Start-ups founded in Silicon Valley aren't famous for playing down their products' virtues. This Californian Mecca of arrogant behavior continues operation thanks to exaggerated claims, little lies, and an established tradition of faking-it-till-you-make-it.

There are generally two sorts of the end for these braggadocious ventures: The start-up becomes highly successful and transforms the world for good – like Google, Apple, and Amazon – or it fails big upon getting a decisive loss in a ruthless market.

However, occasionally it is possible to witness unusual twists.

One person who managed to do this was Elizabeth Holmes, the charismatic, putting-on-turtleneck-clothes wunderkind who promised to bring about a revolution in medicine and got many investors ready to subsidize her idea: Theranos.

Should an idea seem too good to be valid, the idea generally is. Theranos' Edison had the same quality. A very small, slim and lightweight, affordable, and fast blood-testing tool that can test for 200 prevalent conditions, the device was praised by everyone as a "wonder machine."

What was the sole issue? The device was dysfunctional. At this point, this incredible story of lies, artifice, deception, and trickery begins getting very eerie.

Chapter 1 - Elizabeth Holmes came up with a splendid idea for a device that would have the capacity to transform medical diagnoses.

Just like the same as most people, needles frightened Elizabeth Holmes, too.

Thanks to this fear, she created a splendid idea: a small device that could examine patients' blood during a day by means of microneedles.

Create that device, Holmes imagined, and no one would ever have to use needles and everyone would own a machine that would enable actual-time data on bloodwork to help continuing diagnoses.

Until 2004, Holmes became poised for beginning realizing her idea. Holmes established Theranos together with Shaunak Roy, who was among her peers at Stanford University.

However, they met an obstacle. Shortly later, both became aware that microneedles couldn't get sufficient blood. At this moment, the initial idea began to change its skin.

Subsequently, they developed the idea of a blood-testing device not bigger than a credit card that would get several drops of blood by means of a pinprick. Then, that device would be connected with another, a bit bigger device to carry out diagnostic tests.

The other device that is as big as a toaster would carry out chemical and conductivity tests to screen for 240 general conditions. The conditions vary between vitamin D deficiency to herpes and HIV.

That was the device that guaranteed to bring a breakthrough transformation in medicine – were it to be constructed. Medical diagnostic devices could abruptly be within the reach of innumerable people.

The pair began conceiving a planet on which all people could possess a Theranos tool in their home. By virtue of early diagnoses, it would be possible to save many people's lives.

The device would scrutinize hormone levels and send the data to medical professionals on an every-hour or diurnal basis. Physicians would be able to give advice to patients like "take some more pills" or "you need an ambulance."

Those who are badly off would abruptly be able to afford medical care. Well, the machine could help do away with the need for costly physicians and nurses!

A blood test could begin to be something accessible to everyone who could carry them out when they were in a mall and shopping for and it would never even cost more than 20 dollars

Things that this device would offer appeared infinite.

How would it be, for example, were we to send the devices to war zones or put them in place in field hospitals after disasters? We would also be able to carry one in the back of an army jeep.

Chapter 2 - They had only one obstacle in front of them: the devices were almost improbable to create.

Theranos began dealing with building this wonder machine, whose name became the Edison.

However, shortly later the device came across a problem.

The thought of employing a single pinprick could not be functional.

This constituted an issue – well, it was the Edison’s principal marketing point. However, it became apparent that there was no way of testing for 240 conditions utilizing that much small blood sample.

The start-up's engineers endeavored to make an outline of specific microchambers that could move the blood around. However many possible answers hit on, the engineers were unable to have the machine screen for more than 80 prevalent conditions.

One other issue came up: the question regarding its accuracy. The blood that undergoes screening got ever more diluted in the testing process, causing the feeling of uncertainty about the trustworthiness of the outcomes.

Other technical issues arose, too.

One other negative feature of the Edison was its temperature-sensitivity. How could the device work in other geographical locations that has extremely differing climates?

For example, the pipettes were inclined to be obstructed. In a month, the devices became almost completely dysfunctional. So, this indicated there would be a need for an engineer to be sent to get rid of the clog-up.

The device had issues regarding deciding on sodium and potassium levels as well. Red blood cells divide asunder if they’re drawn by means of a pinprick, rendering the results questionable at best.

Alan Beams, the director of Theranos’ lab, got dubious over time.

Beams convinced the start-up's command to postpone plans for an HIV test. The results of coming down to a device that can lead to errors for a significant screening like this didn’t need a second thought.

The issues continued to accumulate, however, Theranos wasn’t allocating almost adequate resources to research and development (R&D).

Experts watching from the outside began to be more and more suspicious of the machine.

Timothy Hamill, the vice-chairman of the University of California’s Department of Laboratory Medicine in San Francisco, was particularly censorious.

Hamill officially stated that it wasn't probable for them to manage to carry out 240 different examinations with a single drop of blood however long they tried to come up with a solution!

Those who were kinder weren't as much harshly critical as Hamill, however, they still said that Theranos necessitated another three years of research and development prior to making the Edison public in the market.

