA project provided a strong theoretical basis from which the project could move forward over the course of the nine-month DELTA experience and created the opportunity for the DELTA student to enable large-scale change.

The DELTA project began with defining an initial business plan and business model. This activity, in keeping with a learning approach, was acknowledged from the

outset as a set of hypotheses to be validated as part of the DELTA rather than a work plan to be followed during the experience. Consistent with classroom learning during the DrPH program, the initial business plan included definition of the PlanShepherd team, revenue, distribution, and support models, identification of risks and issues, and a falsifiable value hypothesis. The project then set about achieving the three goals of the DELTA project – to develop PlanShepherd into a “beta” product, validate the PlanShepherd value hypothesis, and characterize Southeast Louisiana’s health innovation ecosystem.

The experience of the Propeller startup incubator proved extraordinarily valuable in the second goal: validating the PlanShepherd value hypothesis. Despite acknowledging the flexible nature of the business plan, it became clear early in the DELTA process that PlanShepherd was even earlier in the idea-stage of a new venture than anticipated. As such, the incubator program was focused much more on idea validation than on implementation. The first learning iteration included engagement with executive stakeholders from across the health innovation ecosystem and completion of business development exercises that are often ignored in the early stages of a new venture. During these validations, no less than three value hypotheses were developed, validated, and refined, representing “micro-iterations” within the first learning iteration of PlanShepherd. After the first learning iteration, the remainder of the DELTA project focused on maintaining the progress that was made while also implementing and developing the actual PlanShepherd application.

When thinking about the end-result of this DELTA project, it is clear that the project did not develop in the way that was anticipated from the outset. Originally, the plan was to build and launch a digital application; however, the intent of the DELTA to

enable some positive and meaningful change dictated that simply building PlanShepherd would not have been sufficient to merit DELTA success. The act of idea validation and iterative learning guaranteed that the project was not completed in a vacuum and had the potential to enable this meaningful change, despite the results and deliverables of the DELTA having changed significantly from the initial proposal. In short, while the PlanShepherd application was not as refined at the conclusion of the DELTA project as the initial proposal had promised, the business plan and value hypothesis for PlanShepherd and HHI were far stronger.

The application of a learning approach enabled this change. Rather than strictly conforming to a project plan that would, in all likelihood, have been unsuccessful in enabling the potential for large-scale change, the project plan adapted to new information and constraints that arose as a result of hypothesis tests. Moreover, the learning approach became instilled and unconscious during the project. Assumptions and responses to new information were often made, validated, and either accepted, adapted, or abandoned in a matter of hours or days without jeopardizing a traditional, phase-dependent project plan. Perhaps more significantly, success criteria were based on the project's purpose rather than on work plan milestones. Thus, spending more time on idea validation than expected was not contrary to the goals and plan for the DELTA project, but rather became a key enabler of the DELTA project's success. The learning approach unquestionably allowed the success of the DELTA project.

The DELTA project also shared a symbiotic relationship with the Innovation Ecosystems framework. The framework provided a grounding structure to the DELTA project, while the DELTA project helped to refine and improve the framework. Without the Innovation Ecosystems framework, validating the PlanShepherd value hypothesis

would have been a far less focused, constrained, and purposeful activity. Conversely, without the DELTA experience, the Innovation Ecosystems framework would remain immature and untried.

The final, key theme for this thesis was the framework for change described in the analytical platform. From a practical perspective, it provided a basis for action during the DELTA project, helping to define the scope of activities and constrain the number of tasks dedicated to efforts irrelevant to the goals of the project. The framework for change transformed over the course of the project, with the most notable changes being the addition of the Innovation Ecosystems framework to the vision of the project, and changes to the nature of the “community of practice engagement” pillar. This pillar was initially envisioned as primarily digital engagement, including from HHI’s social media accounts and in the form of a blog. During the validation of the value hypothesis, engagement with the community of practice related to digital health insurance support tools became much more concrete, characterized by meetings and consultations with industry stakeholders and experts. While these interactions were more geographically constrained to Southeast Louisiana than digital engagement may have been, they provided more tangible results, beneficial to the validation of the PlanShepherd product. While the framework for change was helpful in framing the DELTA project, it is not expected to have as long-lasting an impact on the future activities of HHI or the PlanShepherd team. It was a helpful exercise to define and constrain the DELTA experience, but does not represent a meaningful framework that could be more generally applicable outside the scope of this particular DELTA project. Because the framework for change was designed and constructed specifically for this DELTA project,

while the individual elements represent sound practice in many contexts, they are not, in combination, particularly generalizable to other projects.

