Healthcare

Leveraging AI to diagnose cancer up to 10x faster

Ministry of Healthcare of the Republic of Kazakhstan

To help accelerate breast cancer screening at 120 hospitals in Kazakhstan, the Ministry of Healthcare deployed a hyperconverged infrastructure solution powered by 14 Lenovo ThinkAgile HX5520 nodes—enabling rapid, AI-powered processing of radiological images.

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Who is the Ministry of Healthcare?

The Ministry of Healthcare of the Republic of Kazakhstan is one of the central executive bodies of the government of Kazakhstan. The organization provides guidance in the fields of public health protection, medical and pharmaceutical science, and medical and pharmaceutical education, as well as quality control of medical services, medical devices, and medical equipment.

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The Challenge

As part of its efforts to build a world-class health system, public health officials across Kazakhstan are striving to tackle non-communicable diseases such as cancer, which are among the leading causes of mortality in the country.

Early detection is vital to improve outcomes for patients with conditions such as breast cancer, but a shortage of radiologists in a number of regions made it difficult for healthcare providers to deliver effective screening programs.

In the Zhetysu, Atyrau, Abay, and East Kazakhstan regions, more than 3.3 million people rely on 120 state hospitals for radiology and oncology services. To accelerate cancer screening programs, the government launched an innovative pilot program. The aim was to harness AI to provide a decision-support solution for radiologists, enabling them to analyze a greater number of images.

Enabling the new capabilities presented some tough technical challenges. The project called for a brand-new central data center with the performance, security, and scalability to capture and analyze massive volumes of picture archiving and communication system (PACS) data from all 120 hospitals.

The project required local servers to be deployed at each hospital, connected by high-speed internet connections to the central data center. Doctors and laboratory assistants would perform and examine radiological images using performant workstations and high-resolution medical displays, backed by an AI-powered computer vision engine.

The Ministry selected local technology partner iNOVA TECH as the system integrator for the new radiology project. Ilyas Kaldybay, co-founder of iNOVA TECH, says: “We wanted to deliver the public health benefits to patients as quickly as possible.”

“The heart of the new decision-support solution is an AI system developed by AKGUN, a specialist in healthcare automation. Trained on hundreds of X-rays and mammograms of healthy and cancerous tissue, the AKGUN solution can accurately detect possible cancerous and pre-cancerous areas and highlight them to radiologists on screen.”

Sultan Assylbekov
CEO, iNOVA TECH

Building a central platform for AI

To lay the foundation for the centralized PACS platform, iNOVA TECH selected a hyperconverged infrastructure (HCI) solution from Lenovo and Nutanix. Based on 14 Lenovo ThinkAgile HX5520 nodes—fully virtualized using Nutanix AHV—the solution combines compute, network, and storage in a single, easy-to-manage footprint.

Ilyas Kaldybay comments: “By choosing an integrated HCI solution from Lenovo, we knew that we could meet the high-performance requirements of the PACS and AI workloads, while ensuring seamless future scalability and low upgrade and support costs.”

Hardware

Lenovo ThinkAgile HX5520 appliances
Lenovo ThinkStation workstations
Lenovo ThinkVision displays
Lenovo V Series tower desktops
Lenovo ThinkCentre M Series

Software

Nutanix AHV

Accelerating decision-making

Over a six-month period, iNOVA TECH worked with Lenovo, AKGUN, and technology partner WDSOFT to deploy the new solution. First, networking specialists from WDSOFT installed 5km of fibre optic network cables between all hospitals in the project catchment area and the central PACS hub.

Next, iNOVA TECH implemented the new HCI solution at the central data center, and deployed Lenovo ThinkStation workstations and ThinkVision displays at radiology departments at all 120 hospitals. Each imaging unit is connected to the central site via high-speed fibre broadband, enabling PACS data to flow instantly to the data center as soon as it is captured.

Finally, iNOVA TECH collaborated with AKGUN to deploy and configure the new AI solution, based on a progressive object detector model constructed on a deep convolutional neural network architecture. Integration of advanced techniques such as data augmentation and hyperparameter optimization has enhanced the performance and efficiency of the model.

