



# Daffodil International University

Department of Innovation and Entrepreneurship

## A STUDY ON THERANOS

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Submitted to

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## Letter of Approval

To,  
Md. Asif Iqbal  
Lecturer  
Department of Innovation & Entrepreneurship  
Daffodil International University

Subject: Submission of Project Report “A study on theranos”.

Dear Sir,  
with due regard, I beg you to say that it is my utmost pleasure to send you my Project Report for Project Work on “A study on theranos”. I truly enjoyed and learned a lot from the attachment in preparing this report. I would be thankful if you would kindly consider my mistake. I recognize with gratitude the whole heartfelt assistance and kind guidance received from you for this report.

I therefore ask you to acknowledge this report and offer me the appropriate proposal to work in my professional career, and I pray and hope that the errors that the report may have will be kindly excused.

Sincerely,



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Md. Mustak Ahmed  
ID: 183-45-177  
Department of Innovation & Entrepreneurship  
Faculty of Business & Entrepreneurship  
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## Certificate of Approval

This is to certify that the project report on ‘Bookshelf’ has been prepared by Md. Mustak Ahmed as a partial fulfillment of the requirement of Bachelor of Entrepreneurship, Daffodil International University under my guidance and supervision.

I wish him every success in life.



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Md. Asif Iqbal  
Lecturer,  
Department of Innovation and Entrepreneurship

## **Acknowledgement**

First and foremost, I wish to express my gratitude to the Almighty Allah for giving me the essential strength and mentality to perform all my responsibilities in this project report with utmost effort and dedication. Secondly, I would like to offer my special thanks to my teammates in this project report without whom all of this would've been never possible.

I would like to convey my utmost gratitude to Mr. Asif Iqbal sir for giving us such an opportunity. He has always helped us to pursue practical knowledge instead of the mainstream education, and this has helped us greatly.

## **Executive Summary**

Theranos was a health-tech company of Silicon Valley. It was one of Silicon Valley's most successful startups. Just in a decade, Theranos became zero to a multibillion dollar company. They had a mission of revolutionizing the blood analysis system by using only a few drops of blood instead of using a full test tube of blood. People thought it was going to be one of the great innovations. But it was a complete lie, a billion dollar lie! Then in September 2018, the company was shut down due to fraud and conspiracy.

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## **1.0 Introduction**

### **1.1 About Theranos**

Theranos was a privately owned health-tech company which was founded in 2003. Theranos begun it's journey as a startup with a revolutionary mission and vision. They claimed they could run hundreds of blood tests with some drops of blood. They said they're building a blood analysis machine that would replace the massive blood test machine. Multiple blood testing equipment will no longer be needed to run multiple blood tests. Instead, you can run all of those blood tests in a single Theranos device. But it is technically impossible by this time because of technological limitation.

The CEO and founder of Theranos said that “less people have to say goodbye to people they love, too soon.” People and investors thought it would be the most revolutionary step and their machine would be the most revolutionary device ever created in medical history. But day by day, that lie became more and more transparent when a reporter from 'The Wall Street Journal' asked for their technology to be validated. Then the investors realize that Theranos was selling lies to them. Then the company was shut down due to fraud and conspiracy in September, 2018.

### **1.2 About Elizabeth Holmes**

Elizabeth Holmes was founder and Chief Executive Officer of Theranos. Elizabeth Holmes founded this company when she was a 19 years old student at Stanford University. She was that company's 50 percent owner. Holmes was born in Washington D.C. on February 3rd, 1984. Her father Christian Rasmus Holmes IV held executive posts with government agencies such as USAID, the EPA, and the USTDA, and was vice president at EnRon. Her mother, Noel Anne Daoust, served as a staff member of the Congress.

In Houston, Holmes went to St. John's School. She was interested in computer programming during high school and claims she started to sell C++ compilers to Chinese universities in her first business. She studied in chemistry and works as a



student investigator and laboratory assistant at the School of Engineering at Stanford College in 2001. She dropped out of Stanford's Engineering School in March 2004 and used her tuition money as seed funding for a consumer healthcare technology business.

