Welcome change

Moderna delivers breakthrough medicines with help from VMware.

Founded in 2010, Moderna is pioneering an innovative approach to combat diseases. To develop new vaccines and therapeutics, the company uses messenger RNA (mRNA)—a single-stranded RNA molecule that provides real-time instructions for generating proteins. mRNA-based drugs instruct a patient's own cells to produce proteins that can potentially prevent or treat a disease.

Moderna has built a technology platform to help the company quickly and safely deliver these new mRNA-based drugs. The platform is designed to work like a computer operating system, enabling the company to spin up a variety of "apps"—that is, mRNA-based drugs.

But software is not just a metaphor for Moderna. The company relies on software to accelerate drug production. Instead of spending years to design a new mRNA-based vaccine, for example, Moderna can use software to complete a new design in weeks or even days.

This ability to quickly develop new vaccines placed Moderna at the forefront of efforts to fight COVID-19.

To keep employees working on the new vaccine while only few could be physically present in company offices, Moderna relied on VMware Workspace ONE digital workspaces. The workspaces provide simple, frictionless access to essential apps while protecting sensitive data.

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Pivoting rapidly to address a new virus

A software-based approach to solving problems gives organizations the agility to swiftly refocus priorities when necessary—and that's exactly what Moderna needed to do.

In September 2019, Moderna CEO Stéphane Bancel made his annual visit to the U.S. National Institutes of Health (NIH) and met with Dr. Anthony Fauci, director of the NIH's National Institute of Allergy and Infectious Diseases. Moderna had been working with the NIH on a few viruses that were global threats, such as Middle East Respiratory Syndrome (MERS)-CoV.

Bancel proposed a test to demonstrate how quickly and efficiently Moderna could develop a vaccine for a virus in the event of a future pandemic. He suggested that the NIH could send Moderna a sequence of an unidentified virus and start the clock. "I told Dr. Fauci that I thought we could develop a vaccine in less than 60 days," says Bancel. "As of November 2019, it was our plan to move forward with the test in the new year."

In early January 2020, the plan changed. Bancel read about a new virus emerging in China and quickly emailed the NIH. Within a few days, the genetic sequence of the virus was available online. Instead of running a test, Moderna now faced an urgent real-world challenge to develop a vaccine that might potentially save millions of lives.

As soon as the genetic sequence was posted, the Moderna team went to work. "Using software, our team designed a vaccine in just two days," says Bancel. "And we never had a physical sample of the virus. We saw the genetic sequence online and designed the vaccine entirely with a computer."

As the COVID-19 outbreak was declared a pandemic, Moderna worked to produce the first doses of the experimental vaccine. Within 42 days, the vaccine was ready, and the company could begin the rigorous clinical trials that all experimental vaccines are required to undergo.

"In the past, it might have taken 20 months to design and produce a vaccine," says Bancel. "But we went from 20 months to 2 for the first dose because we moved from a hardware world to a software world in biology."

Keeping employees productive with digital workspaces

Just like numerous other organizations across the globe, Moderna needed a way to maintain employee productivity and foster collaboration throughout the drug development process—even while employees worked remotely. Fortunately, Moderna had previously deployed VMware Workspace ONE digital workspaces, which provide simple, secure access to enterprise apps.

Because Moderna employees work with highly sensitive intellectual property and clinical data, maintaining the tightest security is paramount. To protect against cybersecurity threats, Moderna uses VMware Carbon Black Cloud endpoint protection.

Driving forward with clinical trials

In March 2020, as COVID-19 spread rapidly in Europe and the United States, the U.S. government launched Operation Warp Speed, an initiative to quickly produce and deliver 300 million COVID-19 vaccine doses. Moderna became part of the program in April.

The manufacturers funded by Operation Warp Speed employ a variety of scientific approaches to vaccine development. "We believe more than one vaccine will be approved because no one company can supply the planet," says Bancel.

In July 2020, Moderna began its Phase 3 clinical trials, in which approximately 30,000 people received either the vaccine candidate or a placebo. To determine the vaccine's effectiveness, the company waited to see whether more people in the control group became sick than those in the experimental vaccine group.

In November 2020, Moderna announced early positive results on the vaccine's effectiveness. The company immediately began seeking emergency authorization for the vaccine's use.

Maximizing innovation with robust partnerships

Bancel recognizes the vital role of partnerships, such as the one with VMware, in keeping Moderna on track to deliver safe and effective medicines. "VMware helps us be a productive and efficient company," says Bancel. "If we can save just one day, we may be able to save more lives."

Looking ahead, Bancel sees an opportunity to prevent pandemics in the future by scaling vaccine production through additional partnerships. "My big crusade for 2021 is to partner with governments around the world to build a few 'never-again' plants," says Bancel. "It took us 42 days to go from sequence to shipping products we could safely inject into humans. By investing more in IT, robotics and process engineering in plants, we can take it down to less than 30 days. If we had had plants that could quickly produce millions of doses earlier this year, think about how the world would look different now." ■