

 CBINSIGHTS

(N + 1) TRENDS

The technology trends that will shape business and society

THE
INNOVATION
SUMMIT



WHAT ARE (N+1) TRENDS?

Technologies, business models and distribution innovations that you should watch for in the next 5 to 10 years.



Patents



**Angel Investors
and VCs**



Startups



**Government
Grants**



**Media and Niche
Sub-Community Chatter**



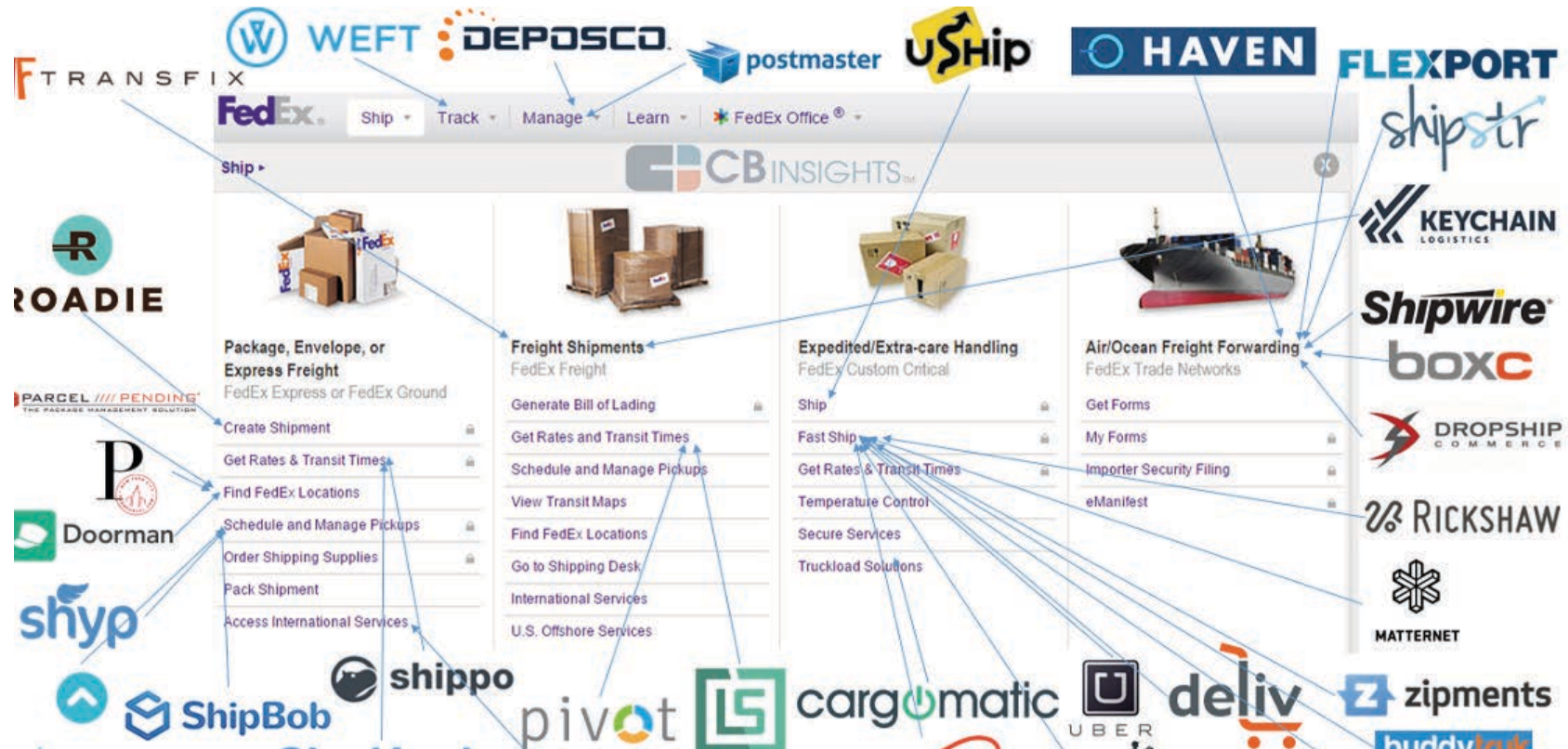
**Academic and
Corporate Research**



WHY SHOULD I CARE?

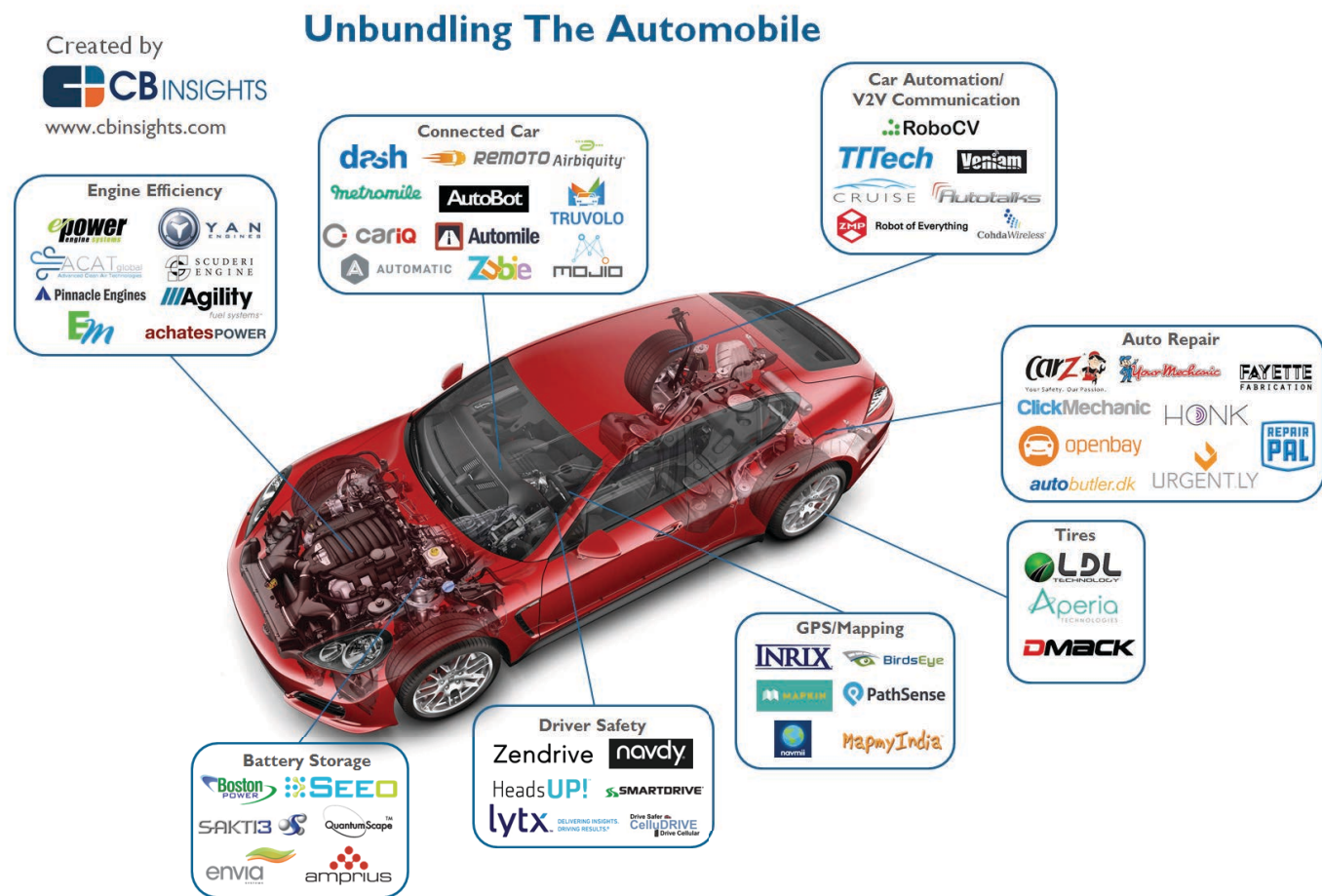
2 reasons. You either want to win.
Or you don't want to die.

UNBUNDLING FEDEX



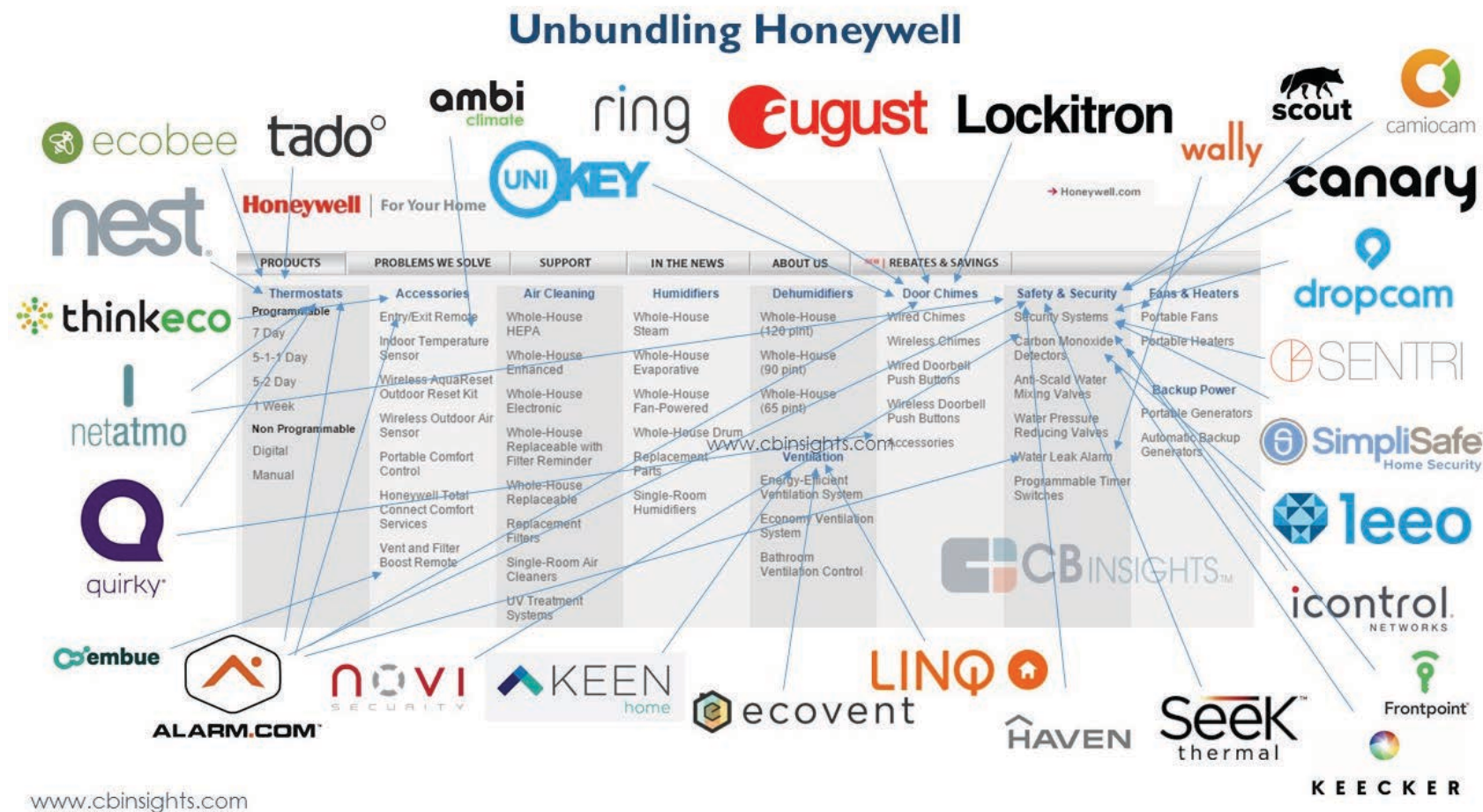
Source: <https://www.cbinsights.com/blog/startups-disrupting-fedex-ups/>

UNBUNDLING THE AUTOMOBILE



Source: <https://www.cbinsights.com/blog/startups-drive-auto-industry-disruption>

UNBUNDLING HONEYWELL



Source: <https://www.cbinsights.com/blog/disrupting-honeywell-startups>

UNBUNDLING P&G



Source: <https://www.cbinsights.com/blog/disrupting-procter-gamble-cpg-startups>

UNBUNDLING STARWOOD

Startups That Are Unbundling The Hotel



Created by
CBINSIGHTS
www.cbinsights.com



Source: <https://www.cbinsights.com/blog/unbundling-the-hotel>

Average company lifespan on S&P 500 Index (in years)

In the last 15 years,
**52% of S&P 500 companies
have disappeared**

1955

61-year lifespan in S&P 500

vs

2015

17-year lifespan in S&P 500

Projections based
on current data

Year (each data point represents a rolling 7-year average of average lifespan)

DATA: INNOSIGHT/Richard N. Foster/Standard & Poor's



Top 5 Publicly Traded Companies (by Market Cap)