Most importantly, the academic and practical results of the PlanShepherd project represent new and lasting ideas with the potential to enable large-scale change beyond the scope of the DrPH program. It is posited that the Innovation Ecosystems framework proposed in this thesis has large-scale and generalized applicability outside this DELTA project, and indeed outside the field of Public Health. Certainly, the framework requires further application and validation to new and different cases, but the framework described herein represents a strong “version 1.0” of what has the potential to become a standard for evaluating and enabling innovation across geographies, industries, and disciplines. It is sincerely hoped that the framework can be further developed and distributed for application by innovators, executives, and public leaders across the globe.

The conceptualization of learning approaches to project management does not represent original thought leadership in the same way that the Innovation Ecosystems framework does; however, it provides specific vocabulary for describing what has become an increasingly important modality of enabling change. As enabling change becomes an increasingly adaptive rather than technical challenge, with problem and solution definitions of increasing complexity and more learning required to find valid solutions in-context, more flexible approaches to problem-solving and project management are necessary. These approaches exist (e.g., agile, lean management, PDSA cycles, etc.), but often remain restricted to their initial scope of application or industry. A more generalized body of scholarship would promote interdisciplinary and multi-disciplinary engagement with the ideas of learning approaches. Widespread

evangelization of this scholarship to business executives, students, community leaders, and others would allow society to confront adaptive challenges with the humility to say “we don’t know for sure what the answer is...” and the ingenuity to follow with “... but here is what we think.”

Finally, the PlanShepherd project itself represents the conceptualization of a new model for expanding insurance coverage and improving health outcomes. While the future of the PlanShepherd project remains uncertain, with considerable validation and implementation still required, the work completed as part of this DELTA project advanced PlanShepherd from an immature project idea to a potentially viable and sustainable business model that could be implemented in communities across the United States. The value hypothesis as of the completion of this DELTA project uses existing structures and relationships in the health system to drive incremental revenues for primary- and specialty-clinics, improve the actuarial health of individual-market plans for insurance carriers, and increase coverage rates across a geographic region. While even an idealized implementation of PlanShepherd could not solve all of the deficiencies in the American health system by itself, small, incremental improvements implemented at scale have the potential for tangible and measurable benefit.

This DELTA experience has exposed the complexity of enabling large-scale change. Even under the best of circumstances – with sufficient funding, support mechanisms, and political capital to advance and validate a hypothesis – change occurs in what often seems like geologic timescales. Despite these challenges, this DELTA project provided not only the vehicle for gaining new knowledge and skills, but also for learning valuable lessons about the importance of creating the enabling conditions for large scale change. Great ideas and hard work alone are not sufficient to address

complex, adaptive social issues, as this project has shown. Translating ideas and discipline into transformative action also requires exercising leadership - humbly engaging with those around you, assembling a network of like-minded advocates, and patience in the face of overwhelming intransigence. This DELTA project realized its potential when respecting these practices and stalled when it did not. Exercising leadership to enable change is a lifelong endeavor for many, including this author, and the DELTA project described herein was a seminal experience in that journey.

Appendices

Appendix A – Procedural Literature Review Methodology

Two repositories of peer-reviewed literature, PubMed and JSTOR, were searched with the term “Insurance AND Preference” (non case-sensitive) in the title and/or abstract of articles. Additionally, searches in JSTOR included refinement by journal discipline (See Appendix B - JSTOR Journal Disciplines Included in Procedural Literature Review). Finally, date parameters were added to include peer-reviewed articles from July 1st, 1991 to July 25th, 2017 (the date of the literature review search). July 1st, 1991 was chosen so as to include all the current literature since the time of the 1992 US Presidential election, in which healthcare was a critical campaign issue and instigated a glut of academic research on the issue. In total, 533 articles were returned meeting the search parameters.

The total set of 533 articles then experienced three separate culling processes. First, the titles of all 533 articles were scanned for relevance to the research question. Of these, 138 were included in the second analysis, 386 were rejected due to irrelevance, and 9 were rejected based on their language of publication being one other than English with no suitable translation available. The second analysis was based on the article abstracts. A further 84 articles were dismissed due to irrelevance. The great majority of these articles fell in one of three categories. Many were articles from economics journals and explored the risk preferences and willingness to pay of various demographics based on various assumptions. These articles proved too abstract to provide conclusive insights into the insurance preferences of those shopping for individual insurance in the United States. Another large set of these articles related to population-level preferences

in health policies and, in particular, covered services by government-sponsored health services in foreign countries – a situation generally not relevant to the United States. Finally, a number of the dismissed articles simply referred to insurance preferences in the discussion section as they were relevant to the rest of the article. While undoubtedly some of these insights could prove significant in elucidating insurance preferences in the future, their relationship to the research question at hand proved only circumstantial and not comprehensive enough to include in this analysis.

