



Creating the Amazon of Healthcare

Enterprise Healthcare Systems and Consumers demand a new way to deliver & consume Healthcare that doesn't exist yet.

OBSERVATIONS ON DIGITAL HEALTH FROM LIFE365



Life365

Connected. Engaged. Everyday.

Digital Health as a Service Platform



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The Need for a Scalable, Technology Agnostic Platform to Move the Point of Care to Home

Over the past decade, I've led and worked with teams focused on addressing healthcare needs outside of the hospital – helping to make the home a viable “point of care”. The goal has been to develop technology and software platforms that link the right solutions to the right patients and populations to increase adherence and better maintain (or improve) patient conditions through behavioral and data generated insights. If done right, there is a resulting increase in operational efficiency for entities that provide care and are financially responsible for patient populations (Integrated Health Providers, ACOs Payers, 3rd Party Solution Providers, Home Healthcare and Employers) as they straddle existing and new payment models. With payments now tied to performance instead of “fee for service”, it is more critical than ever for financial stakeholders to address 30 Day Readmits, Bundled Payments, MACRA, MIPS, etc. – while increasing quality of care and influencing Star and HEDIS ratings.

There is great need for change and it needs to occur rapidly. There are many innovative tools in the technology toolbox that can help in the transition from Mobile Health to Digital Health, unfortunately many of the same hurdles in scalability still exist. There are many clever one-off solutions (“shiny objects”) that aren't connected to anything. The lack of interoperability, cost and time to integrate, and mis-alignment of technology to users' needs has kept the industry in a state of treading water, but the timing is now right for real change.

As digital health evolves and new solutions gain strong evidence for enhancing outcomes, there is increasing need in the industry for the architecture and development of a service platform that will enable providers to quantify, stratify, integrate and align appropriate digital health solutions to scale to individuals across all populations that engage in the healthcare system – from Health and Wellness to Complex Care.

Integrate, Align and Engage

This platform must be able to streamline integration, alignment and procurement of the thousands of digital health solutions and related services used by enterprise customers. For end-users – individuals and populations using the solutions – the platform must be intelligent, flexible, nimble and easy to engage with to drive adoption and keep solutions relevant going forward. Engagement is key to both business and consumer users.

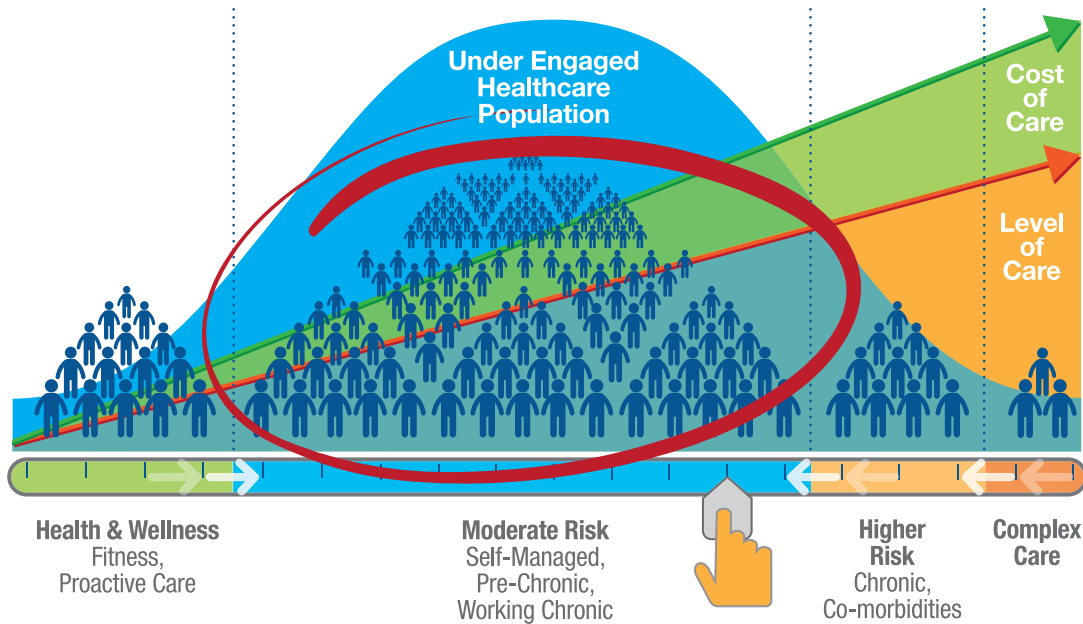
I discussed this platform concept recently in an article, *Creating a Unicorn in Mobile Health: Moving from Efficacy to Scalability*, which described the challenges and escalating opportunities for the next wave of digital health – and the need is even greater now. EMR/EHRs and Analytic backend software systems must meet the growing demand for cost effective, transparent and actionable data. This demand is driven by an industry moving to “at risk” (Fee for Value) programs and new payment models. More and more data gathered from disparate sources will continue to soar over the next decade. However, healthcare systems are not yet prepared to handle the large volume of divergent data that will come from outside the hospital, nor are they organized to integrate and contextualize it effectively.

