PHILIPS

HealthSuite

digital platform

# Health Cloud Strategic Playbook

Cloud-based healthcare services are gaining acceptance. Calls for increased patient engagement via web-based applications strain traditional resources.

**Legacy infrastructure and the need to acquire and maintain necessary hardware, software and personnel, in the face of growing demand, is a bottleneck for many organizations. An industry that strives to cut costs and improve the quality of care should embrace the opportunity to transcend this conventional IT technology model and consider a cloud-based environment. Further, the ability to leverage cutting edge cloud solutions will enable new and innovative approaches, such as virtual trials, thereby helping to achieve the ultimate goal of providing more flexible and efficient means of engaging patients – on their terms.**

A healthcare cloud offers healthcare and life science organizations a shared environment that is massive in scale, elastic, global, available 24/7, and houses vast amounts of data. Properly configured and managed, cloud-based services provide a number of clear and significant advantages including robust and scalable compute capabilities, innovative software development approaches, and HITRUST security and compliance control.

**The healthcare cloud today**

According to HIMSS Analytics, healthcare organizations are looking to become more versatile by using the cloud as a virtualized resource model to allow for additional flexibility and scalability in a number of areas, such as storage, data backup and computing services[1]. The healthcare cloud offers on-demand computing by using the latest in technology to deploy, access, and use networked information, applications, and resources. Designed to support a rapidly evolving healthcare industry, a cloud provider has the ability to purchase more storage capacity than any one individual facility is capable of – with an economy of scale that is non-achievable for a single entity.

Cloud technology is not new, however the healthcare industry brings to it a variety of specific requirements not seen elsewhere. Beyond shear storage capacity, vendors who offer healthcare cloud services must also ensure their environment meets and exceeds rigorous local, national and global regulatory and security standards (i.e. HIPAA, HDS, HITRUST, GDPR, 21 CFR Part 11) required for safety and compliance.

## Industry challenge

While many healthcare and life science organizations understand that a robust cloud solution can play a significant role in helping to achieve their core objectives, the path to building a best-in-class solution specific to the unique needs of their organization presents a number of challenges that requires a distinct approach.

## Objective

The goal of the Philips Health Cloud Strategic Playbook is to help outline the key considerations and components required to build and run a successful cloud solution, one designed specifically for the healthcare and life science industries.

When the burden of purchasing, managing, configuring, updating and maintaining hardware and software is lifted from an IT department's sphere of responsibility, the improved efficiency allows critical thinkers to bring innovative new ideas to market faster. This opens the door for organizations to become leaders in patient-centric care solutions. Being closer to the problem to be solved, builds cloud value.

**Why move to a healthcare cloud?**

Patient centricity is the act of designing a service, treatment, clinical trial or other health solution around the patient. Creating a patient-centric solution involves getting feedback from patients themselves and making decisions based on their needs and perspectives[2]. Increased consumer engagement assumes a more personalized care experience for individuals and health and wellness professionals – connecting the two in ways that not only flourish within the healthcare setting, but move outside and into homes and everyday lives. Patient centricity requires maximizing the potential of data from devices and other sources with standardized protocols and open, scalable platforms.

Success in this approach is contingent upon a flexible infrastructure. From an IT department perspective, it's about how to address the multitude of concerns with the least amount of resources, because at the end of the day, IT departments like every other department are being pushed hard to contain costs. However, to be responsive, storage equipment and servers must be purchased, configured and installed to meet the demand. Over time, data requirements blossom from gigabytes, to terabytes, to petabytes and what was once an enabler becomes a hindrance. Suddenly IT departments are managing massive data centers just to support the growing information infrastructure – a situation that simply is not sustainable. If a department is constrained by what it can procure and keep running, then that becomes a bottleneck. In addition, time spent on updates, patches, new technology, and reaction to/protection against security intrusions, can become overwhelming.

A move to a healthcare cloud can alleviate most of these issues. Cloud infrastructure is nimble and in an excellent position to adopt newer technologies, create more flexible ways of providing computed storage, and maintain raw infrastructure.