Appendix B – JSTOR Journal Disciplines Included in Procedural Literature Review

- American Studies
- Biological Sciences
- Business
- Communication Studies
- Economics
- Finance
- General Science
- Geography
- Health Policy
- Health Sciences
- History
- Labor and Employment Relations
- Law
- Management and Org Behavior
- Marketing and Advertising
- Peace and Conflict Studies
- Philosophy
- Political Science
- Population Studies
- Psychology
- Public Health
- Public Policy and Administration
- Social Work
- Sociology
- Statistics
- Urban Studies

Appendix C – Initial PlanShepherd Project Budget

PlanShepherd Project Budget (Created 8/31/17)

Project Period: 7/1/2017 to 3/31/2017

Budget Category / Justification	Low Budget	Mid Budget	High Budget	Notes
Personnel:				
Salary and benefits for project lead	\$45,000	\$45,000	\$45,000	\$5,000 per month over 9 months
Consultant fees for UI/UX developer	\$5,000	\$7,500	\$10,000	\$125 per hour, 80 hours
Fees for Code Review consultant	\$5,000	\$7,500	\$7,500	\$125 per hour, 60 hours
Hardware:				
Software Development environment and software	\$900	\$1,200	\$1,500	
Materials and Supplies:				
Presentation materials and printing for user research	\$200	\$300	\$500	
Office supplies	\$100	\$200	\$300	
Travel:				
Round-trip tickets for business development	\$600	\$900	\$1,500	2, 3, & 5 tickets @ \$300 RT
<hr/>				
Subtotals:	\$56,800	\$62,600	\$66,300	
8% Anticipated Overhead Cost	\$4,544	\$5,008	\$5,304	
<hr/>				
TOTAL ANTICIPATED BUDGET	\$61,344.00	\$67,608.00	\$71,604.00	

Appendix D – Additional Deliverables for the DELTA Project

- Appendix D.1 – PlanShepherd Work Plans (versions 1.0, 2.0, 3.0, 4.0)
- Appendix D.2 – PlanShepherd Branding Guide
- Appendix D.3 – PlanShepherd “Marketing 2-pager”
- Appendix D.4 – Early-Stage “Lean Business Canvas” for PlanShepherd
- Appendix D.5 – Potential Partnership Matrix
- Appendix D.6 – Revenue Model Projections for PlanShepherd
- Appendix D.7 – PlanShepherd Source Code
 - Latest source code for PlanShepherd Web Services can be found at:
<https://github.com/huntingtonhealth/PlanShepherd>
 - Latest source code for the PlanShepherd User Interface can be found at:
<https://github.com/huntingtonhealth/PlanShepherdWeb>
- Appendix D.8 – PlanShepherd Database Documentation

Appendix E – PlanShepherd Technology Stack and Software Package

Technology Purpose	Technology	Version	Developer
Primary Development Machine	MacBook 12-inch	Early 2015	Apple Inc.
Primary Operating System	MacOS High Sierra	10.13.X	Apple Inc
Application Programming Language	Ruby	2.4	Yukihiro Matsumoto
Web Development Framework	Ruby on Rails	5.0.6	MIT
Relational Database Management System	PostgreSQL	10.1	PostgreSQL Global Development Group
Web Development Markup Language	HTML	5.2	W3C and WHATWG
Stylesheet Language	CSS	3	WWW Consortium
Dynamic Web Programming Language	JavaScript	ECMAScript 2017	Oracle Corporation
Version Control / Code Management	Github	2.15.1	Github
Cross-Origin Resource Sharing	Rack	1.0.2	Github user 'cyu'
Primary Testing Browser	Google Chrome	64.0.3282	Google Inc.

Bibliography

- Abihiro, G. A., Torbica, A., Kwalamasa, K., & De Allegri, M. (2016). What factors drive heterogeneity of preferences for micro-health insurance in rural Malawi? *Health Policy and Planning, 31*(9), 1172–1183. <https://doi.org/10.1093/heapol/czw049>
- Adelson, J. (2015, April 23). Mayor signs ride-hailing law, and Uber says it will soon enter New Orleans market | State Politics | theadvocate.com. Retrieved February 19, 2018, from http://www.theadvocate.com/new_orleans/news/politics/article_559d4a15-36d3-5c9b-8db2-55f813e12a01.html
- Akter, S., Krupnik, T. J., Rossi, F., & Khanam, F. (2016). The influence of gender and product design on farmers' preferences for weather-indexed crop insurance. *Global Environmental Change, 38*, 217–229. <https://doi.org/10.1016/j.gloenvcha.2016.03.010>
- Alonso-Zaldivar, Ricardo. (2017, August 31). Trump administration cuts funding for health care sign-ups. Retrieved September 22, 2017, from <https://www.usatoday.com/story/news/politics/2017/08/31/trump-administration-cuts-funding-health-care-sign-ups/622544001/>
- Andrews, M., Pritchett, L., & Woolcock, M. J. V. (2017). *Building state capability: evidence, analysis, action* (First edition). Oxford ; New York, NY: Oxford University Press.
- Atun. (2004). *What Are the Advantages and Disadvantages of Restructuring a Health Care System to Be More Focused on Primary Care Services?* Geneva: World Health Organization - Regional Office for Europe's Health Evidence Network.

