



## CUSTOMER CASE STUDY

# CLEARSENSE

Apache™ Hadoop® is a relative newcomer to the family of enterprise data storage technologies, emerging as a mission-critical component for healthcare predictive analytics only in the last 10 years. This means most medical centers have adopted Hadoop for Big Data in medicine as an add-on to their existing legacy data architectures.

The story of Hortonworks customer **Clearsense** is different. Clearsense founders started the company with Hortonworks Data Platform at the center of its data architecture. Like many other Big Data start-ups, Clearsense built their data systems from scratch, architected with Hortonworks **Connected Data Platforms** at the core of its offering.

Simply put, Clearsense would probably not exist were it not for the capabilities provided by **Hortonworks Data Platform (HDP®)** and **Hortonworks DataFlow (HDF™)**.

### KEY HIGHLIGHTS

- Predictive analytics for healthcare
- Real-time monitoring of patient health
- Cost savings through cloud architecture allows for rural business growth

### THE CHALLENGE IN HEALTHCARE: OLD TECHNOLOGIES AND SKILL SETS LAG BEHIND THE SURGE IN DATA

Doctors and nurses in the **healthcare industry** have spent decades practicing medicine with the problem of data scarcity and latency that Clearsense now solves.

Before Apache Hadoop, Apache NiFi and related Apache projects matured in the open-source community, there was no viable, economic and secure platform that could combine all the multi-format data streaming from wearable devices, electronic medical records (EMRs), and hundreds of other new sources of data. Clinicians wanted to use machine learning and data science techniques to store and analyze that data, but the necessary technology didn't exist.

Even as Hadoop emerged as a standard, trusted component in modern healthcare data infrastructures, precious few individuals understood both sides of the healthcare-data equation. Healthcare practitioners understood the medical challenges that could be solved with data, but they were not data architects. *Data architects* could build systems, but they lacked medical expertise on topics such as electronic medical records, signs of patient distress or hospital billing and reimbursement processes.

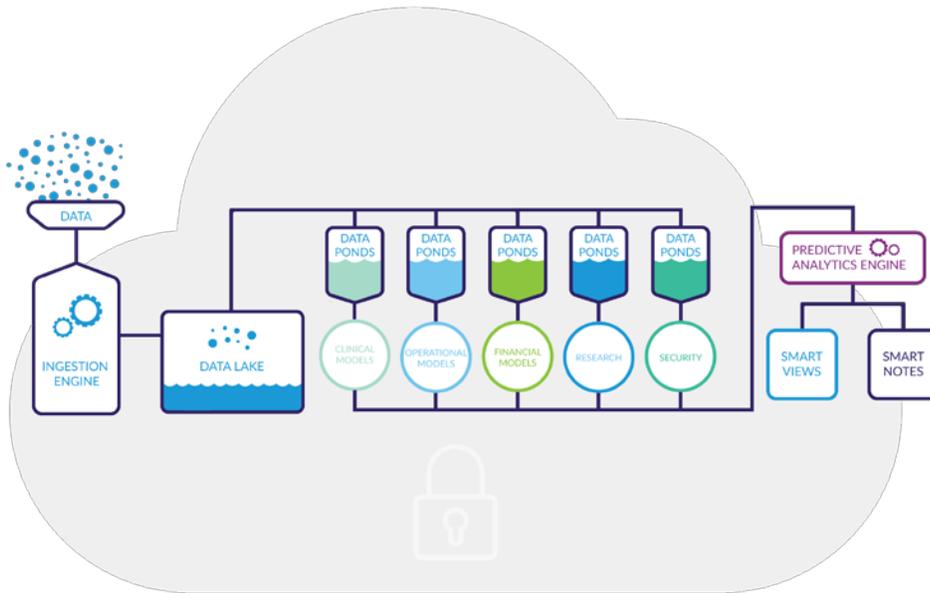


Figure 1: ClearSense Ref Arch

## THE CLEARSENSE SOLUTION: BUILT ON OPEN-SOURCE HDP AND DECADES OF CLINICAL EXPERTISE

Charles Boicey, Chief Innovation Officer at ClearSense, began his career as a trauma critical care nurse in Los Angeles County, USC Medical Center. During his 12 years there, Charles and his colleagues were often frustrated to look back on a patient’s treatment and discover that some piece of data might have indicated a better course of care. In some of the most extreme cases, better data might have saved lives that were lost in the emergency room. Boicey and his colleagues saw the need for healthcare predictive analytics as early as 1994.