Tech

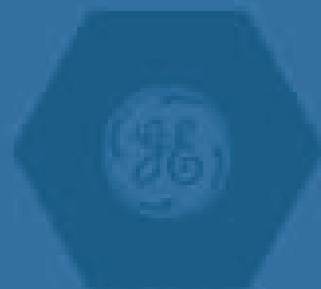


Other

2006



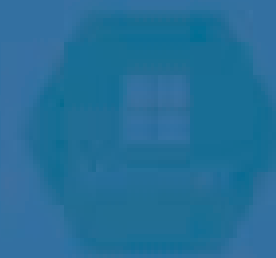
\$446B



\$383B



\$327B



\$313B



\$273B

2011



\$406B



\$300B



\$271B



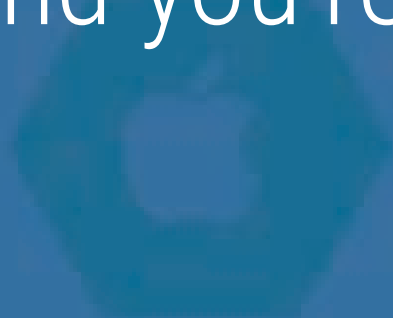
\$265B



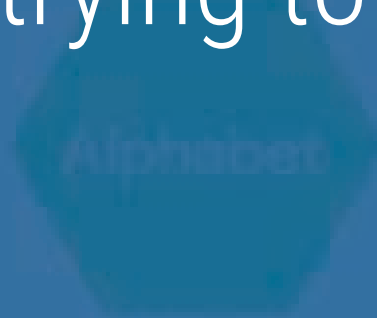
\$228B

Technology is eating **EVERY INDUSTRY**
And you're trying to **BITE BACK**

2016



\$582B



\$536B



\$481B



\$364B



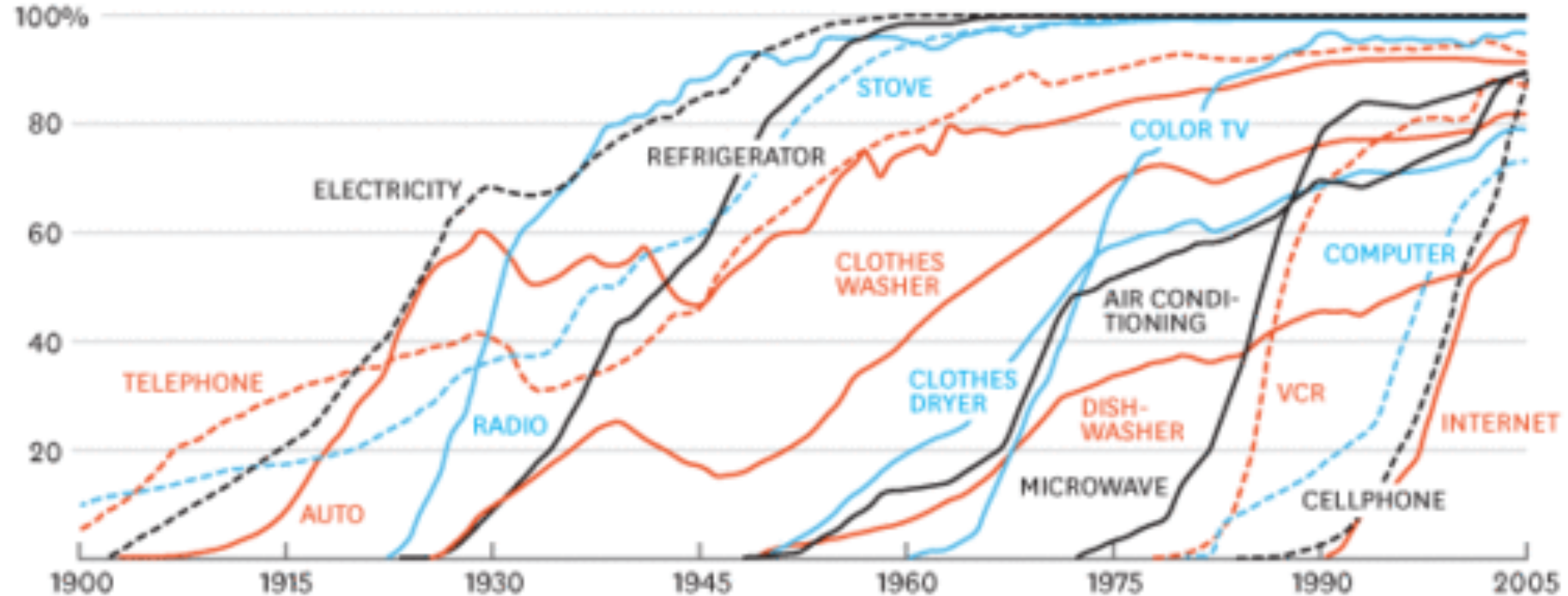
\$252B

TECHNOLOGY ADOPTION IS QUICKER THAN EVER

Time is not on your side

CONSUMPTION SPREADS FASTER TODAY

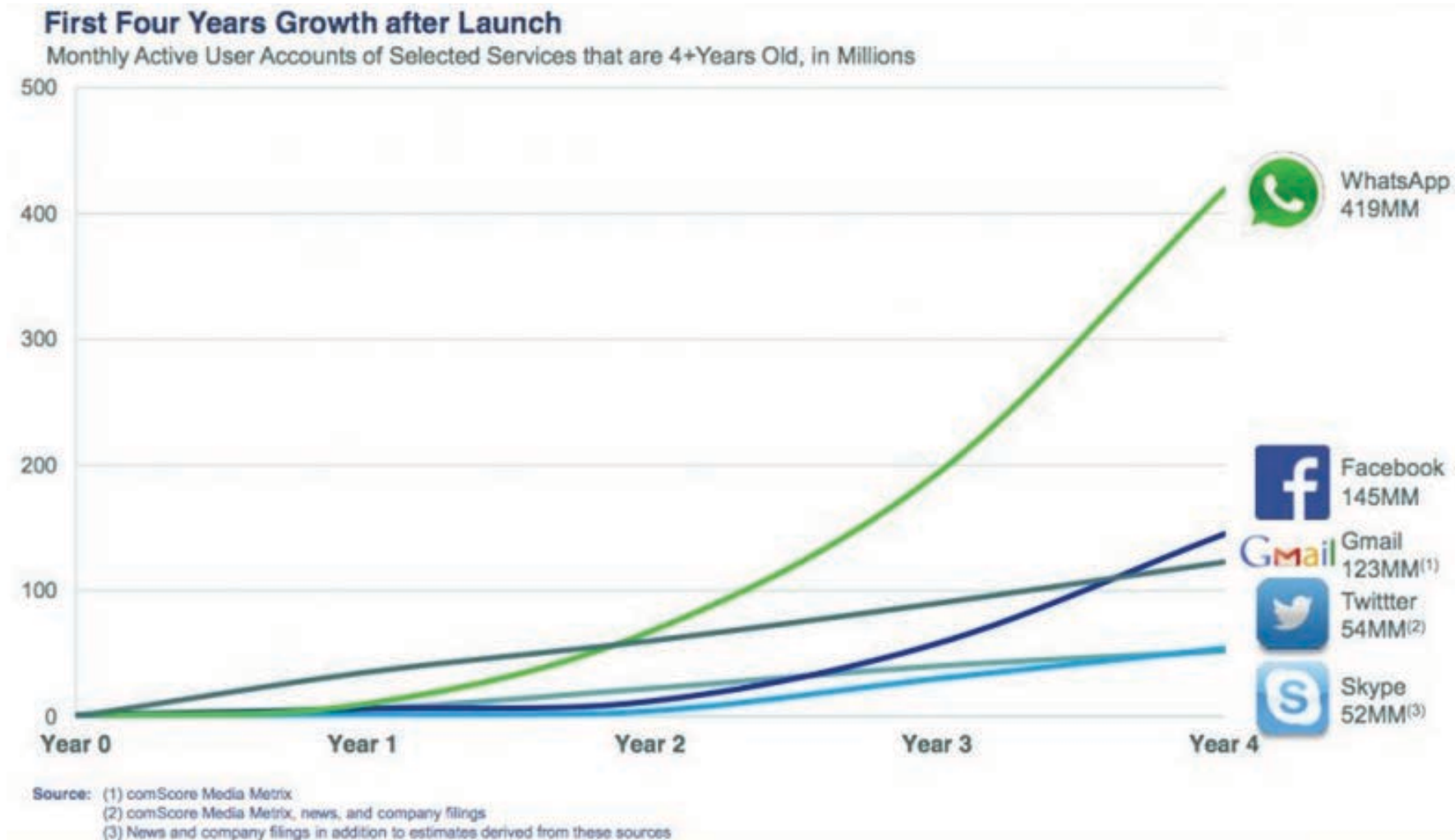
PERCENT OF U.S. HOUSEHOLDS



SOURCE MICHAEL FELTON, THE NEW YORK TIMES

HBR.ORG

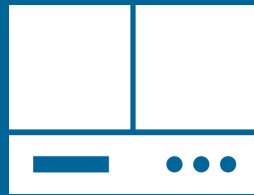
...AND THAT PACE IS ACCELERATING



Source: Facebook



PHASE 1
Mainframe



PHASE 2
**Mini
Computer**



PHASE 3
PC
Software



PHASE 4
Internet
Web



PHASE 5
Mobile
Apps



PHASE 6
**Connected
Platforms**
Hardware & Software

**READY FOR THE
NEXT PHASE?**



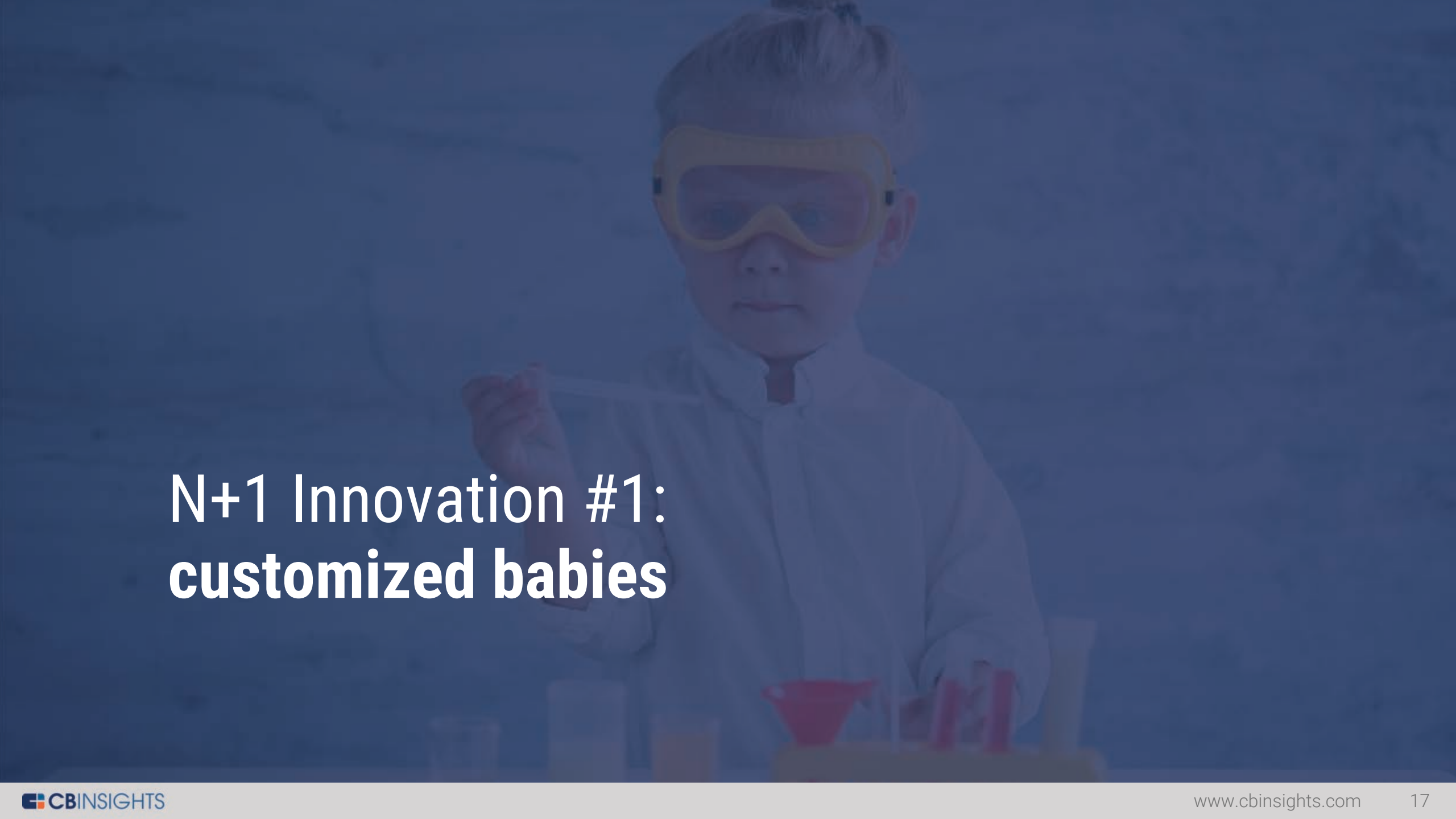
FUTURE LITERACY.

If you know what to expect in the future, you can plan for it. This is about winning future markets.



(N+1) TRENDS – THIS IS SCI-FI SHIT.

Think beyond the technology and markets they open up. There are massive ethical and societal questions these will cause us to confront.



N+1 Innovation #1: **customized babies**



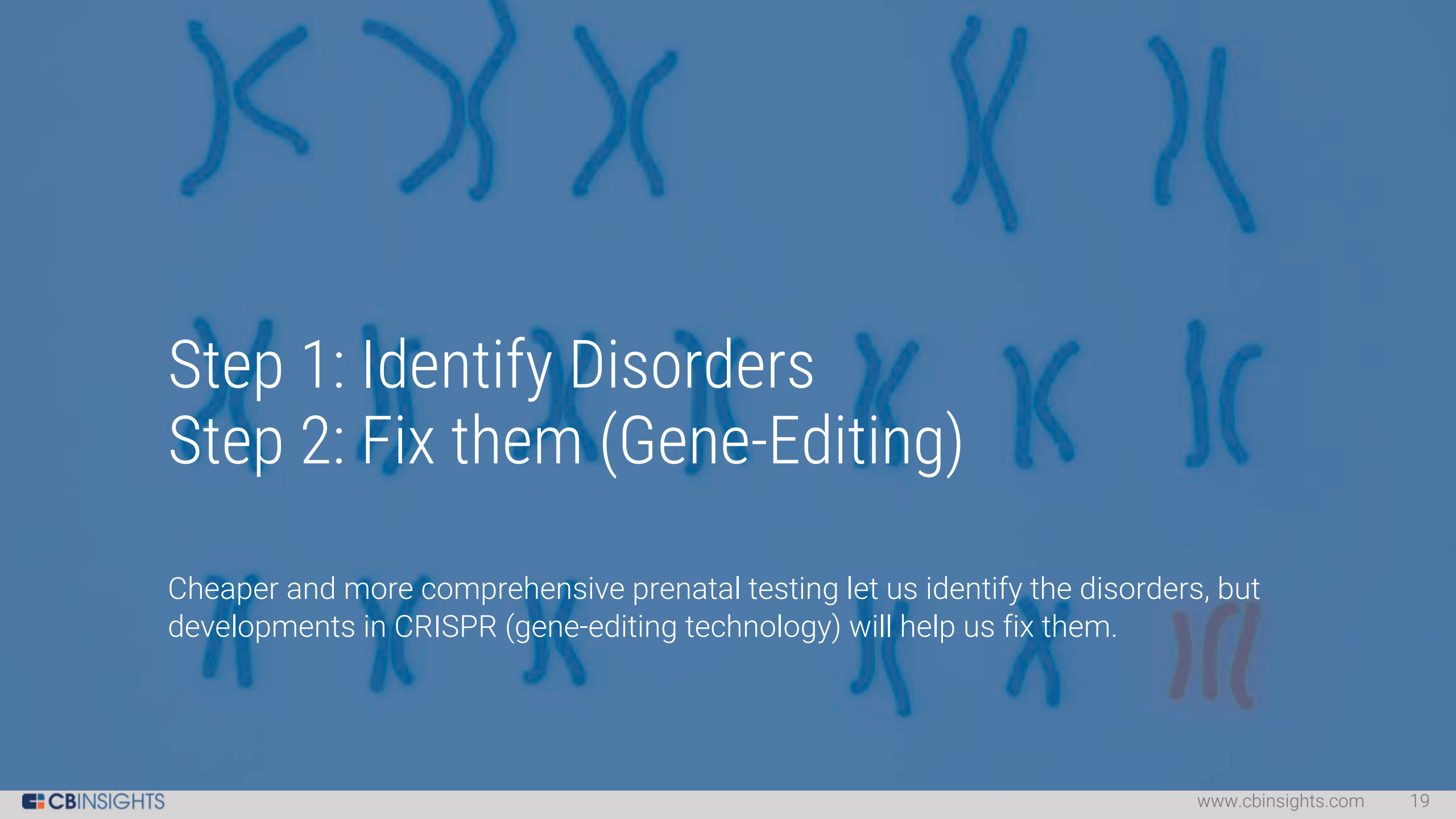
Prenatal genetic testing has become
cheaper
more accurate
and can be done earlier

Test for Trisomy 21, 18, 13

~\$1,000

9-10 Weeks In

~99% Accuracy



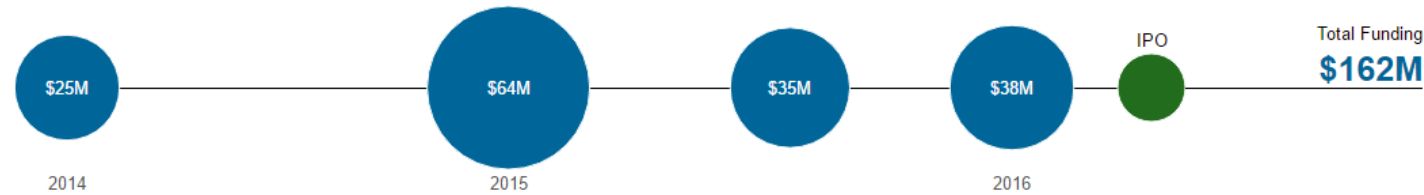
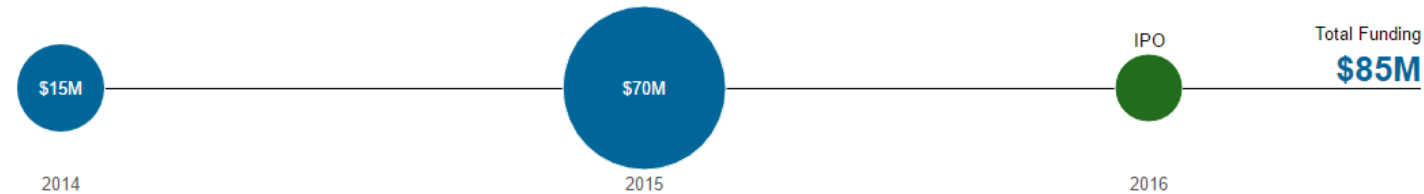
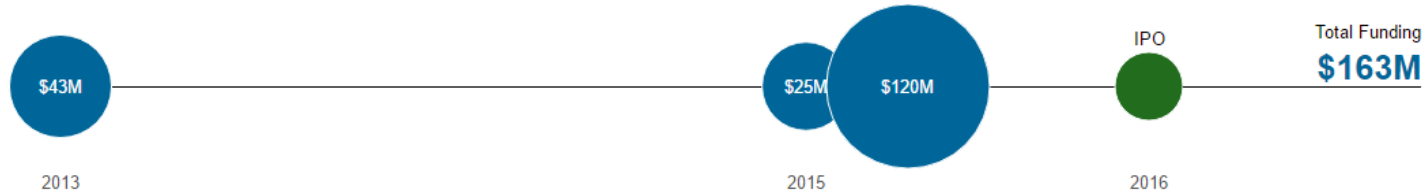
Step 1: Identify Disorders

Step 2: Fix them (Gene-Editing)

Cheaper and more comprehensive prenatal testing let us identify the disorders, but developments in CRISPR (gene-editing technology) will help us fix them.



GENE EDITING (CRISPR) COMPANIES ARE MATURING



GENE-EDITING IS BECOMING A REALITY

Several companies have successfully raised capital and hit public markets as use of CRISPR has demonstrated that gene-editing is no longer science fiction.

CRISPR AND HUMANS

UK SCIENTISTS GAIN LICENCE TO EDIT GENES IN HUMAN EMBRYOS

February 1st, 2016

nature

CRISPR USED TO REPAIR BLINDNESS-CAUSING GENETIC DEFECT IN PATIENT-DERIVED STEM CELLS

January 27th, 2016

 COLUMBIA UNIVERSITY
MEDICAL CENTER

CHINESE SCIENTISTS USE GENE-EDITING TECHNIQUES IN HUMANS FOR FIRST TIME

November 15th, 2016

CNN

FEDERAL PANEL APPROVES FIRST USE OF CRISPR IN HUMANS

June 21st, 2016

STAT

- Down Syndrome
- Cri Du Chat Syndrome
- Turner Syndrome
- Achondroplasia
- Tay-Sachs Disease
- Cystic Fibrosis
- Edward's Syndrome
- Patau Syndrome
- Sickle Cell Anemia
- Muscular Dystrophy
- Infantile Osteoporosis

Common Genetic Disorders In Children **COULD SEE NEW THERAPIES**

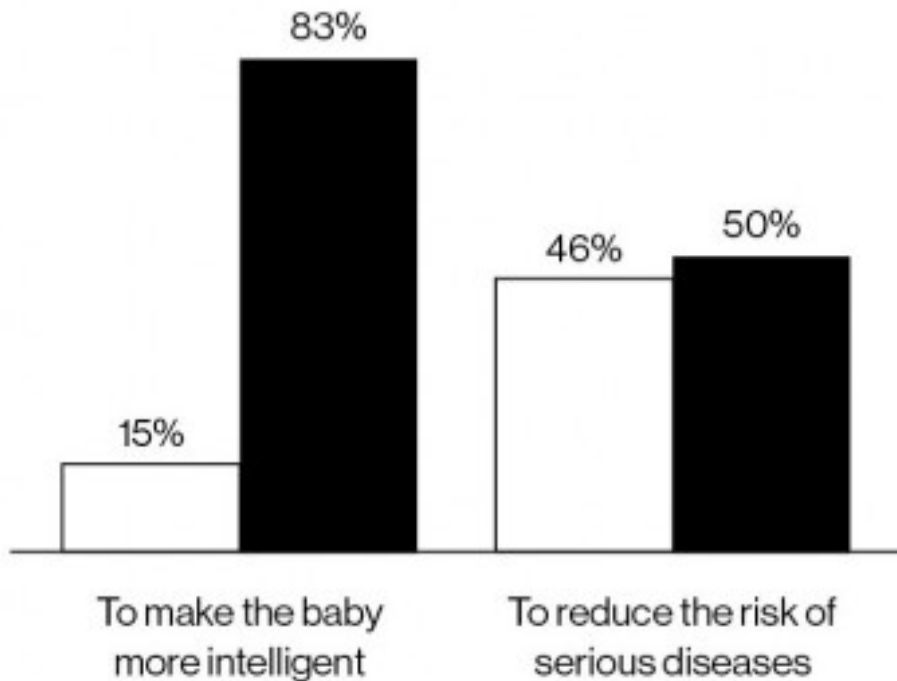
IN THE FUTURE, WE WILL CHOOSE THE TRAITS FOR OUR BABIES



Genetic Modification of Babies

Percentage of U.S. adults saying that changing a baby's genetic characteristics for each purpose is ...

