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Advances in technology provide new opportunities to take banking to the financially excluded. But the chosen technology and the associated digitalization of processes must fit the context, needs and preferences of the target audience. We describe how The Odyssey Project, Inc., a startup, is combining SMS and blockchain technologies to create a context-specific digital solution for the unbanked, particularly in underdeveloped countries. The actions taken by this company provide valuable recommendations for fintech organizations that want to develop appropriate and effective technological solutions.[1,2]

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Opportunities for and Challenges of Deploying Technological Solutions for Financial Inclusion

Financial inclusion is "the delivery of banking services at an affordable cost to the vast section of disadvantaged and low-income groups."[3] It is concerned with providing the unbanked with an account to store and save money and carry out financial transactions. These accounts can be individual or joint and can be held at a bank or any financial institution,[4] such as a credit union, cooperative or microfinance institution.[5] They can also be linked to a mobile phone. Banking then becomes digital in nature and may or may not be linked to a financial institution. These digital accounts can provide the same benefits as physical accounts with a bank or another financial institution.

Financial inclusion is crucial for the overall progress of a nation: the provision of financial services can encourage and facilitate access to health and education, and promote entrepreneurship. From a macro perspective, financial inclusion increases investment

1 Yolande Chan is the accepting senior editor for this article.

2 The authors thank Yolande Chan and the members of the review team for their thoughtful feedback and guidance throughout the review process. We also thank The Odyssey Project, Inc.'s management team, especially Bryce Jurss, chief executive officer, for supporting this research and sharing their experience, expertise and knowledge.

3 Dev, S. M. "Financial Inclusion: Issues and Challenges," *Economic and Political Weekly* (41:41), October 14, 2006, pp. 4310-4313.

4 Our definition of a financial institution is similar to the one used by the Global Findex Database, and encompasses all types of institutions that cover deposit, checking and savings accounts. The definition does not include nonbanking financial institutions such as pension funds, retirement accounts, insurance companies or equity holdings such as stocks.

5 For information about accounts for the unbanked, see Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S. and Hess, J. *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*, 2018, International Bank for Reconstruction and Development/The World Bank.

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resources and opportunities and is particularly important for the promotion of small and medium enterprises. In addition, it increases a country's financial stability by reducing the risk of poverty. According to The World Bank, in 2017, 69% of adults worldwide had formal bank accounts, while approximately 1.7 billion adults were unbanked, with most of them residing in low-income economies.

But the idea of financial inclusion is not limited just to providing a bank account and banking services. It encompasses efforts to motivate marginal communities to participate in banking by providing them with a solution that is accessible, productive and sustainable.[6] Financial inclusion entails the provision of highly diversified banking products that meet customer needs and are easy to access and use—for example, using mobile phones for financial transactions without needing to have a formal bank account. Such technology-based products are known to lead to economic empowerment.[7]

Similarly, a significant body of literature argues that, in informal economies,[8] mobile money improves individuals' financial inclusion and provides new businesses with opportunities for technology startups and small businesses.[9] For this reason, banks, financial institutions and fintech[10] companies see financial inclusion both as a business opportunity and a social responsibility. A study by CARE International and Accenture has estimated that the global financial inclusion opportunity for banks is worth $380 billion. Additionally, big data companies see a huge opportunity in supporting financial transactions for the unbanked.[11] Given this opportunity, The World Bank has called for support and facilitation of financial inclusion throughout the world, highlighting the role of technology, especially mobile phones and the internet, which it believes have the potential to provide a profitable gateway for financial inclusion.

Digitalized financial services have the potential to both remove the distance constraint between banks and users and reduce the cost of providing financial services. They can also increase account ownership and usefulness. Successful examples of digital financial services include MPESA in Kenya, bKash in Bangladesh and N26 in Europe. In Kenya, for example, there are over 40 banks, but only a few are accessible to residents in the major population areas who are either unemployed or have low incomes. The evolution of mobile technology and digital financial services has enabled the development of the MPESA mobile banking service, which facilitates the access and use of financial services to the unbanked. The development and implementation of MPESA has increased business opportunities and promoted economic growth, with 70% of Kenya's GDP now flowing through this platform.[12]

Despite these successes and massive advancements in technology, a large proportion of the world's population remains unbanked.[13] To remedy this situation, there needs to be a deeper understanding of why people remain

6 For an explanation for what financial inclusion means, see Dev, S. M., op. cit., October 14. 2006.

7 For an article that describes how financial inclusion leads to economic empowerment, see Senyo, P. K., Gozman, D., Karanasios, S., Dacre, N. and Baba, M. "Moving Away from Trading on the Margins: Economic Empowerment of Informal Businesses through FinTech," *Information Systems Journal* (33:1), July 2022, pp. 1-31.

8 An informal economy is one where activities have market value but are not formally registered. Informal economies comprise activities as diverse as minibus drivers in Africa, market stands in Latin America and the hawkers found at traffic lights all over the world.

9 For explanations of how financial inclusion leads to economic empowerment for individuals, startups and small businesses, see: 1) Leong, C., Tan, F. T. C., Tan, B. and Faisal, F. "The Emancipatory Potential of Digital Entrepreneurship: A Study of Financial Technology-Driven Inclusive Growth," *Information & Management* (59:3) April 2022, Article 103384; 2) Amoah, A., Korle, K. and Asiama, R. K. "Mobile Money as a Financial Inclusion Instrument: What Are the Determinants?" *International Journal of Social Economics* (47:10), August 2020, pp. 1283-1297; 3) Ng, E., Tan, B., Sun, Y. and Meng, T. "The Strategic Options of Fintech Platforms: An Overview and Research Agenda," *Information Systems Journal* (33:2), April 2022, pp. 192-231; and 4) Canhoto, A. I., Quinton, S., Pera, R., Molinillo, S. and Simkin, L. "Digital Strategy Aligning in SMEs: A Dynamic Capabilities Perspective," *The Journal of Strategic Information Systems* (30:3) September 2021, Article 101682.

10 Fintech (a shortened form of "financial technology") companies use new technology to compete with traditional financial methods in the delivery of financial services.

11 For an overview of banking in the age of big data, see Packin, N. G. and Lev-Aretz, Y. "Big Data and Social Netbanks: Are You Ready to Replace Your Bank? *Houston Law Review* (53:5), May 2016, pp. 1211-1287.

12 For an article that highlights the impact of MPESA on the financial inclusion of residents in Kibera Slum, Kenya, see Thuita, G. W. "Impact of Mobile Payment Applications and Transfers on Business: Financial Inclusion and Innovation—The Case of Mpesa in Kibera Slum, Kenya," in book *Impact of Mobile Payment Applications and Transfers on Business*, pp. 173-189, IGI Global, 2020.

13 The need for financial inclusion is reinforced in Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S. and Hess, J. op. cit., 2018.

unbanked. But developing technological banking solutions is complex; thus, addressing the financial inclusion challenge also requires sophisticated know-how about technological advances that can enable solutions that will increase account ownership and usefulness. There are many complexities associated with technology-based banking solutions, including the rapid pace of technological advancements, the need for regulatory compliance, technology integration challenges, user adoption, reliability and scalability issues, and building partnership networks. To successfully develop and implement solutions that best serve the needs of the unbanked, practitioners also need to be mindful of the economic, social and environmental factors that shape the behaviors of the target market.

Based on the inductive research approach described in the Appendix, this article describes the evolution of The Odyssey Project, Inc., a fintech startup that has developed a unique solution to increase financial inclusion among the unbanked. The company started by understanding the audience and their needs for financial services and then selected the technology needed to develop its custom-made solution for the unbanked. It combined well-established legacy technologies with cutting-edge newer technologies to develop a solution that can effectively serve the needs of the unbanked. From our analysis of The Odyssey Project's evolution, we have derived recommendation actions that practitioners can take, particularly startups, to develop not only future fintech solutions but any technological solutions aimed at new markets.