Chapter 3 - Holmes went on, using her beauty and charisma to continue her plan.

Holmes wasn’t disturbed. Actually, she was preoccupied with shouldering the buzz around Theranos and her position as its charming manager to fret about technical difficulties.

She’d promptly created a prominence like the female version of Steve Jobs – an impression Holmes developed by imitating his liking for black turtleneck sweaters and slightly deepening her voice while giving speaking.

Holmes became a Silicon Valley wunderkind. Investors paid attention to her, and cash began to fill the coffers of the start-up.

Holmes agreed with the advertising agency TBWA\Chiat\Day to represent Theranos. This selection was a tribute to Jobs, as well: the agency had served Apple before.

Carisa Bianchi and Patrick O’Neill, the CEO and executive creative director of the agency, were smitten with Elizabeth. They were also convinced that Theranos was the next big thing.

Seeing her, investors perceived her as an icon in production – the earliest billionaire businesswoman who owed her success to herself alone and who made a lot of money thanks to a device that saved many people!

The fade increase more and more. In 2014, The value of Theranos was $9 billion and the company signed agreements to provide the Edison to worldwide distribution huge corporations Safeway and Walgreens.

Both of these multinationals were aiming to increase their medical and wellness product extent and saw blood diagnosis as a significant development field for their business models.

Safeway also provided $350 million to start remodeling of its stores to store Theranos’ Edison in distinct on-site wellness clinics. Walgreens consented to set up a box in every one of its 8,134 branches.

How something is seen without and actually is within seldom match each other in Silicon Valley. Making bizarre claims with regard to your business is only to be expected should you desire to draw investors.

So far so good as long as we talk about software upstarts, however, things change a bit if the topic is something as essential as blood testing.

However, Theranos kept going on. They employed Larry Ellison, the brain that created billion-dollar tech company Oracle, as an advisor and implemented his business model.

That indicated they would get rid of flawed software and go on optimizing it later during beta-testing.

As you'll discover in the next chapters, that was the beginning of numerous acts of subterfuge that would aftermath render Theranos infamous.

Chapter 4 - Theranos concealed the machine's errors to attract investors.

How would have things turned out had Theranos consumed more time and money on research and development – would the start-up have been able to fully transform medical care as its creators had thought it would?

It'll be a mystery forever since Theranos was in a great hurry to sell its products onto the market.

The pressure to start the sales of the machine was engulfing. Theranos began misleading not only its investors but also the media and the Food and Drug Administration (FDA) regarding the Edison.

Holmes started making bizarre claims. The machines, she said, were able to carry out 800 tests with merely a single drop of blood. People could find out their test outcomes in under half an hour, and everything was fully FDA-approved.

All these were nothing but scams. The huge percentage of tests, for instance, wasn’t even run by the device!

It is no surprise that if they were lucky, the boxes could carry out one-twelfth of the most crucial tests.

Thus, though the device had the capacity to run an immunoassay – a test that looks at proteins by means of antibodies – the Edison couldn't carry out a hematology test to determine blood platelet and white blood cell counts. The device even fell far short of performing general chemistry tests.

Clients going to the test centers would solely get the pinprick test were they to ask for an immunoassay. Hematology and chemical tests were carried out applying the conventional technique of extracting blood from a vein.

The small cylindric bottle with the client's blood was then sent to a lab in Palo Alto through express-courier and there, the sample was examined employing devices manufactured by other companies, most importantly Siemens.

Theranos was meeting its objective, however, the entire operation was very much dishonest – well, their sole marketing point was the “miraculous” Edison!

However, the trick deceived almost all people, even the regulators who evaluated Theranos.

The regulators carried out proficiency tests created to decide on the standard of a given lab’s blood-testing facilities, which also covered thyroid, vitamin D, and PSA tests.

Then, how did Theranos manage to outwit the regulators? They covertly employed third-party devices to run the tests, being wholly cognizant that the regulators would think these machines belonged to them.

Chapter 5 - Theranos forged statistics to maintain its deception in a systematic way.

Not only was the start-up misleading its investors and clients but also the whole healthcare establishment and media.

Until this moment, the company had achieved a virtuosity at manipulating and using data that bore positivity to clean its image.

So, solely the outcomes of successful tests – usually run in labs using another company's manufacture machinery – were sent to interested individuals and companies.

The start-up loved to brag about the performance of its Edison that had been confirmed in quality-control journals.

But, it was discovered this was a lie.

The sole “peer-reviewed” article written concerning the Edison was in an unknown pay-to-publish Italian journal whose name is Hematology Reports. The article’s data set consisted of just six patients.

The business regularly said as well that its service had better accuracy when compared to orthodox blood tests.

After pushed to give proof for this daring claim, the company contended that more than nine-tenths of flawed outcomes in orthodox blood-testing followed from human error.

So, that meant its boxes must have more correct results rate. However, Theranos didn't include one tiny fact: incorrect results of the Edison exceeded those of its rivals!

After regulators ultimately examined the machine, they found out that it gave accurate results approximately in just six-tenth of cases for each test. Some tests, such as for testosterone, were far from accurate with a surprising almost nine-tenth of the time.