A New Digital Health Platform

Digital health and remote health monitoring solutions cover a wide spectrum of products and services. At the far end of the spectrum are traditional remote health solutions that have concentrated on the more costly patients in the healthcare system – the high risk / complex care population. These solutions have demonstrated efficacy over the years, but their higher cost and complex implementation have limited deployment to a broad population. To really impact the healthcare system, these solutions need to “shift left” into medium/moderate risk patients in order to address a greater population that aligns with new payment models, increased ROI, Quality of Care and Engagement.

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On the other end of the spectrum is Wellness and Fitness. These solution providers need to move into healthcare to prop up sagging sales with narrow margins, like those in consumer wearables. Healthcare industry leaders realize the data sets from these consumer technology solutions do not significantly impact the level of care required for most patients. Even though the majority of these solutions are lighter in touch and lower in cost – their ability to really “move the needle” in the care of a larger patient population is minimal – again, the economics simply don’t work for their financial / business models. These solutions must “shift right” into the higher cost burden of the pre-chronic, working chronic and retiree chronic patients.

Scaling “left” or “right”, aligning the best fit solution with the patient needs to achieve the best outcome at the best cost – this is the real benefit of an integrated Digital Health as a Service Platform (DHaaS).

Using DHaaS to Move from Efficacy to Scalability

Challenges still exist today that are significant barriers to scalability including:

Lack of interoperability between EHR and digital health solutions. Digital health solutions should integrate into the clinical workflow and back-end, however, healthcare providers simply cannot integrate the thousands of digital health solutions into their backend and make the timelines for delivery and economics work. Because of this, Health Systems will typically address the low hanging fruit and leave the rest on the vine and untouched.

There are 1000’s of digital health solutions to choose from with little to no characterization, alignment or stratification of which patient characteristics, environments, and situations will benefit the most from the solutions. Mis-alignment results in bad user experiences, low adherence, and poor ROI. On the other hand, limited

integrated solutions can cause the healthcare provider to “cherry pick” patients to work with a given solution – typically those they already know, leaving the alignment and ROI at risk.

The bulk of chronic care is in the Senior population, and although 60% of Seniors have a smart phone, very few use them for much more than calls, texts and emails, and even fewer are utilizing it to help control their health.

The days of disconnected systems and platforms are numbered. In order for the industry to scale in the next 18-24 months, digital health solutions must be quantified, integrated, aligned and patients engaged on a common platform that allows those that are financially responsible for the patient to choose from a host of solutions, already accessible from their backend enterprise platform.

Health systems want to and must be clinicians first – not technicians. Offering a Digital Health as a Service platform and Health IT Middleware Framework will allow this transformational step to be implemented and scaled across their enterprise.

End users of these solutions need to be engaged properly – otherwise, the enterprise can save some time and money on implementations, but outcomes will still miss the mark and payment models will be at risk. The majority of consumers want to shop for and receive healthcare and medical services in a new way that doesn’t exist yet. Health systems want to select and deliver healthcare and services more efficiently. This new way is the DHaaS platform.

The Life365 Digital Health as a Service Platform is a big vision, but we’ve received validation from leading innovators in the industry – we are already rolling out the our solution with customers in practical phases. This platform is the engine that will produce an integrated Digital Health Catalog – and help drive the “Amazon of Healthcare”.



