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# THERANOS 2015: RADICAL + DISRUPTIVE INNOVATION

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UC San Diego

**All discussion based on information as of December 2015**

If you use this as a  
case, please drop me a note. |

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# SUGGESTED READINGS

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- "Blood, Simpler: One Woman's Drive to Upend Medical Testing." New Yorker (December, 2014)
- "Affordable Diagnostics is the Missing Link in Medicine." Financial Times (December, 2015).
- "Theranos Exemplifies Clash of New versus Old In-Vitro Test Models." Financial Times (December, 2015)
- "Scientists are Skeptical About the Secret Blood Test that has Made Elizabeth Holmes a Billionaire." [www.cytofluidix.com](http://www.cytofluidix.com) (May, 2015)



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# THE OPPORTUNITY

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\$75,000,000,000 per year

\$50 vs. \$2.99

*30% of people skip blood tests*

- Competitors = Quest (10B), LabCorp (12B)

*Self-ordered tests  
23andMe*

*>\$400 M ==> \$9 Billion*



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# THE INSPIRATION

## Why Vice President Joe Biden Is So Inspired by Elizabeth Holmes

At a visit to health care startup Theranos, Vice President Joe Biden seemed to endorse the company's unorthodox strategy.

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# THERANOS TECHNOLOGY

- Software + Moore's Law
- Microfluidics
- Nanotainer
- Existence proofs:
  - Pulse oximetry
  - Glucose testing
  - Demo!

2YR \$ Shenzhen Toleda Digital Technologies Co., Ltd.

Contact Details | Video

T1 Patent design activity tracker waterproof blood

TLWF1 Patent design health bracelet wearable

TLW31 Factory Supply Bluetooth smart wrist blood

TLWF1

Patent Design

Get it on Google play CE FC CCC

workwithrogerbohn.com/2

driving videos Press This temp DBs Efiler SD weather BigData Innovati

app - Google Search The Magazine's Money Issue -... glucose test meters - Google S... Blo

Reflolux S

FreeStyle

FreeStyle mini

MediSense



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# COMPETITIVE ANALYSIS

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- Existing supply chain
  - Need sample Cold chain
- Business model
  - New business model: vertical integration
    - Strategic partnership w Walgreens
- MD orders test
- Performance advantages  
(who is buyer of Theranos tests?)
- Old, well established. Stodgy?
- New, no preconceived ideas.
- Theranos supply chain
  - Still need cold chain



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# \$ MARKET CAP CALCULATION

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- $\text{Cash flow/year} = \text{Revenue} - \text{Variable costs} - \text{Fixed costs} - \text{CAPX}$ 
  - Let's simplify: steady state, 30% market share (by tests), price = .5 x competitors
- $\text{Income} = \text{Market size (in \$)} \times \text{Market share}$ 
  - $\text{Income} = \text{Market size (in units)} \times \text{Our price} \times \text{Market share}$
- $\text{Gross margin} = (\text{A.S. Price} - \text{Average Delivered Cost}) \times (\text{\#units})$
- $\text{Cash flow} = \text{Gross margin} - \text{SG\&A} - \text{CAPX}$
- $\text{NPV} = \text{Cash flow per year, discounted out 10? years}$
- + PVGO = Present Value of Growth Opportunities



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July 2010 Theranos [says in a Securities and Exchange Commission filing](#) that it has raised \$45 million

July 2013 [Theranos](#) adds Richard M. Kovacevich, the former chief executive of Wells Fargo, and Gen. James Mattis, a retired top military commander, to its board. September 2013

Theranos [announces a partnership](#) with Walgreens to allow consumers to test their blood at the pharmacy's stores.

2014 Theranos and its founder, Ms. Holmes, are profiled in national magazines and other news outlets. [Fortune](#) [says](#) the company has raised \$400 million from equity sales to investors who have effectively valued the company at more than \$9 billion.

Dr. Delos M. Cosgrove, the chief executive and president of the Cleveland Clinic, [tells The New Yorker](#) that Theranos is “potentially a breakthrough company.”

February 2015 In [an editorial](#) in The Journal of the American Medical Association, a Stanford School of Medicine professor criticizes the company for operating in “stealth mode for more than a decade” in order to “change the entire health system” without publishing anything in peer-reviewed biomedical journals.

July 2015 The Food and Drug Administration [approves](#) Theranos's test to detect if someone has been infected by herpes simplex virus 1. The company has not received approval for any additional tests since then.

October 2015 An investigation [by The Wall Street Journal](#) raises questions about whether the company's technology actually works.