**An effective healthcare cloud environment:**

- Provides managed infrastructure for hosting and the essential/basic managed services for hosted applications, supported by performance metrics
- Offers secure, centralized mechanisms to manage identities, authentication and authorization of users, services, and devices, and enables access control
- Delivers services to manage, update, remotely monitor, and collect and store data from smart devices – ranging from consumer wearables to large medical-grade systems
- Presents the tools to build standardized interfaces between external systems and enabled applications and devices to facilitate cross-enterprise integration
- Offers a range of storage services to match data types and the requirements of unique applications – acquiring, storing and archiving data in different types of cloud-hosted repositories
- Provides a framework for ingesting and managing data, executing ETL's and analytics applications and quickly visualizing retrospective, prospective, predictive, and prescriptive data

**A robust and flexible infrastructure supports key use cases:**

- Consumers, patients, and informal caregivers need capabilities to enable them to access and control personal data sharing
- Health and wellness providers need capabilities that will support having actionable clinical data where, how and when relevant
- Administrators need analytics capabilities to help manage patient populations and reduce financial risks
- IT professionals need capabilities to address interoperability, privacy and security to ensure secure data exchange
- Developers need open APIs, the ability to leverage industry standards, and a compliant cloud infrastructure
- Researchers and data scientists need capabilities to support analytics, machine learning, artificial intelligence

There is also a cost savings potential when working in a cloud-based environment. While engaging a managed cloud infrastructure and platform will require upfront investment, the ability to forego hardware/software capital expenditures, reduce the real estate footprint, and reassign support staff, may reduce the total cost of ownership and present a fiscal advantage.

**Security and Compliance**

Healthcare and life science organizations cannot afford a data breach. A competent healthcare cloud provider will conduct external audits and penetration testing, and offer privacy, security and regulatory controls, to assure operational security. They will also maintain an extensive set of external compliance certifications and attestations to provide objective evidence of compliance to security and privacy regulations.

Most data/security breaches in the industry today are caused by human error, often something as simple as selecting the wrong checkbox (in a public Amazon S3 bucket) on a webpage. Suddenly what was intended to be secure, becomes publicly accessible. An experienced healthcare cloud provider understands the criticality of the data and the sensitivity, privacy, and security implications around it and removes opportunity for human error from the equation through the use of layered access authorization and role-based profiles.

The global cloud provider has a unique security perspective. They don't just see attempts, attacks, and intrusions that come at an individual site, they are able to judge what's happening around the world and recognize problems long before an individual institution can. They see a much larger slice of the world and are therefore able to be proactive rather than reactive.

An experienced healthcare cloud provider will safeguard sensitive data through the establishment of a robust Information Security Management System. These controls are in addition to what is provided by the cloud infrastructure vendor itself (i.e. AWS, Microsoft, Google). Such operational, security and privacy controls are particularly important since they allow IT departments to meet the security and privacy requirements for running

a cloud-based consumer or healthcare solution and reduce the financial risks for security and/or privacy data breaches.