Retrieved from

http://www.euro.who.int/__data/assets/pdf_file/0004/74704/E82997.pdf

Baicker, K., Taubman, S. L., Allen, H. L., Bernstein, M., Gruber, J. H., Newhouse, J. P., ... Finkelstein, A. N. (2013). The Oregon Experiment — Effects of Medicaid on Clinical Outcomes. *New England Journal of Medicine*, *368*(18), 1713–1722.

<https://doi.org/10.1056/NEJMsa1212321>

Barnett, M. L., & Sommers, B. D. (2017). A National Survey of Medicaid Beneficiaries' Experiences and Satisfaction With Health Care. *JAMA Internal Medicine*, *177*(9), 1378. <https://doi.org/10.1001/jamainternmed.2017.3174>

Barringer, M. W., & Mitchell, O. S. (1994). Workers' Preferences among Company-Provided Health Insurance Plans. *Industrial and Labor Relations Review*, *48*(1), 141–152. <https://doi.org/10.2307/2524631>

Barseghyan, L., Molinari, F., O'Donoghue, T., & Teitelbaum, J. C. (2013). The Nature of Risk Preferences: Evidence from Insurance Choices. *The American Economic Review*, *103*(6), 2499–2529.

Barseghyan, L., Prince, J., & Teitelbaum, J. C. (2011). Are Risk Preferences Stable across Contexts? Evidence from Insurance Data. *The American Economic Review*, *101*(2), 591–631.

Bayes, T. (1763). An Essay towards Solving a Problem in the Doctrine of Chances. *Philosophical Transactions*, *53*, 370–418.

Becker, K., & Zweifel, P. (2008). Age and Choice in Health Insurance: Evidence from a Discrete Choice Experiment. *The Patient: Patient-Centered Outcomes Research*, *1*(1), 27–40. <https://doi.org/10.2165/01312067-200801010-00006>

- Biglaiser, Gary, & Ma, Ching-to Albert. (2003). Price and Quality Competition under Adverse Selection: Market Organization and Efficiency. *The RAND Journal of Economics*, 34(2), 226–286.
- Bundorff, M. Kate. (2003, September). *The Effects of Offering Health Plan Choice within Employment-Based Purchasing Groups*. Working Paper.
- Care Without Coverage: Too Little, Too Late*. (2002). Washington, D.C.: National Academies Press. <https://doi.org/10.17226/10367>
- Catalanello, R., & Times-Picayune, N. com | T. (n.d.). University Medical Center opens to first patients. Retrieved February 19, 2018, from http://www.nola.com/health/index.ssf/2015/08/university_medical_center_rece.html
- Centers for Medicare & Medicaid Services. (2017, December 19). Quality Measures. Retrieved January 9, 2018, from https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/QualityMeasures/index.html?redirect=/QualityMeasures/03_ElectronicSpecifications.asp
- Centers for Medicare and Medicaid Services. (2018, February 9). marketplace-puf. Retrieved March 5, 2018, from <https://www.cms.gov/ccio/resources/data-resources/marketplace-puf.html>
- Chokshi, S. (n.d.). *Holy Non Sequiturs, Batman! - What Disruption Theory Is... and Isn't*. Retrieved from <https://soundcloud.com/a16z/what-disruption-is-and-is-not>

- CMS. (2016, December 22). assistance. Retrieved May 27, 2017, from <https://www.cms.gov/ccio/programs-and-initiatives/health-insurance-marketplaces/assistance.html>
- Congressional Budget Office. (2016). *Federal Subsidies for Health Insurance Coverage for People Under Age 65: 2016 to 2026*. Retrieved from www.cbo.gov/publications
- Couvillion, B. R., Barras, J. A., Steyer, G. D., Sleavin, W., Fischer, M., Beck, H., ... Heckman, D. (2011). *Land area change in coastal Louisiana from 1932 to 2010* (USGS Numbered Series) (p. 12). Reston, VA: United States Geological Survey. Retrieved from <https://pubs.er.usgs.gov/publication/sim3164>
- Cutler, D. M., Finkelstein, A., & McGarry, K. (2008). Preference Heterogeneity and Insurance Markets: Explaining a Puzzle of Insurance. *The American Economic Review*, 98(2), 157–162.
- Deming, W. E. (2000). *The new economics: for industry, government, education* (2nd ed). Cambridge, Mass: MIT Press.
- Django Software Foundation. (2018). The Web framework for perfectionists with deadlines | Django. Retrieved March 5, 2018, from <https://www.djangoproject.com/>
- Eaves, D. (2016, September). *Learners vs. Planners: Agile vs. Waterfall*. Lecture presented at the DPI662 - Digital Government: Technology, Policy and Public Service Innovation, Harvard Kennedy School.
- Eisenmann, T., Ries, E., & Dillard, S. (2013). Hypothesis-Driven Entrepreneurship: The Lean Startup. *Harvard Business Review*.