However, since many flawed results are the result of human error, the company was right in its claim.

Then, how did Theranos go on to draw investment considering that the Edison was operating so terribly?

As you can understand, the company threw around other lies. The displays presented to angel investors were full of lies, too.

The levels of deceit we witness in Theranos were close to the surreal. In the initial levels of product development, the company even utilized mock machines that are unable to run genuine blood tests.

It was possible to watch Blood filtering through the Edison prior to the exhibition of false results on the display.

They excluded investors from full knowledge. After VIPs paid a visit to Palo Alto, a pinprick of their blood was drawn into the device for demonstration. After VIPs had exited the room, though, the blood sample was immediately sent to a lab, and tests were run through a Siemens device!

Chapter 6 - The company made a lot of effort to evade FDA inspections and at the same time feigned to be FDA-supporting campaigners.

Until now, perhaps you are astonished to see the way the business was able to carry off its lies in a delicately regulated market like in the US.

It is very easy to understand: it made a lot of effort to evade FDA regulation.

What was an important part of Theranos' ruse was to feign that the device wasn't a medical machine.

Since the samples were sent to Palo Alto for tests, Theranos said, the machine was nothing but a device for dispatching information. So, it didn't undergo FDA regulation.

Theranos grudgingly adopted a different strategy after Dr. Shoemaker, who was a lieutenant colonel in the American Army, was resolute in getting an approval for the boxes from the FDA prior to planning their use in military field hospitals.

They assured that the company would adhere to FDA measures, however, delayed simply for a sufficiently long time for Shoemaker to go on retirement. Following this event, the entire project was noiselessly discarded.

Until this moment, a novel method had been secretly implemented – choosing the most suitable tests that were in line with the FDA's standards.

The device yielded perfect test outcomes for HSV-1 and herpes tests, for instance, thus Theranos asked – and obtained – FDA approval for them.

However, this wasn't over for Theranos. Actually, they had the chutzpah to compose a song and arrange a dance choreography about this and said the company was really a great supporter of the FDA!

Naturally, the FDA had just provided its seal of approval for a few tests. However, what is the reason for allowing the truth to be an obstacle in the process of a great story?

Indeed, the story itself was great, producing a large amount of free-of-charge publicity for the company.

Chapter 7 - Theranos guarded what they hid by firing dissidents and employing drones.

Not all employees at the company felt content with the business' false information campaign.

The dissatisfaction of workers was huge, and Theranos replaced many of its personnel with new members. Most of its employees just quit after finding out how fraudulent their bosses are.

However, their opinions didn't allow them to express what's going on there. The company guarded what it hid through having employees sign confidentiality agreements, precluding the discontented from disclosing compromising details to the media.

However, there were unable to stop a chain of resignations. The whole management team and numerous others resigned.

But, the company had another ploy at hand: They started employing Indian workers reliant on their work visas to stay in the United States.

Hiring workers from India was simple. Holmes's lover and number two, Sunny Balwani, had great connections in India's tech industry.

Shortly later, Holmes's lover was giving empty positions to Indian employees. Their strategy was very sly. Since the employees were in great need of keeping their positions and not being extradited, the employees were a lot more inclined to stay silent with regard to Theranos' infinite problems. These employees made an excellent makeshift measure to continue the Theranos operations.

However, these tactics quickly ended up as a tragedy.

Ian Gibbons, a British biochemist having worked with much effort on Theranos’ immunoassays for so long, killed himself in 2013.

Before his death, Gibbons had been reduced to a lower rank for suspecting the Theranos' honesty about the devices employed for tests.

Because of his doubts, Theranos substituted Gibbons with a junior scientist who wasn't even close to having as many qualifications as Gibbons. However, he had one essential quality: he wasn't involved in anything that disturbs the bosses a.

The company wasn't happy to see their highly-qualified scientist leave, thus they gave him a less senior position. Gibbons remained in Theranos hoping that he could be of assistance in improving the machine to the optimum.

Lowering his rank had an adverse effect, though, as Gibbons more and more became addicted to alcohol. About sixty days later this demotion, Gibbons committed suicide by swallowing acetaminophen with wine and killing his liver.

There are no fixed numbers with regard to the number of patients who passed away because of Theranos' careless behavior. The thing that is known to us is that Theranos' Edison boxes were employed one million times just in Arizona prior to Walgreens' cease of cooperation with Theranos.

The company was ordered to reimburse the $4.65 billion given to them for running the blood tests in Arizona.

Bad Blood: Secrets and Lies in a Silicon Valley Startup by John Carreyrou Book Review

Holmes was the wunderkind in Silicon Valley who was going to achieve something big. Advertised as the female version of Steve Jobs, this charming wunderkind with black turtleneck gave her word everyone that she would bring about a medical revolution: a small, very movable, affordable, and fast blood-testing machine that can test for 240 ailments. However, Theranos, the start-up she established by relying on this claim, transpired to be a fraud. After the company's executive team became aware that its "miracle machine" was dysfunctional, the team began lying and deceiving investors, clients, and regulatory authorities.

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