Charles went back to school to tackle that data challenge, earning a Masters in Technology Management, and then he returned to practice at [UC Irvine Health \(UCI\)](#), a clinical and educational hospital in Irvine, California. Intent on bridging the gaps between healthcare professionals and information architects, Charles brought Hortonworks Data Platform to UCI in 2013 and began some of the earliest work on Big Data in medicine.

Gene Scheurer, ClearSense CEO, was following a different path to address many of the same challenges. Gene is the Executive Chairman and co-founder of [Optimum Healthcare IT](#), based in Jacksonville, Florida. Optimum provides IT technical solutions for clinical implementations, with the mission of delivering best practices and leading IT solutions to strengthen the healthcare community.

In 2012, Gene and his Optimum partners were thinking about founding a healthcare data company, but they weren’t sure of a technology for the data analytics platform they envisioned. While trying to identify individuals who could advise them, they met Charles Boicey.

*“We initially did work with predictive analytics as early as 1994. Moving forward I made a transition to IT where, in 2008, I discovered Hadoop. That’s where this journey started.”*

**Charles Boicey,**  
Chief Innovation Officer,  
ClearSense

*“Charles was able to bring that [Hadoop] knowledge into the organization and prove the fact that Hortonworks technology is, in fact, able to pull from multiple data sources, bring that data into the system and report back outcomes from all of the data and disparate systems.”*

**Gene Scheurer,**  
Chief Executive Officer,  
ClearSense

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## A NEW COMPANY AND A NEW PRODUCT FOR REAL-TIME NOTIFICATION IN THE HOSPITAL

The ClearSense team is proud to be first in delivering SMART, real-time streaming data to its healthcare customers. Its **Inception™** product makes data available for critical decisions in three areas:

- **Clinical Decisions** – pulling in all relevant patient information in real-time for early detection of patient deterioration to reduce catastrophic consequences and optimize outcomes
- **Financial Decisions** – tracking organizational KPIs related to financial goals
- **Operational Decisions** – identifying and eliminating variation in the care delivery processes, providing visibility into current performance to help identify opportunities for improvement

The Inception product is architected on HDP, so it offers its users many of the same Big Data efficiencies that the initial Hadoop architects designed into the platform at Yahoo! in the early 2000s. Both ClearSense and its Inception product also benefit from the rapid innovation and ecosystem friendliness that come from Hortonworks' 100% open-source approach.

Inception customers have access to **all data sources**, ingested with HDF, stored in HDP and delivered to the point of decision. This gives doctors and nurses a new level of mission-critical data and relevant insight they can incorporate into their clinical decisions.

Inception is **based in the cloud**. It is secure, easy to activate, and capable of working with virtually any IT infrastructure or data environment.

Because of its cloud-based nature, Inception can be **rapidly activated**, in a fraction of the time and cost it takes with traditional solutions. This means that ClearSense customers can begin benefiting from **Inception's SMART Data™** in days, not months, with minimal impact on internal IT resources or infrastructure. (SMART Data is: **S**teaming, **M**easurable, **A**ppled, **R**eal-Time™.)

"We constructed the ClearSense Inception platform upon HDP. That was our very first step in the deployment of our solution," said Jimmy Hurff, ClearSense CTO. "After that, we began to work on our first clinical surveillance model, Code Blue, which leverages both HDP and HDF. The Code Blue prediction algorithm is for cardiac arrest prevention. It looks for somebody we believe is going to go into cardiac arrest in the next 4 to 12 hours and notifies caregivers that may happen. Code Blue was our very first use case."

The cost efficiencies provided by Hortonworks platforms running in the cloud have also contributed to an important social benefit that Boicey and Scheurer insisted on as they created the company. ClearSense's architectural choices allow it to offer healthcare predictive analytics to smaller, rural and underserved providers that wouldn't be able to afford a major up-front investment with a proprietary vendor selling a software license.