- Elliot, D. (2015, August 13). Restaurants Feed New Orleans' Recovery: "I Knew I Had To Come Back." Retrieved February 19, 2018, from <https://www.npr.org/sections/thesalt/2015/08/13/431683330/new-orleans-identity-hangs-in-the-balance-as-restaurants-rebuild>
- Engström, S., Foldevi, M., & Borgquist, L. (2001). Is general practice effective? A systematic literature review. *Scandinavian Journal of Primary Health Care*, 19(2), 131–144.
- Facts for Features: Katrina Impact | The Data Center. (n.d.). Retrieved March 6, 2018, from <https://www.datacenterresearch.org/data-resources/katrina/facts-for-impact/>
- Families USA. (2017, April). A 50-State Look at Medicaid Expansion. Retrieved May 27, 2017, from <http://familiesusa.org/product/50-state-look-medicaid-expansion>
- Fan, Q., & Davlasheridze, M. (2016). Flood Risk, Flood Mitigation, and Location Choice: Evaluating the National Flood Insurance Program's Community Rating System: Flood Risk, Flood Mitigation, and Location Choice. *Risk Analysis*, 36(6), 1125–1147. <https://doi.org/10.1111/risa.12505>
- Fang, H., Keane, M. P., & Silverman, D. (2008). Sources of Advantageous Selection: Evidence from the Medigap Insurance Market. *Journal of Political Economy*, 116(2), 303–350. <https://doi.org/10.1086/587623>
- Finkelstein, A., Taubman, S., Wright, B., Bernstein, M., Gruber, J., Newhouse, J. P., ... Baicker, K. (2012). The Oregon Health Insurance Experiment: Evidence from the First Year*. *The Quarterly Journal of Economics*, 127(3), 1057–1106. <https://doi.org/10.1093/qje/qjs020>

- Gooch, K. (2017, April 27). Hospital bad debt: 10 trends to know [Becker's Hospital Review]. Retrieved September 29, 2017, from <https://www.beckershospitalreview.com/finance/hospital-bad-debt-10-trends-to-know.html>
- Handel, B. R. (2013). Adverse Selection and Inertia in Health Insurance Markets: When Nudging Hurts. *The American Economic Review*, 103(7), 2643–2682.
- Health Department - City of New Orleans. (2017, December 18). Retrieved February 19, 2018, from <https://www.nola.gov/health-department/>
- Health Department - Data and Publications - City of New Orleans. (n.d.). Retrieved February 19, 2018, from <https://www.nola.gov/health-department/data-and-publications/>
- HUD USPS ZIP Code Crosswalk Files | HUD USER. (n.d.). Retrieved March 5, 2018, from https://www.huduser.gov/portal/datasets/usps_crosswalk.html#codebook
- Institute for Health Metrics and Evaluation. (n.d.). Healthdata.org - United State. Retrieved September 22, 2017, from <http://www.healthdata.org/united-states>
- iO - Innovation Ochsner | Ochsner Health System. (n.d.). Retrieved February 24, 2018, from <https://www.ochsner.org/io>
- Iwasaki, M., Pierson, M. E., Madison, D., & McCurry, S. M. (2016). Long-term care planning and preferences among Japanese American baby boomers: Comparison with non-Japanese Americans: LTC among JA baby boomers. *Geriatrics & Gerontology International*, 16(9), 1074–1084. <https://doi.org/10.1111/ggi.12601>
- James, L. E. (2015, August 29). Charts Show How Hurricane Katrina Changed New Orleans. Retrieved March 6, 2018, from

<https://news.nationalgeographic.com/2015/08/150828-data-points-how-hurricane-katrina-changed-new-orleans/>

Keating, N. L., Kouri, E. M., He, Y., West, D. W., & Winer, E. P. (2013). Effect of Massachusetts health insurance reform on mammography use and breast cancer stage at diagnosis: Health Insurance Reform and Breast CA. *Cancer*, *119*(2), 250–258. <https://doi.org/10.1002/cncr.27757>

Kerssens, J. J., & Groenewegen, P. P. (2005). Consumer Preferences in Social Health Insurance. *The European Journal of Health Economics*, *6*(1), 8–15.