Origins and Overview of The Odyssey Project

The Odyssey Project, Inc., a technology company that offers a software-as-a-service solution, was founded in July 2018 and is headquartered in Austin, Texas. The company's mission is to "humanize technology and make it accessible to everyone." Its initial offering is an end-to-end payment and software solution for consumers and merchants, called RoyPay. The idea for RoyPay was conceived by Bryce Jurss, the company's CEO, during his study-abroad trip to Rwanda, where he came across SMS banking services. He recognized that SMS, an old technology, was an effective way to provide financial services to the unbanked. However, the solutions he encountered lacked the range of services that were offered by banks or internet-based applications. He realized that SMS could be integrated with other technologies to increase the functionality of current SMS-based financial service solutions.

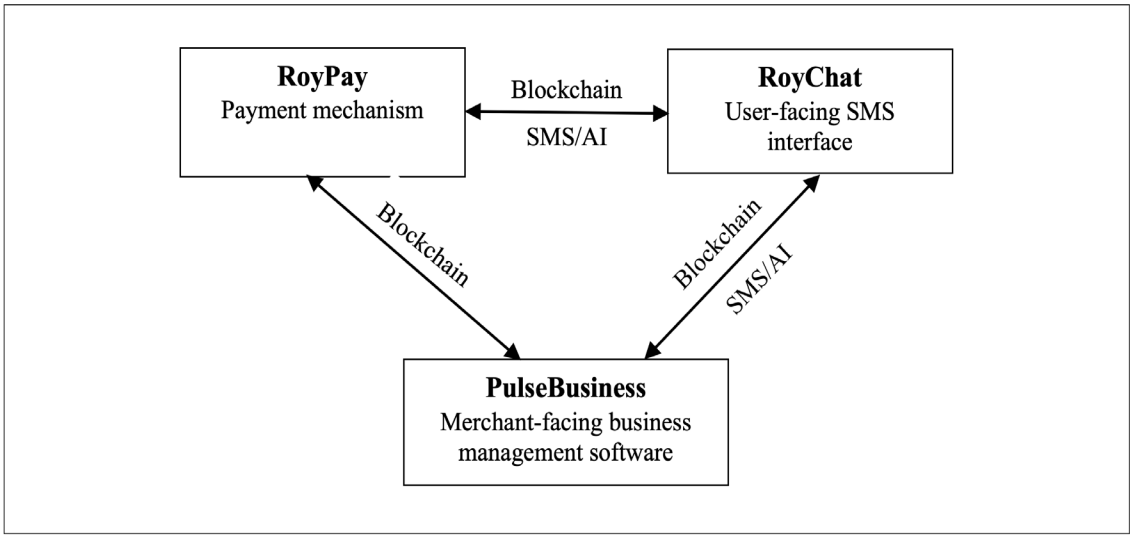
On his return to the U.S., he began working on his idea. He put together a team of like-minded individuals who worked in both the financial and technology sectors to develop a solution aimed at the unbanked. Together with his team, Bryce identified cutting-edge technology that could be integrated with SMS to achieve his goal. The beta version of The Odyssey Project's solution was launched in the U.S. in 2019, though the final product will be able to scale across countries to provide services to the unbanked throughout the world. At the time this article was first drafted (June 2019), the company had eight full-time employees, four business customers across 57 retail/restaurant locations, and 4,500 active users. As of June 2019, the company's annual revenue was approximately $500,000.

Including RoyPay, The Odyssey Project has three main products, which together provide a fintech solution. RoyPay is the blockchain-based core payment mechanism and processes peer-to-peer payments, currency conversions, bill payments and payments to merchants with credit/debit cards or bank accounts.

RoyPay is accessible to consumers through a consumer-facing interface called RoyChat. RoyChat is an SMS-based intelligent chatbot that runs on a mobile network and uses AI-based machine learning. It provides the consumer with a channel to interact with RoyPay and initiate transactions via the payment mechanism. RoyChat uses SMS to make and receive payments and lets consumers make search queries and, as of the 2019 beta version, order and pay for food in restaurants.

The third product—PulseBusiness—supports the merchant end of RoyPay. PulseBusiness is an all-in-one business management software app that integrates with RoyPay and RoyChat for seamless transactions from the consumer to the merchant and vice versa. This point-of-sale software processes business transactions and provides inventory management, billing and

Figure 1: The Odyssey Project's Three Products



expense management. It also allows merchants to leverage consumer data to make better business decisions.

Together, the three products cut costs and promote financial inclusion via an AI-powered consumer interface and a blockchain-powered payment mechanism. Figure 1 depicts the way in which the three products connect to each other.

The company's objective with these three products is to give everyone access to the global economy—i.e., take the technology to the people in the form that is most accessible and that the people find most usable. The strategic focus is on consumers, who are promised access, ease of use, convenience, affordability and security. We describe below how the idea of this solution was conceived, developed and implemented. Following the description of the evolution of the company and its products, we then highlight the challenges that the company will face as it expands.

Evolution of The Odyssey Project

In June 2018, Bryce Jurss put together a team to develop his idea of creating a fintech solution. He needed people who could write code, develop interfaces, understand technology and finance, and implement the solution. Most of all, he needed people who shared his vision of creating a better world.

Up to June 2019 (when this article was first drafted) The Odyssey Project and its products had evolved in three main phases: 1) Conceiving the idea, 2) Developing the solution, and 3) Taking the solution to the market. Though these phases emerged from in-depth interviews using an inductive approach, they closely correspond to the widely recognized stages of the entrepreneurial process:[14] idea generation, opportunity evaluation, planning, launch and growth.

Phase 1. Conceiving the Idea

The conception of The Odyssey Project's fintech idea can be divided into three stages: 1) identifying the need, 2) profiling the audience, and 3) generating the idea. Identifying the need concerns spotting a particular need in the market. Audience profiling involves describing the customer in terms of demographic and socioeconomic characteristics to develop a deeper understanding of the need. And generating the idea involves matching an appropriate solution to the identified need and audience profile.

14 The entrepreneurial process is described in *The Duke Entrepreneurship Manual*, Duke University's Fuqua School of Business, available at https://sites.fuqua.duke.edu/dukeven/selected-topics/the-entrepreneurial-process/.

Identifying the need: Bryce's exposure to the fintech industry started at home as a child and was reinforced later at college. His mother worked for Visa, which was his introduction to the basics of digital payments. At college, he signed up for study abroad programs, which exposed him to payment technology in low-income economies. He realized there was a clear disparity between banking facilities and solutions provided in low-income economies and those provided in high-income ones.

> *"Growing up, with my mom working for Visa, I have seen a lot of different things in the payment industry. … [Then], when I [was at Baylor University] and studied abroad in Rwanda, I came across mVisa and MPESA, a type of SMS technology used for banking that [enables someone] in a village to communicate with the bank, and do basic transactions, [such as] move money between bank accounts, but not actually transact with people. I also studied abroad in Hong Kong. Hong Kong doesn't have peer-to-peer payments. … So, … over the years I saw this disconnect of giving people access to services and technology, and really diffusing it to what they have available."* Bryce Jurss, Chief Executive Officer, The Odyssey Project, Inc.

Bryce perceived that the problem was access. And access could be facilitated by technology. Most unbanked people were either unemployed or had low incomes and lived in rural areas in underdeveloped and developing countries. Internet access was either unavailable or intermittent and slow. Smartphones were expensive. And the few financial institutions (e.g., banks) were far away. As a result, it was impossible for the unbanked to access digital financial services through expensive smartphones and high-speed internet, or to use physical financial services because of travel costs and time constraints. He also saw that existing applications like MPESA did not offer the needed functionality and thus recognized the need for a technology solution that did not require a smartphone, high-speed internet access or physical locations but could offer the range of services afforded by a physical bank account or an internet banking application.

