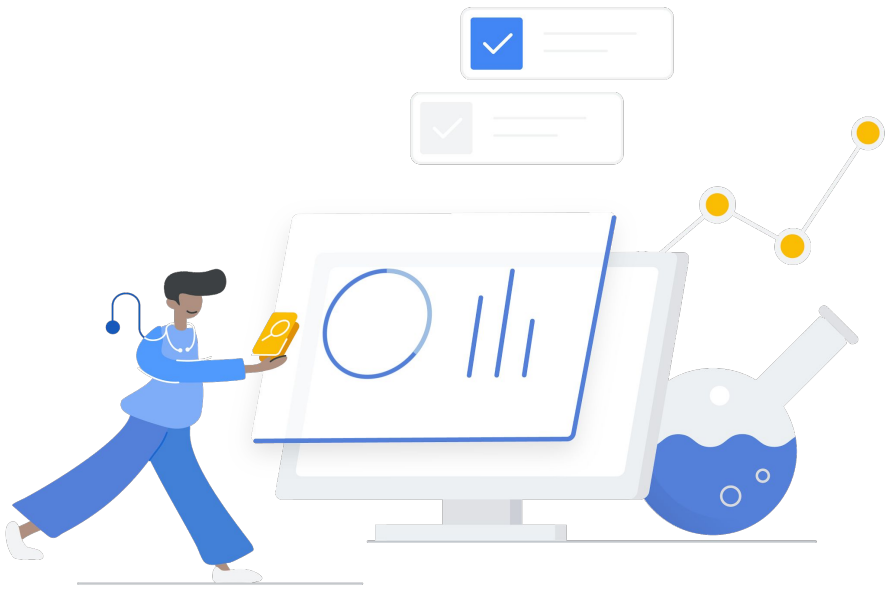
Google Cloud

Healthcare API

With the Healthcare API, healthcare solution builders can use the power of Google as a force multiplier to accelerate digital transformation for their own and other healthcare organizations.

The Healthcare API reduces the time, effort & cost to enable safe & secure data interoperability, launch & scale digital healthcare applications, surface insights from analytics and train, explain & integrate AI/ML models.



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[Quantiphi](#)
"Tagging Cancer Recurrence through ML"

[Stratus Medicine](#)
Building a Real Time Machine Learning System with the GCP Healthcare APIs

[Quantiphi](#)
"Digital Transformation of Radiology Data Ecosystem with Machine Learning"

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FHIRing up the Cloud: How Edifecs and Google Replicated GuideWell's BB 2.0 Framework for the Cloud

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Introduction

This ebook contains some recent examples of how Google's technology can be applied to real world healthcare challenges with transformative results. These examples cover the range of implementation patterns in which solution builders have used the capabilities of the Healthcare API to deliver value.

Security and regulatory compliance are foundational components of any software system that manages healthcare data. Navigating the regulatory landscape can be challenging so the Healthcare API has been designed to lower this burden by providing tools, templates & technology that are regulation friendly.

Interoperability requires that systems can talk to each other using the language of healthcare data. The Healthcare API enables this by talking the traditional languages of healthcare (HL7 and DICOM) and also the emerging languages such as FHIR. These are implemented in a serverless manner so solution builders can focus their efforts on differentiating capabilities not implementing standards or running software stacks.

The rapidly growing healthcare application ecosystem will increasingly be consumed in a mobile first manner. So the Healthcare API provides a simple and performant REST interface that is integrated with the broader Google Cloud technology stack. In addition it has been integrated with Google's Apigee API management platform that enables the exposure of healthcare data via API endpoints.

Many healthcare organizations have invested heavily to build out SQL based analytics capabilities and already leverage Google BigQuery and visualization tools, such as Looker. The Healthcare API has been integrated so that it is very quick & easy to setup a synchronised BigQuery projection of data to feed analytics pipelines and dashboards.

The Healthcare API is being used to enable many exciting machine learning use cases both over structured text based data and unstructured pixel based data. The standards based approach to healthcare data promises to significantly reduce the work involved in feature engineering for ML models.

We hope you enjoy the examples outlined in this eBook. To learn more be sure to read the Voices of the Healthcare API eBook for first hand testimonials on why organizations chose to use the Healthcare API.

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Quantiphi

"Tagging Cancer Recurrence through ML"

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Using AI and machine learning to automate cancer recurrence tagging

Cancer recurrence tagging using patients' historical EHR records, manual abstraction practices, and legacy data subsystems can take up to a year. A cloud-based solution from Quantiphi can do the same thing in minutes.

About Quantiphi

Based in Marlborough, MA, Quantiphi is an award-winning Applied AI and data science software and services company driven by the desire to solve transformational problems at the heart of business. It is Google Cloud's Global Social Impact Partner of the Year for 2019 and machine learning Partner of the Year for 2017 and 2018.

Quantiphi is passionate about its customers and obsessed with problem-solving to make products smarter, customer experiences frictionless, processes autonomous and businesses safer by detecting risks, threats and anomalies. Healthcare is one of its strongest and fastest-growing business segments.

Identifying patients where cancer has recurred is like finding needles in a field of haystacks. For a large, multi-state non-profit health system in need of a solution, cancer recurrence represented less than one percent of oncology related encounters.

"One of the major challenges in the field of cancer research today is the availability of real world clinical evidence for researchers," says Asif Hasan, co-founder of Quantiphi, a Google Cloud partner specializing in artificial intelligence (AI), machine learning, and all things Data. Researchers building machine learning models in oncology need to know, among other things, each patient's incoming diagnosis, when their cancer was first detected, what treatment protocols followed, what medications they took, and what interventions doctors tried, as well as the eventual outcome.

"It's hugely important for researchers to have this entire information in cancer registries," Hasan continues. The more quality data they have, the better their chances of tagging—based on insight collected from other cases—that a patient's cancer is likely to come back. Quantiphi quickly learned that gathering all the necessary data and curating features from a mix of structured and unstructured data would be a massive undertaking for its client.

Using natural language processing techniques, more than 1,300 data features of patient encounters were generated for modeling cancer recurrence that cancer researchers may find useful. Multiplying this number by millions of patient encounters would result in billions of data points.

Since not every data point applies to every patient, the data matrix contained a lot of missing values. Adding to the challenge, records that covered patient encounters, including pathology reports, medications, diagnoses, treatment plans, physician notes in free-form text across multiple electronic health record (EHR) systems were not necessarily consistent from one visit to the next, much less from one patient to the next. Complicating matters even further, the data model must also account for the sequence of a patient's visits and how often they visited, which could be five times in one month or five times in one year.

Using machine learning at scale to automate tagging of cancer recurrence

Before researchers could apply analytics to help tag cancer recurrence, patient data across the provider's oncology population had to be captured in a consistent format, a process Hasan describes as "hugely tedious and very time consuming."

"Think of a clinical expert," he suggests, "maybe a trained nurse or a physician looking at reams and reams of information in electronic health records, looking at labs, medications, and freeform texts that various clinicians have entered, and then from there, trying to abstract information that eventually needs to make its way into the cancer registry — it's a huge burden on the healthcare system. Every minute the clinician is out there abstracting data from electronic health records and putting it into a cancer registry is a minute they could have spent delivering patient care."

Overall, hundreds of thousands of oncology patients had millions of visits. "There's a lot of heterogeneity in the interactions that we have had," says Hasan. "Our job is to then take all of this information, and from there, automate the process of detecting the recurrence of cancer from the electronic health record data that's made available to us."

Asif Hasan,
Co-founder,
Quantiphi

"We can leverage the power of machine learning on Google Cloud to solve a very sizable challenge in cancer research, making real-world evidence available for researchers without having experts spend valuable time abstracting this data manually and entering it into the system."

A large part of data ingestion was undertaken by the client's data engineering team. Quantiphi recommends leveraging the Cloud Healthcare API for this task in the future. "The Cloud Healthcare API bridges the gap between care systems and Google Cloud," explains Shantam Gupta, machine learning engineer at Quantiphi. "Using the Cloud Healthcare API, you can ingest structured and semi-structured data. You can create, store, import, export, and manage FHIR, HL7v2 and DICOM stores. You can also de-identify your data to protect personally identifiable information. It also helps in data persistence. Overall, this API makes it easier and faster to get actionable healthcare insights in a compliance-heavy environment."

Google Cloud

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The Cloud Healthcare API connects EHR data sources and Google Cloud. Once the data has been ingested into Google Cloud Platform, managed services like BigQuery and Dataproc can greatly reduce computational workload and simplify complex operations to prepare big data for downstream modeling and analytics. A de-identified longitudinal patient record prepared for analysis stays in Google Cloud, where it is consumed by machine learning models on the AI Platform for tagging cancer recurrence. Information on a patient's cancer recurrence state is now available to the entire health system, making it easier for different departments to optimize care coordination.

Saving time for the experts while augmenting their expertise

The system Quantiphi has developed in partnership with Google Cloud has reduced the process of tagging cancer recurrence from as much as a year to a matter of minutes. "We can leverage the power of machine learning on Google Cloud to solve a very sizable challenge in cancer research, making real-world evidence available for researchers without having experts spend valuable time abstracting this data manually and entering it into the system," says Hasan.

Shantam Gupta, Machine Learning Engineer, Quantiphi

"Overall, the Google Cloud Healthcare API will make it easier and faster to get actionable healthcare insights with its HIPAA-compliant services and environment."

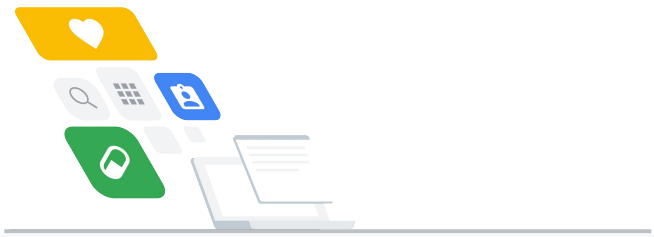
Not only has their work produced important cost savings by redirecting valuable clinician expertise away from data mining to patient care, but it has also demonstrated the power of augmenting clinical wisdom with machine learning. "Doing this project makes us very, very optimistic," says Hasan, "that when we combine the intuition of clinicians with assistive AI techniques and use the power of Google Cloud to solve some of these computational challenges, we can really impact the healthcare system in a very positive way."

Hear more from Quanitphi in this exclusive interview

To learn more about Quantiphi visit:
https://www.quantiphi.com

Google Cloud

STRATUS MEDICINE



Stratus Medicine

Building a Real Time Machine Learning System with the GCP Healthcare APIs

Google Cloud

STRATUS MEDICINE

Machine learning tackles the leading cause of breast cancer mortality

Machine learning algorithms flag likely breast cancer recurrence to support clinicians in deciding upon early intervention

Cancer is a complex set of many diseases, each distinctly manifesting within the body in locations characteristic to that particular ailment. Left unchecked, insidious cancers can metastasize, which often leads to the patient's death. Relentless research, clinical experimentation, and treatments completed over many, many decades have parried against this biological foe with differing degrees of success, achieving greater rates of remission. But even with these successes, breast cancer remains among the leading causes of death for women.

Breast cancer is a complex disease in itself. As with most cancers, survival depends on early detection. Most often, the patient emerges from surgery, chemotherapy, or a combination of the two with no detectable cancer anywhere in her body, her chances of survival extremely good. But in a limited percentage of cases, the cancer comes back. If the cancer has recurred and metastasized, the patient's survival chances are significantly lower. Recurrence has, in fact, become the leading cause of death in breast cancer patients.