### **1.3 About Ramesh Balwani**

Ramesh Balwani was Theranos' president as well as chief operating officer. Balwani began studying in 1986 at Austin University, Texas, where he was a member of the Students Association of the Pakistani Federation. He received a Bachelor of Information Systems degree. He then returned to school and was earned an Master of Business Administration from the University of California at Berkeley in 2003. He spent another four years in Stanford University's computer science graduate programme, but fell out in 2008.

Before 1998, Balwani did work for Lotus Software and Microsoft, helping to create CommerceBid, a software development company that helped businesses buy and sell products over the Internet. He joined the theranos in 2009.

### **1.4 Objectives**

The report's primary objective is to learn and study Theranos from the depths. Analysis Theranos' history from the foundation. How Theranos collects investors and raises funds from them. It was a zero dollar company when Theranos started their journey. I want to study how in just a decade they become a multi-billion dollar company.

### **1.5 Methodology**

I have collected data from the Internet to prepare this report and the most useful was Wikipedia. I collected plenty of information from wikipedia. To create this report, I've watched many videos about Theranos and Elizabeth Holmes on YouTube. For this project report, ColdFusion's videos were mostly very

informatics. HBO's documentary film ' The Inventor: Out for Blood in Silicon Valley ' was very useful for this report.

## **2.0 History of Theranos**

### **2.1 Founding**

Stanford Chemical and Electrical Engineering 19-year - old Elizabeth Holmes founded Theranos in order to revolutionize blood testing in 2003. Theranos claims to be able to perform a multitude of tests on the physiology of a patient within minutes, at a fraction of the current technology cost.

Holmes incorporated the company as Theranos in April 2004 and rented a group college house's basement. Then Holmes hired her first employee at that time and rented laboratory space. Robertson was the first member of the board of the company, presenting Holmes to the capitalist venture. Apple founder Steve Jobs was admired by Holmes and copied his style intentionally, dressing often in a black sweaty turtleneck, as Jobs did. She spoke with an unusually deep voice over most of her public appearances, but a former Theranos colleague later showed she was actually a few octaves higher in natural voice. In the meantime, her family have maintained the truth of her voice. Despite the strong appreciation of her company, Holmes was very close but still unable to find out how the technology of Theranos works.

### **2.2 Finance and Funding**

Theranos raises \$ 6.9 million in early funding within a year in 2004, gaining a valuation of \$ 30 million. The valuation of the company reached 197 million dollars in 2007 after the raising of an early round funding of another 43.2 million dollars. In 7 years' time, Theranos is now valued at \$1 billion after further rounds of funding. Holmes introduces Theranos to the world through the media and the presentation of a website after a decade of working in the dark. With over \$ 400 million in funding, Theranos is valued at almost \$ 9 billion. Thanks to her 50 percent stake, Holmes is effectively become a multi - billionaire, in 2014.

Theranos is selected as its preferred laboratory supplier on 8 July 2015 by Capital BlueCross, Pennsylvania Insurer with 725,000 clients. Theranos now has an estimate of approximately \$ 10 billion.

Fortune reports on 28 October 2015 that Theranos sought to raise \$ 200 million in C-3 finances just days before the Journal article was first published. After Theranos does not meet key deadlines for deployment, 350 million dollars of Safeway fizzles have been dealt with, and Safeway officials question the validity of test findings in November 2015.

### **2.3 Downfall**

Theranos ' bad time begins when The Wall Street Journal's journalist John Carreyrou begins investigating them and asks for validation of their blood testing device. He finds after a long month of investigation that the blood testing device seemed suspicious. He reported that Theranos used traditional blood testing machines to run his tests instead of the company's Edison devices, and that the company's Edison machines could deliver inaccurate results.

Theranos submitted that the claims were factually and scientifically wrong and based on unfounded claims by inexperienced and displeased old employees and incumbents of industry. Following the report, Walgreens discontinued plans to expand blood testing centers in its stores. The Cleveland Clinic at the time announced its work to verify the technology in Theranos. In an attempt to stop him from providing the media, Theranos fights against the Journal's enquiry and sends lawyers to sources in the story. Theranos' former employee Tyler Shultz was the key source of WSJ's story. The history of FDA interactions with Theranos was scrutinized after the WSJ story. The U.S. FDA had received a formal inquiry to look at U.S. blood test devices from Theranos. Defense Department in 2012 before the devices were commercially available and did not require FDA approval. In January 2016 Theranos received a new letter based on an inspection of the Newark, California laboratory in fall 2015 from the Centers for Medicare and Medicaid Services (CMS) stating that the facility "was not certification requirements and

standards" and caused the "immediate threat to health and safety" of patients as a result of the test to establish the correct dose of the blood - thinning medication.