Profiling the audience: Once Bryce had identified the need, the next stage was to create a profile of the people who needed the solution: his target audience. Understanding the audience is key to starting and sustaining any business. From his experiences in Rwanda and Hong Kong, Bryce knew that there was a disconnect with respect to access. In Rwanda, banks and formal institutions were far away from consumers. Moreover, consumers did not have smartphones or Wi-Fi access. They were largely low-income individuals with low levels of educational attainment and relied solely on their community, friends and family for financial support. They found it difficult and complex to understand and use technology-based solutions. However, almost all of them had a basic mobile phone and knew how to use it for messaging and making calls.

The situation in Hong Kong was rather different. The headquarters of HSBC, one of the world's largest banks, is in Hong Kong and many people there have smartphones, high-speed internet access and traditional bank accounts. However, the functionality of mobile banking apps did not support peer-to-peer money exchange, and low-income communities were still cut off from the mainstream banking system. Moreover, because of its sheer size, in 2019, China had the world's largest share of unbanked individuals (225 million adults).[15]

To understand the unbanked better, Bryce also looked at the unbanked population in the U.S. These were people with low incomes and mostly on welfare programs. There were also some who had a general mistrust of using online applications, partly because of security and privacy concerns.

From his experiences in Rwanda and Hong Kong and his insights into the U.S. unbanked, Bryce created his audience profile. He knew that those who needed a solution had low incomes and low levels of educational attainment. They relied on and trusted their community more than financial institutions and needed an on-the-go solution that did not necessarily require a smartphone or good internet access. They were also concerned about the security and privacy of their data and wanted more functionality than regularly sending, receiving and saving money.

15 For global data on unbanked individuals, see Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S. and Hess, J., op. cit., 2018.

Generating the idea: Bryce needed an inexpensive, on-the-go, functional, secure and easy-to-use solution that would motivate the unbanked to have accounts and actively use them. Poor internet access and the non-ubiquity of smartphones were the biggest limitations to digital banking in low-income economies. Though some of the population had smartphones, most did not. Access to Wi-Fi was limited. And even if a consumer had a smartphone and Wi-Fi access, the existing banking apps were both expensive—due to the number of intermediaries involved—and complex to use because of complicated graphical user interfaces and application clutter. Hence, the new solution had to employ technology that was readily available, inexpensive and largely understood.

> *"With a smartphone you need data and there are a lot of complexities in how they are actually moving the money. That can make it expensive…"* Bryce Jurss, Chief Executive Officer, The Odyssey Project, Inc.

For most of the unbanked, the physical locations of banks and financial institutions were far away, so the solution had to work without being linked to a specific location. Most people had basic mobile phones, and Bryce recognized that these could be leveraged to provide a digital solution. But since these phones did not support internet access, the solution had to employ a technology that did not require that. Bryce saw that SMS powered by mobile networks could be a solution. SMS was cheap, easy to use and worked on any phone. It also offered a secure medium for payments because the security footprint of detecting text is much less complicated than that of detecting voice. Moreover, SMS was also being successfully used for several existing financial services applications, including MPESA and bKash.

So, Bryce's idea was to use an old technology—SMS—to facilitate payments, peer-to-peer money exchange, and other financial and exchange services on mobile accounts that did not have to be linked with a bank or financial institution. SMS was accessible, cheap, mobile, secure and did not require additional infrastructure. He set about researching how SMS could be used to provide a diversified set of financial services to the unbanked.

Phase 2. Developing the Solution

There were two stages in the developing the solution phase: selecting technology and building the solution. The infrastructure for the solution was chosen in the technology selection stage, and in the building stage, the selected technology was deployed and the processes and workflows needed for the solution to work were created.

To turn the idea into a working solution, Bryce needed technology and business process expertise and knowledge to move his idea forward. To provide the support needed to design business processes, he appointed Jake Dahms as The Odyssey Project's chief operating officer. Blair Keaton joined as the chief financial officer to look after the financials and set up the company's compliance procedures. Lastly, Brian Smith was brought in as the chief technology officer to take charge of selecting and developing the infrastructure needed to create a viable solution. Together with Bryce, these three made up the founding team of The Odyssey Project, Inc. and shared a common vision to use technology for the greater good. Together, they selected the technology required to develop the solution and oversaw the development process.

Selecting the technology: The first technology choice was to use *SMS on basic mobile phones*. SMS is the simplest form of communication medium. It uses natural language and has a clean interface with the least amount of clutter. It does not require the internet, a smartphone or a complex graphical user interface. Moreover, messaging is a popular form of communicating and thus presents a viable means of reaching people in low-income economies. Because of this, it seemed to Bryce and his team that having an SMS-based chatbot to communicate and facilitate financial transactions was an appropriate choice.

> *"SMS was that barrier breakdown, because the majority of unbanked individuals have access to SMS—it doesn't need data, you don't need to build an internet infrastructure. … It de-clutters their phone—you don't need a million apps now to do one thing."* Bryce Jurss, Chief Executive Officer, The Odyssey Project, Inc.

The team next selected blockchain technology for the payment mechanism. As with any fintech solution, the core of The Odyssey's Project's solution is its payment mechanism. For the SMS-interface to work, a strong payment mechanism was required. The company could have used one of the existing payment mechanisms available on the market, but these would have tremendously increased the cost of the solution. Vendors and intermediaries charged additional fees every time money exchanged hands. Bryce and his team needed a mechanism that would support RoyChat without increasing its cost or complexity. The payment mechanism also had to take account of privacy and security issues and provide instant access. The team decided to use blockchain technology as the basis of the payment mechanism to support RoyChat, calling this component of the solution RoyPay.

Blockchain technology[16] offers a transparent, efficient, cost-effective and frictionless payment mechanism through the use of an immutable activity ledger. Blockchain uses tokens instead of real money to support a financial system that is very different from traditional banking. Payments are made digitally with tokens/coins, with the real money held in a central bank account. In this way, blockchain provides an end-to-end transaction mechanism that eliminates the middlemen, thus reducing the cost of transactions. It is also a secure means of financial exchange because the technology facilitates cryptography to protect information and tracks the movement of money (tokens) in a ledger. The blockchain uses validity rules at both the payee and payer ends to ensure correct functioning. The system can also support multicurrency transactions without additional costs because real money is never moved.

> *"Blockchain … allows us to build our own network, similar to … a traditional network using real currency … but the fund itself is never moving. The funds stay centralized in our bank accounts, and then it becomes an accounting game ... managing a massive ledger essentially in accounting."* Bryce Jurss, Chief Executive Officer, The Odyssey Project, Inc.

Another advantage of blockchain technology is that it enables instant access. The technology not only tracks but also carries out transactions in real time, as long as the issuer and acquirer are available to make the transaction. This feature is important from both the business and consumer perspectives. It is also beneficial for international payments: blockchain technology can reduce costs and increase traceability through instantaneous payments. A successful example of blockchain-based instant payments and financial transactions is E-Dinar, offered by the Tunisian Post Office. E-Dinar uses blockchain technology to enable cheap and instant payments through mobile networks.

> *"So once inside the payment engine, that's where the whole system works together. I can pay out my employees instantly, with low transactional fees."* Bryce Jurss, Chief Executive Officer, The Odyssey Project, Inc.