The median time for breast cancer recurrence in patients treated at the Foo Foundation Sun-Yat Sen Cancer Center of Taiwan is currently 30 months. "Early detection of a metastasis is really key to patient survival," says Dave Burdick, CEO of Status Medicine, a Google Cloud Partner that drives healthcare innovation. "You want to get that patient into a follow-up treatment regimen as soon as possible." But for a long time, it was very difficult to assess whose cancer was at risk of recurrence and whose wasn't.

About Stratus Medicine:

Stratus Medicine, based in Seattle Washington, assists healthcare systems, startups and payers to fast track their innovative projects. Their core effort uses FHIR, imaging, and machine learning.

About Koo Foundation Sun-Yat Sen Cancer Center:

The Koo Foundation Sun-Yat Sen Cancer Center, located in Taipei, Taiwan, opened in 1990. Now a 325 bed hospital, its mission is to prevent and cure cancer by providing expert and compassionate care, to deepen understanding of cancers to which patients are especially vulnerable, and to train the next generation of oncologic and healthcare professionals

Due to individual physician discretion, the use of advanced and invasive imaging, such as whole-body bone CT scans, varies during follow-up. Establishing a more consistent process for stratifying the risk of breast cancer recurrence became imperative to accelerate the timing of recurrence treatment, which in turn reduces patient mortality and cost.

Google Cloud

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Automating early detection of breast cancer recurrence

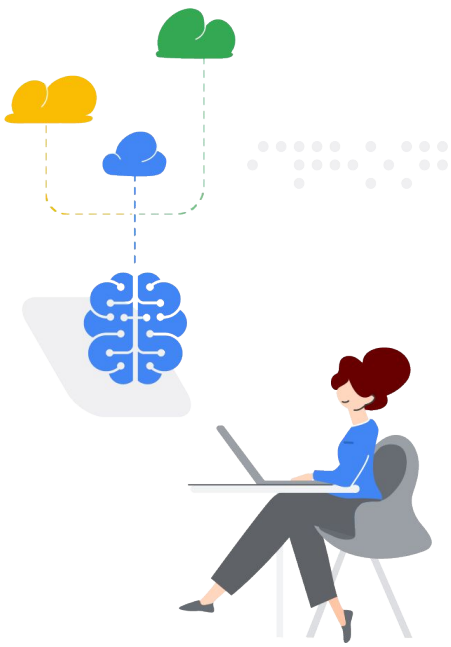
The partnership between Stratus Medicine and The Koo Foundation Sun-Yat Sen Cancer Center led to a real-time machine learning algorithm that helps clinicians more accurately stratify the risk of recurrence in breast cancer patients. The team built their solution on Google Cloud Platform because of the speed and agility that leveraging fully managed services such as the Cloud Healthcare API created. "To create this system, we extracted the relevant data from the center's health system and put it into a structured FHIR and DICOM format, trained the model using these data, and then deployed the model to provide insights in real time to the physician seeing the patient," explains Burdick.

To train the system, the team established an automated process for collecting information from Electronic Health Records (EHRs) and mammograms, including radiology reports describing the severity of each original malignant lesion, who the radiologist was, and which patient was involved. Three sets of images were collected for each patient in the study: images with benign lesions that later turned malignant; follow-on images showing the lesions after they turned malignant; and low Breast Imaging-Reporting and Data System (BI RADS) score images of lesions that stayed benign.

Radiology experts examined each selected image in the DICOM store to label them with a BIRADS score to indicate malignant or non-malignant. Drawing from this data, the team built a transfer learning model that used Auto ML Vision to classify unlabeled images. Google Auto ML Vision processed hundreds of thousands of images to build a model that could classify lesions that turned malignant and those that did not. Technicians then fine-tuned the model to the desired level of performance. The model now automatically screens patient images to indicate higher or lower risk of a cancer recurrence, given the patient's other pathology and demographic data. The system updates itself with each new patient, retrieving additional historical images and related data to strengthen the model.

David Burdick,
CEO, Stratus Medicine

"To create this system, we extracted the data from the center's health system and put it into a structured FHIR and DICOM format, trained the model using those data, and then deployed the model to provide insights in real time to the physician seeing the patient."



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An innovation-ready platform

By using ready-made services like the Cloud Healthcare API to manage FHIR and DICOM data, as well as Cloud Function and Cloud SQL, Stratus Medicine could move quickly. “We didn’t have to provision or manage any of the hardware, or even think about virtual machines or containers,” says Burdick. “The Auto ML Vision and AutoML tables allowed us to create models that were really good, both in terms of speed and the investment we put into making them. And the fact that they integrate so well with the other managed services meant we could move a lot faster than a traditional research project.”

Although this system was designed for a specific project, it can scale to support all the data science research projects at The Koo Foundation Sun-Yat Sen Cancer Center. As Burdick describes it, “Everyone can now leverage these FHIR and DICOM registered resources to do both innovative research and clinical delivery projects and quality improvement projects at a speed unheard of with the earlier on-premises deployment, where you would be building and managing everything yourself.”

David Burdick,
CEO, Stratus Medicine

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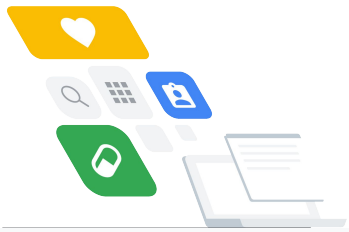

To learn more about Stratus Medicine contact:
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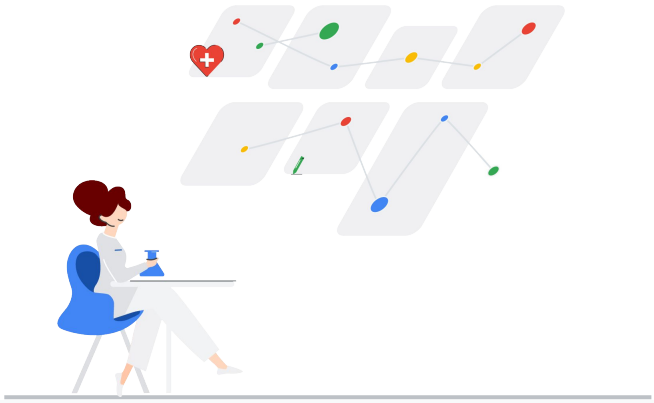

Quantiphi

"Digital Transformation of Radiology Data Ecosystem with Machine Learning (whitelabeled)"

Google Cloud

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Reducing job stress for radiologists

Rapidly analyzing medical images using intelligent data lakes on Google Cloud

Helping radiologists with cloud-based algorithms that aid in diagnosis.

About Quantiphi

Based in Marlborough, MA, Quantiphi is an award-winning Applied AI and data science software and services company driven by the desire to solve transformational problems at the heart of business. It was named Google Cloud's Global Social Impact Partner of the Year for 2019 and machine learning Partner of the Year for 2017 and 2018.

The job of a diagnostic radiologist can be stressful: imagine being alone in a dark room for much of the day, examining images and knowing that behind each one is a human being depending on you for a correct diagnosis. You must evaluate their health based on not much more than a single image—and one mistake could have catastrophic consequences.

Now imagine that there's a centralized system in place: an immense, intelligent data lake that houses millions of similar images and delivers a report and "confidence score" to you right in your office. Combining this powerful report and score with your own trained eye and medical expertise can help you make a diagnosis faster and more accurately than you could on your own.

The idea to create this centralized system came from one of the largest healthcare life sciences companies in the world, who engaged teams from Quantiphi and Google Cloud to make it so. Their vast amounts of medical data come from many geographical areas, originate from many different sources, and include many types of datasets. "Managing different geographies on premises with a lot of overhead—it's a very expensive way of managing data, and that's one of the reasons that it made very good business sense to move to a cloud-based centralized solution," explains Ashish Bharti, Client Engagement Manager at Quantiphi. "The overarching aim here is to create a globally centralized data lake to store, curate, and of course manage, medical and healthcare data."

The challenge of varied formats, rigid source systems, and what people are used to

Centralizing the customer's data proved challenging, not only because of the variety of datasets and formats coming from different geographic areas, but also because no scalable solution existed. Quantiphi would have to create something new. Waled Tayib, Big Data Engineer at Quantiphi, notes that many hospital servers are "rigid source systems," which makes it "really hard to manipulate the data on the source and get it to the cloud." He adds, "We're also dealing with customers that are very used to using different DICOM viewers or different tools that may not necessarily be cloud-friendly."

The team created a new process to ingest and handle all the data, using an array of Google tools and services including Kubernetes, Cloud Scheduler, Cloud Functions and Compute Engine. A crucial aspect of the process is removing Protected Health Information from the data and as it turns out, Google Cloud has the perfect tool for the job. "One of the neat features and neat tools we've used during this project was the Cloud Healthcare API, specifically because it has very good capabilities with DICOM images," recalls Tayib. "There's a lot of software out there to help you de-identify text data, but there's not many out there that can do actual pixel data at scale and also at an accuracy that the Cloud Healthcare API does."

Waled Tayib, Big Data Engineer, Quantiphi

"There's a lot of software out there to help you de-identify text data, but there's not many out there that can do actual pixel data at scale and also at an accuracy that the Healthcare API does."

A custom DICOM viewer that handles widely varied image resolutions to pinpoint even very rare diseases

Let's say that during a typical day examining radiology images, you come across what could be a very rare pulmonary abnormality. With the innovative DICOM viewer that Quantiphi customized for your department, you can see the image annotated and labeled based on data incorporated from thousands of other pulmonary images.

These huge 3D images were originally of widely varied resolution, making them extremely hard to standardize for comparison. Moreover, the incidence of the disease you're checking for is so low that there are few positive examples, making it imperative that you check your image against a large database.

Quantiphi's pioneering solution processes raw images so they're immediately useful for your diagnosis. "You take a raw image or a CT scan, and then it passes through the algorithm pipeline," says Bharti. "Pre-processing includes making cubicle sizes that can pass through the models. It just breaks down the entire image." The smaller images are easier for the trained classification model to compare and analyze.

Google Cloud

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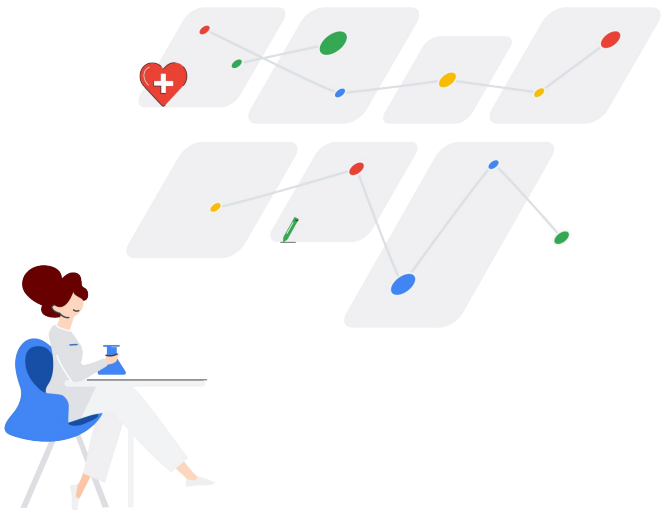
A one-stop shop to support the radiologist's everyday workflow

The custom DICOM viewer, and the entire process that delivers a labeled, annotated image along with its associated report and "confidence score," is in no way a replacement for your human skills as a radiologist. It's simply an invaluable form of assistance. "What we are trying to enable here is to help our radiologist make better decisions," Bharti clarifies. "Our aim with this overall ecosystem is not to be a single source of truth in terms of diagnosis, but rather be a helping hand to make diagnosis faster, better, and probably cheaper."