- ☐ Appropriate
- ☒ Taking medical advances too far



THE LINE OF 'DISORDER' IS BLURRY

What is considered a disadvantage today (medical disorders) could be different tomorrow. If the rest of the population increases their intellect via genetic modification, a disadvantage would be "natural" intelligence.

WE HAVE ETHICAL QUESTIONS TO CONFRONT



Many technologies have both good and bad aspects that they can be used for... **I can think of more scary technologies that we're using today - CRISPR being one in biology - which has equally scary potential.** So while we don't want to risk large catastrophic possibilities, I personally believe technical progress should not be stopped for fear of a downside outcome. Many of these high-leverage technologies need careful consideration, discussion, and protocols.

Vinod Khosla

Founder, Khosla Ventures

L'ORÉAL

 NOVARTIS

 University of
Phoenix®

 MERCK



Who will be affected?
NOT JUST HEALTHCARE

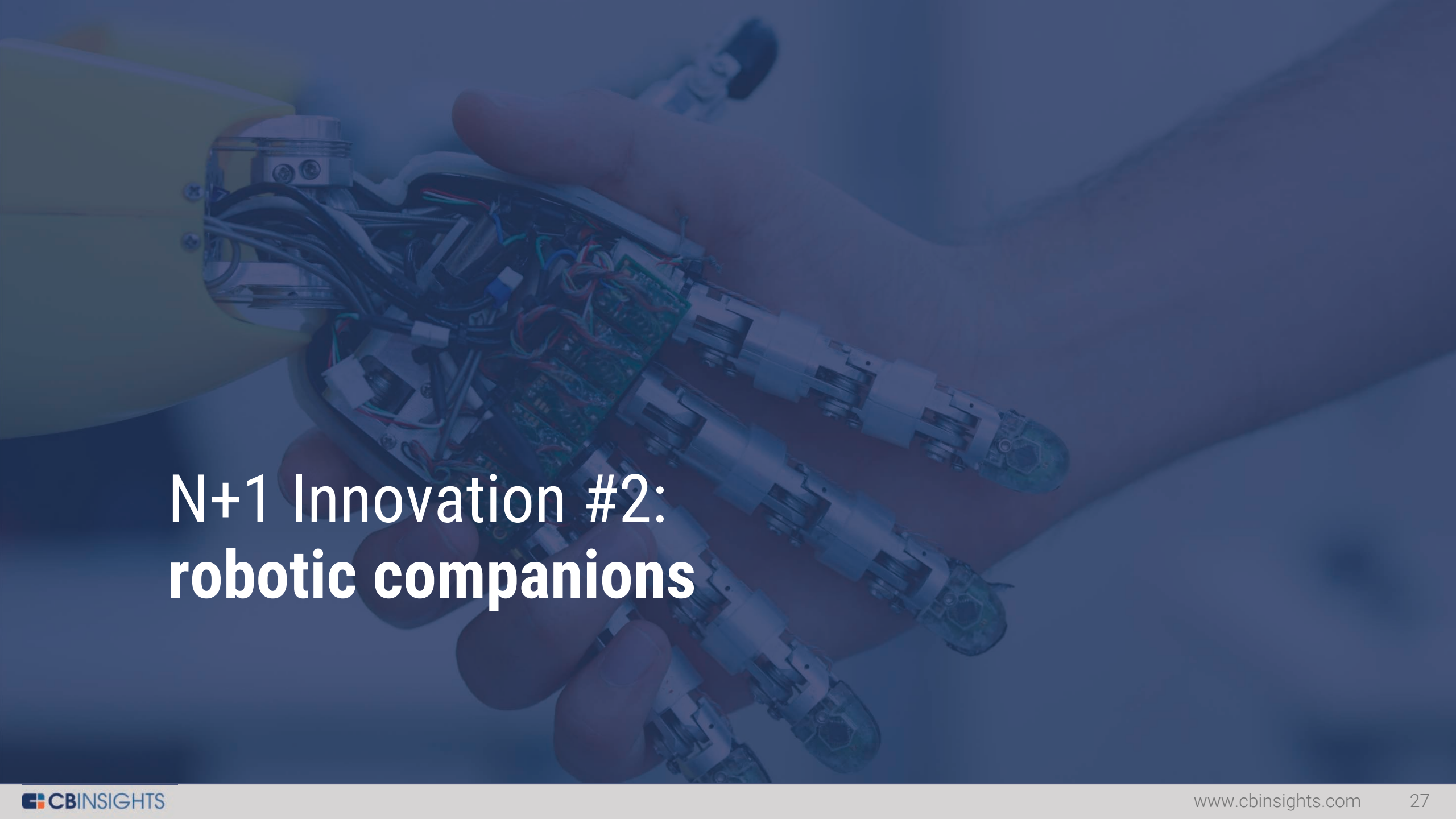


 CollegeBoard



 Mount
Sinai





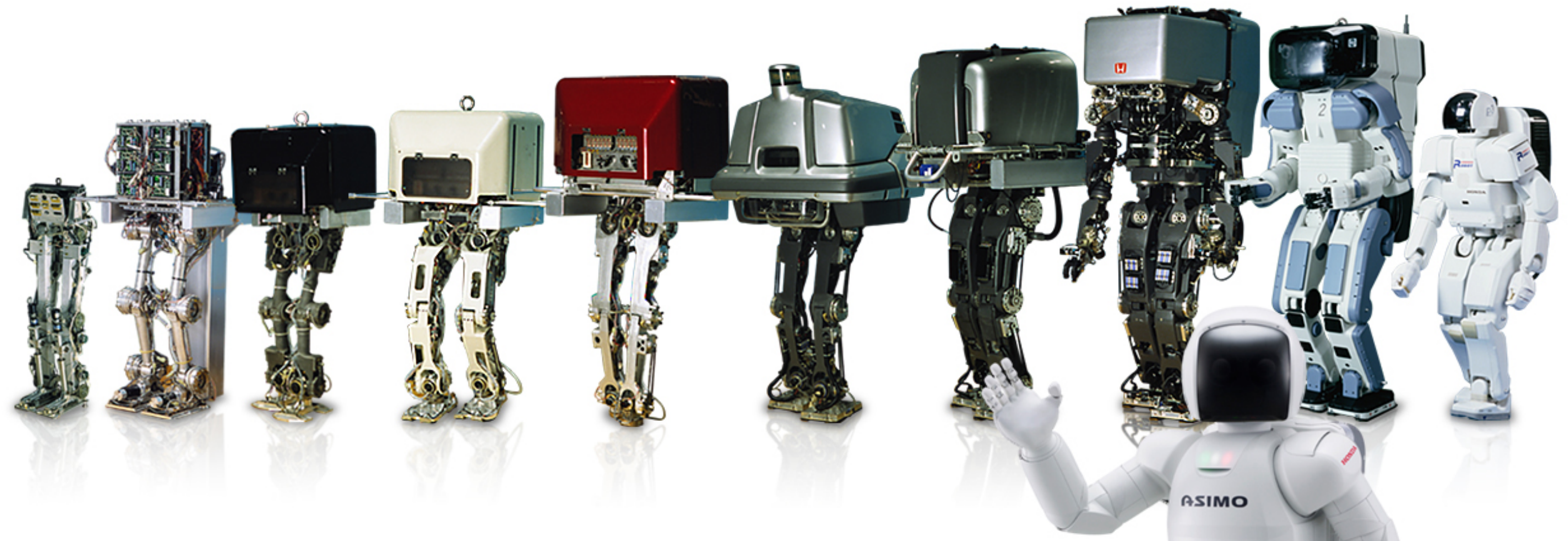
N+1 Innovation #2: robotic companions

BRIDGING THE GAP

While Amazon has proven its Echo device's value as a personal home assistant, **personal robots remains a nascent technology...**

WHERE WE'VE BEEN

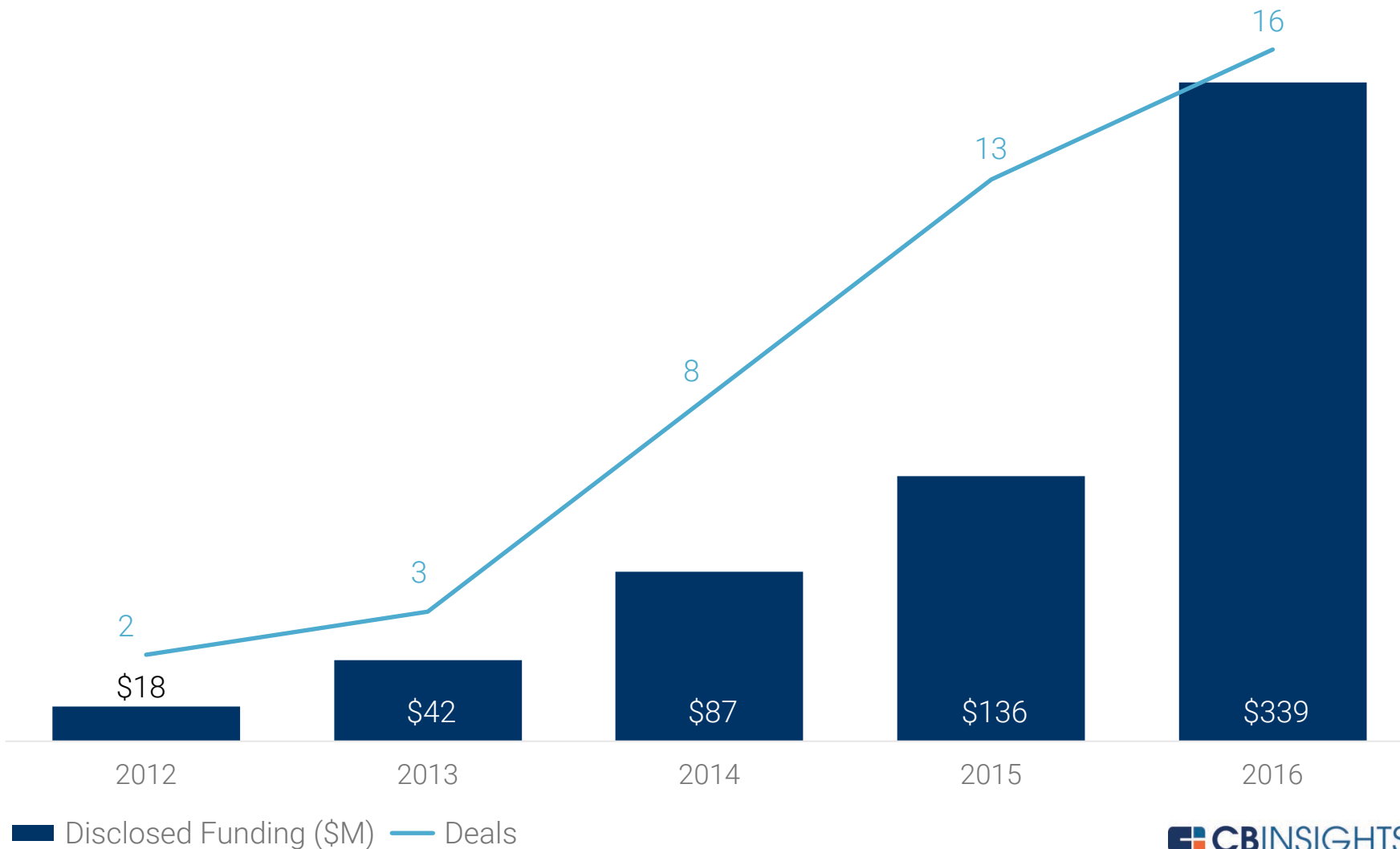
Major corporations have been working on personal robots since the '80s...





INVESTMENT TO ROBOTIC COMPANIONS STARTUPS

2012 - 2016



CBINSIGHTS

GROWING INVESTOR INTEREST

Investment activity to private personal robotics startups has increased markedly since 2012, albeit the field remains small. In 2016, \$339M was deployed across 16 deals.

WHAT'S AROUND THE CORNER?

Two clear use cases for personal robotic companions.



CHILDREN

Robots show potential for emotional companionship, **and gamified education.**

Facial recognition

Uniquely tailored interaction based on user.

&

Nanny mode

Lesson planning, progress reporting, predictive analytics, health, diet, sleep and media consumption management.

CASPER

Hospital robot companion

Researchers from the University of Lisbon and Project Monarch are developing a robot to entertain and lift the spirits of children in hospital.

“Doctors tell us that the happier these children are, the faster, the better they recover after treatment. So we want Casper to help children to have fun, to play with them. We want children to establish the kind of relationship with this robot that they could have with a pet, or even a friend.” –

Víctor González Pacheco, Project Researcher
March 28, 2016

Mic

ELDERLY

By the year 2050,
the percent of people aged 65
and older worldwide will double.

**17% of worldwide population, or 1.6 billion
people will be over the age of 65.**

FILLING THE HEALTH SERVICES VOID

Robot-assisted home care

Mental health & dementia

Robotic companionship to solve for late stage life companionship and memory lapse

