The background of the slide is a futuristic healthcare dashboard. It features a grid of icons for various medical fields: General, Neurology, Pulmonology, Optometry, Cardiology, and Analysis. There are also several circular gauges and charts. One gauge shows a heart rate of 95 bpm, another shows a blood pressure of 120/80 mmHg. A large, glowing heart is prominently displayed in the center. The overall color scheme is blue and teal, with a high-tech, digital feel.

VANTIQ Orchestrating the Future of Healthcare

How Real-Time, Distributed Systems can
Address the Complexities of Healthcare

White Paper by

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VANTIQ

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Introduction

The healthcare industry is facing many challenges, including an aging population, new ways of getting paid for healthcare services, higher expectations from consumers, supply chain disruptions, and a shortage of staff. On top of that, there are new competitors like retail clinics, online pharmacies, and virtual care services that are changing the healthcare delivery landscape.

These challenges come at a time when the rapid emergence and evolution of technologies such as the internet of things (IoT), generative artificial intelligence, and edge computing hold great potential for improving patient outcomes and provider satisfaction.

To effectively harness the potential of emerging technologies and address the current problems in healthcare, it will be crucial to establish real-time, complex systems that can orchestrate the activity and communication between various technologies and the individuals who interact with them. However, the development of these systems is currently costly, time-consuming, and highly susceptible to failures.



Vantiq addresses obstacles in developing modern healthcare applications by simplifying the way new technologies like IoT, computer vision, and generative AI are utilized. The platform enables a flexible real-time data architecture that can serve as an agile backbone for digital innovation and orchestration.

Technology is Changing...And So Is Healthcare

In recent years, technological advancements have revolutionized numerous aspects of our lives, and healthcare is no exception. The emergence of technologies such as generative AI and edge computing holds tremendous potential for solving challenges facing the healthcare industry today. In the future, remote patient monitoring will advance into intelligent patient monitoring by combining real-time data from multiple sensors with artificial intelligence; integrated technologies will empower seniors to age independently at home; advancements in computer vision and edge computing will enhance the accessibility and affordability of medical imaging devices; combining streaming video and sensor data will enable faster diagnosis of sports injuries on the field; and hospitals will transform into interconnected environments, allowing real-time visibility into clinical, operational, and administrative processes.

50% of all healthcare provider digital transformation investments will focus on increasing situational awareness surrounding the patient and provider*

**Gartner Strategic Roadmap for the Real-Time Health System*

However, simply implementing these cutting-edge technologies will not be enough. The need for real-time, complex systems capable of delivering comprehensive end-to-end solutions that foster highly integrated workflows will be important. These systems must be able to handle a high degree of complexity involving the integration of multiple components, data sources, and interactions between various elements. These systems must also be designed to manage and orchestrate the flow of information, communication, and actions across different subsystems, devices, and individuals in real-time.

The Challenges with Real-Time Systems

The development of real-time, complex systems is challenging, and failure rates are reported as high as 82% according to Forbes. In the healthcare industry, where real-time sensing and analysis are crucial, the continuous and unpredictable flow of data can make it challenging to develop such sophisticated systems. As such, many existing healthcare applications are ill-equipped to handle high-velocity data and real-time sensing and analysis effectively.

Current and Future States of the Healthcare Provider

Current State	Future State	
<ul style="list-style-type: none"> • Enterprise <ul style="list-style-type: none"> – Disjointed – Myopic – Latent – Clinician-centric – Automated • Management <ul style="list-style-type: none"> – Reactive – Retrospective – Departmental • Operations <ul style="list-style-type: none"> – Siloed – Constrained – Scheduled – Opaque • Technology <ul style="list-style-type: none"> – Static – Connected – Systems – Secure 	<ul style="list-style-type: none"> • Enterprise <ul style="list-style-type: none"> – Collaborative – Aware – Real-time – Patient-centric – Autonomous • Management <ul style="list-style-type: none"> – Proactive – Predictive – Enterprise • Operations <ul style="list-style-type: none"> – Integrated – Scalable – Event-driven – Transparent • Technology <ul style="list-style-type: none"> – Mobile – Interoperable – Service – Compliant 	<div> Gap <ul style="list-style-type: none"> • Situational awareness • Collaborative capabilities • Real-time operational intelligence </div> <div> Migration Plan <ul style="list-style-type: none"> • Increase situational awareness enterprisewide • Advance interoperability and health information exchange • Promote clinical and workforce collaboration • Expand use of ML, AI and real-time analytics </div>

Source: Gartner
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Gartner.

Additionally, the orchestration of technologies, particularly AI and IoT, across diverse environments such as edge, on-premise, and cloud, introduces further obstacles. Developers find themselves grappling with the intricacies of integrating various IoT devices, understanding different communication protocols, and integrating disparate AI frameworks. This complexity leads to lengthy development life cycles and increased cost.