With this kind of help, both you, the busy radiologist, and your pulmonary patient can breathe a little easier.

Ashish Bharti,
Client Engagement
Manager, Quantiphi

"What we are trying to enable here is to help our radiologist make better decisions...not to be a single source of truth in terms of diagnosis, but rather be a helping hand to make diagnosis faster, better and probably cheaper."



Quantiphi can be reached at
appliedai@quantiphi.com

Google Cloud

Apigee

"Provider Modernization. A self-service API ecosystem to accelerate time to market (whitelabeled)"

Google Cloud

Accelerating API development to serve the needs of healthcare professionals

With the Apigee API Management Platform, healthcare organizations can ship compliant APIs much faster—and make them easier for developers to find.

About Apigee

Apigee API management platform was acquired by Google in 2016. In 2019, for the fourth consecutive year, Google Cloud's Apigee was recognized as a leader in the Gartner Magic Quadrant for Full Lifecycle API Management

Most caregivers and medical researchers pursued their field of study to help people, not to sit in front of a computer. But these days, they regularly cross paths with software engineers wielding acronyms like SOAP (Simple Object Access Protocol), REST (Representational State Transfer), JSON (JavaScript Object Notation), and API (Application Program Interface), terms that don't mean much to the average person. Even if caregivers pick up what these acronyms stand for, they may wonder what they do and why they matter.

The API is a case in point. It's critical in computer communications, particularly between systems. In a nutshell, APIs allow two disparate systems to connect, share data, and provide information to end users. Without APIs, it's impossible to communicate with a system to add information to its storehouse, invoke its ability to manipulate data, or to grant access to analytical results.

To complicate matters, APIs can proliferate like rabbits, making them difficult to find without a centralized resource for discovery. A system may have hundreds or thousands of them, each designed for a specific task, such as retrieving specific information for display in an application window. APIs take time to write, test, certify, and install, and even small updates to a single API can reverberate throughout a system. Any delays keep caregivers and researchers in limbo until approved APIs can channel their needed information to them. This means caregivers and researchers are far more dependent on software engineers than they may want to be.

Google Cloud

Strict compliance requirements can lead to the proliferation of APIs

Google Cloud's Apigee squarely addresses these API issues. "Patient consumers, providers, payers, are all asking for information much faster," says Carol Crowe, Digital Engagement Lead for Apigee. "Legacy systems can't make changes that quickly. A full life cycle API management platform like Apigee can help." Apigee helps enterprises make API changes to meet the demand of consumer applications much more quickly.

The inability of their IT department to deliver new features fast enough left one very large customer in managed healthcare frustrated. "Our customer was trying to provide a 360 view of patient data, from office visit summaries and lab reports, to a list of current prescriptions, and even incorporating billing and payment information," Crowe notes. To comply with healthcare regulations that govern the handling of patient data, each API was customized individually, even when they all had the same business rules. The approval process at each step of the API development lifecycle was not only rigorous, but also manual. The net result was that turning around a business requirement could take six months or more.

Since finding the myriad existing APIs within the organization's system proved challenging without a centralized registry, developers often reinvented the wheel with from-scratch APIs of their own. This made lead times unacceptably long. "What's more, because of different security standards, different traffic management rules, different analytics requirements, and different routing requirements, developers tweaked the same API in multiple ways," says Crowe. "One had a small security change, another a small traffic change. In the end, dozens of APIs ballooned into hundreds." With thousands of custom APIs out in the wild, and tens of thousands more in prospect that required individual inspection, the problem threatened to drown the organization.

Carol Crowe, Digital Engagement Lead, Google Cloud Apigee

"I've worked with many healthcare companies to guide them through the digital transformation journey. My experience has led me to a key takeaway. And that is, it's not just about technology. It's about how the technology applies to your business, and how it can improve the lives of your caregivers, administrators, and of course, patients."

Using Apigee to clear the API jungle

The Apigee platform brought discoverability, consistency and speed to the customer's API world. The key to reducing latency in the development lifecycle was facilitating governance. "As an API management platform, Apigee takes care of all the security rules, all the compliance roles, all the traffic management roles," says Crowe. "And you get analytics right out of the box." The customer reduced hundreds of APIs to mere handfuls by identifying API elements used repeatedly and certifying them. If developers still needed a new API, they could incorporate the pre-certified elements to avoid a lengthy manual review.

Moreover, publishing APIs to the Apigee developer portal made it easy for authorized programmers to locate existing APIs, complete with documentation, and try them out before committing to use them. The customer now gets reports on who's contacting their system, along with the size and frequency of requests.

Crowe reports that the implementation was a resounding success: "Our customer was able to reduce the time it took to get an API to production from over two months to merely five days," she says. According to the customer's lead architect, they made more progress in a few months with Apigee than they had in several years with their previous platform.

"I've worked with many healthcare companies to guide them through the digital transformation journey," Crowe says. "My experience has led me to a key takeaway. And that is, it's not just about technology. It's about how the technology applies to your business, and how it can improve the lives of your caregivers, administrators, and of course, patients." Helping customers accelerate the onboarding of APIs will exponentially increase their ability to provide the kind of responsive care that modern healthcare consumers both need and expect.

Carol Crowe, Digital Engagement Lead, Google Cloud Apigee

"Our customer was able to reduce the time it took to get an API to production from over two months to merely five days."

To learn more about Apigee visit:
https://cloud.google.com/apigee

Google Cloud

BrightInsight

BrightInsight

How to Scale Regulated Digital Health Solutions in Compliant Manner

Google Cloud

BrightInsight

Helping life sciences bring digital health solutions to patients faster with a pre-built healthcare platform

Compliant cloud platforms can help life sciences companies bring digital health solutions to market faster to enable increased patient adherence and engagement.

We are currently living in the age of personalized healthcare, where treatments can be tailored to the individual to maximize therapeutic benefit. As medicine becomes more personalized, it becomes increasingly complex to determine the correct dosing. This is the case for the treatment for Hemophilia A, a rare disorder that affects only 400,000 people worldwide. Roche, the largest biotech company in the world, decided to leverage the power of digital technology to provide a simple and convenient solution for physicians who treat patients with Hemophilia A.

Because it lacks sufficient proteins, the blood of a person with Hemophilia A doesn't clot normally. Emicizumab, sold under the brand name Hemlibra®, brings the right proteins together to restore natural coagulation. Activating the blood clotting process isn't as simple as swallowing a pill, however. Hemlibra requires a subcutaneous injection that doctors must tailor to each individual using complex weight-based calculations.

About Roche

A pioneer in healthcare, Roche creates innovative medicines and diagnostic tests that improve the lives of millions of patients globally. With their combined strength in pharmaceuticals and diagnostics, they strive to deliver personalized healthcare through better-targeted therapies.

About BrightInsight

BrightInsight provides software and services that take the hard work out of building, scaling and maintaining digital health offerings. As Google Cloud's "2018 and 2019 Healthcare and Life Sciences Partner of the Year," BrightInsight helps biopharma and medtech companies accelerate regulated digital health innovation through their industry-leading Internet of Things (IoT) platform.

To maximize Hemlibra's therapeutic benefits, Roche decided to develop a digital dosage calculator to aid prescribing physicians. But given the novelty of digital health solutions, navigating the regulatory landscape would be a challenge. Would the solution be regulated as a medical device? If so, should the relevant registration strategy be 510(k), CE marking, de novo, or something else? The platform for this kind of solution must meet requirements for a multitude of global standards, regulations, and certifications with monikers like IEC 62304, ISO 13485, ISO 27001, GDPR, HIPAA, and HITRUST.

Why build something that's already built for us?

For Roche, the path forward was clear. "Our ability to provide a sustainable competitive advantage with our products won't be based on developing our own cloud-based solutions—that's not our expertise," says Paul Upham, Head of Smart Devices at Roche / Genentech. Rather than engineer their own infrastructure, applications, and data stores, they partnered with BrightInsight.

"Prior to BrightInsight, biopharma and medtech had no other alternative but to build their own underlying platform," explains Paul Schultz, Senior Director of Commercial Development at BrightInsight. "They found this a significantly expensive thing to do. Building that custom-bespoke solution barely meets the requirements for one solution in one country and doesn't scale—not to mention [it takes] an army of engineers and several years to build that infrastructure."

Hosted on Google Cloud, the BrightInsight Platform supports up to Class III medical devices and combination products. Schultz likens it to plumbing that large cap biopharma and medtech customers can build digital health solutions on top of. "We then take on the accountability of the data from a privacy, security, and regulatory perspective," he says.

Paul Upham, Head of Smart Devices, Roche / Genentech

"Our ability to provide a sustainable competitive advantage with our products won't be based on developing our own cloud-based solutions—that's not our expertise. Where we can generate new competitive advantages is in how we analyze and use the new data being generated by all of these digital health solutions."

Paul Schultz, Senior Director of Commercial Development, BrightInsight

"You can think of BrightInsight as the compliant platform through which our large cap biopharma and medtech customers can build their digital health solutions."

Google Cloud

BrightInsight

Reducing the regulatory burden for innovators

Companies like Roche are only too happy to transfer the onus of managing highly-regulated medical device data and personal health information to BrightInsight, which submits design documentation and obtains the necessary certifications for their platform so their customers don't have to. They also maintain a Device Master File (MAF) with the FDA for marketing approval in the US—something that can help life sciences companies get treatments hosted on the BrightInsight Platform to market much, much faster.

Leaving BrightInsight to manage regulatory approvals for its platform, Roche focused on designing the Hemlibra Dose Calculator for physicians treating patients afflicted with Hemophilia A. Because the architecture of the BrightInsight Platform is modular, Roche was able to customize their solution very rapidly for a complex use case that combines patient data with data from other sources. Developing and launching the solution as a CE-marked Software as a Medical Device (SaMD) took only five months.

As an added benefit, Roche only needs to participate in regulatory conversations if they make product changes or encounter issues they have to report. BrightInsight's fully managed service, which tracks privacy and regulatory changes on their behalf, handles the rest.

Now streaming: digital health data to shape future discoveries

With the proliferation of Internet of Things (IoT) for healthcare, biopharma and medtech companies have a tantalizing opportunity to capture and analyze streamed data that can shape new development and demonstrate the efficacy and value of the treatments they put so much into. "Where we can generate new competitive advantages is in how we analyze and use the new data being generated by all of these digital health solutions," says Upham.

Schultz agrees, and adds that "being able to capitalize on the insights from that data in a compliant way that adheres to global regulatory privacy and security is a very overwhelming and challenging task." The BrightInsight Platform can ingest data from multiple devices and digital health solutions, integrate it with data from downstream health IT systems such as electronic health records or disease management programs, and analyze everything using capitalized machine learning and artificial intelligence algorithms. Insights gained will inform drug discovery and help create tools that improve the experience for patients and the efficacy of their treatments.

For companies like Roche, continued success depends on disruptive opportunities like connected combination products, Software as a Medical Device, and digital therapeutics. "We definitely learned so much from our work with the BrightInsight team," says Upham. "I've been surprised by the significant interest and engagement from Roche's country affiliates who are recognizing the value these digital health solutions can bring to each of their markets. It has really set the stage well for future projects."