CMS regulators announced in March 2016 plans to impose sanctions, including the suspension of Holmes and Balwani from owning and operating a laboratory for two years and the revocation of the license of the laboratory. It was not until July that the company was penalized. Theranos underwent criminal investigations, allegedly misleading investors and government officials by federal prosecutors and the SEC, in April 2016.

Theranos announced in January 2017 that it has laid off 41 %, or about 155 workers, and that it has closed the latest blood testing facility after a second major US inspection failed in the laboratory. The Company also faced prosecutions of a number of different bodies, including Walgreens and the Attorney General of Arizona that month. Fortress Investment Group lent Theranos 100 million dollars in December 2017. Theranos was reportedly close to bankruptcy and the loan was intended to keep solvents in the company in 2018. Theranos ' patents secured the loan. According to Wikipedia In March 2018 the US Securities and Exchange Commission charged Theranos, its CEO Elizabeth Holmes and former president Ramesh "Sunny" Balwani, claiming they had engaged in an "elaborate, years-long fraud" wherein they "deceived investors into believing that its key product – a portable blood analyzer – could conduct comprehensive blood tests from finger drops of blood."

Holmes and Balwani were charged with wire fraud and wire conspiracy on various counts on 15 June 2018. Lastly, the company ceased operations in September 2018.

### **3.0 Personal Life of Elizabeth**

#### **3.1 Childhood**

From an early age, Elizabeth Holmes knew she wanted to be a successful businessman. At 7, she started to design a time machine with detailed engineering

drawings and completed a notebook. When she was nine or ten years old, one of her relatives asked her at a family gathering the question which every boy and girl is asked someday "What do you want to do when you grow up?" Elizabeth replied, "I want to be a billionaire," without skipping a beat. The relative again asked, "Wouldn't you rather be president?" She said, "No, I'm going to get married by the president because I'm going to be a billionaire." This is no idle words for a child. In the view of a family member who witnessed the scene, Elisabeth spoke to them with the utmost seriousness and determination.

### **3.2 Early Life and Family**

Christian Holmes IV is Elizabeth's dad. And her mother's name is Noel Anne Daoust. Her parents nourished Elizabeth's ambition. Christian and Noel Holmes expected their daughter to be rooted in a distinguished history of the family. She came from Charles Louis Fleischmann, a Hungarian immigrant who founded a thriving business called the Fleischmann Yeast Company, on her father's side. At the turn of the twentieth century, its remarkable success turned the Fleischmanns into one of America's richest families.

The daughter of Charles, Bettie Fleischmann, married the Danish physician of her father, Dr. Christian Holmes. He was Elizabeth's great-great-grandfather. Dr. Holmes established Cincinnati General Hospital and University of Cincinnati's Medical School, supported by the political and commercial connections of the wealthy family of his wife. So, the fact would be that Elizabeth was not only heritage of entrepreneurs, but medical ones too, for risk capitalists on Sand Hill Road near campus at Stanford University. The mother of Elizabeth, Noel, had a proud background in her family. His dad was a graduate from West Point who in the early 70's, as a top officer in the Pentagon, planned and made the move from a timing military to a volunteer force. The Daousts have traced their origins to the marshal Davout, one of Napoleon's best generals in the field. But it was the achievements of the family side of Elizabeth's father that burned brightest, capturing the imagination. Not only in the outdated success of the older generations, but also in the failings of its younger ones, Chris Holmes ensured to school his daughter. His father and grandfather had both had lived large but faulty

lives, weddings and alcohol. Chris accused them of spilling the fortune of their family. His dad spent a series of jobs with government agencies ranging from the state department to the Agency for International Development in Washington, D.C. ELIZABETH early years was held. Her mother worked as a Capitol Hill assistant until she stopped her career to raise Elizabeth and Christian, her younger brother. The summer was when Noel and the children went down to Boca Raton, Florida. The aunt and uncle of Elizabeth, Elizabeth and Ron Dietz, had their own condominium with a lovely view of the Intracoastal Waterway. David was three years and a half smaller than Elizabeth, and a year and a half younger than Christian.