Prescription regimen & vitals

Nursing, pharmaceutical regimen and health vitals monitoring



Who will be affected? **NOT JUST CONSUMER ELECTRONICS**



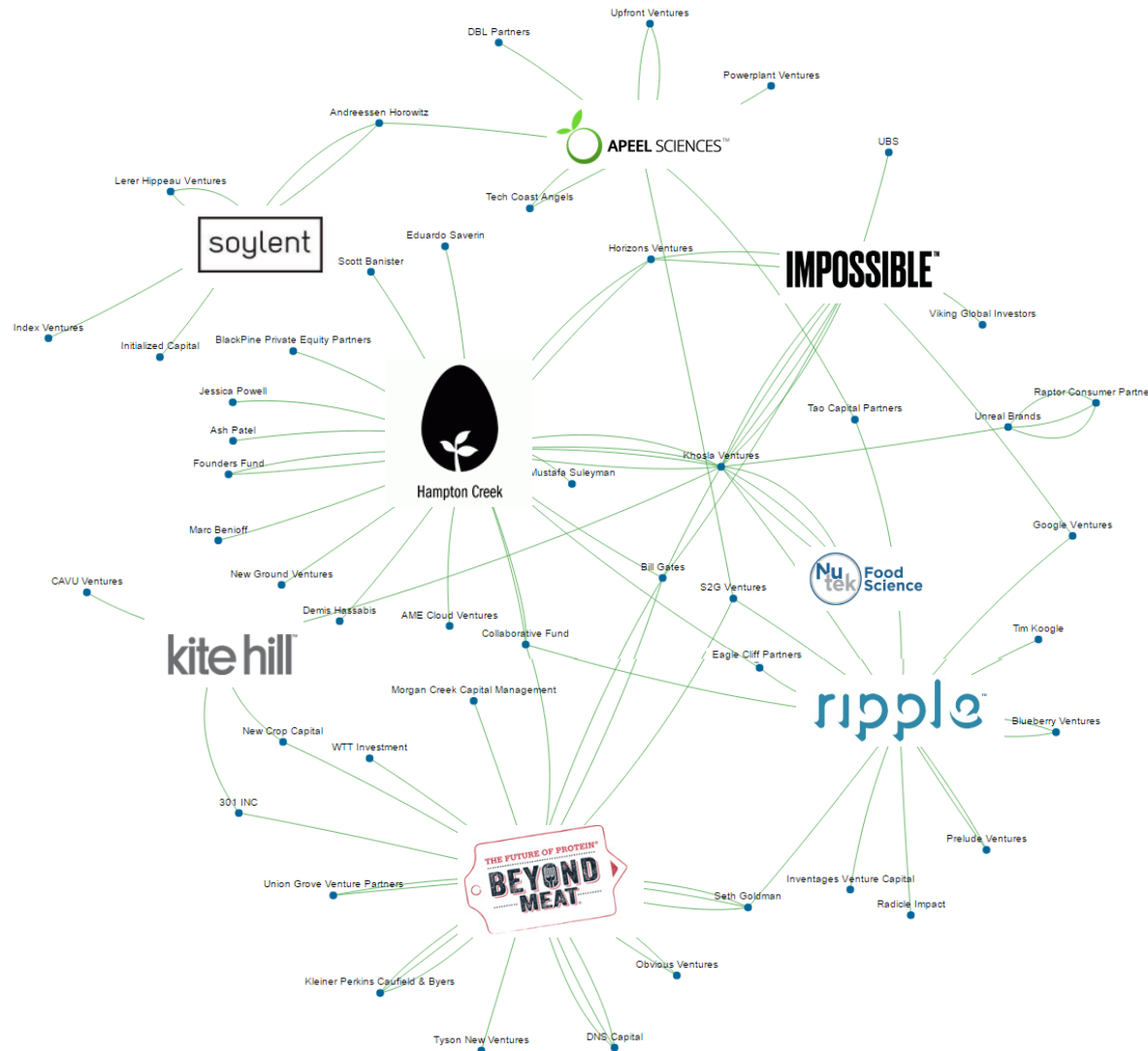


N+1 Innovation #3: **the rise of personalized food**



SMART MONEY VC MEAT & DAIRY TECH INVESTMENTS

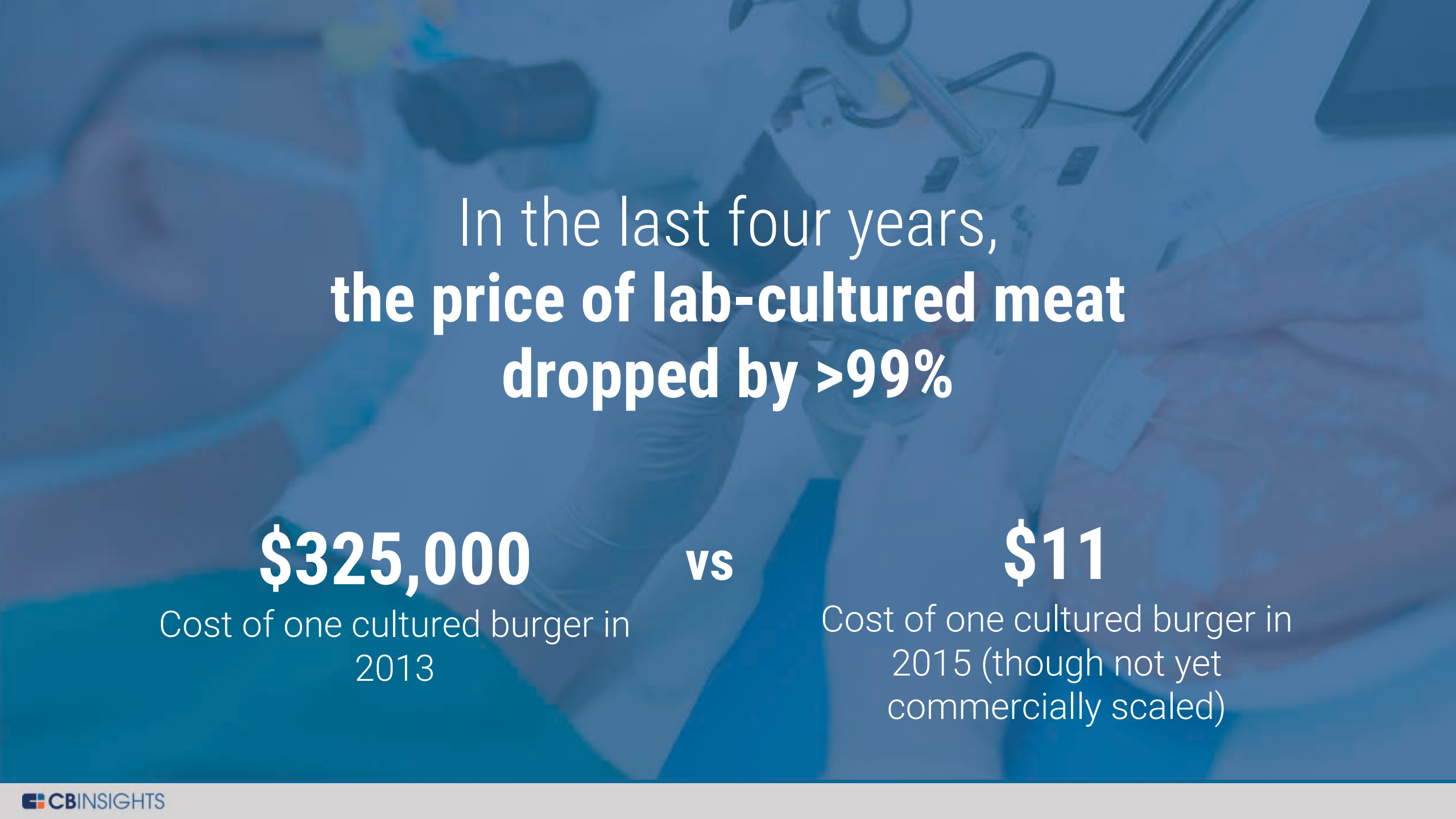
1/1/2014-12/1/2016



FROM PLANT PROTEIN TO LAB-DESIGNED FOODS?

Smart Money VCs – which can act as industry bellwethers – have increased investment activity in engineered food, mainly meat and dairy substitutes.

The rush of interest and funding to the space could lead to new developments in food engineering.



In the last four years,
the price of lab-cultured meat
dropped by >99%

\$325,000

Cost of one cultured burger in
2013

vs

\$11

Cost of one cultured burger in
2015 (though not yet
commercially scaled)

CAMPBELL SOUP INVESTS IN HABIT: DNA-based personalized diet startup

FIND WHAT
Feeds you

When your unique biology meets just the right foods, something amazing happens – you thrive.

HABIT TYPE
PROTEIN SEEKER

40% Carbs

FAT FLEX
MID

The advertisement features a close-up of a woman with curly hair. Overlaid on the image are several text elements and a play button icon. The text 'FIND WHAT Feeds you' is prominently displayed. Below it, a tagline reads 'When your unique biology meets just the right foods, something amazing happens – you thrive.' A large white play button icon is positioned in the lower left. In the lower right, the text 'HABIT TYPE' is above 'PROTEIN SEEKER'. In the upper right, '40% Carbs' is visible. In the bottom right corner, there is a graphic with the text 'FAT FLEX' and 'MID'.

INDIVIDUALLY TAILORED DIETS ARE COMING.

Lab-generated food will be customized to an individuals' needs. Doctors or at-home blood tests will steer shoppers (or are they patients) toward specific products, mitigating the need for medication & boosting individual health.

Beyond today's choice between 92% or 98% lean beef, one could choose between burgers enhanced with Vitamin A, Vitamin D, or dozens of other options.



Nestlé



Cargill™



Who will be affected? **NOT JUST FOOD PRODUCERS**



ConocoPhillips



MONSANTO



aetna™



N+1 Innovation #4: 3D-printed housing

INNOVATION IN HOUSING, CONSTRUCTION, AND DIY

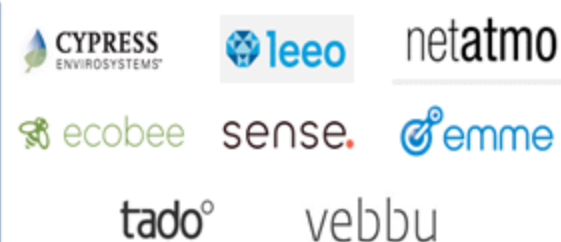
HOME REMODELING/ MATERIALS MARKETPLACE



PROPERTY/REAL ESTATE MANAGEMENT



SMART HOME FIXTURES



DESIGN INSPIRATION/ SERVICES



SMART HOME CONTROL



ARCHITECTURE & CONSTRUCTION TOOLS



THIRD PARTY HANDYMEN



PREFAB HOUSES



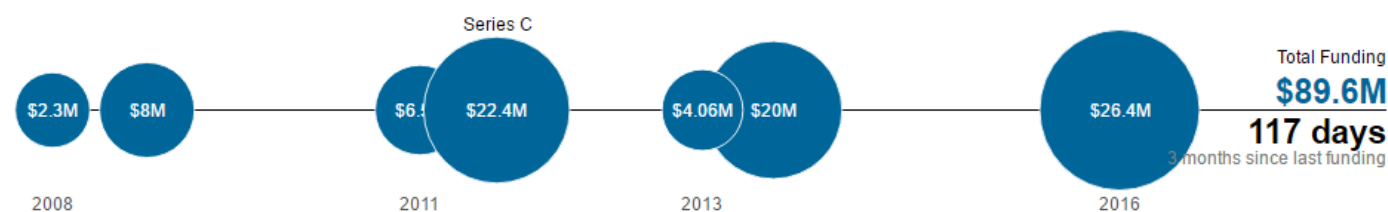
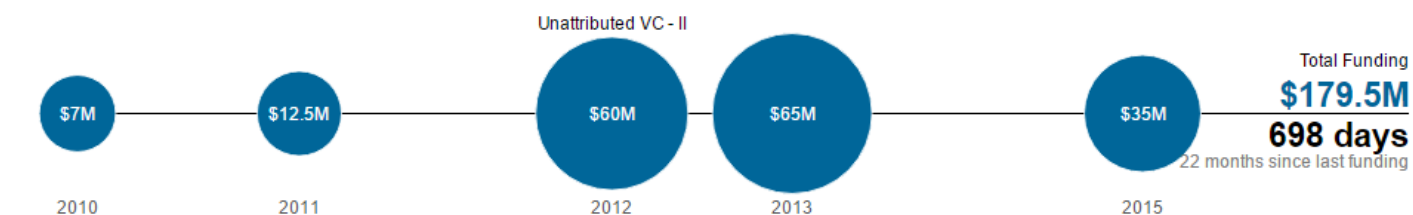
HOUSING: WHERE ARE WE NOW?

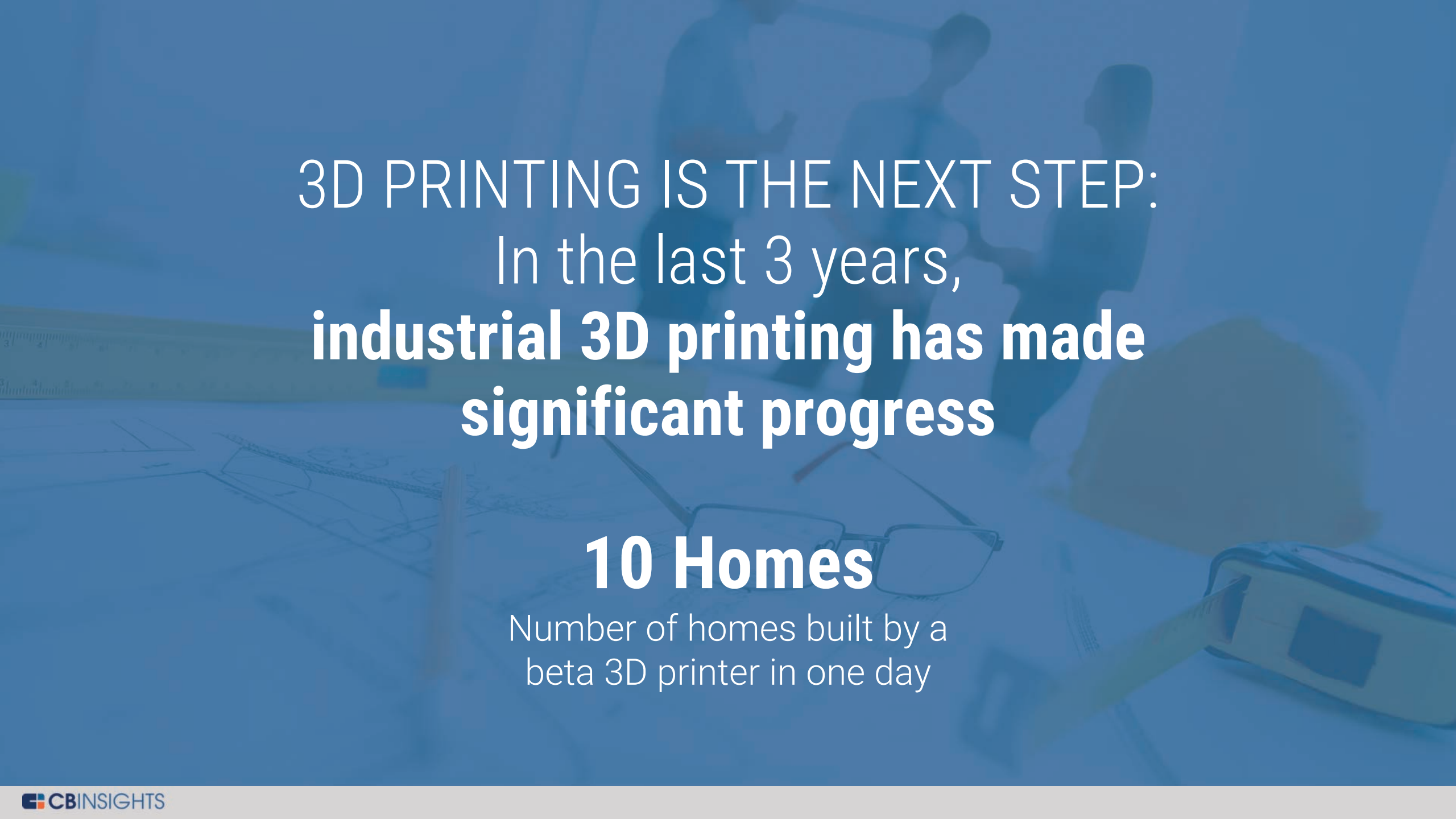
The current market shows a number of technology tools working to drive down the cost of housing and the difficulty of construction.

Consumers increasingly unwilling to put up with the headaches of home ownership and remodeling.

PREFAB ALREADY PLAYS A KEY ROLE IN TRANSFORMING CONSTRUCTION

While prefab and modular housing is not a new concept, new players are seeing investor interest. Several startups are competing in this area, for both the low and high end.





3D PRINTING IS THE NEXT STEP:
In the last 3 years,
**industrial 3D printing has made
significant progress**

10 Homes

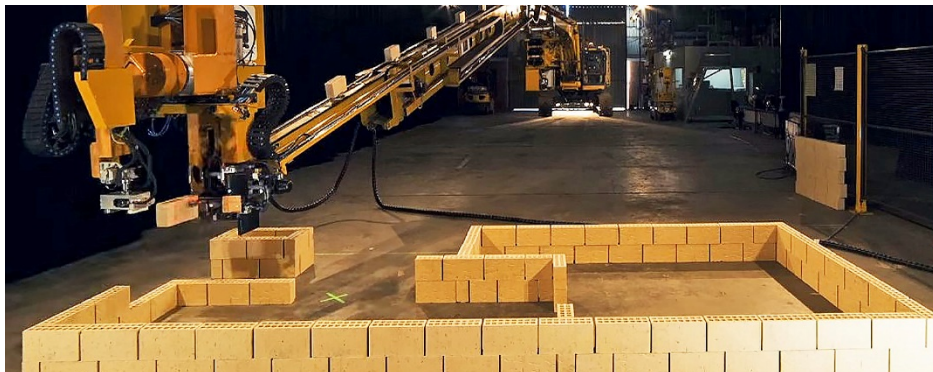
Number of homes built by a
beta 3D printer in one day

A blue self-driving shuttle bus, identified as an 'olli' model, is shown in a street setting. The bus has 'IBM Watson IoT' written on its top front and 'olli' on its side. The background shows a building and a street.

**3D printing has already built medical devices,
consumer products, and even buses.**



3D PRINTING AND ROBOTICS COULD DRAMATICALLY DRIVE DOWN THE COST AND TIME OF BUILDING



COST BENEFITS TO 3D PRINTING

Developments in 3D printing in addition to robotic construction and provide significant cost benefits to the entire housing process.

Affordability and quality not necessarily at odds with the right combination of tech.