To learn more about BrightInsight contact Paul Schultz: paul.schultz@brightinsight.com

Google Cloud

ClearDATA

ClearDATA

Unlocking Legacy Grade Claims Data for AI Discoveries Using the Google Healthcare API

Google Cloud

ClearDATA

Preparing legacy data for cloud-based healthcare algorithms

CareCloud and ClearDATA join forces to bring legacy healthcare data into HIPAA-compliant cloud environments, where providers and plans can analyze records to improve care.

About ClearDATA

ClearDATA's innovative platform of solutions and services protects customers from data privacy risks, improves data management and scales their healthcare IT infrastructure, enabling them to focus on improving healthcare delivery, every single day.

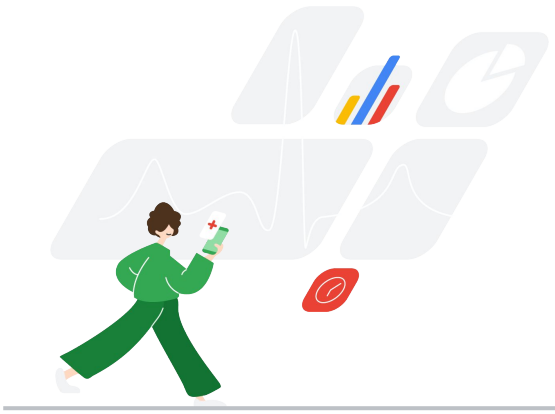
About CareCloud

CareCloud is the leading provider of cloud-based revenue cycle management (RCM), practice management (PM), electronic health record (EHR), and patient experience management (PXM) solutions for high-growth medical groups.

Since modern medicine began, healthcare organizations focusing on advancements in care delivery, more effective medicines, and deeper specialization of medical knowledge have done their best to record resulting improvements in patient outcomes and quality of life.

The mountains of paper records collected in manila folders over the years have slowly given way to various electronic formats, a process made long and arduous by complex regulations. This uneven transition to digital records has unfortunately resulted in disjointed silos that house data in a cornucopia of formats. To inform healthcare's future, data analysts need to harmonize these electronic treasure chests. But this can be a complicated and expensive task, in no small part because health data must be handled in strict compliance with regulations that constantly evolve.

As data interoperability becomes an increasingly pressing concern for healthcare providers, software developers, and technology vendors, data standards that enable the seamless, on-demand exchange of health information have paved the way forward. The Fast Healthcare Interoperability Resource, commonly known as FHIR, has quickly become the go-to industry protocol for joining disparate data systems together, particularly through applications. But a lot of existing data isn't in FHIR format.



Google Cloud

ClearDATA

The challenge of modernizing software for new healthcare data standards

"We're all feeling the financial burden of having to bring our systems up to compliance and in a short period of time with all these ever changing standards," says Alen Pulido, Director of Engineering at CareCloud, a provider of cloud-based software solutions for healthcare IT. "We see the challenge as two-fold. How do we expose all our legacy data that we have collected over the years in these new standards? How do we update our processes in our API to comply with new standards, so we don't have to go through the trouble of migrating them?"

To help customers import legacy data to the cloud quickly and accurately, CareCloud has built a state-of-the-art file translation engine for healthcare data as a part of a FHIR Bridge. Rather than build and maintain their own FHIR service and infrastructure, however, CareCloud relies on the Google Cloud API. With support for popular healthcare data standards such as FHIR, HL7, and DICOM, the Cloud Healthcare API can bulk import and export batch or streamed data in FHIR and DICOM formats, providing a convenient way to move healthcare data to the cloud or between projects. It also offers a service to de-identify data before analysis.

The process begins with data integration that makes multiple components of a health record accessible to the realm of machine learning: DICOM data from medical images like radiology scans, FHIR data representing text in electronic health records, and HL7 data containing clinical messaging. The Cloud Healthcare API accelerates ingestion and integration, helping CareCloud customers take advantage of state-of-the-art analytics and machine learning tools available in Google Cloud.

Alen Pulido, Director of Engineering, CareCloud

> "The question for us is how do we, as an organization, guarantee that all these elastic infrastructures and services are being created and deployed in a secure, compliant way, while at the same time being constantly monitored?"

A key advantage of using Google Cloud Platform (GCP) infrastructure as a service and the Cloud Healthcare API is Google Cloud's focus on compliance with healthcare regulations. "The question for us is how do we, as an organization, guarantee that all these elastic infrastructures and services are being created and deployed in a secure, compliant way, and at the same time being constantly monitored?" asks Pulido. "We're talking about some of the most sensitive data in healthcare IT, where it's a combination of financial and clinical information. Needless to say, all this needs to be protected and guaranteed in transit and at rest. So, we're using a lot of the native ingestion tools to prep and load the data and also stream it across the infrastructure to ultimately save it in the Healthcare API."

Google Cloud

ClearDATA

Automating and maintaining HIPAA-compliant cloud configurations

Passed by the US Congress in 1996, the Health Insurance Portability and Accountability Act, known as HIPAA, requires healthcare providers and organizations to ensure the confidentiality and security of protected health information (PHI) when it's transferred, received, handled, or shared. Given the key role cloud computing is now playing at the frontiers of medicine, says Matt Ferrari, co-founder of ClearDATA, it's important that compliance teams examine how to implement and enforce standards and certification specifics in the cloud. "What kind of protected health information is in that backup and how do you need to replicate it across the environment?" he asks. "In other words, how do you ensure that it's compliant?"

Because cloud environments aren't necessarily HIPAA-compliant right out of the box, ClearDATA provides Automated Safeguards, which configures more than 40 of the most popular cloud services to meet regulatory compliance standards, offering more than 130 technical controls to help keep data safe. This reduces the burden of compliance, freeing healthcare IT to focus on developing applications that harness the full benefits of the cloud.

"There's no third party API, ClearDATA API, or shim between you and the public cloud," says Ferrari. "You are using the public cloud as-is. And that's important for healthcare organizations that are transforming. They want to focus on innovating, changing healthcare, really making an impact on their patients, providers, nurses, and practitioners."

A compliance dashboard provides a near real-time view of where PHI flows and how well an organization's services manage it. This is particularly useful for healthcare organizations that aren't accustomed to cloud-based environments.

Matt Ferrari,
Co-Founder,
ClearDATA

> "ClearData wants to show, specifically, how we drive beyond the minimal level of compliance and security and really drive a culture of compliance into healthcare organizations leveraging Google Cloud Platform."

"ClearData wants to show, specifically, how we drive beyond the minimal level of compliance and security and really drive a culture of compliance into healthcare organizations leveraging Google Cloud Platform," Ferrari says.

The ClearDATA software monitors cloud service consumption to find deviations in use that may impact security or compliance. It tracks changes to public cloud services and evolving regulations, as well as changes to the customer's environment, such as application or operating system updates. "When a customer has some kind of change in any of those scenarios, we can automatically go in and remediate," Ferrari says. This helps ensure that the customer's environment stays compliant.

Google Cloud

ClearDATA

A partnership to unlock the future of medicine

"The two-way partnership with Google on the Healthcare API side and ClearDATA on the compliance side lets us put together a turnkey stack that allows our partners to potentially leverage this type of technology at scale, with automated deployment at the push of a button" says Pulido.

CareCloud's collaboration with ClearDATA and Google Cloud has made it much faster and easier for healthcare teams to develop, test, train, and deploy machine learning models on patient data, and then integrate the outputs into existing clinical workflows to aid decision-making and shape patient treatment plans. With fast access to data stored in the many systems providers and plans use, machine learning and AI can unlock its value to radically reduce the weight of traditionally manual clinical and administrative tasks, opening the future to better care.

Alen Pulido,
Director of Engineering,
CareCloud

"The two-way partnership with Google on the Healthcare API side and ClearDATA on the compliance side lets us put together a turnkey stack that allows our partners to potentially leverage this type of technology at scale, with automated deployment at the push of a button."

Hear more from ClearDATA & CareCloud in this exclusive interview

To learn more about ClearDATA visit:
https://www.cleardata.com/multi-cloud-platform/gcp/

Google Cloud

edifecs

Edifecs

FHIRing up the Cloud: How Edifecs and Google Replicated GuideWell's BB 2.0 Framework for the Cloud

Google Cloud

edifecs

FHIRing up the cloud: liberating health information to drive interoperability

Edifecs replicated GuideWell's on-premises framework in the cloud to enable seamless and compliant access to healthcare data

About Edifecs

For 24 years, Edifecs has been solving complex healthcare challenges, with the mission to improve healthcare outcomes, reduce costs, and accelerate innovation. Touching the lives of over 215 million people, Edifecs strives to build solutions that harness data into meaningful transactions, reduce operating risks, and scale value-based initiatives.

About GuideWell

GuideWell is improving the cost, quality, and access of healthcare for its customers by applying broad industry experience to reimagine and reshape the future of health. In this spirit, GuideWell collaborates with, supports, and creates health companies with a broad range of health-related products and services that are integral and useful to people's everyday lives.

They say that information is power. Ensuring that patients, providers, and plans have easy and efficient access to patient information is essential to improving care coordination, treatment outcomes, and cost efficiency. But it's been notoriously difficult to construct a full picture of individual patients from siloed clinical and financial systems that store data in a myriad of different formats like HL7, CCD, CSV, JSON, XML, CARIN, and NCPDP, among others. Moreover, as patients switch providers or health plans, their data becomes even more fragmented over time.

To address this problem, the US government is enacting the Interoperability and Patient Access final rule (CMS-9115-F) to ensure that patients can retain access to their data wherever their healthcare journeys take them. It requires all health plans and providers servicing the national healthcare plans administered
by the Centers for Medicare and Medicaid Services (CMS) to adopt the Fast Healthcare Interoperability Resources (FHIR) standard, thus laying the groundwork for secure data exchange.

With the deadline approaching in early 2021, Healthcare organizations have started to bring their systems into compliance with the final rule. Edifecs, a healthcare interoperability vendor that works with most US healthcare plans, is offering to help. "Our primary focus is to deliver a solution for FHIR interoperability that's scalable and easy to deploy," explains Maxim Abramsky, Senior Director of Product Management at Edifecs. "The rule says that all health plan members need to have access to data about them, and FHIR is included as the only API mechanism to get access to the data."

Google Cloud

edifecs

Building a FHIR interoperability solution

To optimize their solution, Edifecs sought guidance from their partner Guidewell, one of Florida's leading healthcare companies. GuideWell's on-premises Blue Button 2.0 solution incorporates Edifecs software to facilitate interaction with the more than 40,000 providers in their healthcare network.