Kotkin, J. (2015, August 26). An Improbable And Fragile Comeback: New Orleans 10 Years After Katrina. Retrieved February 19, 2018, from <https://www.forbes.com/sites/joelkotkin/2015/08/26/new-orleans-katrina-anniversary/>

Lotz, M. (2013, July 5). Waterfall vs. Agile: Which Methodology is Right for Your Project? Retrieved May 27, 2017, from <http://www.seguetech.com/waterfall-vs-agile-methodology/>

Mackenzie, D. (2010). Computing Science: A Tisket, a Tasket, an Apollonian Gasket. *American Scientist*, *98*(1), 10–14.

Manifesto for Agile Software Development. (n.d.). Retrieved May 27, 2017, from <http://agilemanifesto.org/>

Marketing & Design For Your Business Growth. (n.d.). Retrieved February 28, 2018, from <http://growhausstudio.com/>

MIT. (2018). Ruby on Rails. Retrieved March 5, 2018, from <http://rubyonrails.org/>

- Monheit, A. C., & Vistnes, J. P. (1999). Health Insurance Availability at the Workplace: How Important are Worker Preferences? *The Journal of Human Resources*, 34(4), 770–785. <https://doi.org/10.2307/146416>
- Monheit, A. C., & Vistnes, J. P. (2008). Health Insurance Enrollment Decisions: Preferences for Coverage, Worker Sorting, and Insurance Take-Up. *Inquiry*, 45(2), 153–167.
- Moore, M., Peterson, L., Coffman, M., & Jabbarpour, Y. (2016). Care Coordination and Population Management Services Are More Prevalent in Large Practices and Patient-centered Medical Homes. *The Journal of the American Board of Family Medicine*, 29(6), 652–653. <https://doi.org/10.3122/jabfm.2016.06.160180>
- Murray, S. F. (2000). Relation Between Private Health Insurance And High Rates Of Caesarean Section In Chile: Qualitative And Quantitative Study. *BMJ: British Medical Journal*, 321(7275), 1501–1505.
- O’Neil, R. M., Cook, N. C., Finkin, M. W., Henry, M. S., Kasper, H., Morris, L., ... Crisologo, N. R. (2007). *Hurricane Katrina and New Orleans Universities* (pp. 60–126). American Association of University Professors. Retrieved from <https://portfolio.du.edu/downloadItem/92556>
- OPH-Public Health Units | Department of Health | State of Louisiana. (n.d.). [Department of Health, State of Louisiana]. Retrieved February 19, 2018, from <http://new.dhh.louisiana.gov/index.cfm/directory/category/192?pn=6>
- Our Purpose | Idea Village. (n.d.). Retrieved February 24, 2018, from <https://ideavillage.org/pages/detail/120/our-purpose>
- Ozawa, S., Grewal, S., & Bridges, J. F. P. (2016). Household Size and the Decision to Purchase Health Insurance in Cambodia: Results of a Discrete-Choice

- Experiment with Scale Adjustment. *Applied Health Economics and Health Policy*, 14(2), 195–204. <https://doi.org/10.1007/s40258-016-0222-9>
- Pendzialek, J. B., Simic, D., & Stock, S. (2017). Measuring customer preferences in the German statutory health insurance. *The European Journal of Health Economics*, 18(7), 831–845. <https://doi.org/10.1007/s10198-016-0829-7>
- Pfarr, C., & Schmid, A. (2016). Redistribution through social health insurance: evidence on citizen preferences. *The European Journal of Health Economics*, 17(5), 611–628. <https://doi.org/10.1007/s10198-015-0704-y>
- Phyllis M. Taylor Center for Social Innovation and Design Thinking at Tulane. (n.d.). Retrieved February 24, 2018, from <http://taylor.tulane.edu/>
- Pitts, B., Smith, C., & Effron, L. (2014, November 20). Why New Orleans Is the New Movie-Making Capital. Retrieved February 19, 2018, from <http://abcnews.go.com/Entertainment/hollywood-south-orleans-movie-making-capital/story?id=27036988>
- Plyer, A., Shrinath, N., & Mack, V. (2015). *The New Orleans Index at Ten: Measuring Greater New Orleans' Progress Towards Prosperity* (p. 72). New Orleans, LA: The Data Center. Retrieved from https://s3.amazonaws.com/gnocdc/reports/TheDataCenter_TheNewOrleansIndexatTen.pdf
- Politi, M. C., Kaphingst, K. A., Liu, J. (Esther), Perkins, H., Furtado, K., Kreuter, M. W., ... McBride, T. (2016). A Randomized Trial Examining Three Strategies for Supporting Health Insurance Decisions among the Uninsured. *Medical Decision Making*, 36(7), 911–922. <https://doi.org/10.1177/0272989X15578635>