SKANSKA

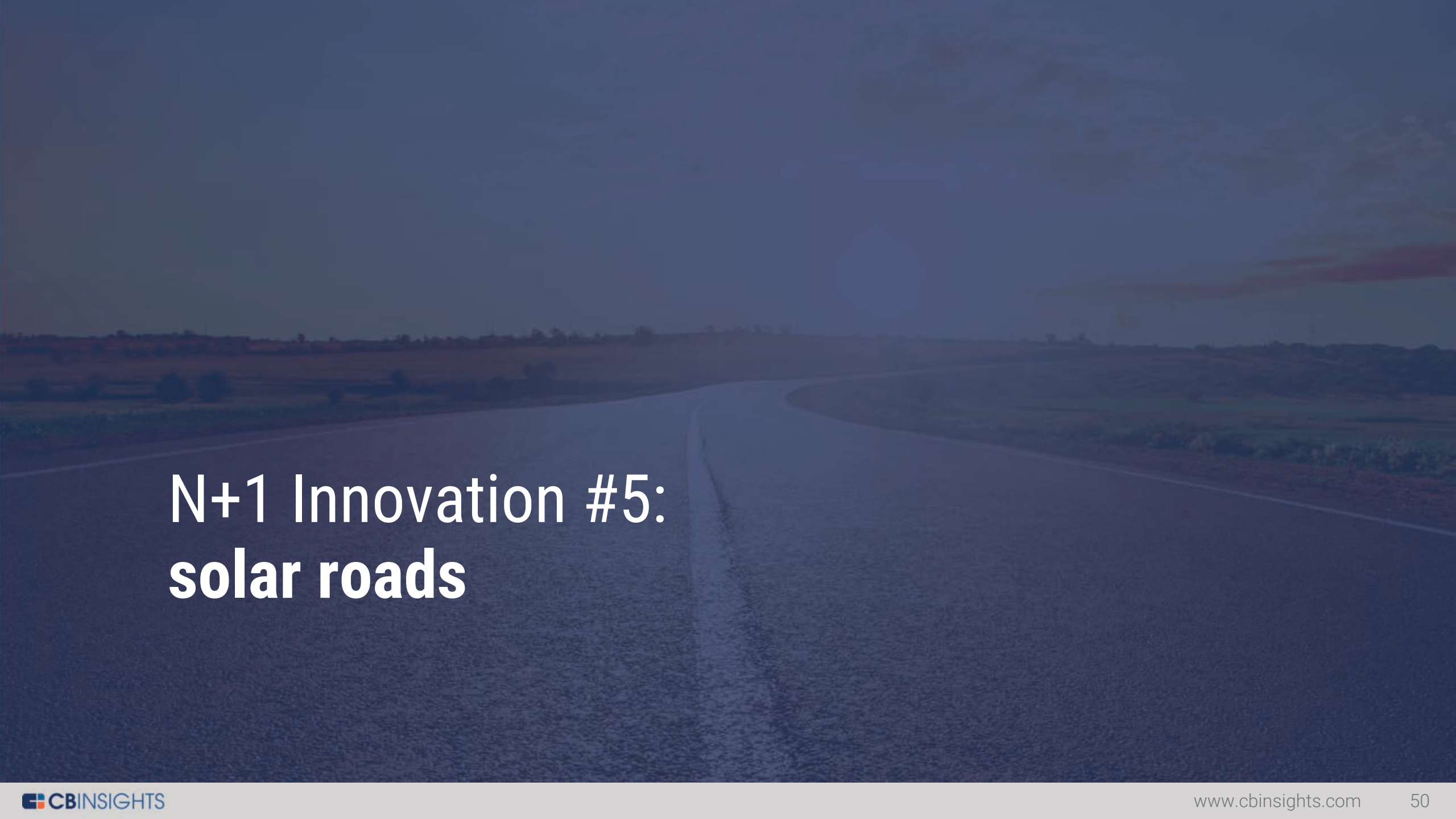


Who will be affected? **NOT JUST CONSTRUCTION WORKERS**

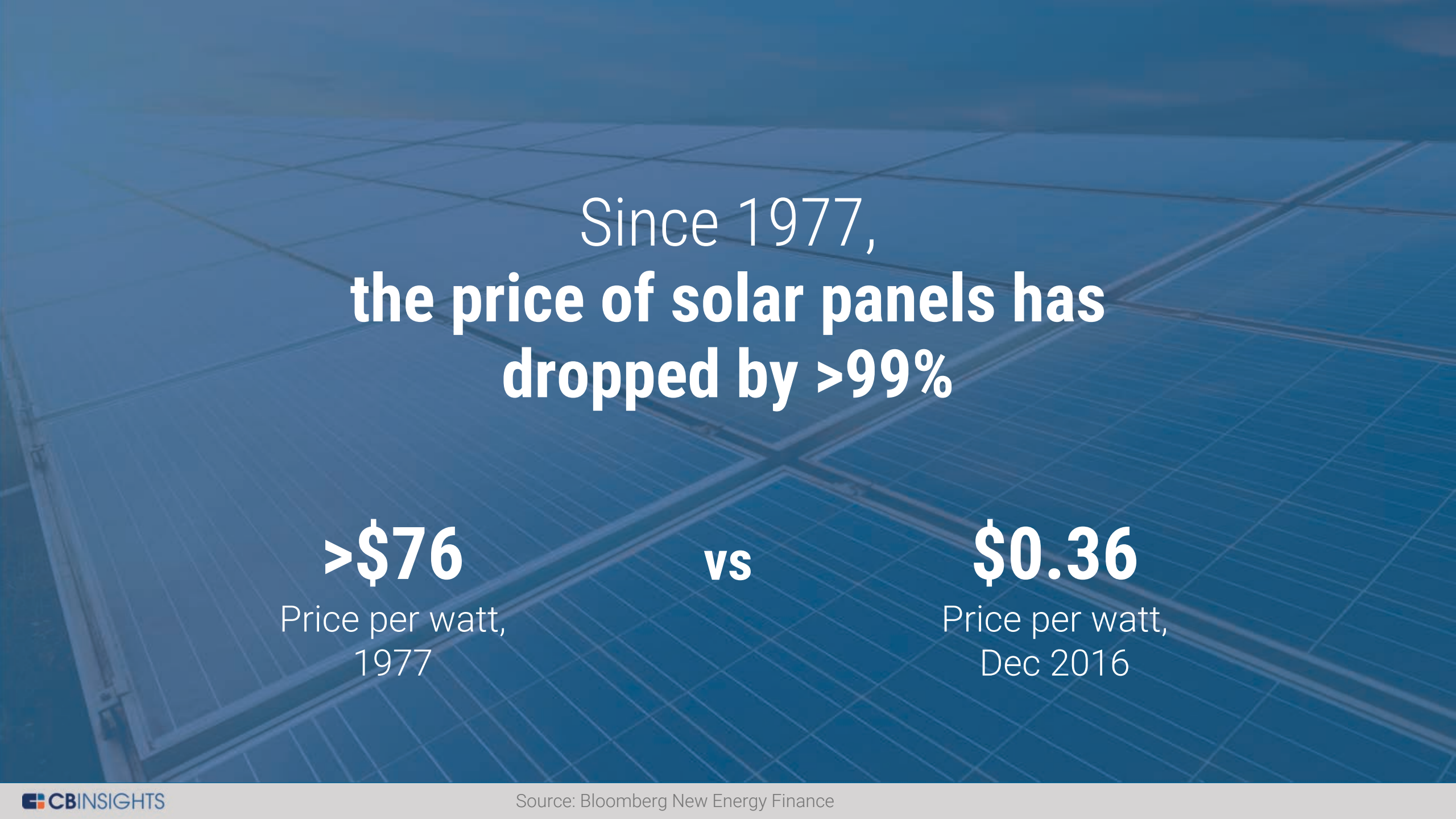
FLUOR®



Turner
Construction Company



N+1 Innovation #5: **solar roads**



Since 1977,
**the price of solar panels has
dropped by >99%**

>\$76

Price per watt,
1977

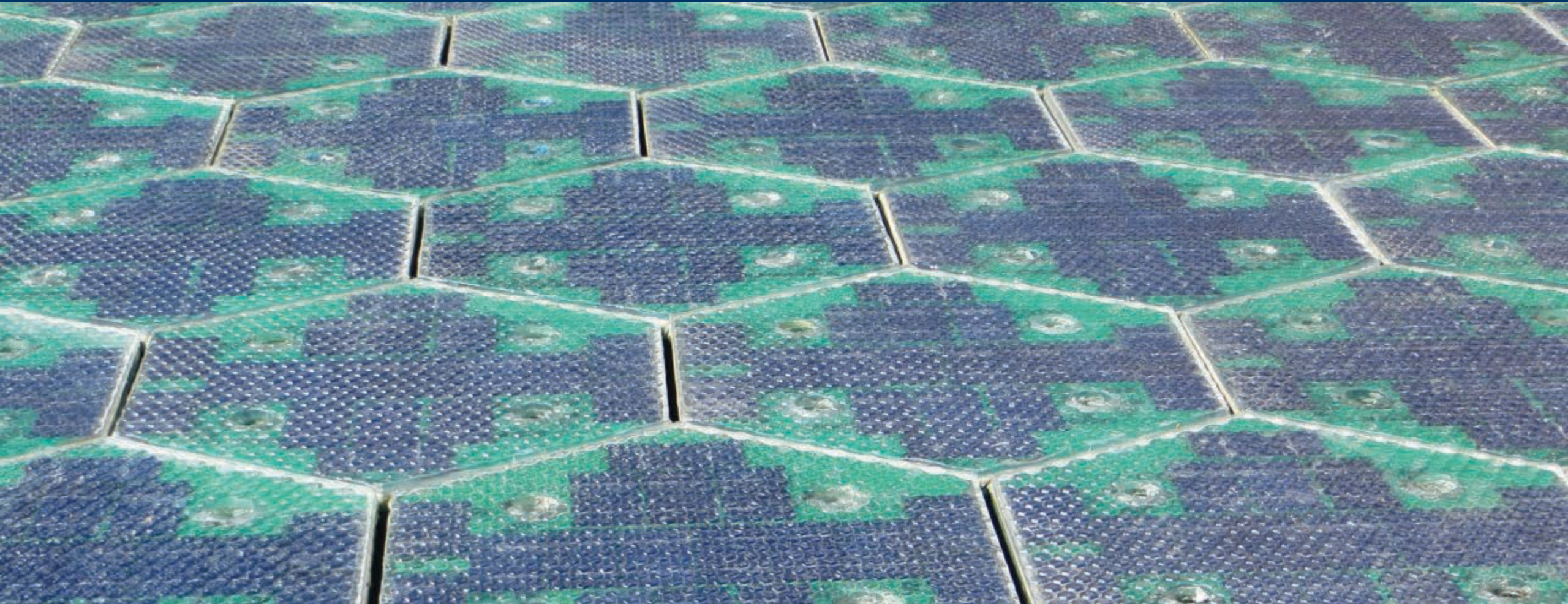
vs

\$0.36

Price per watt,
Dec 2016

LIMITED TRIALS ARE EMERGING IN THE US:

A DOT-backed startup has designed lit, heated road cells



AND A (VERY) SHORT STRETCH IN EUROPE

With a 1 kilometer active highway



AN ENERGY REVOLUTION BENEATH OUR FEET.

Although currently costly and modestly efficient, as solar roadways become economical to deploy at scale, they become an integral part of a clean energy solution for the next century.

These roadways could be self-heated and lit, and could even be used to wirelessly deliver power to energy vehicles driving over it. Widespread use of these roads would obviate the need for large patches of real estate for utility-scale solar plants, especially in densely populated areas.



Who will be affected?
**NOT JUST TRADITIONAL
ENERGY COMPANIES**



N+1 Innovation #6: ephemeral retail



AS RETAILERS SHUTTER STORES, WHAT'S NEXT?

MACY'S CLOSING 68 STORES,
IMPACTING 10,000 EMPLOYEES

January 4, 2017

CINCINNATI
BUSINESS COURIER

SEARS AND KMART CLOSING 150
STORES

January 5, 2017

CNN

STORE CLOSINGS SIGNAL BIG CHANGE
AT KOHL'S

February 26, 2016

CNBC

MORE THAN 700 DEPARTMENT
STORES HAVE CLOSED SINCE 2013

September 28, 2016

FORTUNE

WAL-MART TO SHUT HUNDREDS OF
STORES

January 15, 2016

Bloomberg

PHYSICAL SPACES INCREASINGLY IRRELEVANT



“Retail spent the past century organizing around the automobile. We’ll spend the next 100 years re-urbanizing, with **smart phones and the internet** as the primary means of engagement.”

Andy Dunn

Founder & CEO, Bonobos

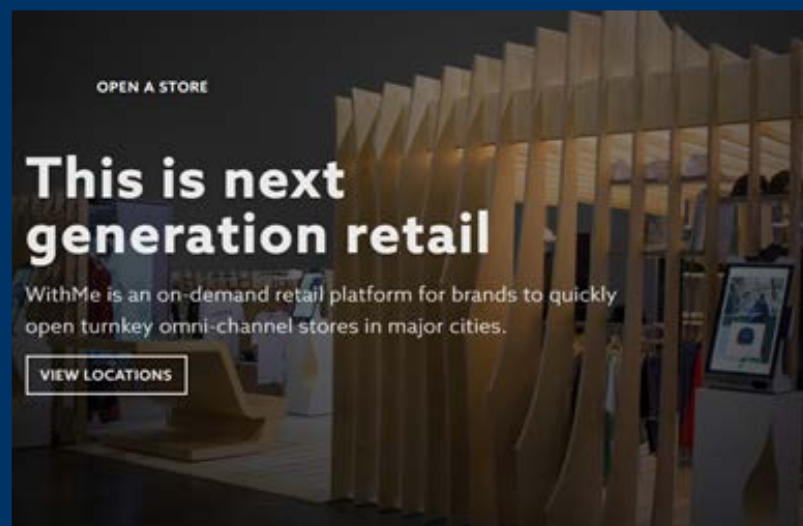
NEW MODELS OF DISTRIBUTION ON THE RISE

The Uber-based convenience store



CARGO

The high-end pop-up store



The next-gen vending machine



Byte.

AMAZON ANNOUNCES 'AMAZON GO' STORE: Uses facial recognition to process payments



INTRODUCING
amazon go



THE ULTIMATE IN MOBILE DISTRIBUTION: SNAPCHAT LAUNCHES 'SNAPBOTS'

Snap Inc. released its Spectacles in limited distribution last fall via automated "Snapbot" vending machines.

Snapbot machines pop up in various locations for short periods of time.



MOBILE & TEMPORARY STORES CAN REPLACE BRICK-AND-MORTAR RETAIL

Looking at Snap's Snapbots, Amazon's Amazon Go pilot, and other examples, down the road we see:

- Plug-and-play solutions for retailers to set up temporary stores without staff, outfitted with beacons, sensors, and other tracking technologies
- Automated checkout through facial recognition and/or geo-fencing
- Robotic store assistants and drone delivery
- Retailers using physical stores as data collection centers in addition to being sources of revenue



GE
Real Estate



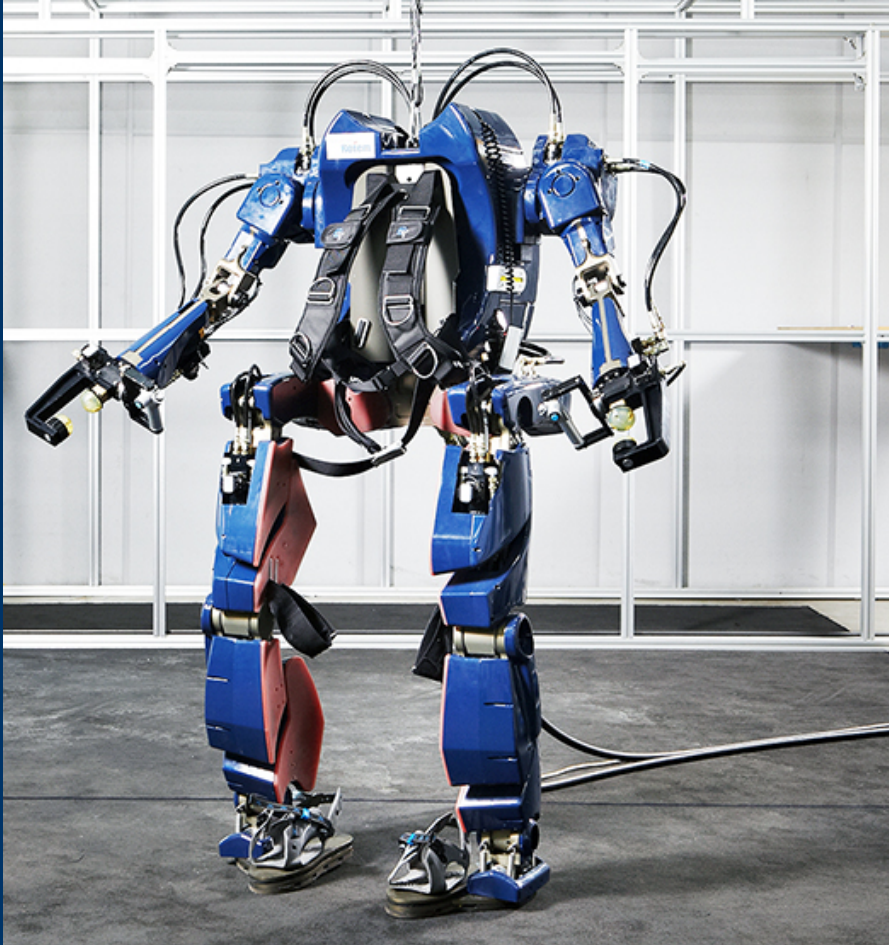
Who will be affected? **NOT JUST RETAIL & COMMERCE**





N+1 Innovation #7: **enhanced workers**

IRONMAN SUITS? NOT A DISTANT DREAM



“Ironman suits... which were only seen in movies, are expected to emerge in the near future. The Hyundai Motor Group is developing a wearable robot with the aim of commercialization.”

Hyundai Motor Group blog



The power of exoskeletons in industries

Increased safety + Enhanced Strength = More productivity

BIONICS IN THE NEWS

HYUNDAI WANTS TO MAKE
EXOSKELETONS CHEAPER

DEC. 19, 2016

engadget

A MODULAR EXOSKELETON WILL
MAKE MORE WORKERS BIONIC

NOV. 16, 2016

MIT
Technology
Review

I WORE AN EXOSKELETON THAT GAVE
ME SUPER STRENGTH

JAN. 15, 2016

TIME

EXOSKELETON MARKET IS EXPECTED TO
GAIN POPULARITY ACROSS THE GLOBE

DEC. 17, 2016

medGadget

ELECTROSTATIC SHEETS PROMISE
SUPER-LIGHT EXOSKELETONS

JUN. 19, 2016

engadget



From military to industrial applications: **GE, Schlumberger invest in Sarcos**

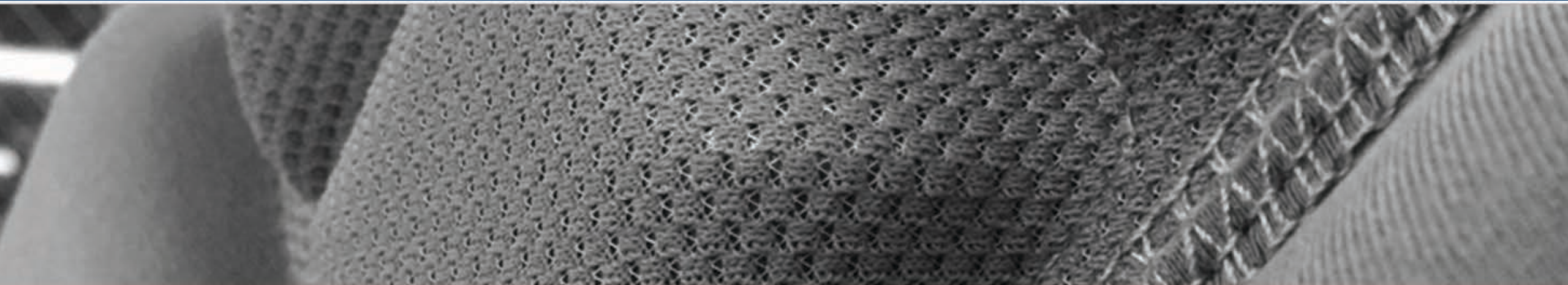
\$15.6M

in Series A

Industry applications: Nuclear plant inspections, petrochemical, welding, manufacturing, disaster recovery

POWER CLOTHING = ELECTRIC MUSCLES

Horizons Ventures, Global Brain back spinout Superflex



SUPERFLEX

Powered Clothing™

Defining the Future of Movement™

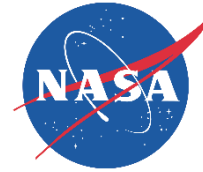
Human Ingenuity + Robotic Augmentation

- Robots will augment - not take over for humans in industry
- Zero accident workplaces
- Older workers and people with physical disabilities can still participate in jobs they were previously unable to

GLENCORE



CATERPILLAR



Who will be affected? **NOT JUST HEAVY INDUSTRY**

aetna

Johnson & Johnson



TRAVELERS



Medicare



N+1 Innovation #8: **lab-engineered luxury**

MODERN MEADOW: \$53M IN FUNDING FOR LAB-CRAFTED LEATHER



“The 20th century... facilitated a generation of materials that came out of the petrochemical industry – like DuPont creating Lycra – [now] the 21st century is about biotechnology.”