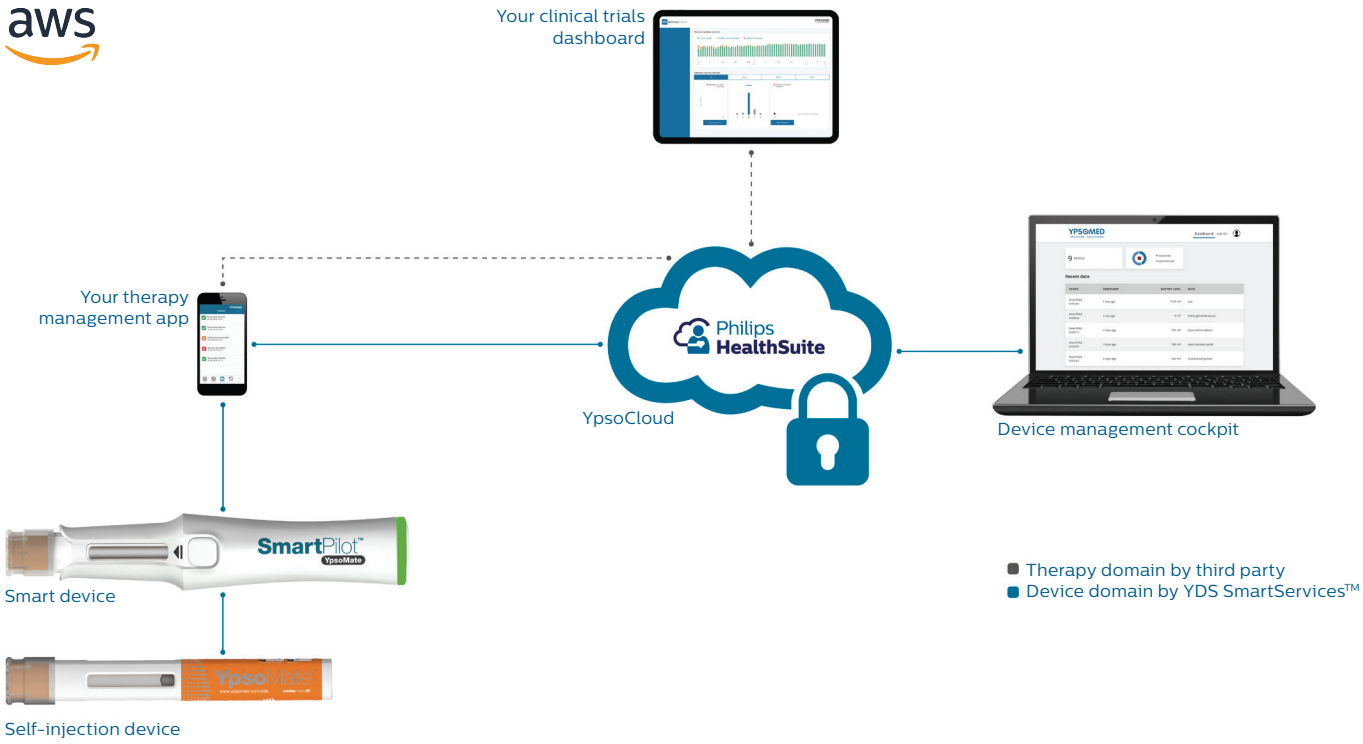
In terms of the ability to safely integrate data from a diverse set of third party systems and IoT devices (patient monitors, drug delivery systems, RFID readers, vitals recording devices, etc.), the provider must have a knowledge of each unique protocol and how to deal with the related data, in addition to the ability to track the provenance of the data to be certain it is used only for purposes for which it is authorized.

All services and applications developed in and provided through a healthcare cloud must meet or exceed compliance standards, which vary around the globe. Whether its HIPAA in the US, HDS in France, or GDPR in the EU, compliance validation is a crucial element in any comprehensive approach to security.

What does a HITRUST cloud environment ultimately provide? – the assurances that the application/data is always going to meet the requirements of the healthcare users. For a CIO or CFO who has final responsibility to confirm all that can be done is being done, it is comforting to look to the provider and the standards they adhere to, including outside audits and ongoing validation, and be 100% confident that security and compliance has been handled properly. Anything less is unacceptable.

## Case study:

## **Smart devices help Ypsomed measure medication adherence for clinical trials**




**Challenge** – Ypsomed wished to create a digital solution for medication adherence monitoring and smart device management for use in clinical trials, including self-injection systems for at-home medication administration. The company faced significant demands for remote device management, global scaling, and privacy and security regulations such as HIPAA and GDPR.

**Solution** – Ypsomed partnered with Philips and used HSDP to connect devices to the cloud, manage them remotely, and store data. The solution enabled Ypsomed to manage and scale services in multiple geographies while providing for healthcare regulatory, privacy, and security requirements.

**Results** – Ypsomed was able to create an MVP (minimum viable product) of their solution from scratch in just five months with enhanced security and strict adherence to HIPAA and GDPR regulatory requirements. Ypsomed realized cost savings by reducing operations, infrastructure, and staffing.

### Cloud-native applications

A cloud-native application is a software application that is specifically built for cloud computing and virtualization environments. Cloud-native applications are designed, developed and deployed in such a way that they reap the maximum functionality and services of a cloud computing and virtualization infrastructure[3]. A cloud-native application only uses resources when those resources are required, as opposed to consuming local resources on a dedicated basis. As an example, a cloud native application typically is only activated when a button is pushed, data is sent, or a measurement is updated, versus a traditional application that is built in a health facility and continuously consumes time, compute power, and money.