### **3.3 Education Life**

Elizabeth did not belong to the popular crowd in high school. By that time, her dad transferred the family to Houston to work in the Tenneco conglomerate. St. John's, Houston's most prestigious private school, attended the Holmes children. Elizabeth, gangly, blackened her hair and struggled with an food disorder as an adolescent girl with large blue eyes. She threw herself into her schoolwork during her sophomore year, often stayed up to study late at evenings and became a student straight - A. This marked the beginning of a lifelong pattern: hard work and little sleep. As she excelled in education, she found her base socially and date the son of a renowned Houston orthopedic surgeon. Together they visited New York to celebrate Times Square's new millennium.

Elizabeth set her eyes on Stanford as the college drew closer. This was the obvious choice for a successful student who wanted to become a businessman with an interest in science and computers. Inextricably linked to Silicon Valley, the little agricultural school founded by the tycoon Leland Stanford at the end of the 19th century. At that time the internet boom swung and some of its largest stars were founded on the Stanford campus, including Yahoo. Two Stanford PhD students started to draw attention to a small start - up called Google in Elizabeth's senior year.

Stanford was known already by Elizabeth. For several years in late 1980s and early 1990s, her family lived in Woodside, California, a short distance from the Stanford campus. She was friends with a girl who lived next door, Jesse Draper. Jesse's father was Tim Draper, an enterprise capitalist of the third generation, who was about to become one of the best startup investors in the valley. She had a special Stanford connection: the Chinese. Her father had traveled extensively to work and agreed to learn Mandarin from his children, so on Saturday morning he and Noel had arranged to take a teacher to the house in Houston. On her way to Stanford's summer Mandarin programme, Elizabeth spoke through High School. This had to only be open to university students, but with its fluency she impressed sufficiently the program leader that he was an exception. On the Stanford campus in Palo Alto, the first five weeks were taught, followed by four weeks of instruction in Beijing.

She was accepted as a President's Scholar at Stanford in the spring of 2002, a distinction given to top students who came with a \$ 3,000 grant that she could use to pursue any intellectual interest of her choice. Elizabeth's drilled the idea that she ought to live a deliberate life into her. Chris Holmes had been in charge of humanitarian efforts during his public service career, such as the Mariel boat trip, in 1980 where more than 100,000 Cubans and Haitians have migrated to the United States. In the war - torn countries, there were photos of his house that offer catastrophic relief. Elizabeth took them away with the message that she would need to achieve something that promotes the greater good, not just enrich it, if she really wanted to make her mark in the world.

The prospect of achieving both was offered by biotechnology. But she decided to study chemistry, a field that gave the industry a natural gateway. Channing Robertson was the face of Stanford chemical engineering. Robertson had been studying at university since 1970 and had a very rare ability to connect with his students, charismatic, good - natured and funny. He was also the most higher of the engineering faculty, with a blond, gray mane, and a leather jacket class that made him look like a decade younger than his 59 years. She studied Chemical Engineering Introduction from Robertson and taught a workshop on controlled devices for drug delivery. Robertson agreed and brought her to a doctoral student

who was working on a project to find the best enzymes to put into washer detergent. They also lobbied him to let him help out in his research laboratory.

Elizabeth led an active social life, apart from the long hours she spent in the laboratory. She took part in the campus parties and dated JT Batson, a sophomore. He was from a small Georgian town and was struck by the way Elizabeth was polished and worldly, although he also found her guarded. "She was not the world's largest sharer," he remembers. "She'd play stuff near the vest." Elizabeth came back to Houston to have a vacation with her parents and Dietzes from the Indianapolis during the winter break of her fresh year. Elizabeth would have been in college for only a couple of months, but she was already having entertaining thoughts about dropping out. Her father floated a paper aircraft at the end of the table at Christmas dinner with the letters "P.H.D." written on his wings. According to a family member attending the meeting, her response was blunt: "No, Dad, I'm not interested in having a Ph.D., I would like to earn money."