Establishing the Pillars of Digital Health as a Service (DHaaS)

Digital Health as a Service (DHaaS) – A Single Integrated Platform

The phrase, “What gets measured, gets managed” is universally understood as truth. Collecting patient vitals is a good start, but these measurements alone are not enough to effectively manage the health of patients – especially as the industry shifts the point of care to outside the hospital. We need solutions to capture more actionable data that can meaningfully impact the health and care of specific individuals or patient populations, while remaining cost effective. Data should indicate trends in physiological, behavioral and environmental patterns, and include aggregation of different types of information, such as Digital Marketing, Social Media and User Engagement metrics – in order to produce better outcomes for the broadest population, relieve strain on healthcare systems and ultimately improve the bottom line for financially responsible stakeholders.

This has worked extremely well in the retail industry. For example, Amazon’s platform has catalyzed ecommerce and online retail shopping at scale by quantifying the offerings, integrating them to the Amazon cloud, aligning and engaging products with consumers on an extremely personal level. The Amazon platform facilitates the purchase, payment and distribution of goods, from both high volume mainstream products and the long tail, less mainstream products. This same exercise must happen with digital health, in order for the industry to scale.

For many years, the industry has provided line item catalogs of medical devices and solutions, which are highly static offerings and barely scratch the surface of providing the economics and ease of integration necessary to scale dynamically. These catalogs need to be “Digitally Integrated Catalogs” that allow solutions to be integrated and aligned to a specific patient population. A truly open platform allows solutions and services to be quickly contracted and integrated and will facilitate a consolidated data flow into the health systems backend system. New, more effectual solutions could be ready for health systems in a shorter time frame at a much-reduced integration cost, reducing the workload of the IT team and reducing the barrier to entry for many new solutions.

Many customers would prefer to utilize a service platform that includes hundreds of pre-screened and pre-integrated digital health solutions so they could distribute the most effective solutions for a population, or single individual, and receive the resulting data from any deployed solution into their backend system. The platform could recommend a solution set of apps, devices and services aimed at a specific individual being discharged or within a member population. The system would consolidate payment and billing as well into a single payment.

Recent articles have validated the need for the type of connected data that digital health solutions can provide, as well as emphasize the lack of interoperability between EMR / EHRs, Vendors, Providers, Payers, etc. – emphasizing the need for Server Based Health IT Middleware Framework to help fix the problem(s), in order to scale.

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Launching the DHaaS Platform

Skeptics suggest the vision is just “too big” – fortunately, innovators are not deterred. The fact is, the pieces are already there – hardware, software, chips, sensors and SaaS – technologies that didn’t exist just a few short years ago. They’re ready to go, they just don’t “talk” to each other efficiently. Even the less rapidly moving parts, such as regulatory, quality measures, payment models and reimbursement are now in place with a focus on value based care – these factors also need to be integrated into the overall solution. It will take time to bring all of the Digital Health solutions together onto a common platform in order for the industry to scale, but healthcare systems will gain the benefit as the platform evolves and unifies. We are putting the pillars in place, to meet the pressing demand in the next 18-24 months.