Running on the Lenovo and Nutanix HCI platform, the AKGUN solution analyzes radiological images and generates diagnostic reports. These reports serve as an additional decision-making resource for oncologists and other medical professionals, empowering them to make better-informed decisions about diagnosing and treating patients.

“The use of AI has enabled us to reduce image processing time and respond faster, improving the quality of diagnostics and expediting primary and secondary mammography readings. We are confident that our experience can serve as a model for medical systems worldwide, showcasing the potential of technology to enhance healthcare.”

Spokesperson
Ministry of Healthcare of the Republic of Kazakhstan

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Results

Today, 120 hospitals in Kazakhstan are leveraging the centralized decision-support solution, helping to boost the efficiency of cancer screening programs dramatically. The system can analyze X-ray images within 20 seconds, and radiological images within 45 seconds.

A spokesperson for the Ministry of Healthcare of the Republic of Kazakhstan says: "The centralized teleradiology project in Kazakhstan has led to revolutionary changes in medical diagnostics. Thanks to the solution, over three million radiological studies have been conducted with the highest efficiency.

“Our achievements include a 375% increase in early detection of pathologies and a 35% increase in early detection of cancer, resulting in improved quality of life for patients and increased treatment effectiveness. The project has also provided economic benefits through the transition to filmless medical imaging technology, reducing costs and enhancing the continuity of medical data.”

- 3 million radiological images analyzed
- 10x faster breast cancer diagnosis
- 35% increase in early cancer detection

Enhancing outcomes

“The new solution—powered by Lenovo and Nutanix—is helping to speed up breast cancer screening by a factor of three,” confirms Sultan Assylbekov, CEO of iNOVA TECH. “As a result, physicians can diagnose cases of breast cancer 10-times faster, contributing to a significant increase in early detection.”

The results obtained highlight the potential of deep learning and image processing methods in nodule detection, contributing to the development of computer-aided diagnostic systems for better healthcare outcomes.