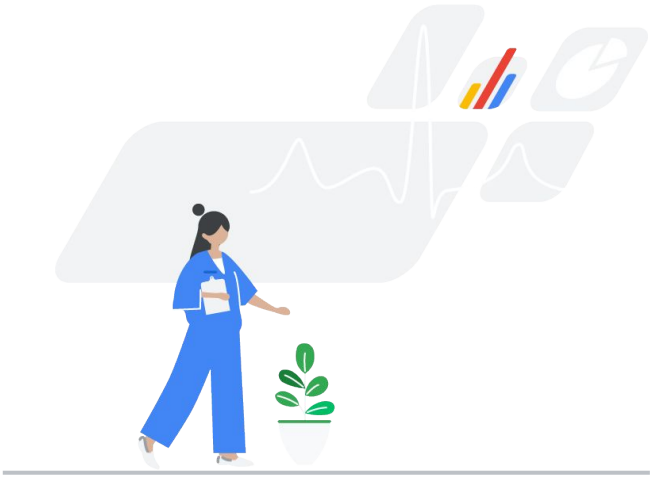
"We have a lot of different health solutions, as well as insurance businesses," says Amit Shah, Senior Director of Shared Applications/Service at GuideWell. "We needed help making the shift toward utilizing a FHIR-based API for real-time, bidirectional exchange of data between our provider offices, our clinics, and us, so we could give our members better care during their visits with a provider. We had an Edifecs platform for EDI transactions and decided to leverage their FHIR module to help with this particular interoperability."

While GuideWell's on-premises solution meets their needs, other healthcare organizations may find it challenging to replicate their approach. For one thing, on-premises deployments may take as long as six months and require significant investment in hardware and staffing expertise.

"GuideWell provided us with a lot of feedback and a lot of information on how to solve different business problems while being deployed on-premises," Abramsky says. For example, GuideWell showed Edifecs how to match members across different EMR systems when orchestrating payer-to-payer data exchanges. Such learnings helped Edifecs design an alternate solution, built on Google Cloud, for translating data from older, siloed systems into the compliant FHIR format.

Amit Shah, Senior Director of Shared Applications/Service, Florida Blue/GuideWell

"We needed help making the shift toward utilizing a FHIR-based API for real-time, bidirectional exchange of data between our provider offices, our clinics, and us, so we could give our members better care during their visits with a provider."



The Google Cloud advantage

The Edifecs solution ingests terabytes of data related to patients or health plan members, then converts it into the FHIR format using out-of-the-box maps. After validating the data and removing duplicates, the solution moves the cleaned-up data into a FHIR repository. “Google Cloud has one of the best FHIR servers in the industry, which supports the most recent version of FHIR R4,” Abramsky says. “GuideWell told us the precise number of terabytes of data we’d need to load, so we could mimic that load with Google Cloud engineers to confirm that their FHIR service could sustain it.”

Because the Edifecs solution runs on Google Cloud, additional resources scale on demand, requiring minimal up-front configuration. “We were able to very rapidly deploy the Edifecs solution on Google Cloud and make it available on demand,” remarks Abramsky. “When the amount of data increased, Google Cloud was able to just scale up.”

The added benefit of converting data into FHIR format and storing it in a cloud repository, Abramsky says, is the access healthcare organizations gain to Google Cloud capabilities such as analytics reporting, artificial intelligence, and machine learning. “Once the data is loaded into the FHIR server, all that becomes instantly available to you versus on-premises, where you have to deploy and implement custom solutions.”

Maxim Abramsky, Senior Director of Product Management, Edifecs

> “With Google Cloud, the actual deployment took less than a day. If somebody comes in saying, ‘Hey, we need the same solution but we need it tomorrow,’ we can do that.”

The cloud-based solution Edifecs built with help from GuideWell and Google Cloud demonstrates that healthcare systems and provider networks can quickly and easily deploy a HIPAA-compliant solution to meet the Blue Button 2.0 requirements from CMS. “With Google Cloud, the actual deployment took less than a day,” Abramsky declares. “If somebody comes in saying, ‘Hey, we need the same solution but we need it tomorrow,’ we can do that.”

To learn more about Edifecs visit:
www.edifecs.com/interoperability

Google Cloud

KPMG

KPMG

"Deploying ML in Healthcare Using the Data Transformation & Migration Hub (whitelabeled)"

Google Cloud

KPMG

Predicting sepsis seven hours ahead of symptoms

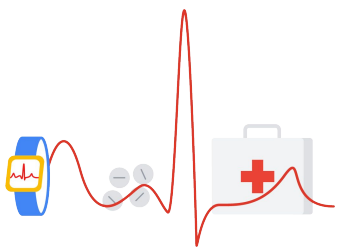
Machine learning in the cloud derives life-saving predictions from real-time data, saving lives in the ICU.

KPMG LLP

Is a professional-services firm that continuously strives to keep abreast of industry trends, drivers, and issues through knowledge-sharing and industry-insights programs. The firm harnesses innovative technology to help clients overcome their biggest challenges.

If you're an intensive care physician monitoring and treating varied health crises, you're always on the lookout for sepsis, one of the leading causes of death in hospitals worldwide. A life-threatening condition where the body's response to fight infection causes underlying damage, sepsis can elude early diagnosis, since its outward symptoms are common to many conditions. Even though you channel considerable medical knowledge and experience into your very best effort, sepsis still manages to steal lives.

But what if you had an alert system that could predict the onset of sepsis—based on each patient's up-to-the-minute labs, vitals, and other indicators—up to seven hours in advance? You could tune into the earliest indications that it's time to adjust a patient's care and begin treatment before they show any outward symptoms, quite possibly saving their life.



From Hollywood to healthcare

An early warning system that accurately predicts a patient's condition might sound futuristic, but it's not science fiction. It's actually here. The sepsis-alert system, a collaborative effort among KPMG, Google Cloud, and a major Academic Medical Center, offers a glimpse into myriad game-changing possibilities for applying machine learning and artificial intelligence (AI) to healthcare.

"We rely today on evidence-based medicine and the experience of a single doctor who makes life-changing decisions. Yet we use machine learning to do things like telling us what product to buy next, what movie to go see," says Bharat Rao, KPMG's national leader for healthcare and life sciences and a leader in their innovation and enterprise solutions practice."There's an opportunity to completely transform healthcare to a tech-driven system, to take large amounts of data and crunch it to find insights that would otherwise not be used."

True to their moniker, machine learning systems continually "learn" by identifying patterns and making increasingly precise predictions as more data comes in and researchers fine-tune the algorithms. The ever-expanding machine learning capabilities of Google Cloud Platform (GCP) can derive meaning from massive amounts of data, like those generated in healthcare environments today.

Security, privacy, and compliance, every step of the way

In developing the sepsis prediction system, Rao's team took on the challenge of creating a platform for hosting multiple prediction engines that rely on streamed data while ensuring security, privacy and compliance from start to finish.

"We developed a solution—Data Transformation and Migration Hub—that interfaces with existing healthcare IT systems and employs various data, quality, integrity, and security checks before loading the data into GCP for real-time computation," Rao says. "Our unique IP enables us to transform this data into an analytics-ready set in an environment that is specifically designed for industries like healthcare that request strong controls, security, and governance."

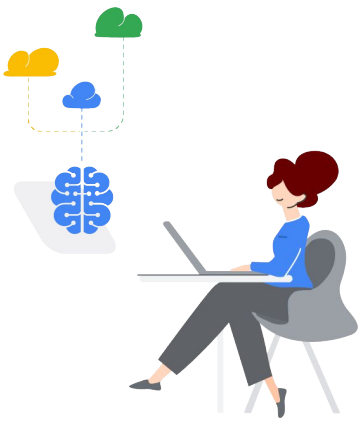
Google Cloud Platform is designed to accommodate compliance measures unique to healthcare. "When the data is sent to the cloud," Rao explains, "it is encrypted both in transit and at rest, meeting or exceeding the requirements for HIPAA." To protect patient privacy, the hub obscures the source and PHI (Protected Health Information) of ingested data, making it essentially anonymous once it's in Google Cloud. KPMG also ensures that every project from every client that runs on its platform stays separate. There's no co-mingling of data. Researchers and physicians who want access must get permission.

To prepare data for analysis, the hub converts data ingested from disparate systems into an apples-to-apples format, something no physician or researcher could do quickly enough by hand to save an at-risk patient. "The possibilities are endless," says Rao. "Imagine if you could actually analyze patient results or share data across hospital networks in seconds, or at least hours."

Bharat Rao, partner and national leader for healthcare and life sciences analytics, KPMG

> "There's an opportunity to completely transform healthcare to a tech-driven system, to take large amounts of data and crunch it to find insights that would otherwise not be used."

The speed of the sepsis-prediction application gives doctors an advantage over infections that appear asymptomatic until hours later. "This is tremendous," Rao emphasizes. "It could be the difference between ensuring a really good outcome versus a bad one."



Google Cloud

KPMG

Putting data to work saving lives

Today many healthcare organizations do not have a cohesive strategy to integrate data analytics into their hospitals operations. Rao says the Data Transformation Hub establishes a key mechanism for transmitting information to secure, compliant environments in Google Cloud Platform for analysis, something that will "be relevant for every healthcare customer of Google."

The implications and potential applications are broad. "There are many ways all of this data can be put to use," Rao continues. "With Google Cloud's enormous capabilities in scaled data processing, healthcare providers can securely collect data, store it, and extract insights and highly accurate predictions, which doctors can use to treat cancer patients or hospital administrators can use to improve financial returns."

"We can definitely expand the scope to do other things," he adds, "like genomics data, or anything that needs to be sent up in real time or in batches in a secure way." Although he anticipates the platform will also be useful for research, Rao says that its real value is in clinical settings like the intensive care unit, where deploying algorithms like the sepsis-prediction system can support doctors already doing everything they can to save lives.

Bharat Rao, partner and national leader for healthcare and life sciences analytics, KPMG

"We can definitely expand the scope to do other things, like genomics data, or anything that needs to be sent up in real time or in batches in a secure way."

Heare more from KPMG in this exclusive interview
To learn more about KPMG visit:
https://read.kpmg.us/googlecloudalliance

Google Cloud

Maven Wave
an atos company

Maven Wave + UT Austin

How UT Austin & Google Are Combating the Opioid Epidemic

Google Cloud

Maven Wave
an atos company

Maven Wave and UT Austin take on the opioid epidemic in Texas

Tackling the overdose epidemic in Texas will require work on numerous fronts. A digital platform in development by Maven Wave and the University of Texas at Austin will improve data reporting and distribution to enable that teamwork by reaching those who need it most.

University of Texas at Austin

The Department of Psychiatry at UT Austin's Dell Medical School works with a range of community partners to transform mental health care and mental illness prevention in central Texas and beyond.

Maven Wave

Maven Wave, an Atos company, is a technology consulting firm working with leading companies to create agile, analytics-based solutions in the cloud.

Every day, an average of 130 Americans die from an opioid overdose. Few people realize that behind this epidemic, one of the biggest hurdles is a data problem that hinders the work of those trying to bring life-saving resources to areas and individuals most affected by substance abuse. Anecdotally, some people who work in harm reduction have estimated that 50-90% of overdoses go unreported in Texas. According to Dr. Kasey Claborn, a research scientist and assistant professor in the psychiatry department at the University of Texas, Dell Medical School, this reporting gap—and the uncounted fatal and nonfatal overdoses it represents—extends beyond opioid use, and, significantly, beyond Texas. "In 2017, over 70,000 people died from an overdose in the United States alone," she says. "We're seeing a rise in stimulant, cocaine, and meth overdoses within the last five to ten years as well. We don't necessarily just have an opioid problem. We have a drug problem in the United States."

Without accurate information, it's impossible to create effective solutions. Tackling this problem, in Texas and everywhere else, will require first and foremost closing the reporting gap. Getting better data to people who can put it to work in real-time—from those who direct funding and allocation of resources, to EMT and emergency room workers, law enforcement, substance abuse treatment and prevention experts, communities and families affected by substance abuse, and even those struggling with substance abuse themselves—will literally save lives.