The healthcare cloud offers a very flexible environment that meets regulatory requirements to support the rapid development and testing of cloud-native applications. Developers need not worry about the underlying infrastructure services such as identity and access management, clinical data repository, and IoT. Instead, they can focus exclusively on application development. Fault tolerance is built-in, such that if the application is developed in a container (secure development tool) and the container is deployed, ultimately the cloud compute environment is going to fully and safely support it, have it automatically scale, and be made available to all regions.

It is quite easy to modify a cloud-native application's algorithm in real-time to have better engagement with customers. It is also easy to track usage. Multiple A/B type deployments can be run to test new capabilities in ways that were not possible in a legacy environment.

When an application is running in the cloud versus a workstation on-premise, users don't need a high compute desktop for access. The application can be accessed and run from any location and on any mobile device, such as iPad or mobile phone. It is simply much easier to deploy broadly.

### Opportunity to scale quickly and confidently

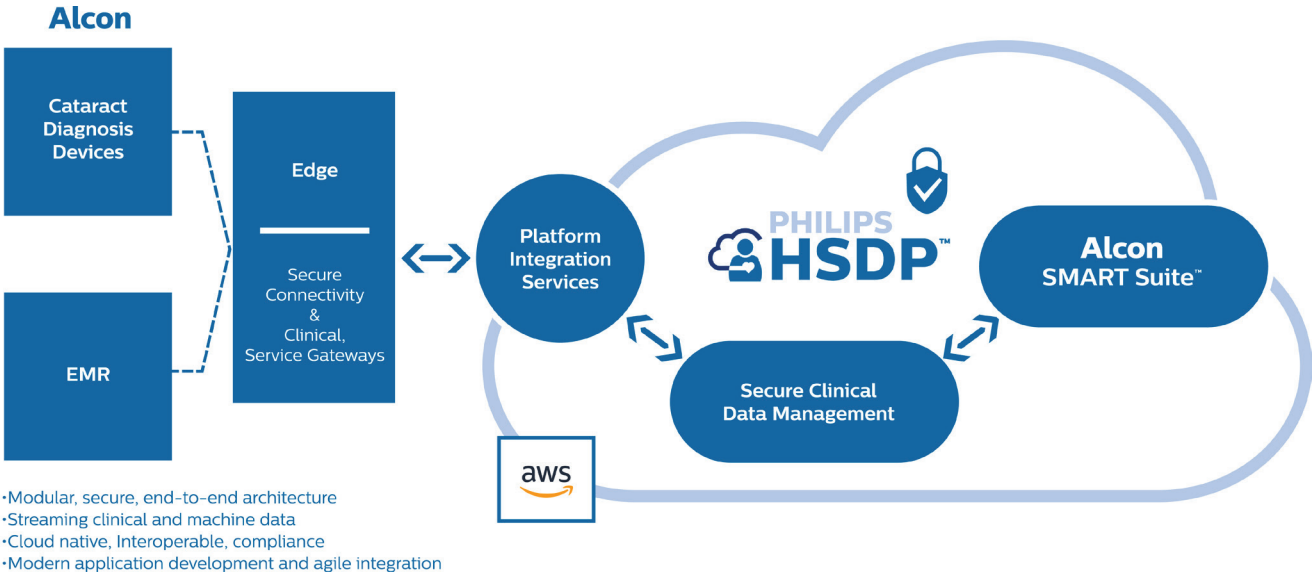
When IT departments install their own hardware and software, they pay for it 24/7 and typically spend large sums of money to configure their data center to handle the maximum expected load. However, in healthcare as with many other industries, there's a peak period problem. It can be very busy during certain times of the day with a greater need for compute power, throughput, and capacity – then at night that demand lessens. Such reduced usage in off hours means resources sit idle.

Cloud solutions offer a fluid economy of scale where organizations pay only for what they use when they use it. If they require ten times the compute capacity during the hours of 10:00 AM and 12:00 noon, multiple servers can be spun up during that time, then spun back down when not busy. This real-time 'as needed' capability offers virtually unlimited freedom to scale resources on-demand.

A healthcare cloud is also able to offer a strong reliability and resiliency (recovery) profile. They tend to have multiple geographic sites where mirrored servers and applications run, so the failure of an individual building, power source, or network sector does not have the same negative impact as it would if an on-premise data center was compromised. By distributing data across zones, a balance can be achieved that helps assure uninterrupted availability.