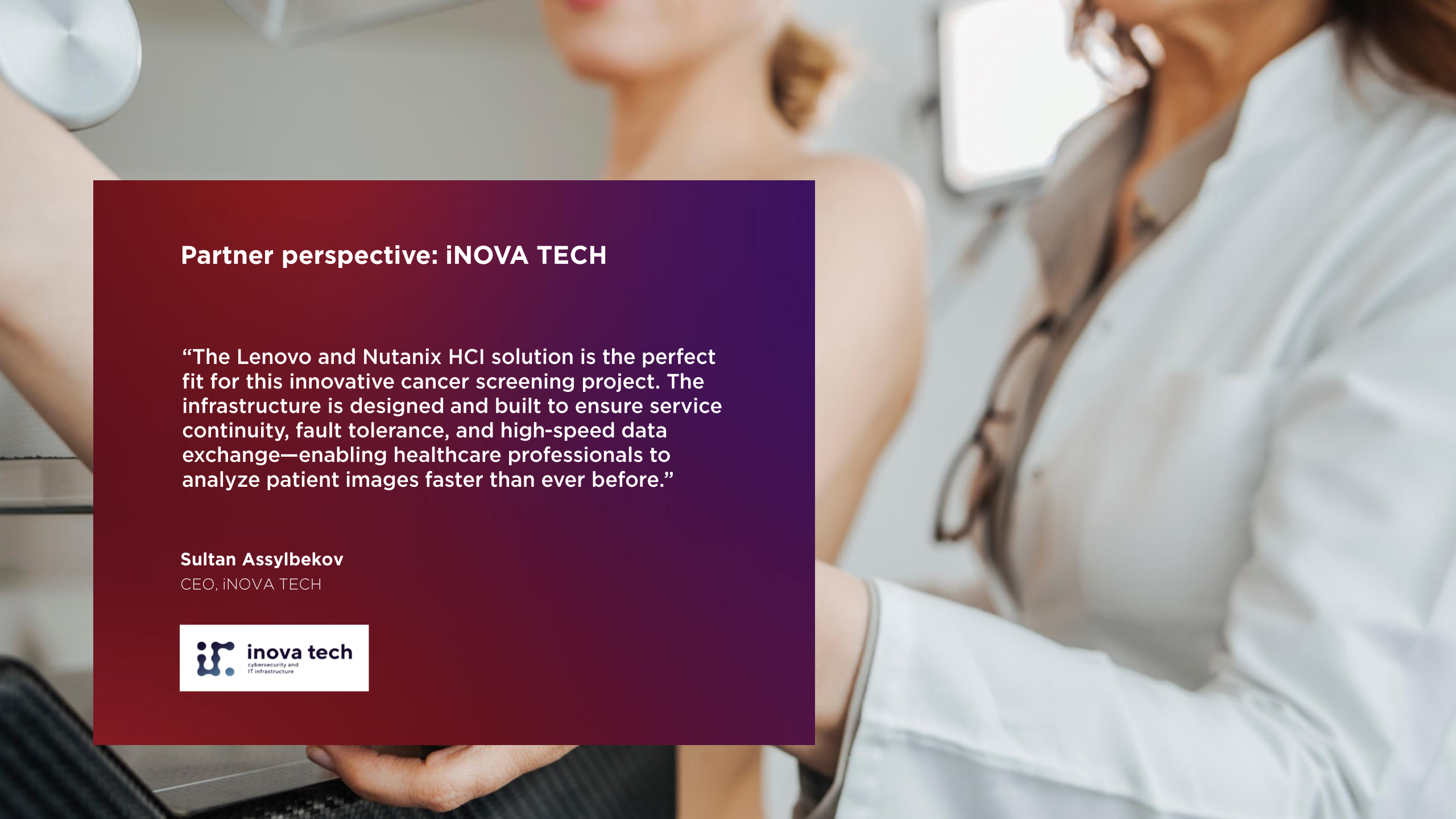
“Our work with Lenovo has been a great success. By enabling earlier detection of breast cancer, the HCI infrastructure is playing an important role in improving outcomes for patients across Kazakhstan.”

Ilyas Kaldybay
Co-founder, iNOVA TECH

Why Lenovo?

iNOVA TECH was tasked with finding a solution that would meet the Ministry of Healthcare's needs. In addition to the scalability and performance of the Lenovo and Nutanix solution, iNOVA TECH was impressed by the security and resilience of the solution.

"The Lenovo and Nutanix HCI solution gives us peace of mind that demanding PACS and AI workloads will run and run," says Ilyas Kaldybay. "In healthcare—and particularly in areas such as oncology—unplanned downtime for key clinical systems is simply not an option. With Lenovo ThinkAgile and ThinkSystem solutions at the heart of the new healthcare data center, we know the platform will never miss a beat."



Partner perspective: iNOVA TECH

"The Lenovo and Nutanix HCI solution is the perfect fit for this innovative cancer screening project. The infrastructure is designed and built to ensure service continuity, fault tolerance, and high-speed data exchange—enabling healthcare professionals to analyze patient images faster than ever before."