Another technology selection was to use an *AI-based chatbot*. The Odyssey Project's solution needed to understand users' SMS messages so that it could carry out the required tasks. Messages from a user to a merchant or vice versa had to be interpreted automatically by the software. To achieve this, the solution needed something that would act as a bridge between the front-end user interface (RoyPay/PulseBusiness) and the back-end payment mechanism (RoyPay). The team decided to deploy a chatbot built on mobile networks. This chatbot would take user commands and transfer them to the payment mechanism via servers. To achieve this, the chatbot would need to be smart so that it could provide services above and beyond taking simple default commands and understanding text messages from the users. By leveraging AI-based natural language processing capabilities powered by machine learning, the chatbot could be made personal and friendly and could be customized to the needs of the users. By seeking to understand users like a friend, it could build a relationship with them.

Several AI chatbots were already being used in e-commerce as recommendation agents. In

16 For more information on blockchain technology and how it works, see Mavilia, R. and Pisani, R. "Blockchain and Catching-up in Developing Countries: The Case of Financial Inclusion in Africa," *African Journal of Science, Technology, Innovation and Development* (12:25), August 2019, pp. 1-13.

the financial sector, chatbots like Erica[17] are designed to help consumers with their banking needs. These chatbots are supported by machine learning and the internet. If such a chatbot could work with SMS on basic mobile phones—i.e., over a mobile network—it could facilitate the diffusion of cutting-edge technology such as artificial intelligence among unbanked communities.

> *"Totally simplified, the problem is to give people access to the global economy … [by leveraging] existing infrastructure with new cutting-edge technology like AI, machine learning, deep learning, [etc.] to manage data, and provide relevant solutions. … Machine learning [can be used to look at] how we are interacting with people, [how] I can help this person, and [how] that person can help me. [Machine learning helps to build] a relationship and the conversation. … It's not about objectifying these people using other people."* Bryce Jurss, Chief Executive Officer, The Odyssey Project, Inc.

Because cost was a primary concern, The Odyssey Project chose to use *open source software* to build its solution. Using open source software would keep expenses to a minimum. The company also wanted to increase efficiency by maximizing the use of hardware and software. The maximum use of resources was achieved by selecting a *hyperconverged infrastructure*[18] and *containerization*,[19] which helped the company to auto-scale servers as needed and only pay for the space and time the solution was using.

The solution would not only need to be low cost but should also be secure and scalable. The company did not want to be worried about server-related technical difficulties, which might also pose a security risk. Containerization of server space created multiple copies of data, thus reducing the risk of losing data and making the solution safe and secure.

> *"[Containerization] also allows us to do more … we are not worried about a problem in our servers, which are technically services out of containers. If something [odd] should happen, an anomaly, … [the infrastructure] can bring [back] our environment in a matter of minutes [through] something called "reversal tab." [Thus] we are … not dependent on one machine always staying up, and it also means that if anyone hacks the system, we have some kind of security to avoid risk for all our certificates and patents. … So, if anyone hacks our system, they will be removed the moment we run the reversal tab."* Brian Smith, Chief Technology Officer, The Odyssey Project, Inc.

> *"With the technology that we are using, there are many copies of [the] data; [it's spread] across all nodes. … [We] don't have to worry about backing up data. [Though we] can, and we do … it [is] not a major issue … because there are so many copies of it spread across [the] U.S. [and] the world. [Our technology] … really changes the landscape of how … we make our data highly available, how … we back it up, and how … we keep it and make sure that we have a copy of it."* Brian Smith, Chief Technology Officer, The Odyssey Project, Inc.

Containerization also supports scalability. The Odyssey Project wanted the ability to roll out the solution internationally. The company therefore needed to select technology that allowed scalability at a global level without increasing cost or complexity.

> *"The solution is fully scalable globally, and can change at any time based on the usage of a geographical area, and that itself is pretty cutting edge in terms of where businesses need to be in order to be nimble and change [in response] to their environment. … [Our solution] lives within micro-services and*

17 Erica is Bank of America's chatbot offered to consumers for banking operations.

18 For a description of hyperconverged infrastructure, see Bigelow, S. J. *What is Hyperconverged Infrastructure? Guide to HCI*, TechTarget, January 2024, available at https://www.techtarget.com/searchdatacenter/definition/What-is-hyper-converged-infrastructure-Guide-to-HCI.

19 Containerization is a type of virtualization in which all the components of an application are packaged into a standardized unit called a container. A container encapsulates everything the application needs to run, including code, runtime, system tools, libraries and settings. This packaging approach allows the application to be deployed and run consistently across different computing environments, from development to testing to production.

Table 1: Technologies Selected for The Odyssey Project's Solution

Technology	Reasons for Selection
SMS/Mobile	**Acceptance and access:** SMS is popular and easily accessible through basic mobile phones. **Low complexity and cost:** SMS facilitates communication without requiring smartphones, an internet connection and complex graphical interfaces. It is therefore easy to understand and inexpensive.
Blockchain-Based Payment Mechanism	**Cost reduction:** Blockchain uses tokens for digital financial transactions, allowing the money to stay in a central bank account. It thus offers end-to-end transactions without additional handling fees by middlemen. **Security and transparency:** Blockchain automates and facilitates the tracking of tokens in the ledger. **Real-time transactions:** Blockchain can support multicurrency transactions without additional cost. **Compatibility:** Blockchain can be integrated with SMS to provide peer-to-peer transactions.
AI-Based Chatbot	**Diversity:** AI can help broaden the range of services offered through SMS. **Personalization:** AI makes the chatbot more personal and friendly.
Open-Source Software	**Cost reduction:** Open-source software is publicly available at no cost, so using it keeps costs at a minimum.
Hyperconverged Infrastructure and Containerization	**Cost reduction:** A hyperconverged infrastructure and server containerization can help with autoscaling, enabling the company to only pay for the space and time the solution is using. **Safety and security:** Containerization creates multiple copies of data in servers, thus reducing the risk of losing data. **Scalability:** Containerization facilitates scalability at a global level by creating multiple copies of data at multiple nodes.
The Cloud	**Scalability:** Cloud servers can be clustered across different regions around the globe. **Low complexity:** Cloud servers are easy to configure and modify and are less complex to manage because the technical difficulties of managing physical resources are offloaded to the companies that own the servers in the cloud.

> *containers, so everything is containerized, [which] means … that each specific feature works independently. … I can take that container, that one node, or a server as a node, … and … can deploy it and move it anywhere in the world and replicate it."*
> Bryce Jurss, Chief Executive Officer, The Odyssey Project, Inc.

The final technology choice was to use *the cloud* instead of physical servers, which would also help with the company's global expansion ambition. Cloud servers are usually easy to configure and modify and can be clustered across different regions around the globe. It also allowed the company to offload the technical difficulties of managing the physical resources to companies managing the cloud servers.

In summary, blockchain technology in tandem with containerization supported by cloud servers created multiple copies of the data across all nodes, allowing for the replication of data, the reduction of security risks, the provision of a high-tech solution at low cost, and the ability to scale the solution across multiple regions and countries. Table 1 summarizes the technology choices made by The Odyssey Project and the reasons for selecting them.

Building the solution: After selecting the technologies for the infrastructure, The Odyssey Project's team then procured the products to

build the solution, defined the business processes and created the beta prototype.

The infrastructure for SMS is already in place for most of the world, with the application facilitated by mobile network terrestrial towers and orbiting space satellites. This meant that no investment or development was required by The Odyssey Project. All the company had to do was register a mobile phone number assigned to RoyChat. After storing this number on their mobile phones, users could start messaging to communicate with RoyChat. Thus, the SMS part of the solution was easy to set up, use and share.

> *"It is just a number. And all you need is to text, and all of a sudden you have a RoyPay account. It is very easy to spread [the service] and acquire new business [through] word of mouth [and low marketing spend]. … [The] barrier to entry is gone in terms of what physical hardware do I need, what app do I need, what phone do I need."* Bryce Jurss, Chief Executive Officer, The Odyssey Project, Inc.