### **3.4 Founding Theranos and Work Life**

She showed up at Batson's dorm room door that spring and told him she couldn't see him anymore because she started a company and had to devote all her time to it. After returning to Singapore in the summer from the Genome Institute, Elizabeth did not actually leave Stanford until the following autumn. She sat down on her computer five straight days when she returned home to Houston and slept for an hour or two a night and was eating from food trays brought by her mom. From her new technologies during her internship and in the Robertson courses, she wrote a patent application to diagnose and treat medical conditions simultaneously. Then, once she has returned to campus. Robertson and Shaunak Roy showed her proposed patent to the Ph.D. student, which she was assisting in his lab.

During Elizabeth's paperwork for the company, Shaunak had finished the last semester of his studies. He was the first employee to join the startup in May 2004 and a minority interest in the company. For his part, Robertson joined the board of the company as a consultant. Elizabeth and Shaunak flocked up for a few months in a small office in Burlingame before they found a larger space. The new site was



far from glamorous. It was in a rude industrial zone on the outskirts of East Palo Alto where shootings remained frequent when it was technically located in Menlo Park. Elizabeth appeared one morning in her hair with glass shards. Someone shot her car, shattered the driver's window and lost his head inches. Elizabeth incorporated the business as Real - Time Cures, which on early employee paychecks became an unfortunate type of Real - Time Curses. Then the name was changed to Theranos and by combining "therapy" and "diagnosis". She used her family connections to raise the money she needed. She was persuaded to invest 1 million dollars by Tim Draper, her childhood friend's father and former neighbour Jesse Draper. Draper's name had a great weight and contributed to the credibility of Elizabeth, with Tim's grandfather establishing Silicon Valley's first venture capital firm in the late 50s, and Tim's own business, DFJ, was well - known for early lucrative investment in companies such as the Hotmail web based email service. The retired corporate turnover specialist, Victor Palmieri, was another family connection she made for a huge investment and he was a friend of her dad's for years. Both of them met at the end of the 1970s, while Chris Holmes had been at the State Department, and Palmieri served as his ambassador for refugee affairs. With her giggly energy and vision to apply nano- and microtechnology principles in the area of diagnosis, Elizabeth fascinated Draper and Palmieri. She has described an adhesive patch which will painlessly draw the blood through the skin by microneedles in a 26-page document that recruit investors. As the Document has described it, the TheraPatch contains a microchip detection system which analyzes the blood and decides how much of a drug to be given. This would transmit its readings to the doctor of a patient wirelessly. A colored patch diagram with its various components was included in the document. The pitch was not all purchased.

### **3.5 Fund Raising**

Elizabeth met MedVenture Associates in July 2004 one morning, a venture capital company specializing in investment in medical technology. Later, she spoke quickly and greatly about the potential of her technology to change humanity across a conference room table from her five partners. When however, the partners of MedVenture asked for more information on their microchip system and how it

would differ from a company called Abaxis, they became visibly flustered and the meeting grew tense. She got up after about an hour and left huff and was incapable of answering the technical questions of the partners. The associates of MedVenture were not the only corporate venture capital company to reject the 19 year old dropout from college. However, Elizabeth did not stop raising almost \$ 6 million from a bag of investors by the end of 2004. Other than Draper and Palmieri, she secured investments from an old venture capitalist, John Bryan, and Stephen L. Feinberg from the Board of the MD Anderson, Cancer Center of Houston. In addition, she persuaded a colleague from Stanford named Michael Chang who controlled a multibillion dollar Taiwan high - tech device distributor. Many of the extended Holmes family members, including the sister of Noel Holmes, Elizabeth Dietz, also came in. When the money came in, Shaunak realized that a little patch could accomplish everything Elizabeth wanted to do, bounded by science fiction.

## **4.0 The Edison**

### **4.1 Concept of Theranos' Device**

In order to make the patch concept more practicable, it could be just the diagnostic part, but it was even incredibly difficult. It could have become theoretically possible, as manned flighted flights to Mars were theoretically possible. They eventually dropped the patch completely in favor of something similar to the handheld devices used for blood glucose monitoring in patients with diabetes. Elizabeth wished that the Theranos device would be portable just like the glucose monitors, but wished it to measure much more blood substances than sugar, making it much more sophisticated and thus voluminous. A cartridge - reading system that combines the fields of microfluidics and biochemistry is the compromise. To draw a small sample of blood and put it in a cartouche that looked like a thick credit card the patient would staple her finger. The card would be transformed into a larger machine known as a reader. Pumps in the reader are supposed to push your blood across the cartridge's tiny channels and into small wells covered with antibodies. Upon the pit, a filter would separate the solid elements of the blood from the plasma and leave only the plasma through its red