Suzanne Lee

CCO, Modern Meadows

SYNTHETIC DIAMONDS TACKLE \$80B MARKET

LAB-GROWN DIAMONDS COME INTO THEIR OWN

December 1, 2016



LOCKHEED MARTIN FILES PATENT FOR A SYNTHETIC DIAMOND 3D PRINTER

August 19, 2016



WHY LEONARDO DICAPRIO IS BACKING MAN-MADE DIAMONDS

August 30, 2016



DE BEERS TRIES TO COUNTER A GROWING THREAT: MAN-MADE DIAMONDS

November 6, 2016

THE WALL STREET JOURNAL.

WOULD YOU PROPOSE WITH A DIAMOND GROWN IN A LAB?

April 6, 2016

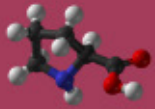
QUARTZ



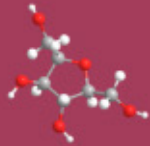
A \$10K BOTTLE OF CHATEAU MONTELENA: CLONED?

What is Ava Winery?

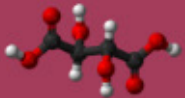
We analyze the molecular profile of your favorite wines and create them from scratch, flavor by flavor. We combine these components at precise levels without grapes, aging or fermentation.



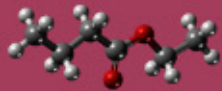
Amino Acids



Sugars



Acids



Volatile Organics



AVA WINERY AIMS TO REVERSE ENGINEER TOP WINES

With \$3M in disclosed funding, Ava Winery aims to create lab-synthesized wine - actual molecule-by-molecule clones of specific vintages of the world's best wines throughout history.

ENGINEERING CAN TRANSFORM LUXURY

Synthetic diamonds, wines and liquors, leathers, and other luxury goods may soon be indistinguishable from the real thing - not just visually, but down to the molecular level.

Of course, part of the lure of luxury is the authenticity. With the growth of synthetic luxury items, traditional luxury companies may try to move even higher-end to differentiate themselves.

DE BEERS
A DIAMOND IS FOREVER



RICHMONT

TIFFANY & Co.
NEW YORK SINCE 1837

FONDÉ EN 1743
MOËT & CHANDON
CHAMPAGNE
★

SIGNET
JEWELERS

Who will be affected?
NOT JUST PRADA

L**V**
LOUIS VUITTON

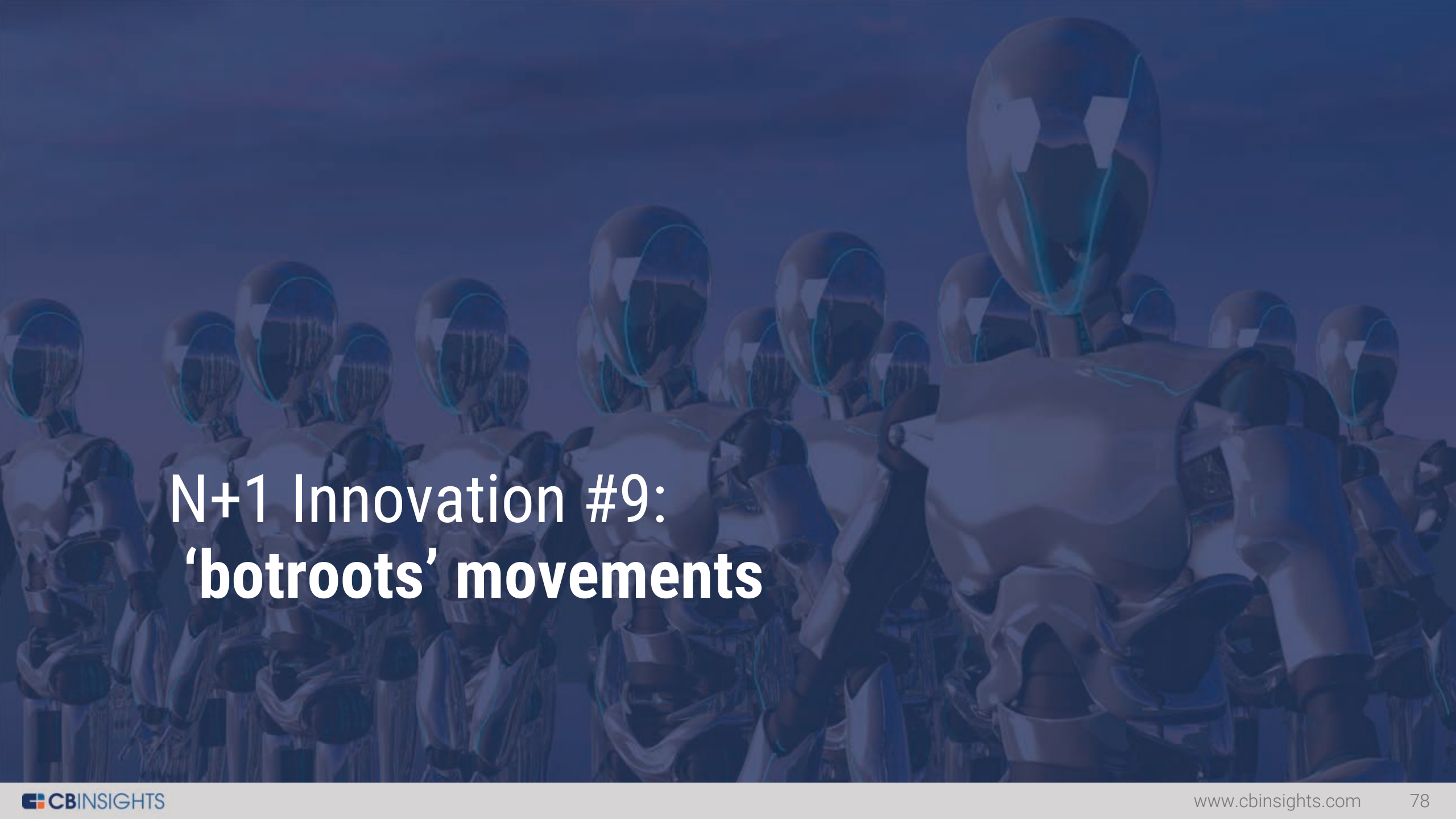


ConocoPhillips

MONSANTO

PRADA
MILANO
DAL 1913

K KOCH



N+1 Innovation #9: **‘botroots’ movements**

TECH



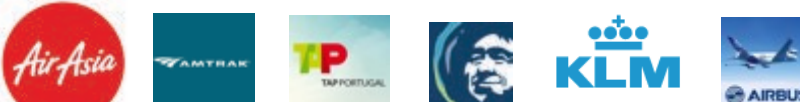
FOOD



NEWS



TRAVEL



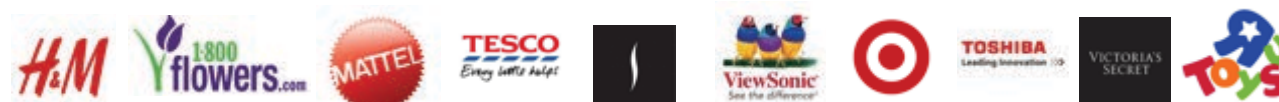
FINTECH



INSURANCE



CPG/RETAIL



AUTOMOTIVE



ENTERTAINMENT



BOTS ARE ALREADY SPREADING LIKE WILDFIRE IN INDUSTRY

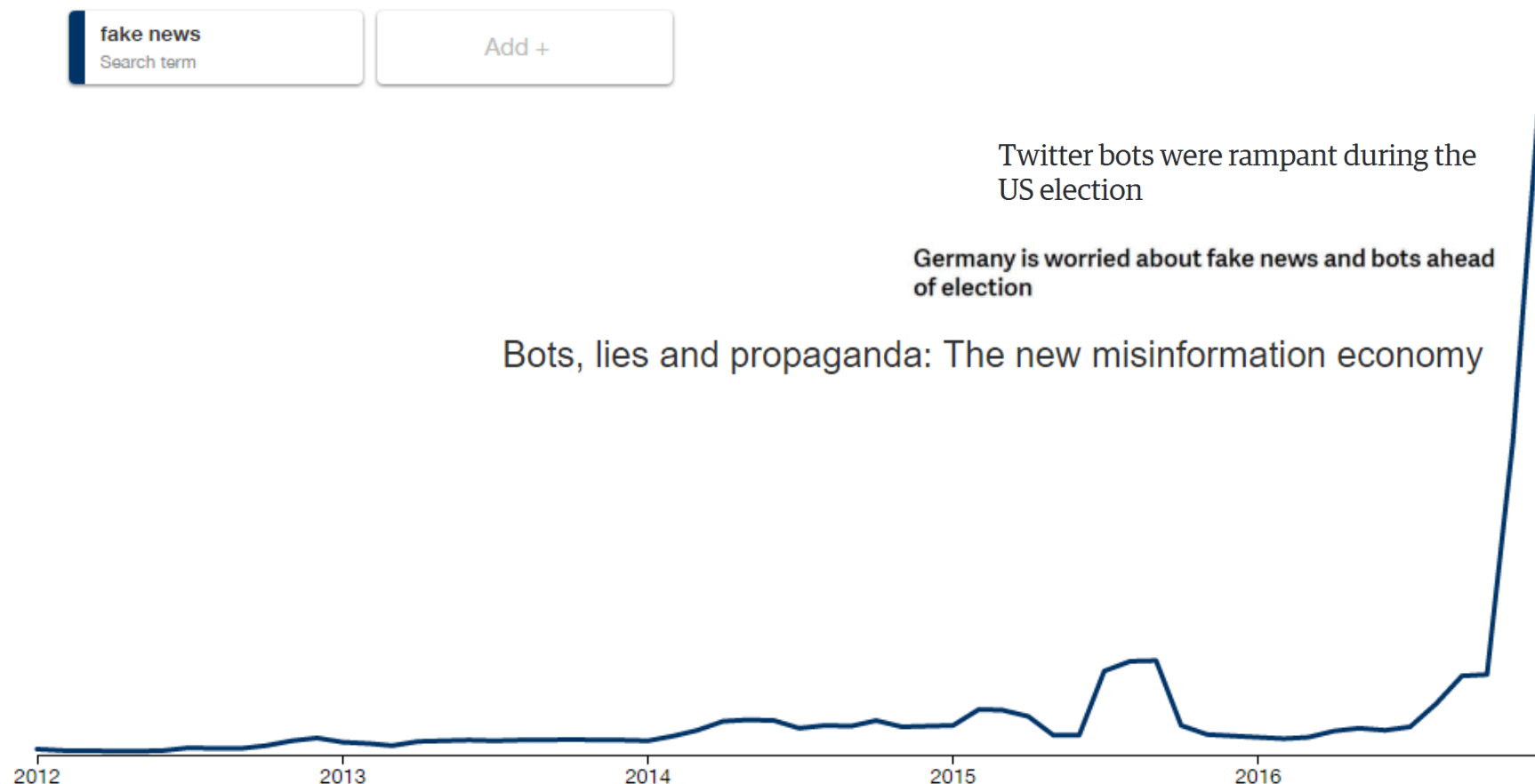
Corporations and startups alike are rushing into bots as a positive force to improve their services and overall customer satisfaction.

However, they could also be used for more nefarious purposes.

WE'VE ALREADY SEEN DARKER SIGNS EMERGING

2016 saw the rise of simple bots used to promote misinformation, most prominently in the US presidential election (which also featured foreign and non-state actors).

Though their impact is still uncertain, the trend is undeniable.



NEXT-GEN BOTS COULD BEND PUBLIC DISCOURSE

The natural consequence of improving AI (and specifically conversational intelligence) will result in bots that are indistinguishable from actual human beings.

If such bots become readily accessible, corporations, governments, or even non-state actors could harness battalions of them, masquerading as grassroots movements of real people to advance agendas on political and economic issues.

Companies could also use these “botroot” movements to influence trending brands and products (already seen in today’s simple manipulation of product reviews).



GALLUP®

WPP



Goldman
Sachs



Who will be affected?
**ANY ENTITY DEPENDENT ON
ACCURATE SIGNALS & PUBLIC OPINION**



CNN



WSJ





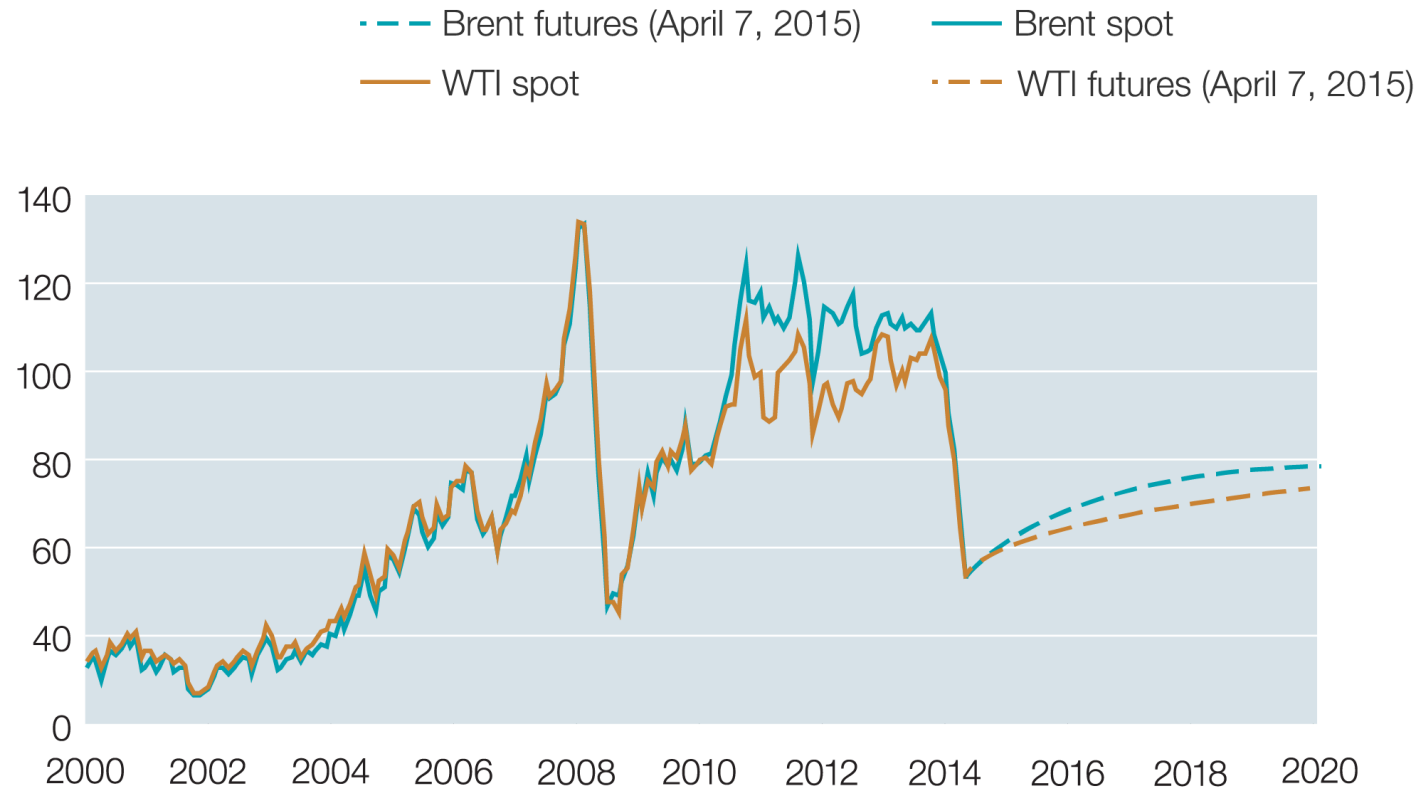
N+1 Innovation #10: **microbe-made chemicals**

PETROCHEMICALS ARE USED IN NEARLY EVERY INDUSTRY

- Plastics
- Cleaning Products
- Industrial Chemicals
- Rubber
- Dyes
- Ammonia
- Methanol
- Fertilizer
- Synthetic Fibers
- Aromatics

CHEMICALS DERIVED FROM PETROLEUM: OIL VOLATILITY = CHEMICALS VOLATILITY

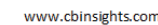
Brent and West Texas Intermediate (WTI) monthly prices and futures, \$ per barrel





OIL AND GAS CORPORATES ARE LOOKING

Many oil and gas companies are not just looking at ways to improve oil drilling and exploration capacity but in deriving new petroleum based chemicals, biofuels, etc.