- Propeller - About Us. (n.d.). Retrieved February 22, 2018, from
<http://gopropeller.org/about/>
- Rice, T., Jacobson, G., Cubanski, J., & Neuman, T. (2014). The Private Health Insurance Choices of Medicare Beneficiaries: How Much Does Price Matter? *Medical Care Research and Review*, *71*(6), 661–689.
<https://doi.org/10.1177/1077558714556896>
- Robbins, A. S., Han, X., Ward, E. M., Simard, E. P., Zheng, Z., & Jemal, A. (2015). Association Between the Affordable Care Act Dependent Coverage Expansion and Cervical Cancer Stage and Treatment in Young Women. *JAMA*, *314*(20), 2189.
<https://doi.org/10.1001/jama.2015.10546>
- Roberts, E. T., & Pollack, C. E. (2016). Does Churning in Medicaid Affect Health Care Use?: *Medical Care*, *54*(5), 483–489.
<https://doi.org/10.1097/MLR.0000000000000509>
- Ryan, M. J., & Vaithianathan, R. (2003). Medical Insurance with Rank-Dependent Utility. *Economic Theory*, *22*(3), 689–698.
- Sadick, B. (2017, February 28). New VA Hospital in New Orleans May Serve as a Model. *Wall Street Journal*. Retrieved from <https://www.wsj.com/articles/new-va-hospital-in-new-orleans-may-serve-as-a-model-1488164762>
- Sayre, K. (2017, November 13). Tech company to bring 2,000 jobs to New Orleans. Retrieved February 19, 2018, from
https://www.nola.com/business/index.ssf/2017/11/software_company_new_orleans_m.html
- Schwarber, K. (n.d.). SCRUM Software Development Process. *Advanced Development Methods*. Retrieved from <http://www.jeffsutherland.org/oopsla/schwapub.pdf>

- Siskou, O., Kaitelidou, D., Economou, C., Kostagiolas, P., & Liaropoulos, L. (2009). Private Expenditure and the Role of Private Health Insurance in Greece: Status Quo and Future Trends. *The European Journal of Health Economics*, *10*(4), 467–474.
- Sommers, B. D., Baicker, K., & Epstein, A. M. (2012). Mortality and Access to Care among Adults after State Medicaid Expansions. *New England Journal of Medicine*, *367*(11), 1025–1034. <https://doi.org/10.1056/NEJMsa1202099>
- Sommers, B. D., Gawande, A. A., & Baicker, K. (2017). Health Insurance Coverage and Health — What the Recent Evidence Tells Us. *New England Journal of Medicine*, *377*(6), 586–593. <https://doi.org/10.1056/NEJMs1706645>
- Squires, D., & Anderson, C. (2015, October 8). U.S. Health Care from a Global Perspective. Retrieved September 29, 2017, from <http://www.commonwealthfund.org/publications/issue-briefs/2015/oct/us-health-care-from-a-global-perspective>
- Stole, B. (2017, October 12). DOJ gives New Orleans, 3 other cities “last chance” over “sanctuary” immigration policies. *The New Orleans Advocate*. Retrieved from http://www.theadvocate.com/new_orleans/news/politics/article_84928874-af67-11e7-afee-73fc5028c1e1.html
- Survival to Renewal: Tulane University. (n.d.). Retrieved March 6, 2018, from <http://renewal.tulane.edu/>
- Szrek, H., & Bundorf, M. K. (2011). Age and the purchase of prescription drug insurance by older adults. *Psychology and Aging*, *26*(2), 308–320. <https://doi.org/10.1037/a0023169>

- Taylor, M. Z. (2016). *The politics of innovation: why some countries are better than others at science and technology*. New York, NY: Oxford University Press.
- The Henry J Kaiser Family Foundation. (2016a). *Health Insurance Coverage of the Total Population*. Retrieved from <http://kff.org/other/state-indicator/total-population/>
- The Henry J Kaiser Family Foundation. (2016b). *Key Facts about the Uninsured Population*. Retrieved from <http://kff.org/uninsured/fact-sheet/key-facts-about-the-uninsured-population/>
- Thompson, D. (2013, April 8). The Big Comeback: Is New Orleans America's Next Great Innovation Hub? *The Atlantic*. Retrieved from <https://www.theatlantic.com/business/archive/2013/04/the-big-comeback-is-new-orleans-americas-next-great-innovation-hub/274591/>
- Tigas, M., Wei, S., & Glassford, A. (2017). Nonprofit Explorer (Version 2). ProPublica. Retrieved from <https://projects.propublica.org/nonprofits/api>
- Torres, H., Poorman, E., Tadepalli, U., Schoettler, C., Fung, C. H., Mushero, N., ... McCormick, D. (2017). Coverage and Access for Americans With Chronic Disease Under the Affordable Care Act: A Quasi-Experimental Study. *Annals of Internal Medicine*, 166(7), 472. <https://doi.org/10.7326/M16-1256>
- US Census Bureau. (n.d.). US Census Bureau Geography 2010 FIPS Code Files for Counties and County Equivalent Entities. Retrieved March 5, 2018, from <https://www.census.gov/geo/reference/codes/cou.html>
- Walker, R. (2016, March 5). Airbnb Pits Neighbor Against Neighbor in Tourist-Friendly New Orleans. *The New York Times*. Retrieved from