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# CONCLUSIONS: STRATEGIES TO BENEFIT FROM INNOVATION

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- This technology is disruptive and perhaps radical
- Very hard to judge potential market size.
  - Go for low price/market share, or try to join existing duopoly.
  - The “self-testing” market is controversial but could be large
  - Hundreds of possible tests
- Theranos is following the “trade secrets” and “vertical integration” strategies, rather than being open in any way. (2004 vs 2015?)
- Business success will depend on how well technology works.



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# 2016 - THERANOS BEGINS TO UNRAVEL





## 2016 - The Collapse

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Oct. 16, 2015 After concerns are raised by the Food and Drug Administration, Theranos **temporarily halts** its trademark practice of collecting tiny blood samples from finger pricks.

Jan. 25, 2016 The Centers for Medicare and Medicaid Services **issues a letter** saying that the company violated several clinical standards.

March 31 An inspection report released by federal regulators says Theranos **was plagued** by quality control problems.

June 12 Walgreens **terminates its relationship** with the company and moves to immediately close all 40 of the Theranos testing centers in its Arizona drugstores, the source of most of Theranos's customers.

July 7 Theranos **announces** that regulators have imposed sanctions, including banning Ms. Holmes from owning or operating a medical laboratory for at least two years. Regulators also revoke the certification of its Newark, Calif., laboratory and prohibit it from taking Medicare and Medicaid payments for its services.



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# EXCLUSIVE: HOW ELIZABETH HOLMES'S HOUSE OF CARDS CAME TUMBLING DOWN

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- In a searing investigation into the once lauded biotech start-up Theranos, Nick Bilton discovers that its precocious founder defied medical experts—even her own chief scientist—about the veracity of its now discredited blood-testing technology. She built a corporation based on secrecy in the hope that she could still pull it off. Then, it all fell apart. Nick Bilton, Vanity Fair, Oct. 2016
- Ironically, Theranos's alleged improprieties suggest that the venture-capitalist system really worked this time. With the exception of a couple of local Valley firms ... with whom Holmes had a family connection), none of the big V.C. outlets invested in Theranos.

... She met with most top venture firms. But when the V.C.s asked how the technology worked, I was told, Holmes replied that it was too secret to share, even to investors. When they asked if it had been peer-reviewed, she insisted once again it was too secret to share—even to other scientists. BY NICK BILTON MAY 2, 2016 2:46 PM



# QUOTES ABOUT HOLMES AND THERANOS

2014-12	Fortune	Beyond blood: Theranos' billionaire founder talks growth
2013-09	WSJ	<a href="#">Elizabeth Holmes: The Breakthrough of Instant Diagnosis A Stanford dropout is bidding to make tests more accurate, less painful—and at a</a>
2013-11	Bloomberg	Bloomberg - <a href="#">A Portable HIV Test That Provides Results In Minutes</a>
2014-02	Wired	Wired News - <a href="#">This Woman Invented a Way to Run 30 Lab Tests on Only One Drop of Blood</a>
2014-06	Fortune	Fortune - <a href="#">Take the blood, leave the pain</a>
2014-06	Fortune	"When I finally connected with what Elizabeth fundamentally is," he says, "I realized that I could have just as well been looking into the eyes of a Steve
2015-06	WSJ	Holmes: "This is what happens when you work to change things," she said, "First they think you're crazy, then they fight you and then all of a sudden
2015-10	Inc.	Theranos CEO Elizabeth Holmes: 'Avoid Backup Plans' "I think that the minute that you have a backup plan, you've admitted that
2015-12	FORTUNE	"How Theranos Misled Me"
2016-06	Forbes	Forbes downgrades Theranos founder Elizabeth Holmes net worth from \$4.5 billion to Theranothing
2016-06	TechCruch	Jennifer Lawrence tapped to play Elizabeth Holmes in new movie about Theranos
2016-06	Fortune	The Theranos Disaster Shows Us the Dangers of Chasing Fame and Fortune



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# CONCEPT NOT DEAD?