> *"The only other piece of technology is the end users' and we are trying to make that as open as possible. … Whether you have a computer tab or just an old flip phone to text, you can still interact with everything."* Jake Dahms, Chief Operating Officer, The Odyssey Project, Inc.

RoyChat directed messages received to a cloud server, where machine-learning algorithms absorbed the requests and analyzed the language and structure to determine the syntax and the meaning of the user's request. Upon understanding the request, the algorithms initiated a payment request flow that was sent to the blockchain ledger.

The first step in *procuring technology products* was to buy server space on Amazon Web Services. However, using cloud servers can increase the overall cost of a solution because the servers are always running. To work efficiently with the cloud, The Odyssey Project's team used the Kubernetes open source container-orchestration system, which allowed the company to configure the servers so they ran like microservices, meaning that it could auto-scale servers to the workload and thus only pay for the space and time used by the solution.

> *"We use containers, and we use container orchestration. [This] allows us to maximize the CPU utilization [because] the … virtual machines … are sitting in some data center on actual physical machines. … It also saves a lot of money [because] you don't have to physically commit [to an] amount of CPU or memory or disk space. The containers will share the amount of CPU so that you can transfer and scale accordingly."* Brian Smith, Chief Technology Officer, The Odyssey Project, Inc.

The hyperconverged infrastructure, together with containerization, allowed developers to create multiple partitions within a server for software-defined changes, each acting independently but together forming an integrated environment.

> *"The biggest thing is HCI (hyperconverged infrastructure), which adds in a hypervisor, and within that hypervisor… you do … software-defined things. … Now I can have just one server with … a virtual container [and], virtual machines that are operating with their own [operating systems], their own application layers, their own storage allocation. And they can all be their own parts of the server. So, you are [using] way more of the hardware [than] when you worked traditionally without having to buy that next piece of equipment."* Brian Smith, Chief Technology Officer, The Odyssey Project, Inc.

After the data on the servers had been analyzed by machine-learning algorithms, it was sent to the blockchain ledger to initiate financial transactions. The company selected an open source company called Chain to build the blockchain ledger and create virtual user accounts. The Odyssey Project was built on top of Chain's basic offering to produce a blockchain ledger that met its users' needs.

A significant factor in developing the solution was to *define the underlying business processes* and automate them. As part of the company's strategy to decrease costs, it focused on creating a

hands-off solution that would run on its own. For example, as soon as the code for the algorithms was written, it was passed on to an automated error-scanning system. It was then handed on to the development team to be deployed for production.

> *"The code is pushed to a repository, that then has a continuous delivery pipeline… that scans [it] for errors or scans the code for propensity for errors and security flaws. [Once] the code passes, [it] is passed on to development [for deployment]. … We do as much automation as possible so that we can [use] our time for building things."* Brian Smith, Chief Technology Officer, The Odyssey Project, Inc.

As chief technology officer, Brian Smith led the efforts to develop the solution, while Bryce Jurss and Jake Dahms (chief operating officer) defined the business processes. Blair Keaton (chief financial officer) and Brian Smith made sure that all the resources used were accounted for in terms of financial resources and tried to keep expenses at a minimum. Blair also determined the compliance procedures for the company.

The final stage in developing the solution was to *create the beta prototype*. In a typical issuer-acquirer scenario, the prototype would work in the following way:

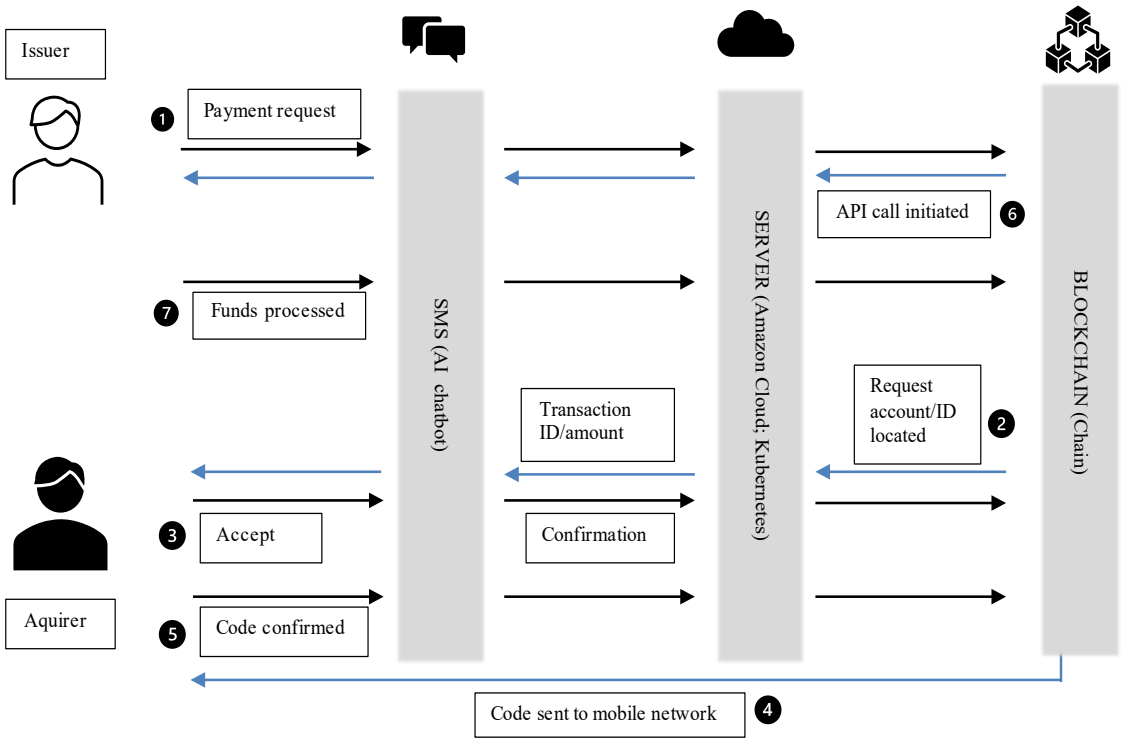
- The issuer sends a payment request via an SMS message to the acquirer stating the payment amount. (Number 1 in Figure 2)
- The request is received at the servers and detected by machine learning algorithms.
- Once understood, the request is sent to the blockchain payment gateway, which locates the acquirer's mobile account to send the payment.
- A prompt is sent back to the server once the account is located, where machine learning algorithms send an SMS message to the acquirer's number with the issuer's ID and transaction amount. (Number 2 in Figure 2)
- If the acquirer does not have the relevant payment gateway account, a prompt to sign up is also received via an SMS message.
- The acquirer either accepts or denies the payment request by replying to the SMS message. (Number 3 in Figure 2)
- If a confirmation is received on the server, the payment gateway sends a multifactor authentication code as a separate SMS message to the acquirer's phone number linked to the account. (Number 4 in Figure 2)
- The acquirer sends this code as an SMS message to the SMS interface and designates a payment method if more than one is linked to the acquirer's ID. (Number 5 in Figure 2)
- The confirmation code is received by the server and passed on to the payment gateway, which initiates an Existing Token API call to the issuer. (Number 6 in Figure 2)
- The issuer processes funds for the acquirer's designated payment method. (Number 7 in Figure 2)
- A record is made of a successful payment transaction and a confirmation summary is sent to the acquirer.
- If a payment fails, a decline prompt is sent via an SMS message to initiate a new payment or cancel the transaction.

Figure 2 provides a numbered visual outline of the payment transfer from issuer to acquirer. The numbers indicate an action that initiates a process through the selected technologies.