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Quantification

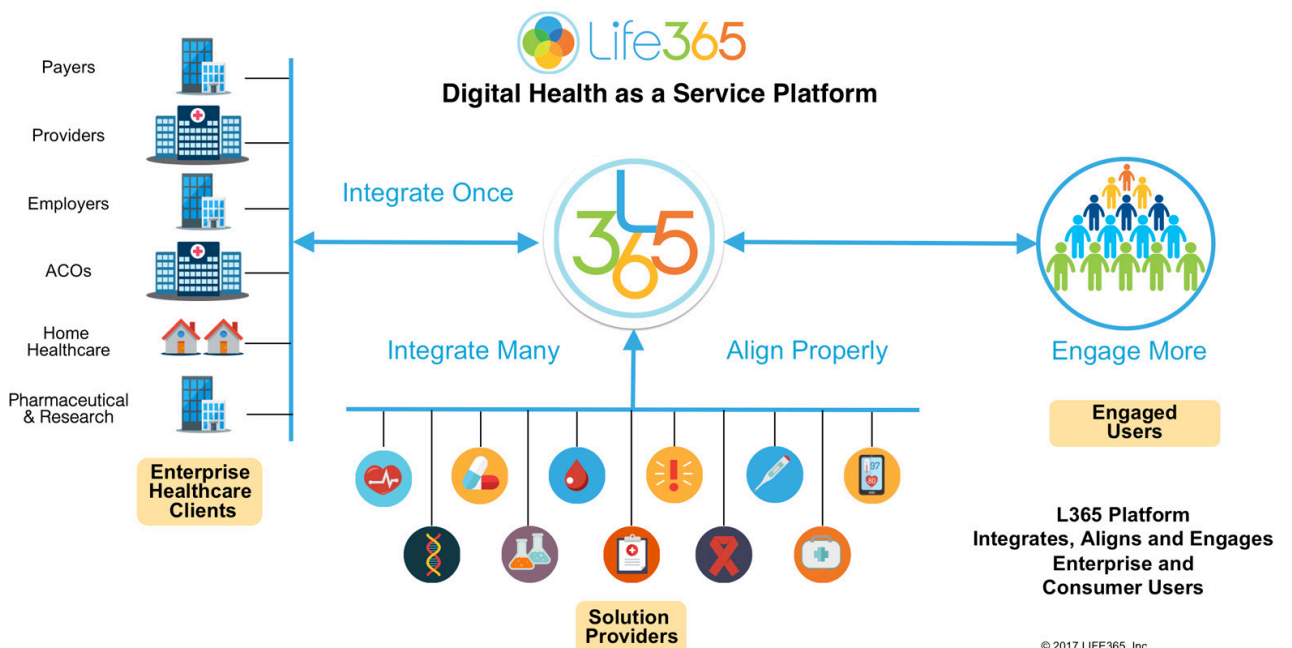
If you ask someone to list all of the digital health solutions available, they would be hard pressed to define what a digital health solution is, let alone name the ones available on the market today. It's been stated that over 150,000 health apps exist on the Apple App Store and most get downloaded once and never used again. What factors determine the best digital health solutions? Is it a matter of the best efficacy, or simply the biggest marketing efforts by a vendor? Maybe the right saying is "What gets quantified, gets used". In order to prescribe a digital health solution, you need to know it exists first, and that it can meet the needs of your individual or target population, in a cost effective manner. The solution must be identified and properly characterized; for example, a glucose monitoring service, using a smart phone app, with a cost \$29/mth, very favorable usability ratings, and evidence that it decreases a specific population's HbA1c by 15% over 12 months. This looks good so far, but it does not deliver a good experience or ROI outside of this user's specific population characteristics. What solution may be effective and cost appropriate for one, may not be for another.

Alignment

Once quantified, the solution must be aligned with a given stratification and cohort of patients. The quantified solution list would be aligned with disease states and cohorts to allow the system or enterprise customers to select the best solutions for that specific patient stratification or cohort, based on the economics and returns they want to

achieve. This example might align with well-managed diabetics that have glucose meters, and strips, and a smart phone, match the patient type for 15% reduction in A1c and are within a price parameter to deliver an appropriate ROI.

Often, a customer implementing a diabetic program will likely select a diabetes management solution – based on ability to integrate, time and cost – then choose patients out of their population that fit the program. They have likely left behind a large group of individuals, outliers of the program, our customer wants to because integration is not practical. A different approach is to start with a target population or individuals. Life365 aligns the right solution providers with patient characterizations. As an example, our customer wants to target A1c reduction. Group A in the population is made up of well-managed diabetics who already have meters and strips. they own smart phones and are comfortable using technology. The Life365 platform may recommend a diabetes management app, like Glooko, for patients that are well managed, already have meters, strips and smart phone. But of course, "one solution doesn't fit all". Group B in the population is less comfortable with downloading apps, they have "flip" phones versus smart phones, and they need more "hands on" coaching. This group may be a candidate for a more comprehensive solution, perhaps a cellular enabled glucose meter, like Livingo, along with a diabetic educator. By having the solutions well characterized, the Health System or Payer can align the most appropriate solution with the right patient population based on well-qualified data. We can "Cherry Pick" the solution for the best ROI with a patient, instead of "Cherry Picking" the patient to get a good ROI for a solution.



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Integration

Once the right solutions are contracted by the Healthcare Provider or Enterprise, a single API integration is performed from the Life365 DHaaS platform (Digital Health as a Service) to the enterprise, allowing for one integration and payment point. A multitude of quantified and characterized vendors that are already digitally integrated to the platform, can now be distributed much more easily to the right patient, with the patient's data flowing into their backend system. A single integration to the digital health platform gives the Enterprise the ability to stratify and align patients to the right solutions, versus the other way around.