Boicey summed it up like this with a smile on his face: "There are more than 2,000 of what we call 'safety net' or 'rural' hospitals. These are the 50-bed, the 75-bed, the 100-bed hospital systems out in rural America. Prior to the advent of ClearSense Inception and the Hortonworks suite of products those hospitals would not have been able to enjoy these advanced analytic technologies. Now, utilizing open-source software in a cloud environment with multi-tenancy and a subscription-based model, they don't have to put out a whole lot of money up front. They can invest a little bit of money and they get a lot of benefit for their patients. Every month they pay a fee and they get something for it. Basically, they can get the same type of analytics as a large hospital system without having to put out that capital expense, and that's pretty cool."

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*"ClearSense has a strategy to leverage supported open-source technologies for our various application development offerings. We believe in the open-source model. We have Linux and Tomcat and Java at the core of everything we do, and we chose Hortonworks, and the subscription model they provide, to give us responsive support personnel who can assist us with challenges."*

**Jimmy Hurff,**  
Chief Technology Officer,  
ClearSense

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## DRIVING THE FUTURE OF HEALTHCARE WITH THE POWER OF OPEN SOURCE

Clearsense is seeing great results with its initial algorithms for code blue (cardiac arrest) and sepsis prediction. The team is looking forward to developing solutions around reducing costs for its hospital clients in the two biggest expense categories: supply chain management and staffing.

Rather than “boiling the ocean” and pursuing all of the many use cases and algorithms at once, the Clearsense product team is tapping into Hortonworks’ deep experience serving many leading companies in the healthcare industry. In partnership with Hortonworks, Clearsense is building its own strategic roadmap about what to do next, so that each new feature or product builds on the momentum generated by previous successes.

Here are some areas that Clearsense has plans for in the future:

### **Rationalizing Patient Throughput**

Clearsense wants to help its clients understand throughput within their hospitals, as patients move from one status to another. When hospital managers understand where each patient is within their course of care and the hospital system, they can improve service and outcomes.

### **Managing Population Health**

Clearsense is determined to help its client hospitals geo-map their patients so they can make smart decisions about where to build the next clinic. As hospital margins thin, Clearsense clients want to learn where their patient population lives and where those patients fill their prescriptions. This data-driven insight promises to make the entire system more effective and efficient.

### **Optimizing Synergies with Its Sister Company**

Clearsense’s sister company, Optimum Healthcare IT, is a Best in KLAS, multi-million dollar organization that does EMR implementations and project management for hospitals across the United States and internationally. Optimum already enjoys intimate relationships with those healthcare systems, and now Clearsense brings new business value outside of Optimum’s traditional consulting work.

Clearsense sees the opportunity to be a market leader in healthcare data analytics—to be first bringing streaming SMART Data to healthcare providers. In the words of Gene Scheurer, “They’re getting used to using an EMR, the next stage of evolution is to make sense of all that data, combined with other sources. That’s what Clearsense brings to bear for our clients.”

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*“Our relationship with Hortonworks has allowed Clearsense to be first to introduce SMART Data™ to our healthcare customers. It gives them the foundation for real-time data—the same data that historically took weeks to show up in a report. We’re providing that information instantaneously to our clients.”*

**Gene Scheurer,**  
CEO, Clearsense

## ABOUT CLEARSENSE

Clearsense is a smart data organization based in Jacksonville, Florida that is re-imagining and simplifying data analytics to help healthcare organizations realize measurable value from their data. They have developed a secure, cloud-based healthcare data ecosystem that rapidly consumes data from an array of sources to provide a real-time, SMARTView™ of any healthcare environment. Inception™, the company's flagship product, is designed specifically for the clinical, financial and operational needs of healthcare providers. Inception efficiently detects patient health deterioration, tracks key performance indicators to drive costs, and leverages data to improve operational efficiencies. For more information, visit [clearsense.com](http://clearsense.com).

## About Hortonworks

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Hortonworks is an industry leading innovator that creates, distributes and supports enterprise-ready open and Connected Data Platforms and Modern Data Applications that deliver actionable intelligence from all data: data-in-motion and data-at-rest. Hortonworks is focused on driving innovation in open source communities such as Apache Hadoop, Apache NiFi and Apache Spark. Along with its 1,800+ partners, Hortonworks provides the expertise, training and services that allow customers to unlock transformational value for their organizations across any line of business.

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