SYNTHETIC BIOLOGY COMPANIES ARE RAISING TO CHANGE CHEMICAL PRODUCTION

	LYGOS Lygos	x	 Ginkgo BioWorks	x	 Amyris	x	Zymergen	x
Headquarters	Berkeley California United States		Boston Massachusetts United States		Emeryville California United States		Emeryville California United States	
Website	lygos.com		ginkgobioworks.com		amyris.com		zymergen.com	
Status	Private		Private		Public		Private	
First Funding	2014		2013		2006		2014	
VC Backed	Yes		Yes		Yes		Yes	
# of Investors	10		14		12		12	
Days Since Last Funding	24		212		2398		87	
Total Funding	\$14.85M		\$161.25M		\$334.1M		\$174M	

LYGOS CREATES CHEMICALS FROM SUGARS:

Engineers microbes to make cheaper chemicals

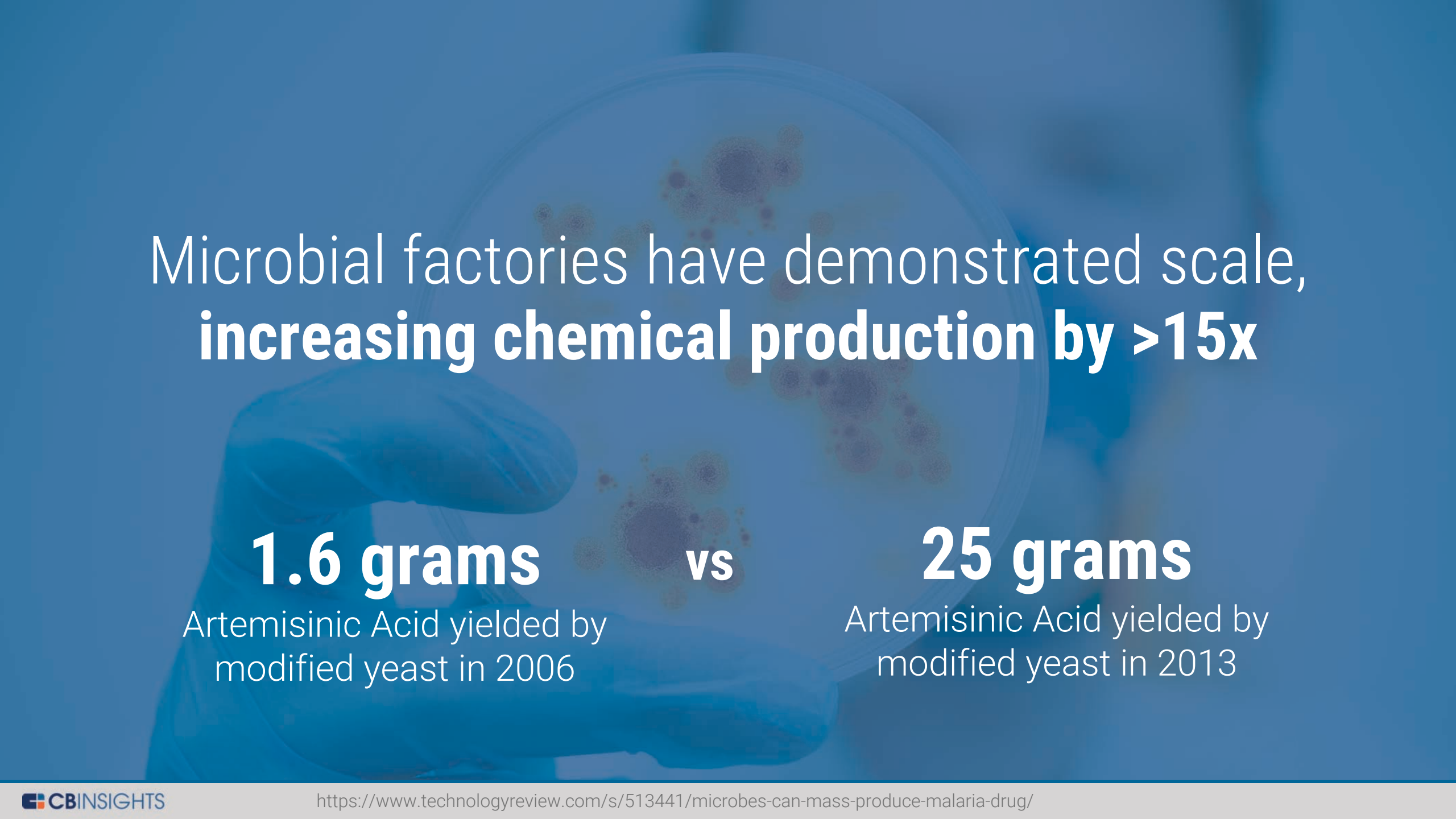
LYGOS

sartorius stedim

sartorius stedim

Biochemistry, not Petrochemistry

Founded in 2010, Lygos is providing biotechnology solutions for today's renewable chemical challenges. We engineer microbes to convert sugars into high-value, industrial chemicals, targeting compounds where biological production is cost-advantaged over petrochemical production.

A gloved hand holding a petri dish with bacterial colonies. The background is a solid blue color.

Microbial factories have demonstrated scale,
increasing chemical production by >15x

1.6 grams

Artemisinic Acid yielded by
modified yeast in 2006

vs

25 grams

Artemisinic Acid yielded by
modified yeast in 2013

GINKGO BIOWORKS CAN EVEN CREATE EXTRACTS PETROCHEMICALS COULD NOT

CULTURED FRAGRANCES

A New Cultured Rose Oil from Yeast



SYNTHETIC BIOLOGY WILL CREATE NEW SUPPLY CHAINS FOR CHEMICALS

Re-engineered microbes and yeast will be able to create necessary chemicals and petroleum-related products independent of petroleum itself. These products will be independent of petroleum pricing shocks, more scalable + cheaper, and remove many parts of the supply chain and refining process.



Who will be affected?
**NOT JUST PETROCHEMICALS
& PHARMA**



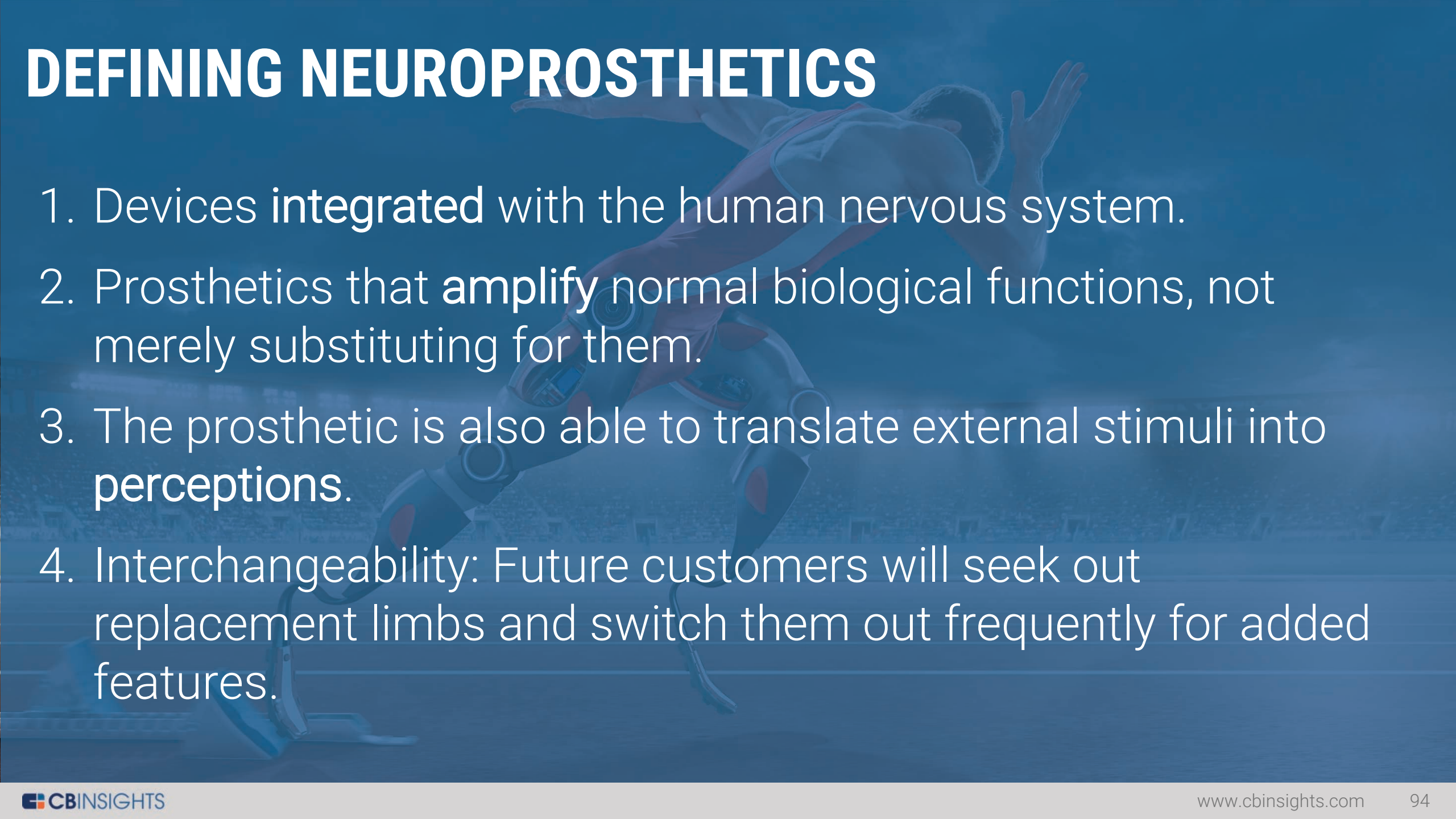
MONSANTO



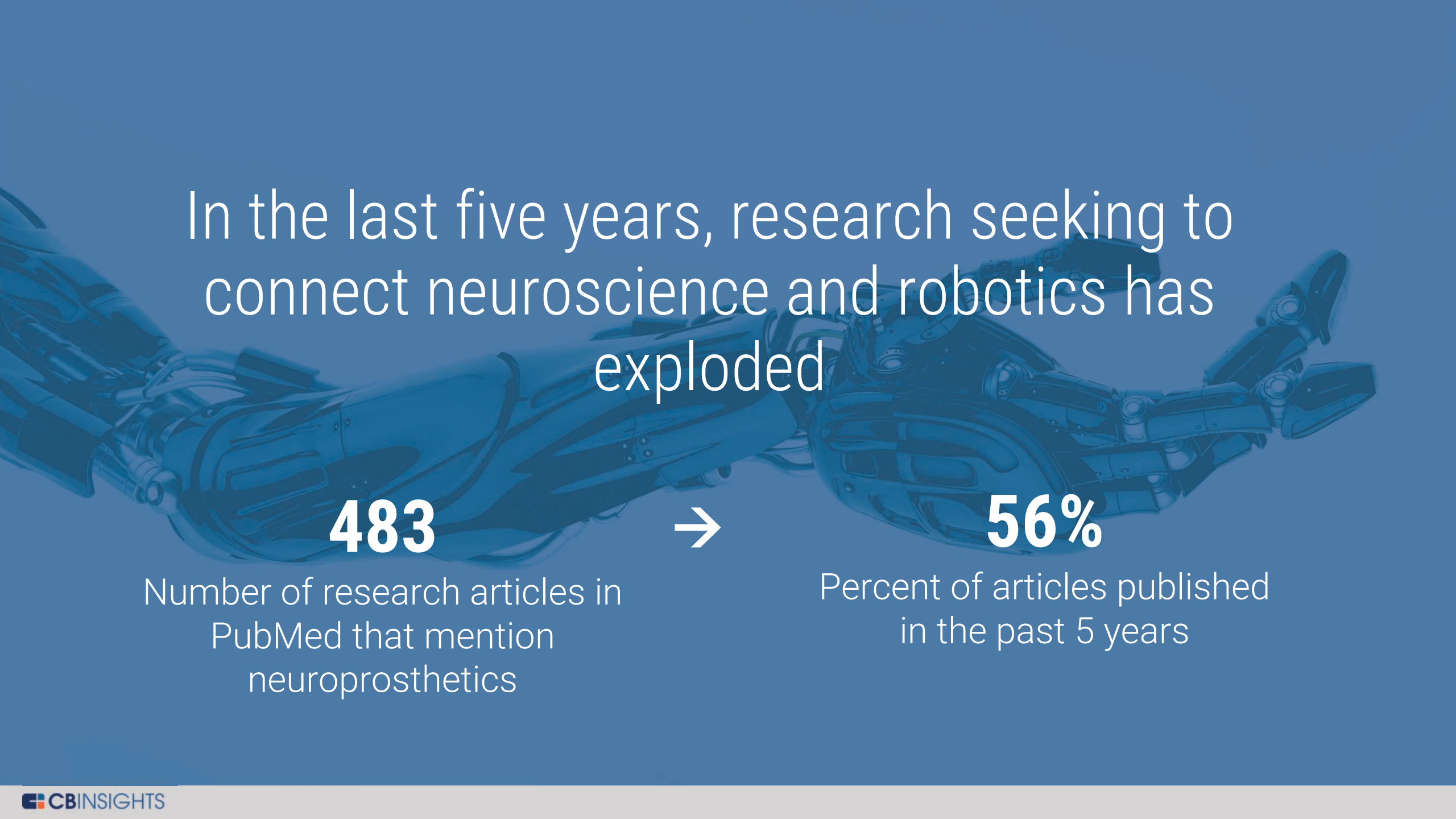
A man with a prosthetic arm is shown interacting with a robotic arm. The man is wearing a black harness and has a visible scar on his left arm. He is leaning over a table, and the robotic arm is positioned in front of him. The background is a dark blue gradient.

N+1 Innovation #11: neuroprosthetics

DEFINING NEUROPROSTHETICS

A person with prosthetic legs is shown in a running pose on a track. The person is wearing a red and white athletic suit. The background is a blurred stadium with spectators. The image is overlaid with a semi-transparent blue layer.

1. Devices **integrated** with the human nervous system.
2. Prosthetics that **amplify** normal biological functions, not merely substituting for them.
3. The prosthetic is also able to translate external stimuli into **perceptions**.
4. Interchangeability: Future customers will seek out replacement limbs and switch them out frequently for added features.



In the last five years, research seeking to connect neuroscience and robotics has exploded