## Case study:

## Intuitive app from Alcon helps cataract surgeons be more precise




**Challenge** – Alcon wished to help cataract surgeons gain access to all relevant patient information required during a surgical procedure, through an easy-to-use app. Integration of data from diagnostic equipment, EMR, and the enabling technologies of Alcon's Cataract Refractive Suite was imperative.

**Solution** – Alcon partnered with Philips and used HSDP to scale their solution globally, working with third-party devices to collect data from biometers, keratometers, and topographers needed to create a sound cataract surgical plan. Now, every patient's data will be available to the surgeon throughout the surgical procedure.

**Results** – Alcon created their SMART Suite digital platform to proactively produce an image-guided surgical plan for each patient. The platform is predictive, meaning it learns from what it is told and presents information it believes will be needed. And it can be customized to make procedures more precise.

### Maintaining system access

It is important to consider how cloud access can be maintained in the face of local Internet downtime. Should a fiber be cut, or construction backhoe sever the line entering the hospital or on-premise location, critical operations must not be affected.

Imagine a petabyte of data consisting of diagnostic images, EMR records and IoT device data. Organizations may not need access to 100% of this data at all times, but they must have access to that which is necessary to support critical, lifesaving procedures.

The majority of the data resides in the cloud environment, however a portion (most critical) is mirrored locally, with mechanisms designed to move that data up and down based on prioritized missions. In addition, applications and solutions must be designed to adapt to connectivity failure in a way that doesn't interrupt the delivery of care.

## Summary

Building a best-in-class health cloud requires careful analysis of organizational needs and an eye to future growth. Today's patient/professional demands may quickly outstrip in-house data management capabilities, putting healthcare and life science organizations in a difficult spot. Moving to a cloud-based healthcare environment may be the answer. The nimble cloud infrastructure encourages accelerated product development and improves data storage stability.

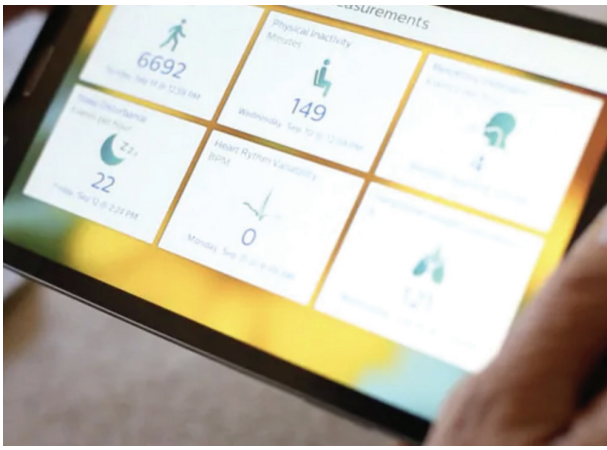
**Benefits of a healthcare cloud:**

- **Security** – multi-layered security hierarchy designed specifically for the healthcare industry to mitigate breaches
- **Compliance** – ongoing and up-to-date adherence to local, regional, global regulatory requirements, i.e. HIPAA, HDS, HITRUST, GDPR, 21 CFR Part 11
- **Interoperability** – capacity to acquire, store, manage and analyze data from a widely diverse set of medical/consumer devices
- **Development** – versatile, cloud-native application development environment with rapid prototyping, testing, and deployment capabilities
- **Accessibility** – 24/7 data access with robust recovery/redundancy profile and improved patient/professional point-of-use access
- **Scalability** – virtually unlimited scalability with 'on demand' – 'pay for what you need' server structure
- **Reduced IT costs** – lower cost of ownership and better control through reduction in required in-house hardware, software and staffing expenditures

### About the Philips HealthSuite Digital Platform (HSDP)

Philips HSDP provides its customers the cloud expertise and capability to connect devices, collect electronic health data, aggregate and store data securely, analyze data, and create solutions in the cloud.

Built specifically for healthcare and life science organizations, HSDP offers a diverse set of capabilities for ingesting data from multiple data sources – consumer devices, medical devices, imaging modalities, genomics, digital pathology, patient monitors, and more. HSDP also has the ability to integrate with other data sources such as EMR, RIS, CVIS, etc., then ultimately to put that data into an environment and data stores that are conducive to algorithm and predictive model development.




For more information, visit:
https://www.usa.philips.com/healthcare/innovation/about-health-suite

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