and white blood cells. When the plasma came into contact with the antibodies, a chemical reaction would produce a signal that would be “read” by the reader and translated into a result. In order to get their blood regularly, Elizabeth intended to put the cartridges and reader in patients' homes. The results would be sent by a cellular antenna to the reader via a central server to the patient's computer. Instead of waiting to receive a blood test at or in the following office visits, the doctor can make adjustments to the patient's medication quickly.

Eighteen months later, Shaunak started to feel that they were progressing by the end of 2005. The company had a prototype, called the Theranos 1.0, and grew to a workforce of two dozen. This one has a business model that it hoped would quickly produce revenue. It was planned to allow pharmaceutical companies its blood testing technology to capture adverse medicines in the course of clinical trials.

#### **4.2 Minilab**

Elizabeth suddenly faced a problem with Walgreen and Safeway as retail partners. She told them that both companies could perform hundreds of tests with small blood samples. In fact, only immunoassays, a test that uses antibodies to measure substances in the blood, could be performed in Edison system. Immunoassays included certain common lab tests, such as vitamin D measurement or prostate cancer detection. Many other routine blood tests, from cholesterol to sugar, however, required entirely different lab techniques. She had a new device to carry out more than a single test class. In November 2010, she hired and entrusted him with the design of a young engineer named Kent Frankovich. At Stanford, Kent had recently obtained a Master of Engineering degree. He had previously stayed for two years at Pasadena's NASA Jet Propulsion Lab where the Mars rover Curiosity he had helped build. In turn Kent recruited Elon Musk's Los Angeles - based racket company, Greg Baney, a friend that he had met at NASA who had worked for SpaceX. Greg was built like an NFL liner at six feet five and 260 pounds, but his physique disregarded a sharp mind and a strong sense of sight.

Kent and Greg became Elizabeth's favorite employees for a period of several months. She was in brainstorming sessions and suggested what robotic systems she was supposed to use. She gave them company credit cards and allowed them to charge anything they wanted. As the name suggested, her overarching concern was its size: she still nurtured the vision of the "miniLab," which she called her own machine to be built by Elizabeth. As her name suggested, she still fostered the vision of putting it one day in the homes of the people and wanted something that could fit in on a desk or a shelf. Elizabeth taught the machine she had entrusted to build a "miniLab." That was a challenge for engineering because the miniLab needs much more components than the Edison in order to run all the tests it wanted. The new device should cram three other laboratory devices into one small room in addition to the Edison photomultiplier tube: a spectrophotometer, a cytometer and an isothermal amplifier. These were neither new inventions. The American chemist Arnold Beckman, founder of the laboratory equipment manufacturer Beckman Coulter, created the first commercial spectrophotometer in 1941. The molecular concentration of blood is then determined by the level of light absorption. It worked by beaming the colorful light rays into a blood sample and measures how much light the sample absorbs. For measured substances such as cholesterol, glucose and hemoglobin, spectrophotometers are used. In the 19th century, cytometry was invented as a way to count blood cells. It is used among other disorders for diagnosing anemia and blood cancers.

## **5.0 Conclusions**

The diagnostic testing industry was supposed to be disrupted by Theranos through the development of technology that could perform dozens of tests using a very small amount of blood from finger-prick. Ms. Holmes grew to fame and became the youngest woman in the world to have made herself a billionaire and was placed across journal coverage. As a consequence, Ms. Holmes grew to fame and became the youngest woman in the world to become a self-made billionaire. However, after more and more damaging revelations concerning their lack of expertise, technology, framework, extreme secrecy, or inaccurate test results, Theranos began

to fall apart in 2014. It resulted in two of its laboratories being shut down, investor and patient prosecution and the devaluation of the wealth of Ms Holmes. The Security Exchange Commission of the United States ordered Ms. Holmes to pay \$ 500,000, and for 10 years prohibited her from acting as a manager of a publicly owned company, probably concluding Theranos ' efforts In March 2018.

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