Everything's bigger in Texas

Active involvement from the community is essential to improving the gap in reporting across Texas, Dr. Claborn says. The tool needed to capture such a broad range of data from an equally broad range of people will be of truly Texan proportions, stretching across complex urban centers—each with their own unique characteristics and challenges—and large, rural areas, some that today aren't capturing overdose data at all.

Some reporting hurdles are unique to Texas. For example, only 15 out of 154 counties have a medical examiner, so most autopsies in the state are performed by a Justice of the Peace with no training at all in substance use and overdose. Other factors contributing to the state's data gaps are more universal, such as fear of legal repercussions among users and their communities, social stigma, and, of course, the lack of a unified reporting system across the state. To be useful to—and easily used by—everyone it will reach, such a system must be scalable and versatile enough to do what it needs to do in a state where, as the saying goes, everything's bigger. Ultimately, other states will be able to use the same platform to confront their own overdose data challenges.

So, the questions is, how to capture missing data in a reporting system that's scalable to Texas and beyond? With funding from the Texas Health and Human Services Commission, the technology consulting firm Maven Wave is working with Dr. Claborn and her colleagues on a five-year initiative called Project Connect to build a platform that can be widely adopted. To inspire trust that's crucial to the project's success, both from medical professionals concerned with issues like HIPAA compliance and individuals dealing with substance abuse, it must be secure as well as scalable. "We want to ensure that we're building out the right foundation of this platform from the beginning to take absolute care of this sensitive data," says Harrison Sonntag, a principal consultant in the healthcare practice at Maven Wave.

Dr. Kasey Claborn, the Dell Medical School at the University of Texas at Austin

"In 2017, over 70,000 people died from an overdose in the United States alone...We're seeing a rise in stimulant, cocaine, and meth overdoses within the last five to ten years as well. We don't necessarily just have an opioid problem. We have a drug problem in the United States."

Groundbreaking steps to get ahead of the curve

While getting actual drug users to report overdoses will be a groundbreaking step forward, it obviously presents unique challenges, both ethical and practical. A genuine understanding of the barriers to reporting is vital for creating a system that drug users will actually use. To that end, community advisory boards at five urban and rural "pilot sites" across Texas will contribute directly to quantitative and qualitative research, talking with everyone from state government employees to healthcare workers to regular citizens (including users themselves) to find out what's getting in the way of accurate data collection, reporting, and management. The knowledge gained from the pilots will help project stakeholders create an implementation protocol that's sustainable state-wide.

Google Cloud

Maven Wave
an atos company

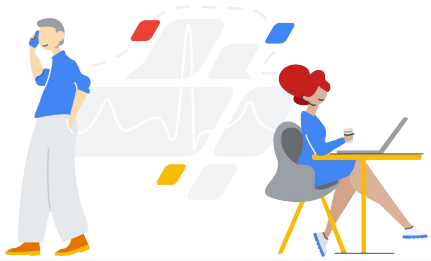
In year one, Maven Wave will focus on creating the project's scalable foundation, a digital platform for overdose reporting and tracking hosted in Google Cloud. An administrative dashboard with real-time data visualizations will help identify, among other things, geographic hotspots. This will help channel life-saving medications like Narcan to the places they're needed most. In years two through five, tailored applications that integrate predictive analytics will help law enforcement and other professionals get ahead of the curve so they can start preventing overdoses. A comprehensive application for substance users will not only help them report overdose data, but may also, as Sonntag explains, incorporate telemedicine for individuals who might not otherwise have access to care. The next phase will involve applications for healthcare professionals and laypersons, as well as statewide implementation and rollout.

Saving lives through technology

Although it's an undeniably ambitious project in schedule and scope, only collaboration at the level of Project Connect can address a challenge as multifaceted—from both technical and human perspectives—as the opioid epidemic. "If we—Maven Wave, Google Cloud, and UT—all can play our separate roles, ultimately at the end of the day, this, if successful, can save lives," Sonntag says. "It can help families, it can possibly prevent a mother from losing her son, a son from losing his mother or father. So it's an incredible thing to be a part of."

Harrison Sonntag, Principal Consultant, healthcare practice at Maven Wave

"If we—Maven Wave, Google, and UT—all can play our separate roles, ultimately at the end of the day, this, if successful, can save lives. It can help families, it can possibly prevent a mother from losing her son, a son from losing his mother or father."

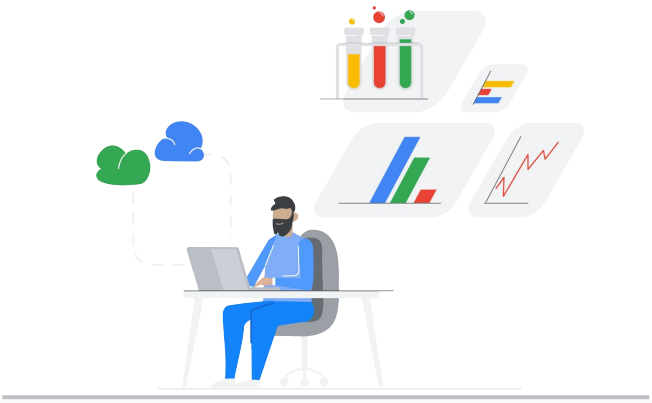


Hear more from Maven Wave & UT Austin in this exclusive interview

To learn more about Maven Wave contact: Harrison Sonntag
harrison.sonntag@mavenwave.com

Google Cloud

btc boston technology



Boston Technology

Patient-centered Studies on Google Cloud

Google Cloud

btc boston technology

Improving the reporting of real-world data for regulatory submission

Life sciences organizations must report clinical trial data to the US Food and Drug Administration. Collecting the data in an open source platform makes it accessible for post-marketing efficacy studies, observational research, and improving the patient experience.

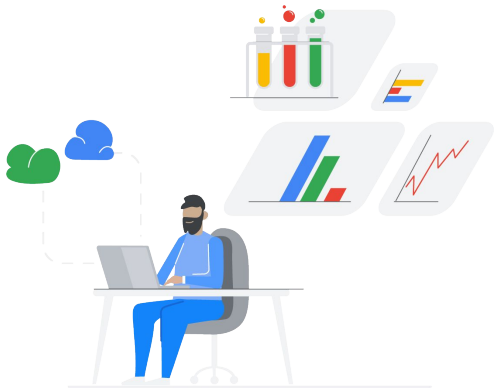
About Boston Technology Corporation

Boston Technology Corporation applies technical expertise in mobile, web, and cloud-based app development and provides skilled technical staffing solutions to bring patient-centric programs into the digital age.

By observing and collecting data, ancient peoples learned which herbs, foods, and methods worked to cure ailments. During the centuries that followed, scientists delivered many important discoveries, while opportunity-driven “snake oil” salesmen promoted cure-all elixirs with bogus ingredients. To help consumers understand the difference, the US Congress passed the Pure Food and Drugs Act in 1906, establishing the Federal Drug Administration (FDA). After the tranquilizer Thalidomide caused serious birth defects, the 1962 Drug Amendments directed the FDA to rely on scientific testing, proof of safety, and evidence of a drug's efficacy before approving it.

Today, the FDA oversees many well-controlled studies. The process for studying candidate medicines and medical devices is, however, complex and lengthy. Although the intention is to ensure safety and efficacy for all who will benefit from these advancements, each additional day a clinical trial lasts can feel like a lifetime to those urgently waiting for a breakthrough in the care of a disease, injury, or congenital condition.

In a quest to improve the treatment study process without compromising consumer safety, the FDA joined forces with the Boston Technology Corporation to build a platform that gives clinical trial administrators one-click access to all the necessary digital components for designing, planning, and executing studies.



Google Cloud

btc boston technology

Offering an extensible, modular platform for content-driven studies

"We wanted to create a web portal that makes it easy for clinical trial administrators to configure protocols, clinical site set ups, surveys and other data collection instruments, and to support participant enrollment," says Shyam Deval, president of the Boston Technology Corporation. "We worked with the FDA, Harvard Pilgrim Health Care Institute, and a company called LabKey to build the first version of the platform. The initial pilot study was run by Kaiser Permanente, and now two clinical trials are running on the platform." In 2020, the platform won the prestigious Federal Labs Impact Award, Deval notes proudly. "We are now working with Google Cloud to make it more capable, more functional, and richer and easier to deploy."

The platform is scalable and extensible, Deval explains, helping administrators "run multiple, simultaneous studies and visualize each study's progress." It also makes studies less time-consuming and laborious for participants, who can fill out study surveys on their mobile devices or share information via wearables that collect and send de-identified data to secure stores, where scientists and regulators can analyze it. Such convenience improves patient recruitment and retention.

Because the platform is open source and integrates with third party systems, researchers can dynamically collect, de-identify, and join data from electronic health records, claims and billing, and product and disease registries, making this data available, Deval says, "for regulatory submission, market access, or for research and development." Data may also come from observers who report outcomes, such as patient family members, investigators at study sites, or clinicians. The assembled data provides real-world evidence scientists and regulators can use to assess the potential benefits or risk of a medical product.

Shyam Deval,
President, Boston
Technology Corporation

"We wanted to create a web portal that makes it easy for clinical trial administrators to configure protocols, clinical site set ups, surveys and other data collection instruments, and to support participant enrollment."

"FDA MyStudies on Google Cloud will improve the ability to perform research that leads to better patient outcomes."

"Supporting all decentralized real-world data collection models makes it easier for that push towards the virtual trials, because you're no longer constrained by the platform or the protocol."

Using real-world data to improve health

The FDA is encouraging the industry to use such real-world data in a number of ways. Drug and device makers can use patient-generated clinical trial and post-marketing studies data as evidence of product efficacy for regulatory approvals. Scientists can use it for observational research. Clinicians can analyze data collected directly from patients via questions or device sensors to manage care, while hospital administrators and health plans can use the data to optimize their operations.

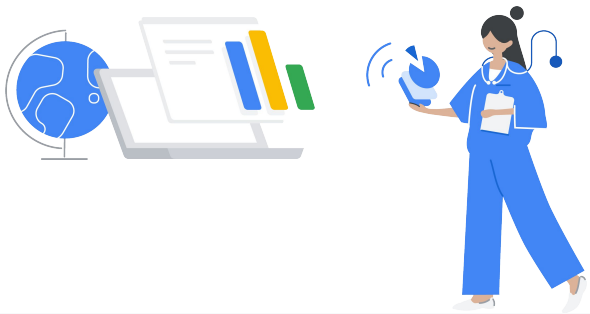
The FDA MyStudies platform on Google Cloud supports four different models for collecting real-world data to meet security and privacy requirements. This flexibility allows study managers to tailor each study design around the participants. “Supporting diverse decentralized real-world data collection models makes it easier for that push towards virtual trials, because you're no longer constrained by the platform or the protocol,” Deval explains. The platform’s electronic consent eligibility process accelerates enrollment and on-boarding, helping studies move faster.

With minimal software development, study administrators can launch multiple types of studies, authoring content through a web application and publishing it to mobile apps or to existing applications through a gateway app. “The configuration and launch of the study becomes an instrument for design management,” says Deval. “The mobile apps can be based on standard frameworks, like research kit and research stack.”