Sultan Assylbekov
CEO, iNOVA TECH

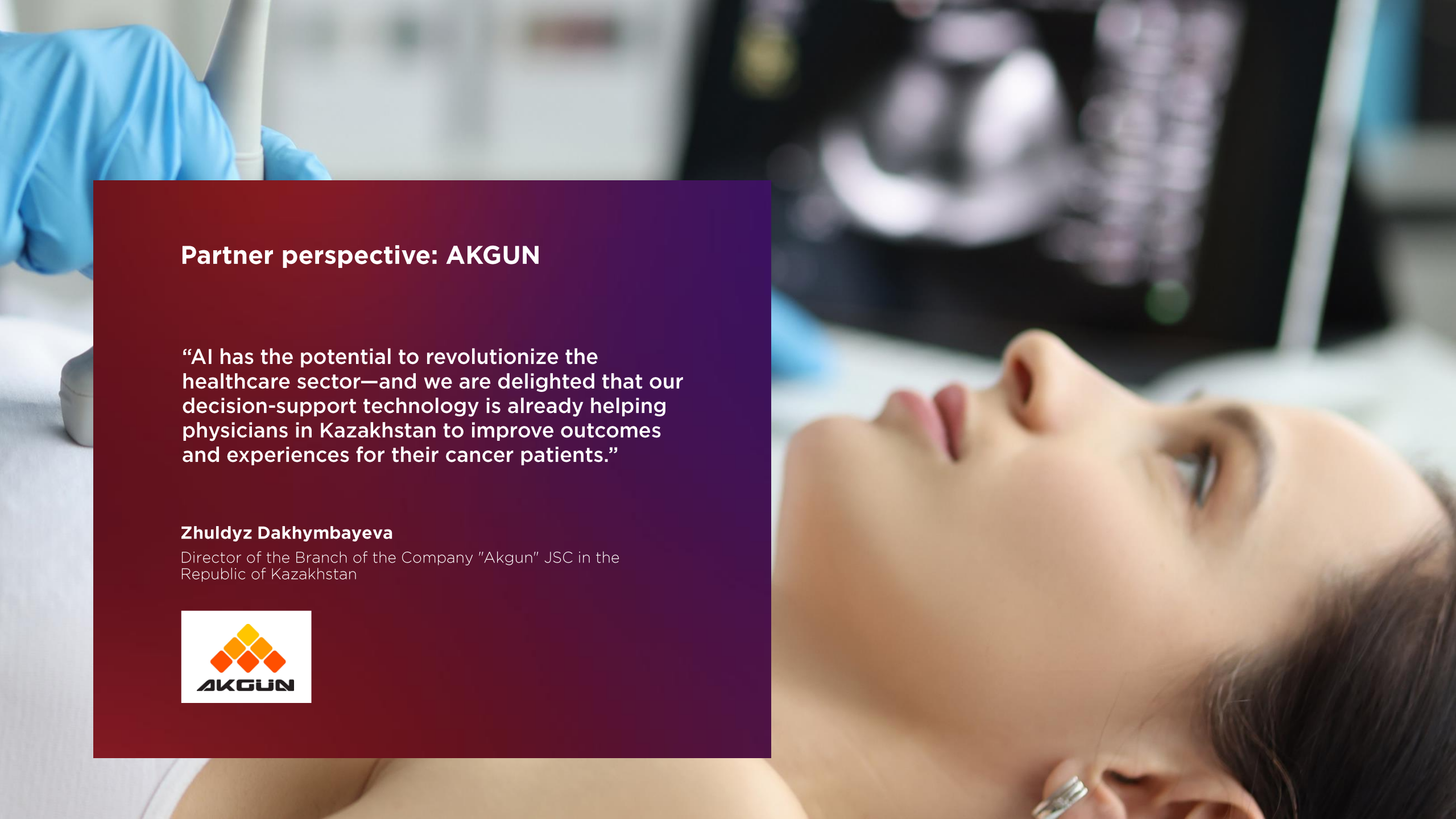
inova tech
cybersecurity and
IT infrastructure

Partner perspective: WDSOFT

“Lenovo already has experience in deploying similar systems in the healthcare sector in Azerbaijan. This confirmed the company's ability to adapt to the needs of medical institutions and effectively provide solutions that meet the specific tasks of this industry, which played an important role in choosing a partner.”

Nursultan Zhumagaziev
Director, WDSOFT

WDSOFT
Creative Engineering



Partner perspective: AKGUN

“AI has the potential to revolutionize the healthcare sector—and we are delighted that our decision-support technology is already helping physicians in Kazakhstan to improve outcomes and experiences for their cancer patients.”

Zhuldyz Dakhymbayeva

Director of the Branch of the Company "Akgun" JSC in the Republic of Kazakhstan

How can health organizations accelerate patient care?

The Ministry of Healthcare in Kazakhstan uses a Lenovo and Nutanix HCI solution to pioneer early, AI-powered detection of breast cancer.

Explore Lenovo ThinkAgile HX Series