To overcome these challenges, a fundamental shift away from traditional system development approaches is necessary. The solution lies in real-time sensing and analysis of data and events at their source, enabling their seamless transformation into actionable intelligence. This type of transformative system must be agile in both development and maintenance, keeping up with the fast-paced evolution of technology. Collaboration across systems and individuals interacting with them is equally crucial, ensuring optimal outcomes in environments that are dynamic, such as healthcare.

The Vantiq Solution in Healthcare

Vantiq is enabling the rapid and agile development of real-time systems in healthcare, helping transform healthcare towards a more proactive and preventive system. Vantiq serves as the backbone for a client's solution, leveraging multiple wearables to understand both group and individual wellness and readiness. By integrating data from off-the-shelf fitness wearables such as physical activity, health metrics, and sleep patterns with artificial intelligence modeling, personalized care and healthier lifestyles can be promoted. This empowers individuals to make proactive choices to prevent chronic diseases, workplace injuries, and other negative events.

The client's solution provides a single, expandable user interface, presenting contextualized data from multiple sensors. Additionally, the larger meta-data is stored for future research and AI model development. Once these models are completed, Vantiq will enable the AI applications to run in real-time across users at the edge, in a hybrid environment, or as a dedicated cloud solution.

Vantiq is supporting another client to optimize their home health delivery and experience for patients and providers. By leveraging real-time monitoring, patients and their families can constantly be aware of where a provider may be in respect to a scheduled appointment. Delays, changes in schedule or patient condition, and even evolving traffic conditions can prompt notifications to a centralized location where an alternative provider could be dispatched if available or necessary. In the future, the client will leverage generative artificial intelligence to provide both scheduling and daily route optimization, improving convenience and efficiency for patients and providers alike.

Conclusion

In the face of numerous challenges, the healthcare industry is in dire need of transformative solutions that can drive down costs, improve patient outcomes, and alleviate burdens on clinicians and care delivery systems. Realizing the full potential for technology to address the problems – and not add to them – will require the development and adoption of real-time, complex systems.

Vantiq is uniquely positioned to solve the challenge of developing real-time, complex systems enabling transformation in healthcare. The software enables real-time data processing and decision-making and excels at integrating with existing healthcare infrastructure, legacy systems, wearables, IoT devices, artificial intelligence, and other applications. This agility extends the functionality of existing investments while providing agility for future growth.

When it comes to building these systems, Vantiq stands alone in capability and agility. By combining its powerful event-driven architecture, real-time capabilities, and seamless integration of IoT, AI, and data processing, Vantiq enables groundbreaking solutions that can improve patient outcomes, enhance operational efficiency, and revolutionize the healthcare experience. The challenges plaguing healthcare cannot wait for solutions to be ready one day – it's time to embrace the possibilities with Vantiq and pave the way for a brighter and healthier tomorrow.



Appendix - Key Capabilities of Real-Time Health Systems:



Real-time processing and analysis of data

Real-time applications on the edge reduce the distance required for information to travel. Computing is done closer to the source of data creation, resulting in a much faster response time.



Resiliency

Resiliency is improved by the fact that access to the data is distributed across multiple compute locations with each node dedicated to a specific set of data sources and processing. If a node fails, you may lose access to the data sources it manages but the remainder of the system continues running. In contrast, if all data sources deliver their data to a centralized cloud application, a failure of the cloud application brings the entire system down.



Increased performance and scalability

When new application logic or additional devices are incorporated into the system, the platform can enable dynamic deployment and distribution of resources across the system to optimize performance and enable scalability across large volumes and velocity of data.



Dynamic deployment

Organizations need the ability to add or change system components of applications and to have ease in moving data locally, to the cloud, or to the edge as needed. As a result, there is great interest in cloud-to-edge data migration, in which data that is normally hosted and running in the cloud is able to be moved to the edge in order to increase performance. This also enables more rapid distribution of business logic to edge nodes.



Reduced data security and privacy risk

Edge-native applications process data close to the local device on which it was created and only send data to a central database or cloud database when action is needed there. The result is that less sensitive data is shared between different points in the network, and this makes it less likely that data is put at risk. Image streams by cameras are a great example.

About Vantiq

Vantiq is the leading Low-Code Platform for building and deploying real-time distributed solutions. Built on a next-generation event-driven architecture, Vantiq enables highly scalable and low-latency analysis of real-time streaming data from IoT devices, cameras, AI services, and enterprise systems to drive situational awareness for safety, wellbeing, and efficiency.

For more information, please visit Vantiq at www.vantiq.com

Contact us at info@vantiq.com

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