This beta prototype worked in almost the same way for the peer-to-peer payments. The request for payment is issued in a group message rather than to an individual, by using everyone's number or payment IDs. The request goes through the server to the payment gateway and then to the acquirers, providing them with the transaction amount and issuer's ID. Acquirers respond with a confirmation or denial. The issuer confirms the transactions with the help of the multifactor authentication code from each acquirer and processes the payments to the designated payment methods. Transactions are then recorded. A confirmation summary is sent to each acquirer.

The same process could also be reversed when the acquirer makes a payment request from the issuer or from other people when funds from various people are pooled to reach a particular

Figure 2: Payment Transfer Mechanism of The Odyssey Project's Solution



amount. The total is equally split among every user in the chain, with SMS facilitating the issuing and receiving of funds to either pay off a merchant or another user.

Phase 3. Taking the Solution to the Market

Phase 3 can be described in two stages: pre-implementation testing and launching the solution. The pre-implementation stage comprised pilot testing the product and identifying potential clients, while the launch stage involved the formal introduction of the product to the market. There will also be a future third stage because the company plans to expand into other markets and countries.

Pre-Implementation testing: Once the infrastructure was in place and the business processes had been defined, The Odyssey Project's team started looking for an audience to test the prototype. In 2019, about 200 students at Baylor University were asked to use RoyChat to test the chat interface. C & H Hawaiian Grill, Texas, was the first company to test the business interface, RoyPulse, the same year.

Feedback from the students and C & H Hawaiian Grill led the company to make a few additions to the prototype. The team also realized that to test the product at full scale in the U.S., it had to expand the audience to the banked population. To do that, The Odyssey Project partnered with Visa to offer additional payment gateways. This partnership would help RoyPay process payments not only from SMS messages but also from debit and credit cards. Importantly, the Visa partnership also allowed the company to bring in more payments to RoyPay and helped with mechanism testing.

> *"You still have to interact with the other payment methods, in order to get funds into that RoyPay account, unless someone would text money through SMS [RoyChat]."*

Bryce Jurss, Chief Executive Officer, The Odyssey Project, Inc.

The company also partnered with Wells Fargo and Meta Bank. These banking partnerships allowed it to test multiple modes/methods of payments: bank transfer, digital wallets, mobile money or physical cards. They also provided instant money transfers to bank accounts.

> *"Once [a payment is] inside RoyPay, [the] whole system works together. … I can [make my payroll payments to] … employees instantly, it doesn't cost me anything. … there are no transactional fees."* Bryce Jurss, Chief Executive Officer, The Odyssey Project, Inc.

The team also decided to focus its efforts on one industry—restaurants—on the merchant-client side for payment processing. It also decided that the best way to test the payment mechanism was to have some companies on board that would use PulseBusiness to make and receive payments to/from employees and customers. This would encourage employees and customers to use RoyChat to interact with those businesses.

Launching the solution: The RoyPay solution, which facilitates payment processing with a blockchain ledger, was launched in March 2019 in the U.S. This product supported payments via SMS, credit/debit cards, mobile money and digital wallets. C & H Hawaiian Grill, the restaurant involved in testing the product, became the first client on the merchant side.

RoyPay was offered to the market on a subscription basis. Initially, revenue was generated mainly from the business software, but The Odyssey Project anticipated that there would also be earnings from marketing applications that could be integrated into RoyChat.

The PulseBusiness business interface was fully functional by the end of 2019, but at that time, the RoyChat user interface was still in beta testing because the AI chatbot needed to gather as much data as possible to become responsive and smart.

> *"We … have a pretty decent structure in beta … where you can actually checkout, pay, and have everyone in a group to text for group payments …"* Jake Dahms, Chief Operating Officer, The Odyssey Project, Inc.

Future expansion plans: The company eventually wants to roll out the solution to developing countries. However, it believes there is also a market for it in developed countries. People everywhere want security and convenience, and RoyPay offers them that.

> *"Security is huge. It's the number one concern of businesses these days in technology, and consumers… [want to ensure the] privacy of [their] data. RoyPay uses anonymous data… Everything is anonymous. Even the marketing algorithm behind you as a user is … anonymous."* Bryce Jurss, Chief Executive Officer, The Odyssey Project, Inc.

The focus on one vertical industry will eventually shift to all kinds of financial exchanges regardless of industry. Diversifying to other verticals will help The Odyssey Project to become profitable and attract investment for the planned expansion.

> *"The three products that we have can scale under different verticals; they just adapt, and that's the ability that we have … designed into the core. [We] can mold the technology to how [the] business operates [rather than] molding [the] business to the technology, and that's the difference."* Bryce Jurss, Chief Executive Officer, The Odyssey Project, Inc.

Funding and investment will be key for expansion. But, as of the end of 2019, the company was focused on perfecting the beta product before pitching it to big investors for funding for expansion. It was focused on developing a network of partners both within and outside the U.S. to facilitate expansion when it is the right time.

> *"We have actually held off on obtaining funding … because we [don't] necessarily need it immediately; ... we have [proven we can be successful] without a massive amount of funding. But we are always talking to people and looking for avenues to improve the product [and] onboard*

> *the right investors."* Blair Keaton, Chief Financial Officer, The Odyssey Project, Inc.

Though the idea of RoyPay is new and unique, it promises to be a viable technological solution for financial inclusion on a global basis. The Odyssey Project is positioning RoyPay, with its business and user interfaces and payment mechanism, as a friendly, relationship-building and human solution for financial and informational inclusion, thus providing the unbanked with access to the global economy.

> *"Roy is your new best friend. It's that person [who] is always one text away—the friend [who] is always out getting something and asking you if you want them to pick anything up for you. That's what Roy is."* Bryce Jurss, Chief Executive Officer, The Odyssey Project, Inc.

We now describe the challenges the company will face when it decides to expand into new markets and countries.

Expansion Challenges

Giving people access to the global economy is a challenging and ambitious endeavor. The Odyssey Project will face several challenges as it expands and implements the full-scale deployment of its solution.

First, educating the unbanked about the use of the company's technology and its benefits represents a huge challenge. The unbanked are not always looking for or convinced by foreign technological solutions. Especially in developing countries, they may view technology that is being offered to them by foreign companies with skepticism. Their culture may not be receptive to what some might interpret as postcolonial efforts to make them dependent on a Western innovation beyond their control. Their mistrust may make it hard for companies like The Odyssey Project that are trying to help them. Persuading them to adopt the technology may therefore be a challenge.

Investment funding is also an issue. Blockchain solutions can be expensive to implement in underdeveloped countries that do not have a mature internet infrastructure. And, in order to work, the solution will require considerable energy consumption. This may be challenging since most underdeveloped and developing countries have very low electrification rates. These constraints mean that obtaining investment funding will be a key challenge for scaling up to a global level, particularly in underdeveloped and developing countries.

Successful implementation of The Odyssey Project's products in underdeveloped and developing countries also depends on the acceptance of the solution by the local government, policy makers, merchants, banks and network operators. Local governments and policy makers may need to establish a clear and favorable regulatory framework for addressing concerns related to data privacy and security in blockchain applications. Even though blockchain solutions are self-regulatory, companies offering these solutions need to be aware of and comply with local regulations. For example, BitPesa in Kenya was able to leverage the existing financial system by engaging with local government regulators and developing a connection between the MPESA cryptocurrency network and mobile network operators. Moreover, the adoption of blockchain solutions by the government and public sector can demonstrate the potential of the technology and build trust among citizens and businesses.

Language is also a barrier to implementing the solution in developing countries. The service will have to be provided in the local language, and mobile networks, as well as the machine learning algorithms, should be able to adapt and learn how to carry out transactions effectively. But training a machine learning algorithm takes time. People need to have conversations with the algorithms for them to become smart and provide customized services. As a result, the initial product might not be as intelligent and personalized, though it will become better over time. But that growth depends on the users. The more that users interact with the solution, the more data the algorithm will have to analyze and learn from. If the solution is only used for specific tasks, with a limited vocabulary used in the interactions, it will remain as a less intelligent version of the product.