There is also great value to a vendor integrating to the DHaaS platform, as it allows their solution to be available to, and seen by, hundreds of Enterprise Healthcare systems with a single integration. The value for the Enterprise Healthcare system to use the DHaaS platform is to have access to hundreds of vendors whose solutions have already been integrated and aligned to enable maximum ROI for the Enterprise.

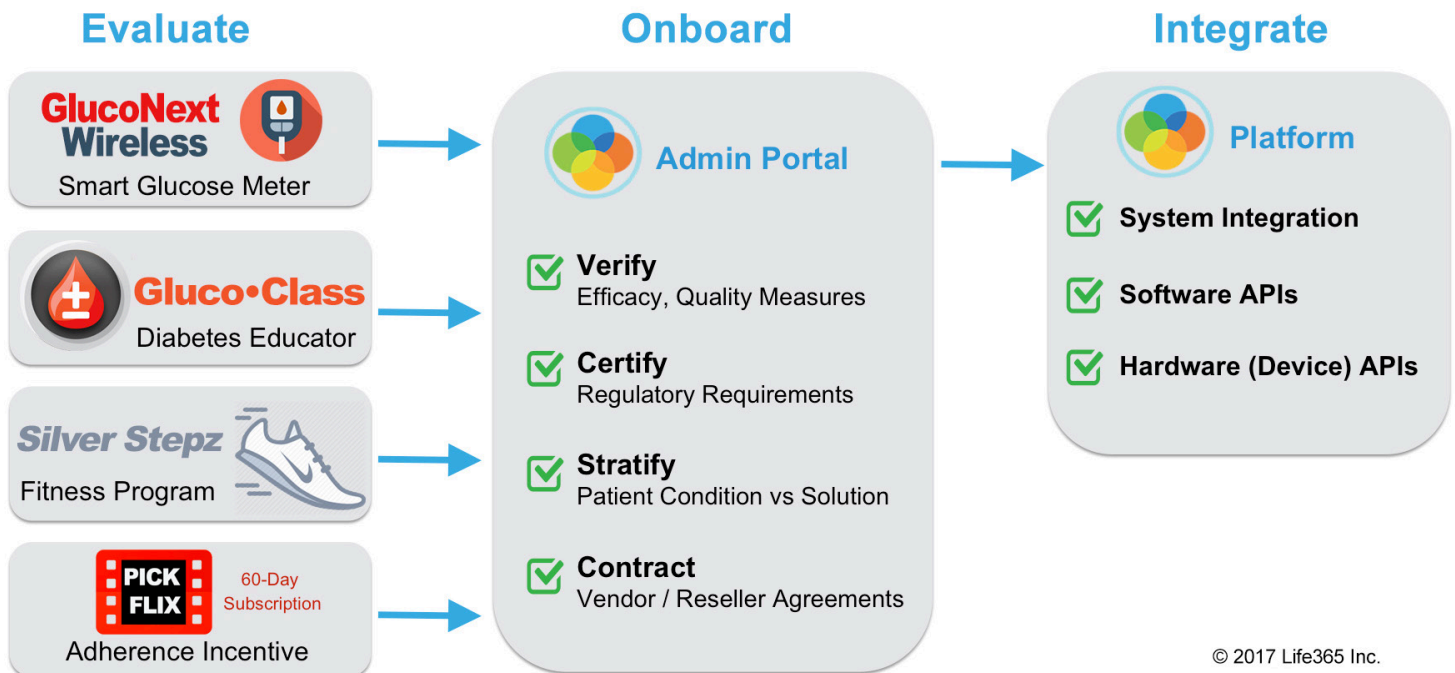
The strength of this platform is the ability to leverage other software platforms like Validic, Redox and others, in order to integrate to larger populations via a "Super Platform" without having to integrate to each platform one at a time.

Engagement

The addition of an engagement analytics AI to the mix, is like adding fuel to the fire. Personalized engagement is essential to drive optimal adherence across a patient population.

Life365 will offer Personalize™, Engagement Analytics driven by AI that pinpoints the best solution to connect with a patient and their surrounding environment and lifestyle, which becomes smarter as it receives continuous feedback about how well a solution was implemented and achieved results. Personalize implements 2 models called "I AM HUMAN" (comparing me to the population) and "I AM ME" (comparing me to me). Continuously fine-tuned with machine learning, these models will become more and more robust and individualized to maximize engagement.