Ready, set, go

Tailoring app functionality to the needs of different therapeutic areas significantly improves the patient experience, encouraging a higher level of engagement, more involved care management from providers, fewer patient drop-offs, and higher medication compliance. Improved patient participation and compliance in turn lead to better evidence, speedier trials, and higher rates of approval. “FDA MyStudies on Google Cloud will improve the ability to perform research that leads to better patient outcomes,” Deval asserts.

Medical product safety and efficacy is, and always will be, the FDA’s primary goal. Until recently, this meant compromising speed to market. The MyStudies platform built on Google Cloud lays the foundation for the public and private sectors to study treatments more quickly and thoroughly, and to provide real-world evidence that can help the world’s researchers discover future treatments and clinicians improve patient outcomes.



Hear more from Boston Technology in this exclusive interview

Shyam Deval can be reached at
shyamd@boston-technology.com

Google Cloud | Deloitte.

Deloitte

The Need for a Cloud-Based Biomedical Research Platform

Google Cloud | Deloitte.

Empowering collaborative biomedical research for faster discovery

To accelerate scientific breakthroughs, researchers need the ability to search, share, and analyze vast amounts of data across the biomedical ecosystem.

About Deloitte

A source for fresh perspectives in health care, The Deloitte Center for Health Solutions looks deeper at the biggest industry issues, providing cutting-edge research to give Research and Development organizations the insights they need to see things differently.

The explosive amount of scientific data generated in recent years has given researchers incredible opportunities to better understand health challenges. With the right tools to collect and analyze relevant data, they can collaborate on their theories and findings, hastening discovery of treatments for patient populations whose needs vary based on geography, demographics, and genetic factors. But effectively storing, securing, and sharing data so that it can prove useful to whomever needs it, whenever and wherever they need it, has been an almost insurmountable challenge. The requirements of a comprehensive solution are huge and complex. It needs to deliver enormous data storage capacity, massive computing resources, advanced analytics and machine learning capabilities, and collaboration tools specific to life sciences research that have proper privacy and security controls.

Today, resource limitations, as well as data silos that make it hard to extract insights, constrain research. "We're estimating that the National Institutes of Health maintains over 650 petabytes of data on-premises," says Juergen Klenk, a principal with Deloitte Consulting LLP. While the vast storage available in the cloud may seem like an easy answer, he says, "simply lifting and shifting on-premises data to the cloud creates additional silos of unconnected data, making it nearly impossible for biomedical researchers to search, find, and compute across multiple data stores."

Juergen Klenk, PhD and Principal, Deloitte Consulting LLP

"The NIH, like many institutions, faces the challenge of disposing potentially valuable data in order to make room for new research data. Simply lifting and shifting on-premises data to the cloud creates additional silos of unconnected data, making it nearly impossible for biomedical researchers to search, find, and compute across multiple data stores."

Google Cloud | Deloitte.

An advanced platform for scientific collaboration

To accelerate research and discovery, Deloitte and Google Cloud are working on a next generation cloud-based research platform that enables collaboration across the entire biomedical ecosystem, encompassing private and public sectors. With shared data that is more consistent, he says, "researchers will have the ability to do more reproducible scientific discovery."

Understanding basic biological mechanisms requires immense amounts of data. Standardizing, aggregating, storing, and continuously updating data coming from various sources can help scientists make research breakthroughs related to vaccines, stem cells, nanobots, biome sensors, and more. For example, they can use advanced analytics to generate novel insights from large aggregated data sets that provide a holistic, real-time view of people and their environments.

Consider a recent development in science where a lightsheet microscope makes it possible to observe a small organism as it develops. A single experiment can generate up to five terabytes of video data. "Just think about the incredible volume as several experiments are run across multiple specimens," Klenk marvels. "There may be a million scans in a single experiment, and finding some frames of video where something of interest is happening is literally like finding a needle in a haystack. It cannot possibly be done manually." The power of machine learning can help uncover that valuable information.

The goal of the platform is to accommodate current and future data generation, analysis, and preservation. Researchers may no longer be burdened with making and maintaining endless copies of data stored in multiple silos. Instead, they'll have a common tool that facilitates search, retrieval, and analysis of data in a secure and standards-based environment. Because the platform will be hosted on Google Cloud, the Cloud Healthcare API will ingest and de-identify patient data, allowing researchers to share it without compromising personal health information.

Juergen Klenk,
PhD and Principal,
Deloitte Consulting
LLP

"When there is more shared clinical and biomedical data available across the globe for researchers to use, new cures for many of the still untreatable diseases can be found."

Google Cloud | Deloitte.

Workspaces for assembling and analyzing data

Catering to the needs and use cases of researchers in a data-centric manner requires integration across genomic, imaging, and clinical data types. Since researchers need an environment where they can share such data virtually, the aim is to connect them using workspaces.

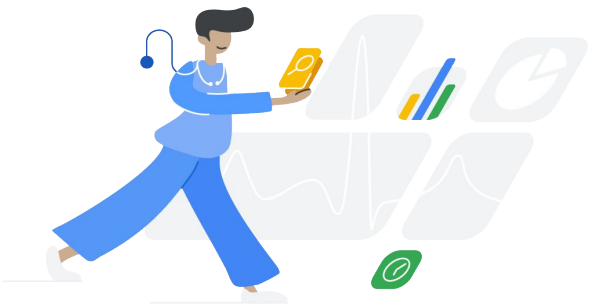
Such collaborative spaces must be intuitive for researchers, presenting a "familiar Google sign-in interface," while finding relevant data sets "must be as seamless as your typical Google search," Klenk says. After creating a research project or "virtual lab notebook," a principal investigator will grant access to team members. Once onboarded, those users will see a description of data sets published by academic medical centers or the broader biomedical research community. They can receive permission to not only access data sets of interest, but also upload their own data sets. After selecting the data sets they need, researchers will gain access to a virtual lab notebook with tailored workflows and algorithms for analyzing the data.

"Once you've done your analysis, you can also use the Google Cloud ecosystem to further visualize and analyze your data," Klenk explains, "for example, Big Query to perform different SQL queries across all your data sets and visualization with a TensorBoard, or machine learning-based analysis from the data that you produce from your initial analysis."

A strong foundation leading to future discoveries

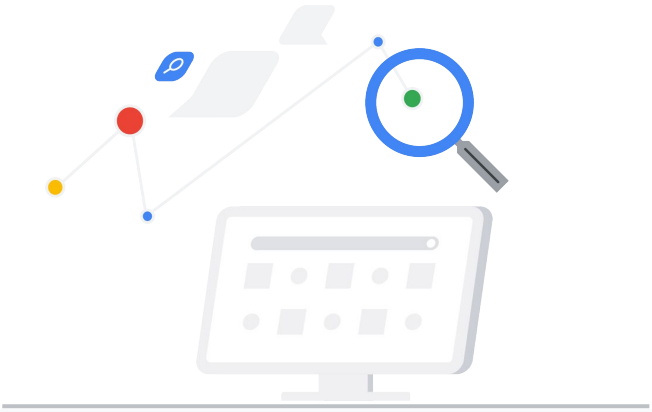
Despite medical advances, the world's vast and diverse population is still sadly vulnerable to disease. When we're hit with the unexpected, such as the COVID-19 pandemic, scientists take the lead in a race to find treatments and cures. COVID-19 has demonstrated the incredible importance of collecting, sorting, and analyzing relevant data so that the public and private sectors can work closely together on medical and economic solutions, stemming the curve of impact, protecting those most at risk, and delivering guidance and answers to those bringing us life-saving products and services.

A next generation, secure, compliant, and scalable research platform designed for large data-driven, highly collaborative projects can help scientists find answers more quickly. Moreover, the data they collect and analyze today can be preserved for future generations of researchers, allowing the biomedical ecosystem to build on past insights in preparation for future challenges yet unseen.



To learn more about Deloitte contact:
Juergen Klenk, PhD at jklenk@deloitte.com

Google Cloud



Onix

Cloud Healthcare API: How It Helps Solve the Interoperability Issue

Google Cloud

Solving the interoperability problem with the Google Cloud Healthcare API

In healthcare, crucial data often resides in disconnected, siloed systems that don't communicate well with one another. The transformational Google Cloud Healthcare API helps to unlock the potential of healthcare data by empowering secure, scalable information exchange between health IT systems and cloud-powered applications.

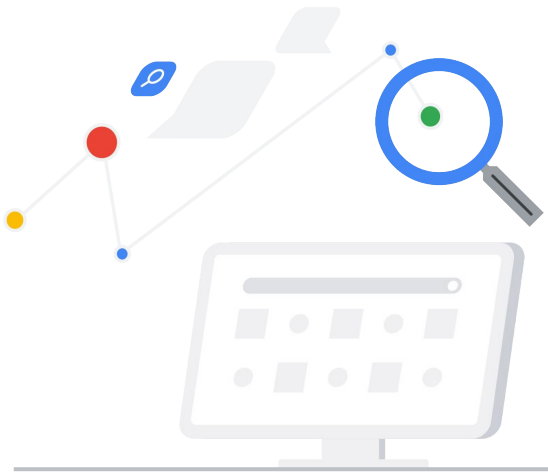
About Onix

Onix enables health and life science organizations to securely leverage the cloud to improve clinical outcomes, accelerate research discoveries, and drive innovation in a HIPAA-compliant environment.

It's a problem that started when people first learned to count using their fingers and toes—what do you do when you run out? In the centuries since, innovators seeking better counting tools brought us the abacus, slide rule, spindle, and calculator. When Charles Babbage created his analytical engine, the first programmable computer, he arguably launched the Information Age.

Just as counting was limited only by the power and capacity of the tools used, so is today's quest to collect and analyze data. In creating systems that gather healthcare data, software developers often worry about scalability, or the ability to run massive calculations on many terabytes of data. They must also overcome data silos. When data is stored in multiple locations in differing formats, it's accessible only by copying and moving huge stores into a central location. Then there's the potential for exposing Protected Health Information. Overall, the challenge of collecting and analyzing data is complex and expensive.

Onix is helping developers to solve these problems with the Google Cloud Healthcare API by creating a repeatable, scalable process for accelerating deployment of the API, as well as an appliance that will automate the process of generating MITRE's Synthea™ synthetic patient datasets in Google Cloud Platform (GCP).



Google Cloud

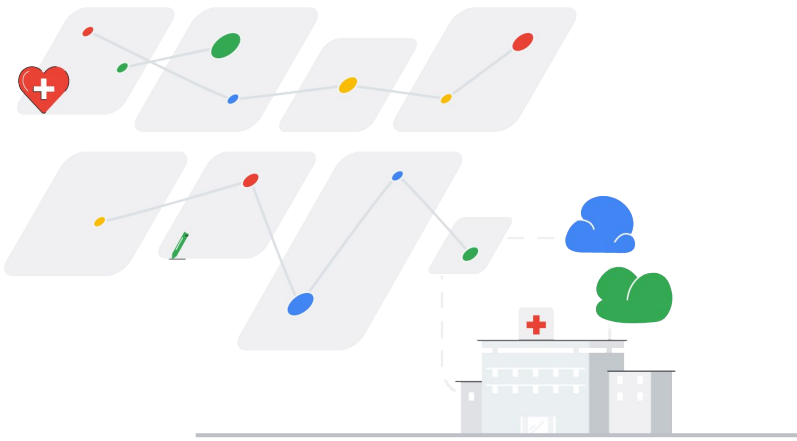
Confidence in the cloud

"Google Cloud Healthcare API leverages the most widely used formats for healthcare data, Fast Health Interoperability Resources (FHIR), HL7v.2 and DICOM," says Sunnie Southern, Vice President for Onix Health and Life Sciences Division. "It provides very specific services that are critical for healthcare organizations, and really supports interoperability, including de-identification and granular security controls." Because data is stored in Google Cloud Platform (GCP), she explains, "you can apply the amazing technology around analytics and machine learning to not only allow data flow in a secure way, but to also leverage insights from that data," says Southern.