Another related challenge is that natural language processing models can introduce bias when handling local expressions. Google Translate, for example, translates all languages to

Table 2: Challenges of Implementing RoyPay in Developing Countries

Challenge	Description
Awareness	Educating the unbanked about the use and benefits of technology and overcoming cultural resistance.
Scalability	Implementation requires capital for infrastructure and functionality, acceptance by local governments/policy makers, and integration with local regulations, languages and mobile network operators.
AI	To be effective in the local language, an AI chatbot requires time to learn through conversations.
Entry Barriers	Implementation requires global and local compliance with financial services industry standards for safety and security. Existing bodies offering financial services, like banks, might consider the new solution a threat to their business and impose barriers related to partnerships and integration.

English first before translating them to another language. This process can sometimes introduce language- and culture-related bias in translation and thus hinder effective communication.

The final set of challenges relate to the financial services industry, which can impose many barriers for new entrants. Compliance is a huge issue. Globally, a few players dominate the market and they may not want disruptive startups in the industry. There is also the need to comply with the rules on consumer data security and safety specified by regulatory bodies. However, these bodies may not necessarily understand new technologies like blockchain and may be reluctant to change traditional practices and/or accept new ones. Acquiring the knowledge to ensure compliance with international regulations can be very challenging.

For similar reasons, it can be difficult to form international partnerships. Existing companies offering financial services, like banks and mobile networks, may see The Odyssey Project as a threat and be reluctant to enter into the partnerships that will be necessary for the company to operate in certain regions.

Table 2 summarizes the challenges faced by The Odyssey Project as it progresses its aim of improving financial inclusion for the unbanked in developing countries. It will need to find ways of overcoming these challenges before it can make its product available to the unbanked. Note that these challenges are not unique to the financial services sector; they apply to almost all technological solutions that entail change, acceptance and adoption, particularly those employing blockchain and AI-based machine learning.

Recommended Actions Derived from the Evolution of The Odyssey Project

Based on our analysis of the evolution of The Odyssey Project and its products, we provide eight recommended actions, many of which are reinforced by findings in extant literature while others provide a new perspective on the development and deployment of technology. For example, the marketing literature recommends that businesses "know your audience" before developing a new product or service. Similarly, the economics literature suggests that "use resources efficiently" is a prerequisite for maximizing profit. Though the recommended actions are derived from The Odyssey Project case, they can be adopted by companies introducing a product or service to a new market. Table 3 summarizes how the recommended actions relate to the three evolutionary phases we identified in The Odyssey Project case.

Action 1. Aim for Sustainability

The Odyssey Project's solution provides informational services, similar to a search engine. People can look for anything, as long as it is available on the web. These services represent a huge leap toward a knowledgeable banked society. The payment gateway, together with machine learning, matches people's budgets as specified by the mobile account or as

Table 3: Summary of the Evolutionary Phases and Recommended Actions

Phases	Stages	Description	Recommended Actions
Conceiving the Idea	Identifying the Need	• Understood the fintech industry and context of the unbanked • Identified a disparity among financial services available to low-income vs. high-income economies • Understood the importance of making banking accessible	• Aim for sustainability
	Profiling the Audience	• Observed and analyzed unbanked in Rwanda, Hong Kong and the U.S. • Described the target audience: low-income, not very educated, concerned about digital security and privacy, comfortable with local peer-to-peer transactions, did not have smartphones and/or internet access, had to travel long distances for banking services	• Know your audience
	Generating the Idea	• Understood that the solution had to be inexpensive, simple, on-the-go, secure and functional • Found that mobile phone SMS technology could support the required criteria	• Take the technology to the people • Aim for sustainability
Developing the Solution	Selecting the Technology	• Chose SMS for simplicity, low cost and mobility • Chose blockchain to support secure, real-time, global and inexpensive payment processing • Selected machine learning for natural language processing and automated smart processing • Chose to use open source software and cloud servers to reduce cost and risk • Chose techniques to maximize the use of software	• Take the technology to the people • Use resources efficiently
	Building the Solution	• Partnered with network operators to support SMS • Subscribed with AWS for cloud services • Chose Kubernetes for container orchestration • Partnered with Chain for basic blockchain ledger • Automated as much as possible to decrease cost • Allowed users to customize data sharing and privacy • Created a process flow for the solution	• Develop a network of partners • Keep the greater good in mind
Taking the Solution to the Market	Pre-Implementation Testing	• Tested the solution with users and a business • Used the feedback to expand the functionality by adding payment gateways and methods • Partnered with Wells Fargo and Meta Bank for multiple payment modes and methods • Decided to focus on one industry for launch in the U.S. • Decided to focus on the business side to promote and motivate the use of RoyPay and RoyChat	• Adapt as needed • Develop a network of partners • Start small and stay focused
	Launching the Solution	• Launched RoyPay as fully functional for businesses but beta for RoyChat (RoyChat was expected to launch fully by the end of Summer 2019) • Decided to make the product perfect in the U.S. before scaling it internationally • Decided to initially use the restaurant industry to achieve profitability and attract investors for international expansion • Decided to connect and build relationships with stakeholders inside and outside the U.S. before scaling internationally • Decided to leave the idea unpatented for others to adopt	• Adapt as needed • Develop a network of partners • Keep the greater good in mind

learned from previous transactions. It provides suggestions on spending and saving money relevant to the account and answers queries in a manner that gives users what they need and can afford. This fosters a healthy, productive and clutter-free relationship between the interface and the user, where the interface guides the user toward a debt-free financial profile that engenders peace of mind and financial well-being. Building such a relationship has several important implications for marketing and advertising on technology platforms.

The solution also involves businesses and institutions in engaging with and promoting the digitalization of financial services. These activities help to create an ecosystem that fosters and sustains digital financial inclusion in a way that not only provides financial services but also educates users on making informed spending choices and promotes sustainable banking.

Action 2. Know Your Audience

Any business setting out to offer a product or service in a new market needs to know its target audience. Developing a product or service that is not needed by the target market is a recipe for failure. In the case of The Odyssey Project, the solution for financial inclusion needs to fit the profile of the target unbanked audience. This audience needs a cost-efficient and simple solution that offers a diversified set of financial services. The SMS-based mobile phone solution is not a disruptive technology because the unbanked are already familiar with text messaging. Natural language communication via SMS messages is not complicated to understand and use and thus requires the least amount of cognitive effort. By combining SMS on basic mobile phones with blockchain technology, The Odyssey Project's solution involves minimum transaction fees. Moreover, users do not need to open and fund a conventional bank account. This makes the solution inexpensive to acquire and maintain and easy to use. The solution also enables peer-to-peer sharing, thus supporting a way of life that the unbanked are familiar with.

The merchant side of the solution enables and motivates governments and private companies to start making digital payments, which helps to foster the adoption and development of digital banking.

Action 3. Take the Technology to the People

The Odyssey Project case shows that the technological solution should fit naturally into the environment of the target audience. Instead of creating a solution that requires people to take several actions to use it, they should be able to use it without having to put in a lot of effort. Unfamiliar technology can create a cognitive load that people may not be willing to take on. This can mean that new products fail to gain traction because they are perceived as being too complicated to use.

The intelligent mobile blockchain solution takes cutting-edge technology to people's doorstep, giving them access, flexibility and personalization. They do not need to buy additional physical devices, subscribe to software applications or pay fees for the financial services they use. The solution is also easy to distribute and use. All consumers need to do to get the service on their phone is to add one mobile number to their contacts. One simple message to this number will activate their account. If a financial transaction exchange needs to be made with someone who doesn't have an account, a text message or email will prompt that person to set up an account to receive the transfer or make a payment. The lesson from the case is that the service needs to be simple to use and the technology should be taken to the people rather than making them travel to use a service.