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## **CYTOFLUIDIX**

Microfluidics Technology Review

News Ticker

Pharma and Drug Delivery Developments Combine

[Home](#) » [Home](#) » [\[Report\] Global Microfluidics Market is Expected to Reach US\\$12.45 Billion by 2025](#)

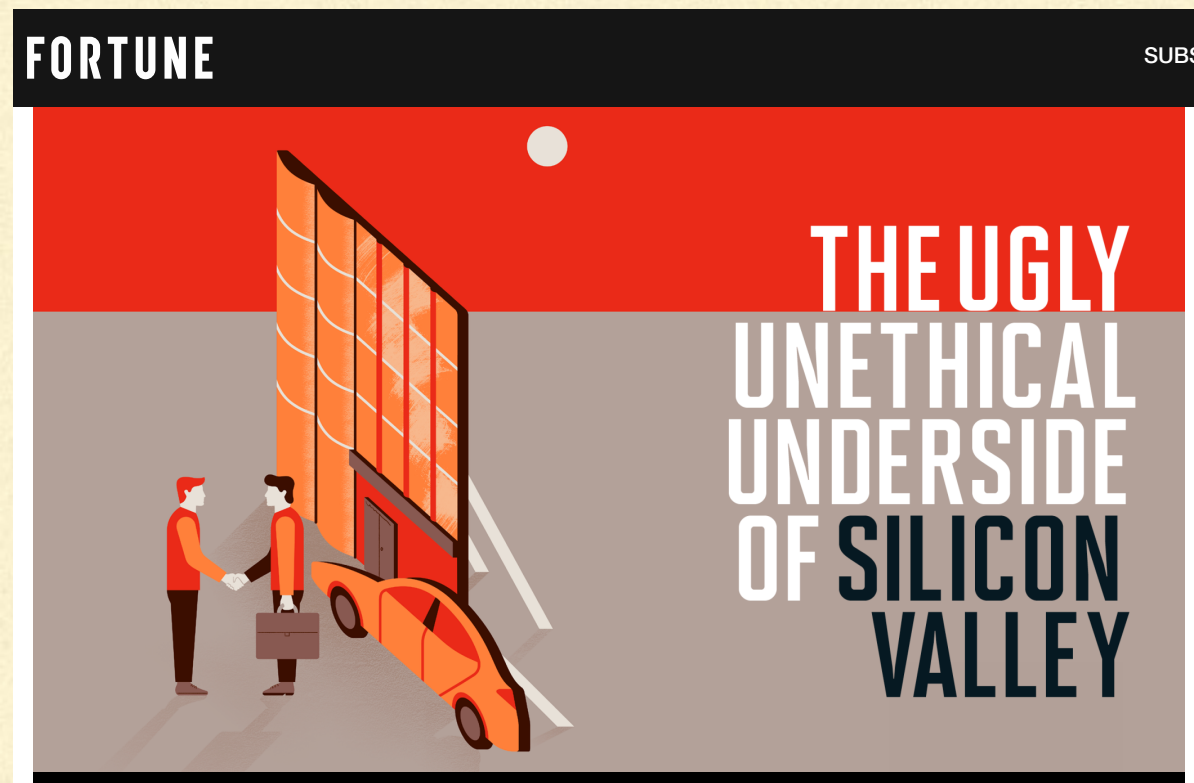
## **[Report] Global Microfluidics Market is Expected to Reach US\$12.45 Billion by 2025**

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Posted on April 26, 2017 by Admin

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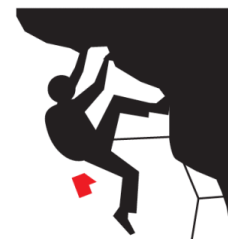


**“We hope that founders bend the rules but don’t break them. There’s a fine line between entrepreneurship and criminality.”**

- Jakub KostECKi, founder of StartupFactCheck, a consultancy that helps investors conduct due diligence on startups. Three-quarters of the 150 early-stage startups he has investigated have pitched investors with misleading or purposely incomplete information, like identifying as “customers” people who are merely using a free trial, or taking full credit for past projects they played only a small role in. <http://fortune.com/silicon-valley-startups-fraud-venture-capital/>

## THE RECIPE FOR STARTUP FRAUD

The Association of Certified Fraud Examiners identifies three main factors behind workplace fraud—all of which happen to be in plentiful supply for the people running venture-capital-backed startups.



### PRESSURE

Venture capital investors demand hyper-growth and immediate results. Competition is intense. The costs of launching and innovating mean the founder is burning money.



### OPPORTUNITY

Privately held companies can publicize self-reported, unaudited financials or not report at all. A hype-friendly media won't look too skeptically at an upbeat story.