Although more organizations are storing highly sensitive information in the cloud, even those databases can end up siloed. Standards like HL7 and the newer FHIR protocols help eliminate medical information silos, explains Yasir Drabu, Principal Engineer for Onix Health & Life Sciences Division. However, when it comes to interoperability, "the challenge really comes down to: how do we set this up, how do we scale it, how do we secure it, make sure we are compliant along the way? The Google Cloud Healthcare API makes it possible for organizations to securely and compliantly share data using the most widely used clinical healthcare data formats - like FHIR."

Sunnie Southern, Vice President, Health & Life Sciences Division, Onix

"Google Cloud Healthcare API leverages the most widely-used formats for healthcare data - FHIR, HL7v2, and DICOM... Because the data is stored in GCP, you can apply analytics and machine learning to not only allow data flow in a secure way, but also to leverage insights from that data."



Google Cloud

Creating a realistic test environment

“How does someone doing application development do it without risking some misconfiguration?" asks Drabu. "How do we test it? How do we scale it? How does it meet our needs?" To answer these questions, Onix and the Google Healthcare API team collaborated to set up SYNTHEA on GCP. MITRE developed SYNTHEA to create synthetic but real-looking patient data from census information. “It provides very realistic looking data, all of which you can actually test,” says Drabu. Onix created different workloads from SYNTHEA, “using compute instances to generate the synthetic data, and store that data, which is in the FHIR STU3 format, in cloud storage,” he explains.

Onix loaded synthetic data into the FHIR store, which the Healthcare API supports. “The FHIR store takes patient data and stores it in a way that’s easy to retrieve and follows the same set of APIs and protocols, making it easy for other systems that can consume and interact using those protocols to pull and push data into the system,” explains Drabu. “Imagine there's a proprietary EMR. Developers can simply write a translation into the FHIR store and make that data accessible with the right permissions and credentialing to other organizations. That's where the Healthcare API makes it super easy to connect patient data between disparate systems.”

GCP’s certifications for HITRUST and HIPAA, plus ready-to-use scalability and security, saves developers from having to build a healthcare data test platform from scratch.

Yasir Drabu, PhD and Principal Engineer, Onix Health & Life Sciences Division

> “Developers can simply write a translation into the FHIR store and make data accessible with the right permissions... That’s where the Healthcare API makes it super easy to connect patient data between disparate systems.”

Running the test

Once Onix loaded the SYNTHEA data into the FHIR store, they ran different workloads to test how well it would scale. “We went all the way from a small subset of 10,000 patient records up to 10 million,” says Drabu. As they increased the size of the dataset, the team measured response times for searching, querying, inserting, and deleting data. “We created a standard set of test scripts, applicable to the different APIs, and at each load—let's say at 10,000 records or a million records—we ran a test script,” Drabu explains. “Then we collected data from those test scripts and stored it in BigQuery for analyzing the performance.” The team visualized the results in Data Studio.

Onix accomplished the goal of creating a repeatable, scalable process to accelerate software development. “Based on this work, we are creating an appliance, which we'll publish through the marketplace, where people can simply use the SYNTHEA engine, point to their FHIR store, and load the data directly,” Drabu summarizes. The appliance takes care of data orchestration, making it even faster for researchers or developers to use the Google Healthcare API.

Future analyses made easier

“Using the SYNTHEA data, researchers, data scientists, and developers can get started with the Google Healthcare API and Google Cloud Platform, and basically build their applications almost to the point of full execution,” says Southern. “They can test before they have to accept live data.”

The process Onix developed allows researchers, data scientists and developers to start using Google Healthcare API quickly, “to realize what we've been trying to do in healthcare for so many years, which is to securely share that information with the right person at the right time so that physicians can make the most informed decisions about how to care for patients,” concludes Southern, “and patients can make the most informed decisions about their own care.”

The appliance, coupled with Synthea and the Google Cloud Healthcare API on GCP, becomes a very useful tool for healthcare teams. They are enabled to build and test applications; to expand the limits of data analysis and push beyond the constraints of today’s siloed data stores. Babbage would be proud.

Hear more from Onix in this exclusive interview

To learn more about Onix Health & Life Sciences, contact us at HLS@Onixnet.com or visit: https://www.onixnet.com/health-life-sciences

Google Cloud

Intuition+

Steadman/Intuition+

Evidence-Based Decision Making in Sports Medicine

Google Cloud

Intuition+

"What-if" analysis revolutionizes orthopedic patient care

A groundbreaking interactive dashboard for physicians helps injured athletes maximize their chances of returning to the sports they love.

After injuring her knee in a skiing accident, Sara gets news that elite athletes like her dread hearing: she needs surgery. Anxious about her prognosis, she bombards her doctor with questions. What's the best surgical approach? How long will it take to recover? Is there anything she can do to minimize complications and maximize his recovery? And, most importantly, will she ever ski again?

A previous patient of the renowned Steadman Clinic in Vail, Colorado, Sara knows she's trusting her care to one of the country's top clinics. What she'll soon learn is that her treatment experience this time around will be far more personalized and easier to navigate thanks to a new, data-driven physician dashboard that the Steadman Clinic and SPRI built in partnership with Intuition+ and Google Cloud.

The Steadman Clinic and SPRI have always kept a secure database of patient treatments and outcomes. They've also built vast repositories of information from their EHR systems, biomotion lab, imaging research group, and regenerative medicine lab, as well as many peer-reviewed scientific papers with applicable data science models. But each dataset was siloed in a different system and as a result, none of it was easily accessible to doctors.

The research scientists at SPRI knew that bringing all the data from the clinic and the institute together would enable analytics engines to compare every detail of a clinic patient's record against that of every other patient, and against every research study the institute has ever performed, revealing patterns and nuanced connections impossible for any human to discern on their own. If doctors could instantly access the combined data during patient visits to run "what-if" projections, they would have an incredibly valuable tool for working with patients like Sara.

"We want to use all of our diverse sets of data to help the physician make the most informed decision on how to proceed with this patient, whether it be choosing among a set of surgical pathways, or pursuing conservative (non-surgical) care," says Grant Dornan, Director of Clinical Outcomes Research at The Steadman Clinic and SPRI.

About The Steadman Philippon Research Institute (SPRI)

The Steadman Philippon Research Institute (SPRI) is globally recognized for its pioneering research in sports medicine, patient-centered research, osteoarthritis, regenerative medicine, and injury prevention. Since 1993, SPRI's database (one of the largest in existence) has been collecting patient information that has led to significant treatment advances in these areas.

About Intuition+

Intuition+ builds leading-edge architectures on Google Cloud Platform to create business value from data, combining world-class data skills with client intuition to create innovative results.

An integrated architecture designed by an integrated team

Diverse teams collaborated to bring the SPRI scientists' dream to life: the SPRI team contributed its knowledge of the data and physician workflow; Google Cloud supplied the HIPAA-compliant environment, along with data ingestion and transformation tools like the Cloud Healthcare API and BigQuery; Intuition+ supplied data design and BigQuery expertise; Looker provided data analytics and development expertise; and Y3ti used its web development skills to build custom visualizations. "Immediately we hit it off and started geeking out about what we could do with this project together," Dornan remembers. "It became a cohesive team."

The resulting solution coalesces data from multiple sources: the Steadman Clinic's Electronic Health Records from Modernizing Medicine and DICOM images from MERGE, as well as patient and physician research information stored in Formsite and Mi-Form.

A fifth source, Looker, supplied data in an unconventional way. "Looker is a regular BI tool and doesn't do data capture," explains Tammy Henderson, President of Intuition+, "but working with the Looker team, we did the impossible. We use Looker as a data capture tool to feed the algorithms, and then render the results in the Looker dashboard."

The result of all this data integration was something unprecedented in the clinical world: real-time, evidence-based healthcare predictions. Using the data capture feature added to Looker, doctors can adjust data values, such as the patient's weight. "They hit a calculate button and this is where the magic happens," says Henderson. "Seamlessly and in a blink of an eye, the doctor can have that conversation with the patient." Sara could see, based on data from many other procedures performed at the clinic, how much better her outcome would be, for example, if she lost weight before surgery and was diligent in performing her post-surgical physical therapy.

Grant Dornan,
Director of Clinical Outcomes Research,
The Steadman Clinic and Steadman Philippon Research Institute

"Our physicians are able to sit side by side with a patient and in real time with newly, freshly collected data, they're able to make informed decisions, talk with the patients about what their care is going to look like in a more precise manner, and make predictions for the prognosis of these patients after their surgery."

"The data has to be available and the doctor has to be able to do what-ifs with the information, to work with the patient to determine the best surgery protocol for them," says Henderson. The staggering number of variables to consider, and the resulting complexity of decision making, make this real-time modeling capability a godsend for clinic doctors.

Evidence-based dashboards to strategize surgery and track recovery

When a patient like Sara arrives, her doctor uses the pre-op evidence-based dashboard to get up to speed quickly. With Sara's demographic information and details about her injury, along with the most relevant peer-reviewed research instantly selected from vast data lakes, her doctor has everything she needs to run predictive models customized for Sara. As Dornan describes, "Our physicians are able to sit side by side with a patient and in real time—with newly, freshly collected data—they're able to make informed decisions, talk with the patients about what their care is going to look like in a more precise manner, and make predictions for the prognosis of these patients after their surgery."

When Sara returns for a follow up appointment post surgery, her doctor brings up the post-op evidence-based dashboard, which tracks her recovery progress. At her fingertips, she has Sara's patient information, her treatment chronology, data summaries on similar cases, and perhaps most significantly, a patient "report card" that allows her to index Sara's recovery against those of other patients in her peer group.

The report card scores "different components of a patient's recovery in terms of function, pain and satisfaction with their procedure," says Dornan. Sara's doctor can compare her scores with the ones from her last appointment, and graph her overall progress. "We're able to present that against a cohort of similar patients presenting the 25th and 75th percentile to understand when a patient is overachieving or underachieving and might need special attention," adds Dornan.

Tammy Henderson,
President, Intuition+

"Looker is a regular BI tool and doesn't do data capture, but working with the Looker team, we did the impossible.
We use Looker as a data capture tool, and then render the results in the Looker dashboard. All of this is seamlessly integrated from the end user's perspective. It just looks like one workflow."

Better patient-doctor teamwork for better outcomes

Because the new dashboard platform is centralized, doctors can access it from any clinic location. And because the algorithms provide immediate feedback, patients can make faster, more well-informed decisions with their doctors all along their medical journey.

When a top athlete sustains an injury, the care they receive determines whether they will ever again participate in the sport they love. The immense power and agility of SPRI's new interactive dashboard can give injured athletes like Sara a better chance of returning to form, safely and soon.

Hear more from Intuition+ & SPRI in this exclusive interview

To learn more about Intuition+ contact:
tammyh@intuitionplus.com

Google Cloud

Thank you

To learn more about
Google Cloud Healthcare and Life Sciences visit:
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