<https://www.nytimes.com/2016/03/06/business/airbnb-pits-neighbor-against-neighbor-in-tourist-friendly-new-orleans.html>

Wendland, T. (2017, May 20). With Lee Statue's Removal, Another Battle Of New Orleans Comes To A Close. Retrieved February 19, 2018, from <https://www.npr.org/2017/05/20/529232823/with-lee-statues-removal-another-battle-of-new-orleans-comes-to-a-close>

White Jr., M. B. LAW ENFORCEMENT: Provides licensing exception for specialty vehicle dealers who manufacture armored personnel carriers for sale to law enforcement agencies and modifies certain requirements regarding sales or offers to sell motor vehicles directly to a consumer., Pub. L. No. SB107, § 1261, 32 Revised Statues (2017).

Williams, C. (2017, September 20). After the Storm: How Tragedy Galvanized A Post-Katrina New Orleans. Retrieved February 19, 2018, from <https://www.forbes.com/sites/courtneywilliams/2017/09/20/after-the-storm-how-tragedy-galvanized-a-post-katrina-new-orleans/>

Wilper, A. P., Woolhandler, S., Lasser, K. E., McCormick, D., Bor, D. H., & Himmelstein, D. U. (2009). Health Insurance and Mortality in US Adults. *American Journal of Public Health*, 99(12), 2289–2295. <https://doi.org/10.2105/AJPH.2008.157685>

Index

- Adverse Selection – 27-28
- Affordable Care Act – 18, 20, 22, 23, 28, 30
- Agile (software development) – 13
- Application Programming Interface – 68-69
- Apollonian Gasket – 7
- Bayes' Theorem – 13
- Business Plan – 51, 78
 - and PlanShepherd Distribution Model - 51
 - and PlanShepherd Revenue Model – 51
 - and PlanShepherd Support Model – 51
 - and PlanShepherd Team – 51
- Clear Health Analytics – 54
- Climate Change – 48
- Cost sharing - 29
- Culture of Innovation - 9
- Deepwater Horizon Oil Spill – 47
- Digital Health Insurance Navigator – 1, 31, 32, 34, 38
- Django (software framework) – 57
- Framework for Change – 3, 16, 78, 81
- Growth Hypothesis – 12
 - and PlanShepherd - 76
- healthcare.gov – 38, 54, 67
- Huntington Health Innovations – 1, 38
- Hurricane Katrina – 43, 45, 47
- Innovation – 7
 - and culture – 8, 41
 - and political support - 42
 - as a process – 8
 - definition of – 8-9
- Innovation Ecosystem - 2
 - and health – 2
 - Framework – 2, 6, 33, 78, 80
- Innovative Features – 10
 - and markets in SE Louisiana - 48
 - and socioeconomics in SE Louisiana – 48
 - and spatiotemporal factors - 48
- Innovative Practices – 9
 - and convening bodies– 44
 - and funding in SE Louisiana – 43
 - and talent in SE Louisiana - 45
- Insurance Brokers – 37
 - and PlanShepherd – 62-64, 74
- Insurance Coverage
 - and behavior – 26, 31, 34
 - and enrollment specialists – 21, 36
 - and impact on health – 23
 - and preferences – 28, 32, 35
 - and small group coverage – 19
- Lean Business Canvas – 65

Lean Management - 13

Learning Approach – 3, 12, 17, 78, 80
and uncertainty - 14

LSU Health Sciences Center – 46

Medicaid – 19
and churn - 20

New Orleans – 41

Oregon Health Insurance Experiment – 23

PlanSherpa – 54

Problem Driven Iterative Adaptation - 13

Propeller – 57-58, 61, 79

Python – 67

Raynor, Michael – 8

Rizzo, Rick – 57, 58

Ruby on Rails – 67-69

SCRUM – 13

Southeast Louisiana – 18, 33, 58, 81
and health innovation ecosystem – 40, 59

State-based Exchanges – 38, 54

Stride Health – 54, 56

Taylor, Mark Z. – 8

Tulane University – 45
and Hurricane Katrina - 46

User-centered Design – 55

User Story – 70-71

U.S. Health Policy - 18

Value Hypothesis – 2, 12, 34, 57-64
and PlanShepherd - 55
in Framework for Change – 17