### RATIONALIZATION

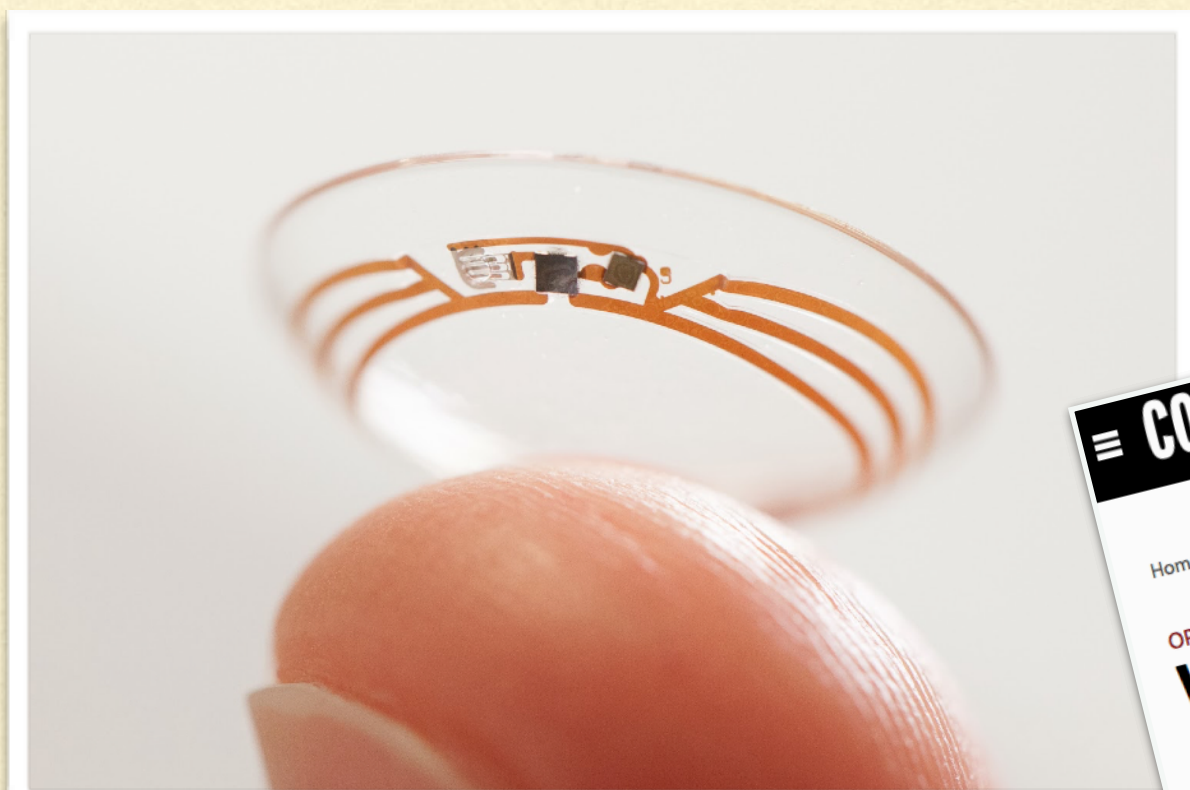
Tech culture says founders should change the world, move fast and break things, and disrupt; many hear that as “ignore the rules.”



# GOOGLE SMART CONTACT LENS

## How does it work?

The lens contains a tiny and ultra slim **microchip** that is embedded in one of its thin concave sides. Through its equally tiny **antenna**, it will send data about the glucose measurements from the user's tears to his or her paired smartphone via installed software.





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# Google's Hyped Smart Contact May Not Exist Beyond PowerPoint and High Hopes

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Angela Chen, Gizmodo 6/07/16 6:50amFiled to: GOOGLE

Google made some big promises about how it would cure what ails us, but now it looks like we may never get those [diabetes-detecting contact lenses](#) or that [FitBit-like cancer-detection wearable](#).

Former employees of the GoogleX biotech division, called Verily Life Sciences, [tell Stat](#) that these projects are examples of “Silicon Valley arrogance” and, well, failing. One even called the contact lens idea “slideware,” meaning that it’s n exciting project that looks great on PowerPoint and hasn’t gotten beyond that point. Verily defended itself with a version of the oft-heard Silicon Valley mantra that “we choose to do things because they are hard” and then added on that “some projects can and will fail.”  
<http://gizmodo.com/googles-hyped-smart-contact-may-not-exist-beyond-powerp-1780987776>





Google's contact lens with embedded 'smart lens' technology was first announced in 2014. Mark Serr—Google

BRAINSTORM HEALTH

# Google and Novartis Won't Be Testing Smart Contact Lenses This Year After All

Reuters  
Nov 18, 2016



Novartis has abandoned a 2016 goal to start testing its autofocus contact lens on people, though it said the groundbreaking product it is making with Internet giant Google is "progressing steadily."

"It is too early to say when exactly human clinical trials for these lenses will begin," a spokeswoman for the Basel-based drugmaker said in an email on Friday.

"This is a very technically complex process and both sides are learning as we go along. We will provide updates at the appropriate time," she said.

EDIT POST