483

Number of research articles in PubMed that mention neuroprosthetics



56%

Percent of articles published in the past 5 years

NEUROPROSTHETICS IN THE NEWS

BRAIN STIMULATION ALLOWS PARALYZED
MAN TO FEEL HIS HAND AGAIN

October 13, 2016

SCIENTIFIC
AMERICAN

PUTTING A COMPUTER IN YOUR BRAIN IS NO LONGER
SCIENCE FICTION

March 15, 2016

The Washington Post

BRYAN JOHNSON INVEST \$100 MILLION IN KERNEL
TO UNLOCK THE POWER OF THE HUMAN BRAIN

TE

October 20, 2016

COULD WE SOON 'UPGRADE' OUR BODIES? EXTREME
BIONICS WILL CREATE MODULAR SUPERHUMANS

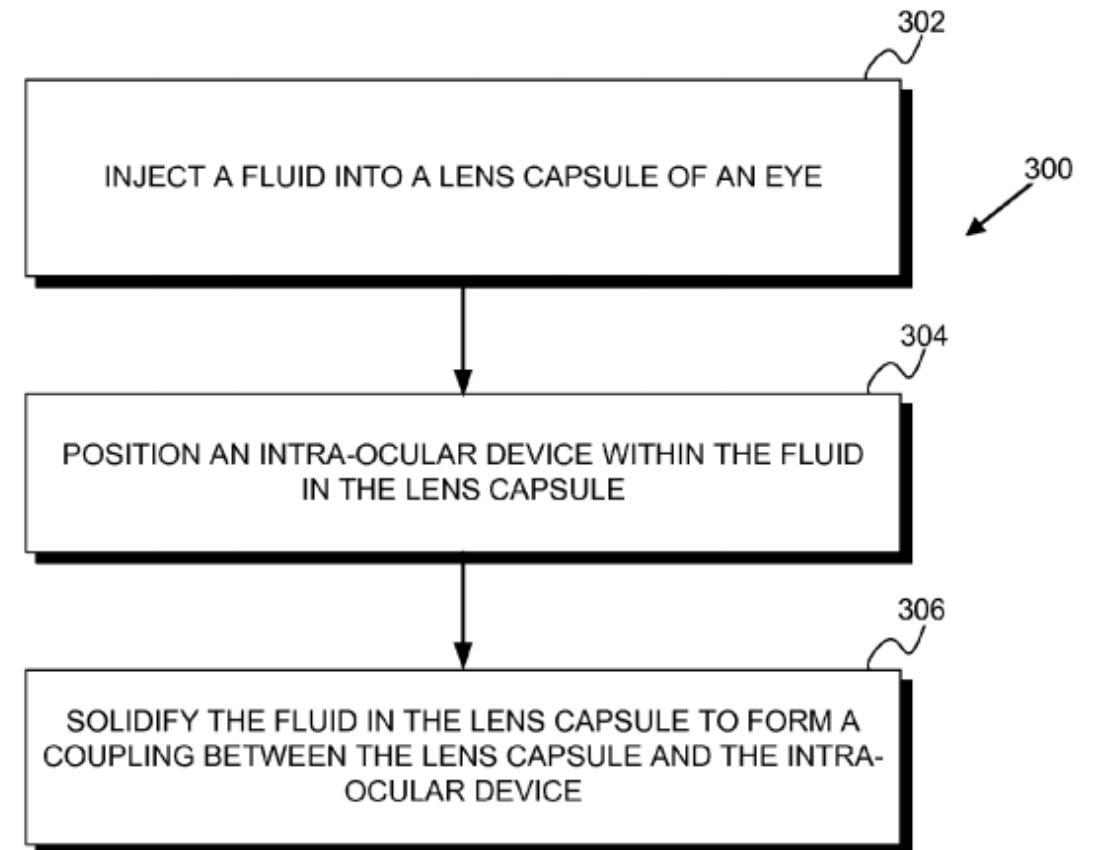
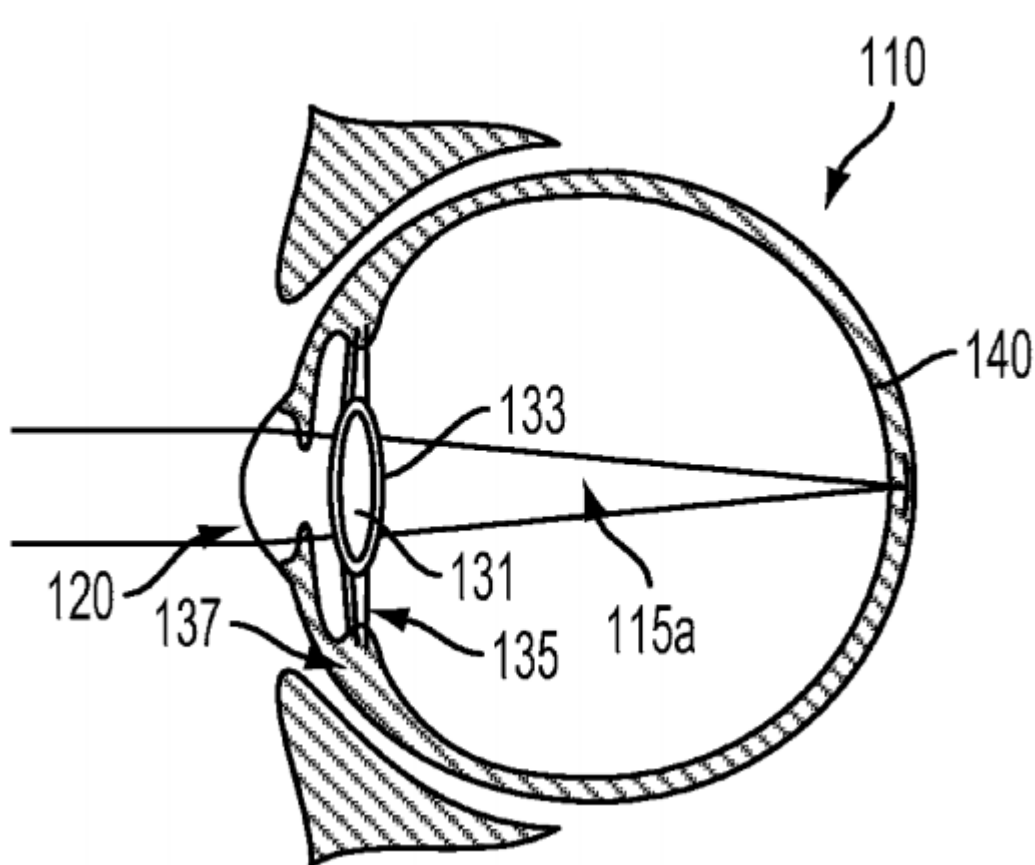
December 23, 2016

WIRED

MICRO COILS MAKE MIND-CONTROLLED
PROSTHETICS EASIER TO USE

December 9, 2016

POPULAR
SCIENCE



SECOND SIGHT GOES PUBLIC IN 2014:

Company's wearables are the first FDA-approved prosthesis intended to restore vision.



Patients & Families Healthcare Professionals





3D Printed Limbs **scale down the cost of prosthetics**

\$5,000-50,000

For Prosthetic Legs In America

vs

\$100

For Prosthetic Legs by startup
SHC Design

CUSTOM, INTERCHANGEABLE PROSTHETICS

As prosthetics improve and exceed existing limbs, amputees and the disabled will no longer be disadvantaged and might even be more capable at specific jobs with enhanced limbs.

People with arthritis and joint pains could opt for replacement limbs, and some may even opt into it without any existing conditions. Advancements in 3D printing make it easier to create entirely new, usable limbs with different functions as well.



stryker®



Medtronic



Who will be affected?
NOT JUST THE SICK



abbvie

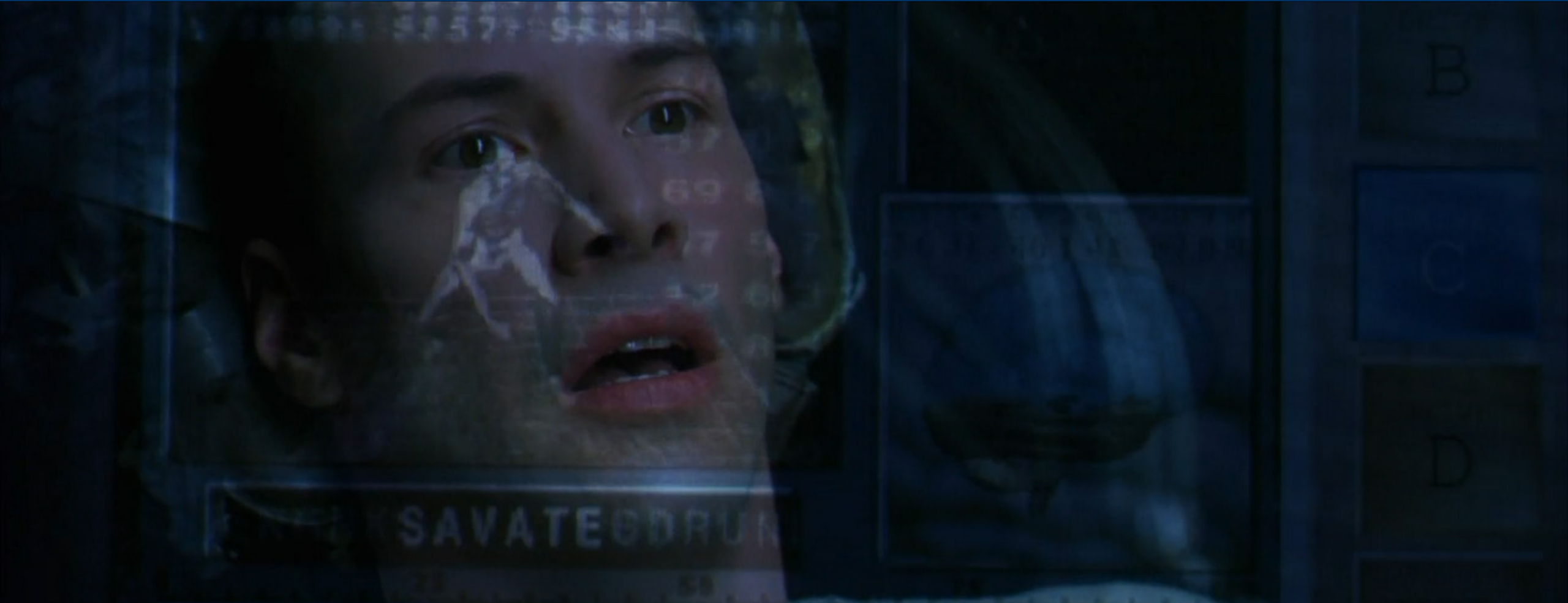
SKANSKA

AECOM



N+1 Innovation #12: **instant expertise**

COULD WE DOWNLOAD WHATEVER SKILLS WE WANTED?



HOW TO BECOME AN INSTANT EXPERT

MACHINE VISION

..... Analyze the data of your surroundings

AR OVERLAY

..... Use augmented reality to overlay step-by-step processes

IN-EAR GUIDANCE

..... Audio based coaching and guidance as you progress

The Pieces Are Coming Together

AR PLATFORMS



GESTURE & EYE TRACKING



REMOTE EXPERTS



IN-EAR PLATFORMS





OPERATIONS
+ MAINTENANCE

CATERPILLAR®

+



SCOPE_{AR}

MACHINE ASSISTANCE + DIAGNOSIS IN FOR EQUIPMENT

ScopeAR has partnered with Caterpillar to use AR to help maintain equipment and solve problems



REMOTE SURGERIES

Surgeries could be guided remotely in emergency situations or for more complex cases



DO-IT-YOURSELF MAINTENANCE

Instead of calling a handyman for every home project or repair, AR and remote help could guide you through it

SEPHORA



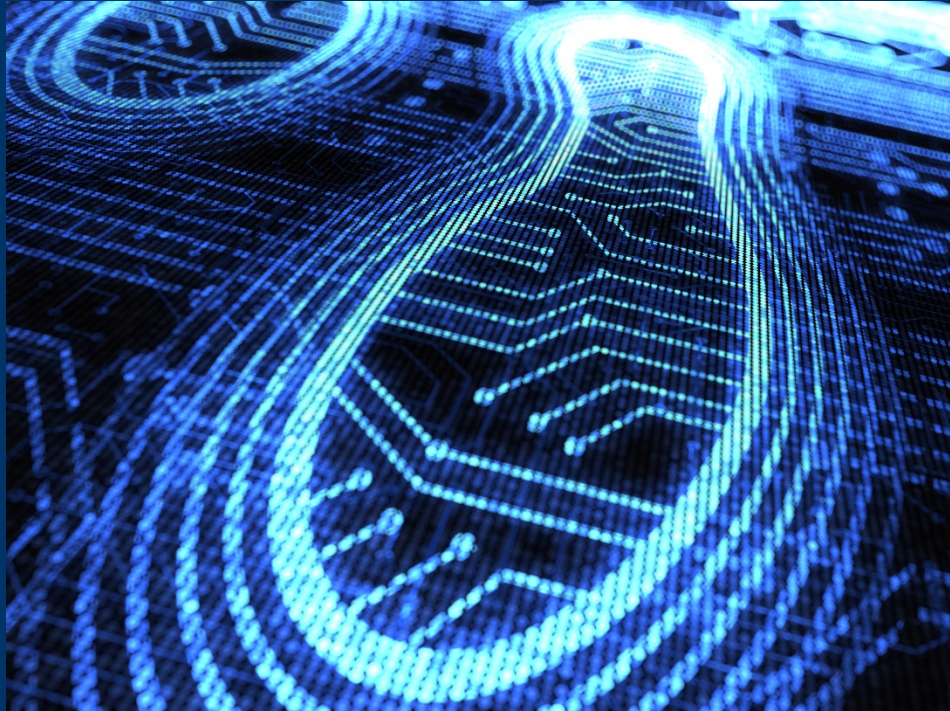
Who will be affected? **NOT JUST EDUCATION & SERVICES**



The background is a dark blue field filled with a complex pattern of light blue circuit lines and numerous footprints. The footprints are of various sizes and orientations, some appearing as solid shapes and others as dotted patterns, creating a sense of movement and digital presence.

N+1 Innovation #13: **AI Ghosts**

DIGITAL FOOTPRINT TELLS EVERYTHING



“One of our most surprising findings is that we could even predict whether your parents were divorced or not, based on your Facebook likes.”

The Stanford News Service

Michal Kosinski, Asst Prof. in Organizational Behavior

Recreating ourselves with AI

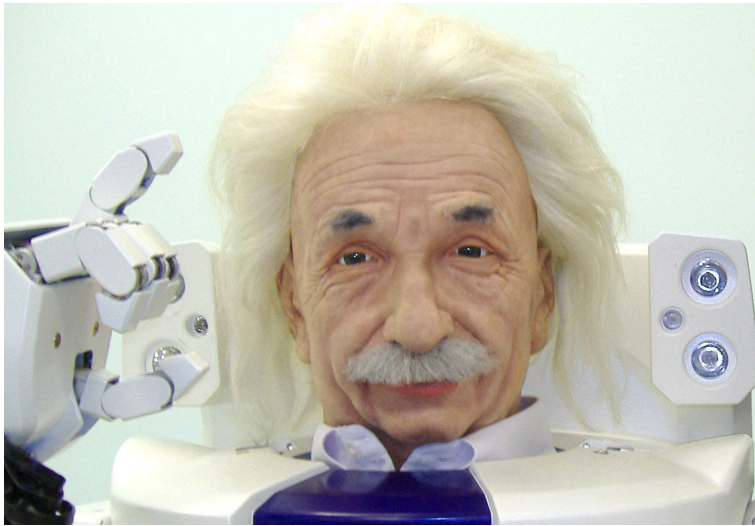
Digital Footprint + AI = Digital replicas of ourselves

YOUR LOVED ONE'S PERSONALITY IN A HUMANOID ROBOT



United Therapeutics CEO Martine Rothblatt commissioned a humanoid robot, **Bina48**, modeled after Rothblatt's wife, Bina Aspen. The robot was created after “more than one hundred hours in compiling all of her memories, feelings, and beliefs.”

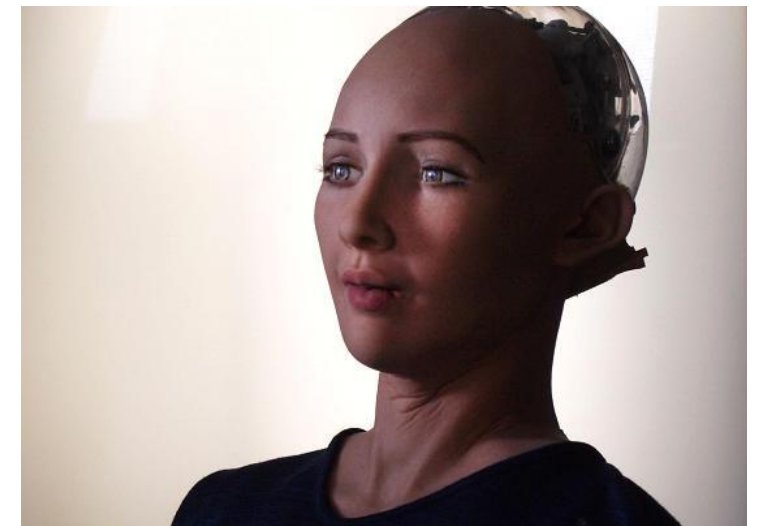
Bina48, and several other humanoid robots were developed by startup **Hanson Robotics**, which is creating robots with “expressiveness, aesthetics, and interactivity” using AI.



Albert Einstein Hubo



BINA48



Sophia

THE FUTURE: WHERE YOUR LOVED ONES LIVE FOREVER

NOT A DISTANT REALITY

COMPANIES WANT TO REPLICATE YOUR
DEAD LOVED ONES WITH ROBOT CLONES

MARCH 16, 2016

MOTHERBOARD

THE AI THAT (ALMOST) LETS YOU
SPEAK TO THE DEAD

JUN. 7, 2016

arstechnica

HUMANOID ROBOT BINA48 DISCUSSES
FEELING "LIKE A LIVING PUPPET"

AUG. 13, 2015



WOMEN IN THE
WORLD

SPEAK, MEMORY: WHEN HER BEST
FRIEND DIED, SHE REBUILT HIM USING
ARTIFICIAL INTELLIGENCE

OCT. 6, 2016

THE VERGE

'DEATH TECH' STARTUP LED BY BOSTON
SERIAL ENTREPRENEUR GETS FUNDING

MAY 21, 2016

**BOSTON
BUSINESS JOURNAL**

Living with the dead: The future of interactions

- Personal interactions may cure or augment grief
- Social networks may need to regulate the presence of bots replacing dead users
- The practice of getting advice from the dead may force marketers to rethink their messaging



ARE YOU READY FOR (N+1) TRENDS?

Technologies, business models and distribution innovations that you should watch for in the next 5 to 10 years.



Patents



**Angel Investors
and VCs**



Startups



**Government
Grants**



**Media and Niche
Sub-Community Chatter**



**Academic and
Corporate Research**

COMPETITIVE LINES ARE BEING RE-DRAWN

This is happening in many industries.

Software over soft drinks. Nestlé SA, Coca-Cola Co. and others selling consumer products in India say they are seeing less activity as more consumers opt to spend on data plans instead of shampoo, soft drinks and other goods. As [the WSJ's Preetika Rana reports](#), a new wave of affordable smartphones has brought hundreds of millions of Indians online for the first time. “There was a time when kids would come here and blow their pocket money on chips and chocolate,” said Anup Kapoor, who runs a mom-and-pop grocery shop in New Delhi. These days, “they spend every last rupee on a data recharge instead.”

A photograph of three elderly men, shirtless and wearing dark athletic pants, pulling on a thick rope. The image is overlaid with a semi-transparent blue filter. The man on the left is shouting with his mouth open. The man in the middle is looking towards the right. The man on the right is smiling. All three are wearing dark pants with a logo that reads "ABERCROMBIE 92 PHYSICAL ED.".

"You clearly have a group that cares less about logo and brand and more just about quality, and they [haven't been] prioritizing apparel [instead, they're] using disposable income on electronics like smartphones, health and fitness, [and] even more so on experiences."

- Betty Chen, Mizuho Securities

A man in a suit is driving a car, looking out the window. The image is overlaid with a blue tint. Text is superimposed on the left side of the image.

UNUSUAL COMPETITORS WILL EMERGE

GM ACQUIRED CRUISE AUTOMATION FOR \$1B. AIRLINES WILL SOON BE COMPETING WITH AUTONOMOUS VEHICLES.



FUTURE LITERACY.

If you know what to expect in the future, you can plan for it. This is about winning future markets.

NEW COMPANIES, BUSINESS MODELS,
TECHNOLOGIES ARE NOT COMING FOR
YOUR BASIS POINTS.

www.cbinsights.com 124

THEY ARE COMING FOR YOUR COMMAS.



“Neither RedBox nor Netflix
are even on the radar screen
in terms of competition.”

– Jim Keyes, CEO of Blockbuster (2008)