In a real world example, the typical cohort for an 80 year old woman may respond well to a Silver Sneakers gym membership, but in looking at her as an individual, walking only 300 steps a day on a walker, a Netflix subscription over a gym membership, may be better motivation for her to stay adherent to her routine, stay out of the hospital and reduce healthcare costs. Although it might be considered counter intuitive to give a Netflix subscription, which might result in more sitting in front of a TV instead of exercising, the main goal for this particular woman might be to bring prescription medication adherence from 40% to 80%, and the motivation to adhere to that plan might come from Netflix combined with a medication management service. The goal is to keep her engaged, to motivate her to take her medication, to help her stay out of the hospital, and we do this by engaging her on her own terms to maximize adherence.





Bringing it Together & Getting it Right

The Open DHaaS Platform

Digital Health solutions today are developed as closed platforms – with a major lack of standards for interoperability. Over the past 10 years, organizations such as Continua, (now part of the Personal Connected Health Alliance) have been working hard to implement interoperability standards. Unfortunately, a major barrier to that effort is the reality that solution companies have their own interests and may have to deal with additional regulatory scrutiny and costs to deliver new or updated products to market. It really comes down to a short-term vs. long-term play. Short-term agendas have won out in the past due to an emphasis on short-term targets and short-term financial gains.

DHaaS provides a highly scalable, agnostic healthcare platform that can overcome the pains of integration and scalability. In order to scale, this healthcare platform must provide the highest levels of security / privacy and interoperability standards – including HIPAA compliance and FHIR (pronounced “fire”: Fast Healthcare Interoperability Resources). The difference between Continua and the DHaaS platform is that the platform doesn’t require the digital health solution to adapt to a specific format. The platform absorbs the different digital health solution’s characteristics and transposes them into a standard format, thus the platform becomes a buffer, taking on the necessary changes and the interoperability hit instead of the individual digital health solution, which saves a vast amount of time, money and regulatory concerns.

Moving from Product to Service Offerings

Many companies are now trying to move from a stand-alone product to an integrated product + service offering. If the product offerings are not quantified, aligned and integrated into a platform, it’s much more costly, and less efficient to wrap services around those offerings. The DHaaS platform allows companies to take these disparate offerings and integrate them into a single, more comprehensive and stratified solution. No more “one-off” solutions – instead we have a “one-stop” digital health catalog that provides the best solution fit for a cohort of patients.

For example, medical technology giant, Medtronic has acquired many companies over the years and they currently have an objective to increase services built off of their current product offerings. Beyond their existing cardiac implantable device offerings, they’ve recently aligned with Canary Health (digital health self-management programs), acquired CardioCom (remote patient monitoring / management), acquired Covidien (medical product maker), and they maintain an enormous diabetes division with MiniMed and over 1.5M CareLink connected hubs in 100 countries throughout

the world. In addition, they have multiple Connected Health initiatives ongoing. For Medtronic to move from a product company to an integrated product + service provider, they need to quantify the solutions they have, align them with patient and customer needs and provide a comprehensive service offering based on the integrated platform. Digital Health as a Service (DHaaS) in a single integrated platform that can help major enterprise customers quantify their offerings and streamline the move into services.

Health Automation Engine

Healthcare systems are now financially responsible for discharged patients at 30, 60, 90 days and beyond – they have a critical need to provide these patients with affordable solutions to stay connected to the patient to keep them from returning to the hospital.

A number of hospital systems have set up “Health Cafés” – that upon discharge the patient can be prescribed a solution to stay connected to their care team from home. The challenge isn’t just knowing which offering to prescribe to specific patients – the care providers need to know if the solutions work across a broad population, if the Digital Health vendors are integrated with the system, as well as how the solutions are billed, paid and reimbursed.

The DHaaS platform provides a “Health Automation Engine” that enables the Health Café to align and distribute the right solutions to right patients. If structured correctly, the Health System would send an automated ADT (admission discharge transfer) record to the Digital Health platform and an integrated vendor solution is distributed with a properly aligned patient, and billed to the customer with minimal or no additional effort from the hospital system.

Procurement for Digital Health

One of the key attractions of the Digital Health as a Service platform is the ability to act in a streamlined procurement function for the Healthcare Systems. Because integrating hundreds of vendors is expensive and time-consuming, the Healthcare System will choose only a few solutions for each disease state. If that vendor should go out of business or is acquired, the Healthcare System is at risk of losing their only vendor for a particular solution.