Action 4. Use Resources Efficiently

Another action that The Odyssey Project took to ensure the success of its solution was to maximize the usage of resources. We recommend that businesses looking to launch a digital product or service in a new market do the same. Using resources efficiently is a proven way of increasing efficiency and profitability. In developing the SMS-based solution, the company focused on leveraging the mobile phone infrastructure to its maximum capacity. Doing this enabled the company to keep costs down while developing a solution that was as good as an expensive one. In addition, the back-end infrastructure uses containers, auto-scaling, a hyperconverged infrastructure and cloud servers, all of which are cost-efficient techniques for

maximizing the use of hardware and software resources.

Action 5. Develop a Network of Partners

Another action for successfully implementing a digital solution in a new market is to develop a network of partners, something that The Odyssey Project's management team realized early on. On the technology side, the company did not try to develop everything in-house, but partnered with firms to procure and leverage existing solutions. It also recognized the need to network with governments and other policy-making institutions, mobile network operators, banks, financial institutions, technology companies and fintech companies, all of which are important external stakeholders in determining the functionality of the solution. For example, even after adding additional payment gateways to the solution, the company partnered with Visa and local banks.

The Odyssey Project's leaders recognized that the banking industry has a few major players and that barriers to entry could be quite large if it did not develop partnerships. They also understood that the company would have to develop a network of partners in each country the solution would operate in. These partnerships would be important for accessing local regulatory knowledge and business acumen.

Action 6. Keep the Greater Good in Mind

Many organizations today are taking steps to promote social good. The growing importance of corporate social responsibility highlights the need for endeavors aimed at improving the business environment and society. Thus, all firms, including those launching a digital product or service in a new market, should keep the greater good in mind.

From its inception, The Odyssey Project's mission was to humanize technology and make it more accessible. Bryce Jurss conceived of the idea of building a culture of financial security and transparency. Consumers are unaware of the intermediaries involved in making digital transactions and, even more so, of where their money is going in terms of transaction fees and taxes. Just as importantly, they are also unaware of where their information is going and how many times it is being shared. With the huge concerns about security and fraud, consumers either become insensitive to the issues related to data transparency and fraudulent practices or they become extremely paranoid and refuse to use any technology at all. Consumers in developing countries are even more unaware of these issues. There is, hence, a general mistrust of technology.

The Odyssey Project offers a solution that motivates consumers to be sensitive and aware of their information, money and data. Moreover, the solution provides users with the ability to customize the kind and amount of information they want to share with the person/business they are interacting with. The founding team hopes that once consumers realize the possibility and importance of protecting their data, they will demand that all organizations comply with data security and confidentiality standards. Bryce and his team believe in sharing the company's solution and have thus deliberately not patented it. They want it to be adopted as a standard practice. Their mission is to change the culture of the global financial system so that everyone can have access to digital financial services in a safe, reliable and knowledgeable way, facilitated by a customized transactional experience.

Action 7. Adapt as Needed

As illustrated by the Odyssey Project case, any business looking to launch a digital product in a new market should be prepared to adapt to changing circumstances. The company started off with the idea of providing a fintech solution to the unbanked. But during the testing phase, the management team realized that the solution could equally benefit the banked. The team also realized that to comprehensively test the solution before scaling it, the company needed to work with people in the U.S., most of whom were banked. The company quickly made adjustments and extensions to the product, to cater to the demands of the audience they were using to test the product. With ever-evolving technology and increasing competition, companies often develop products that can cater to the demands of multiple target segments. The Odyssey Project did this effectively by establishing a network of partners. However, the company did not shift its

focus. While the objective remained the same, the additional functionality could now cater to an additional target segment.

Action 8. Start Small and Stay Focused

A key action derived from The Odyssey Project case is to start small and stay focused. The nature of the company's solution attracted many verticals, providing it with numerous opportunities, but it decided to initially focus on the restaurant sector. The company wanted to be able to make the solution profitable quickly without "boiling the ocean." Plans for expansion, as well as additional services, were put on hold until it had perfected the product.

Sometimes, startups can be seduced by the enormity of their idea, and work on too many things to effectively implement it. This mindset can lead to confusion, wasted funds—which most startups lack—and dissatisfied employees, investors and customers. We therefore recommend that digital startups initially focus on building beta versions of their products and learning from them. This approach will enable them to establish specialized niche services that can be expanded later on.

Concluding Comments

In this article, we have described the evolution of The Odyssey Project, Inc., a software-as-a-solution startup that is building a fintech solution for financial inclusion. This company was worth studying because of the relevance of its solution to the unbanked, particularly in developing countries. Though the article is based primarily on just five interviews, we also had multiple discussions before and after the formal interviews to understand the project and the proposed solution. The solution itself is unique in terms of the combination of old and cutting-edge technologies it employs and the functionality it promises. It also has the potential to dramatically change the culture of financial exchange in the future. As The Odyssey Project grows, we plan to reconnect with its management and collect more data to detail the company's progress and the success of its digital banking solution.

Financial inclusion is important because it aims to provide the unbanked—a significant proportion of the world's population—with access to financial services. There are opportunities for businesses as well as the unbanked; thus, encouraging research into and developing fintech solutions that effectively support financial inclusion is important. The article not only provides insights relevant to fintech entrepreneurs but also highlights financial inclusion opportunities for policy makers, governments, regulatory bodies, and mobile and technology companies. Most importantly, the insights provided in the article are not just limited to underdeveloped or developing countries but apply to the unbanked anywhere in the world. Moreover, in studying the evolution of The Odyssey Project and its products, we have identified actions that practitioners can take when developing and implementing digital solutions aimed at new markets.

The most important takeaway from the article is that the technology deployed should be appropriate for the local environment. We have shown that combining legacy technologies with newer innovations can create effective solutions. But regardless of whether new or old technology is deployed, the success of a solution ultimately depends largely on knowing the audience and keeping its preferences in mind.

This article focuses on a startup whose fintech idea, though still in beta at the time of writing, is unique and worth studying. The startup has already gained a lot of traction and is beginning to be profitable. Given the technologies employed and the size of the unbanked population, we will not be surprised to see the recommended actions derived from the experiences to date of The Odyssey Project being reinforced in future studies of other applications that combine legacy and cutting-edge technologies.

Appendix: Research Method

We conducted a qualitative case study of the evolution of The Odyssey Project, Inc. and its products, based primarily on five in-depth interviews with the company's top management team. We also collected secondary data from the company's transmittal reports and website and from project presentations. In addition, we reviewed extant literature to help us understand the thought process of the company's top management team and their ability to conceive, develop and implement the solution.

The semi-structured interviews were conducted, transcribed and analyzed over a period of three months in 2019. The transcriptions were verified by the interviewees. We also had numerous informal conversations with the management team to understand the business proposition and its operations. The interviews and data collection took place at the time of the company's initial startup and the launch of its first beta product. The interviews focused on understanding The Odyssey Project's vision, the process of idea generation, the company's business operations, the technology selected for its solution, the implementation challenges and the company's plans for expansion.

We analyzed the transcribed interviews to inductively identify the phases of evolution, the stages within each phase and the actions taken to ensure the success of The Odyssey Project's solution. This analysis followed established methods of inductive analysis[20] and was further validated by consulting specialists in the fields of blockchain and financial inclusion. We triangulated the interview analysis with company reports and extant literature to assess and gain a comprehensive understanding of the interview transcriptions. These supplementary sources provided technical details, facts and financial data. In addition to the quotes from interviewees included in this article, additional detailed quotes providing evidence for our findings are available from the authors.

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