DHaaS allows for multiple vendors addressing the same disease state and population to be on-boarded easily and cost effectively. The platform will also further quantify their services and pricing to help identify and provide alternate solutions, as well as curtail costs.

As part of the quality and procurement function, vendors are on-boarded using specific criteria. They’re gauged against a checklist, rated, integrated and contractually bound. This takes the burden away from the Healthcare Systems so they can focus on patient care and not the technical logistics and procurement functions.

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Life in Context

It's reported that 56% of hospital and ER admissions are related to social issues. In the previous 10+ years of remote patient monitoring efficacy, most of the data being presented to the analytic systems was biometric (ex: FEV1 = Severe COPD) and some behavioral (ex: Meds = Not taken). In the past, this information would prompt a phone call to patients with reminder to take their medication.

But, what if we could bring in other information that is now starting to become more readily available such as social engagement, home automation data (climate and security), indoor / outdoor air quality and other factors? This additional information would provide valuable new context to biometric data. The DHaaS Platform can integrate connected health devices as well as other IoT devices in the cloud to help provide more insightful and comprehensive care to the patient. Life365 is partnering with Citrix/Octoblu specifically for this type of data, which will provide deeper understanding into changes in patient conditions. Was a change purely physiological? Has there been a difference in engagement patterns because of a change in social factors? Have cold temperatures or decreased air quality exacerbated a condition? Perhaps a simple phone call or home visit from a professional or family caregiver could prevent a medication adjustment or hospitalization, or maybe their electric bill needs to be paid.

Connecting to a patient at this level gives the ability to look at a broad range of biometric, behavioral, environmental, social, regional, economic, cultural, consumer data and more. The Digital Health platform allows individuals to present their lives in deeper, richer context that enables better interventions and outcomes.

The Binary Option and Exception Based Processing

Very simply put, because of the nature of new financial models, those financially responsible for the patient need to do more with less. Scaling solutions that work, to a broader population within the mid to moderate risk populations in a "lite" way is becoming a more widely accepted mindset. "Lite" solutions will provide the largest impact and benefit to the healthcare system.

One way to get lighter is through the use of smaller, smarter and more cost effective sensors. These solutions can be utilized in more creative ways – for example in an "off label" and "binary" approach. I've heard stories about family caregivers placing activity trackers on their older parent's wrists – not to monitor their specific number of steps, calorie burn or heart rate, but simply to see if they have a heart beat, did they get up this morning, are they're moving more or less than usual, and are they active and engaged. Deploying this type of

first-step "binary" / exception based processing approach to engagement and adherence provides the "lite" touch with simpler types of data – but still very useful information. This data can be enhanced by the Digital Health Platform, driven by an Engagement Analytic / AI engine to help care providers more efficiently gauge trends and adherence. For example: Patient A has a heart beat, is moving the same as last week, is taking medication regularly, and is socially engaged = No interaction is needed – leave them alone. Patient B is not within their normal data parameters or expected patterns, the System's Exception Based Processing is used to help determine an intervention – additional equipment, solutions or services may be needed to gather more data or different information to provide better analysis or a change in therapy.

Imagine the extreme cost savings if an enterprise could monitor 70% of a patient population using "lite" solutions and only having to address 30% with a heavier touch, more robust solutions. Imagine if we could start leveraging a wider range of existing solutions, from consumer wearables to apps and gamification, all on the integrated Digital Health as a Service (DHaaS) Platform to provide the healthcare arena with a new first line of defense in monitoring and engaging their moderate risk populations and keeping the numbers of people who require more expensive and complex care at a manageable level.

The Time is Now

The time is now to bring the available Digital Health solutions together onto a common platform in order for the industry to scale and meet the demands placed upon it by the Healthcare Systems to achieve interoperability, access to cost effective data and to make the financial models work.

The Digital Health market is estimated to be \$233B globally by 2022 (21% CAGR). The Mobile Health market is estimated to be \$49B globally by 2022 (47.6% CAGR). The market and potential is obviously there and growing, but in order to scale, quantification, integration and alignment is required.

The time is now to build upon the successes of the past 10+ years, allowing the healthcare industry to scale outside of the hospital walls and move point of care to the home. The Digital Health as a Service (DHaaS) platform is a necessary and integral component to achieving scalability in both patient outcomes and financial success.



Simplifying the Integration and Economics of Healthcare Delivery Outside of the Hospital.