TWIST BIOSCIENCE

Writing the Future

EMILY LEPROUST, PH.D., CEO and CO-FOUNDER

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DNA is Changing the World

Synthetic DNA Is the Future of Everything

Chemicals
Sustainability

Food
Food Security

Therapeutics
Health

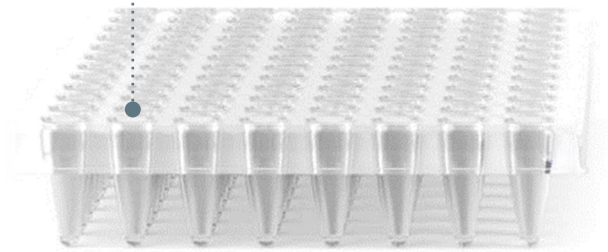
Diagnostic
Precision Medicine

Data Storage
Preserving Heritage

Twist DNA Writing on Silicon Platform

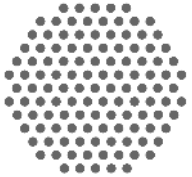
Everyone Else

1 Oligo per well

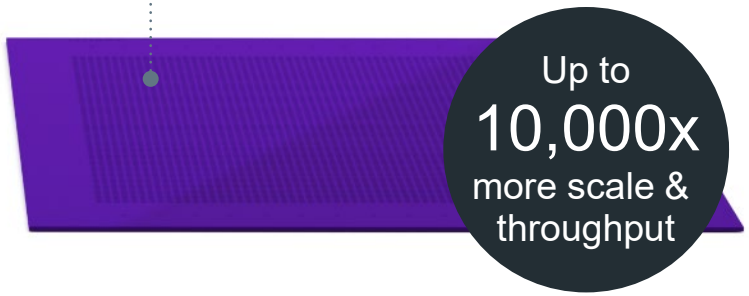


96 Well Plate
makes 1 gene

TWIST BIOSCIENCE



1M Oligos per chip



Twist Silicon Platform
can make 9,600 genes

+

State of the art commercial infrastructure

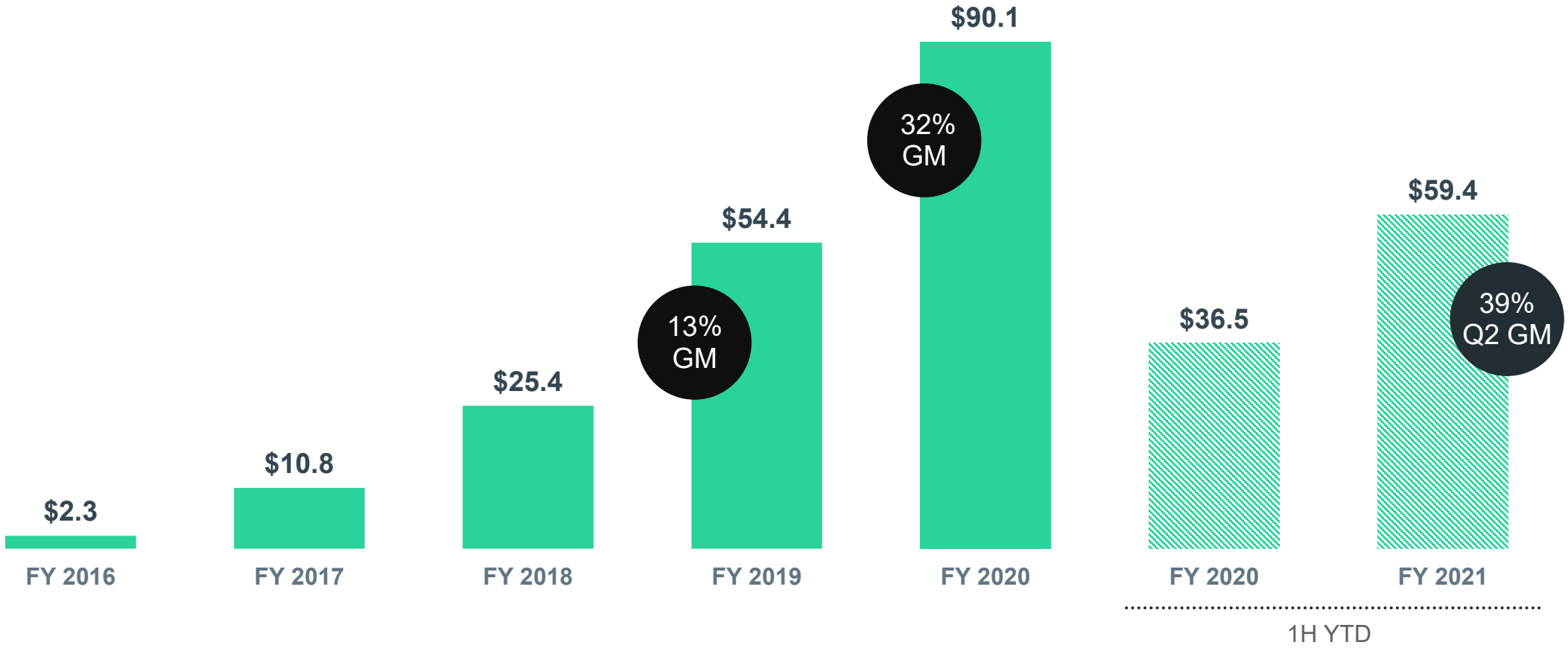
Proprietary software

Robotics

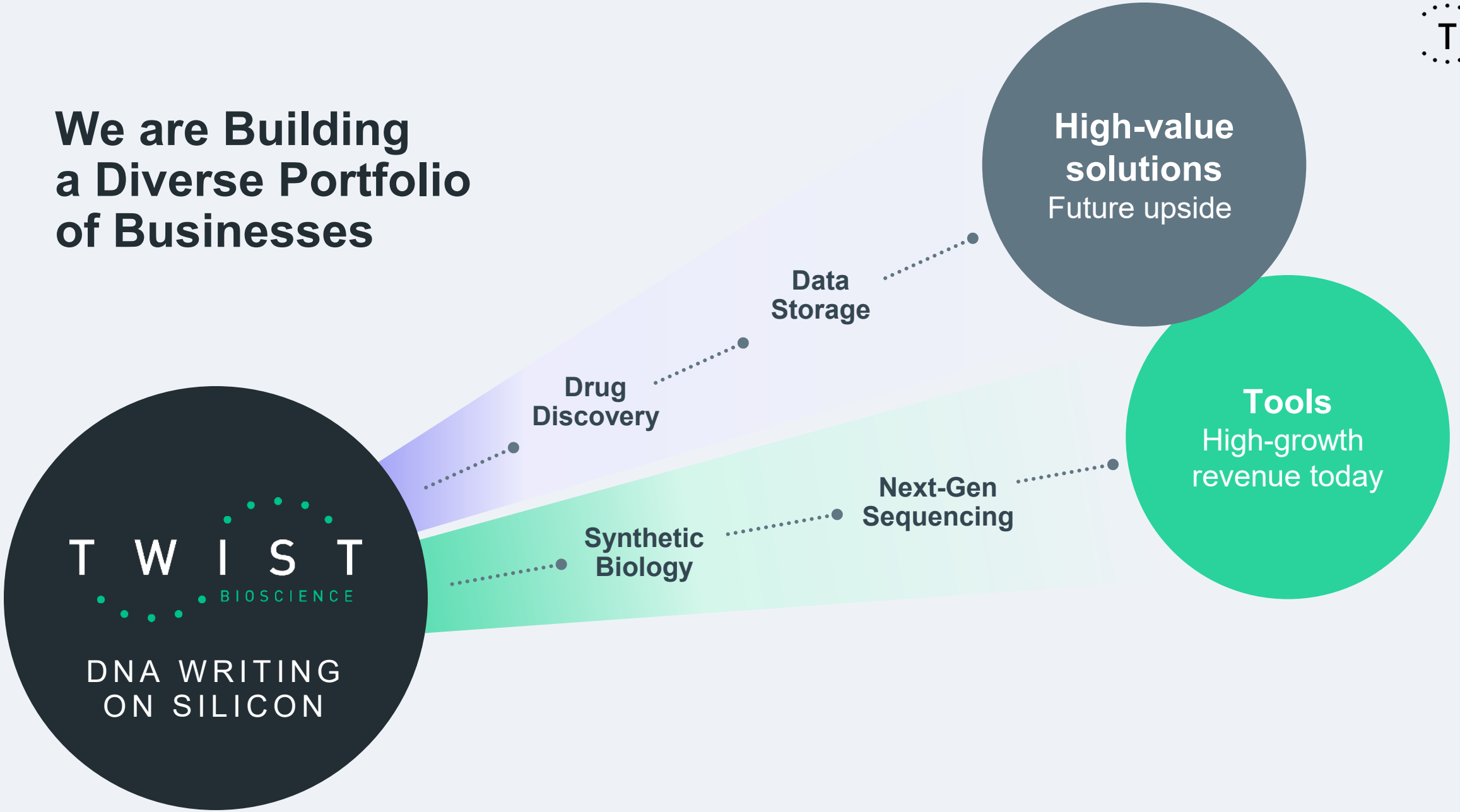
Integrated ecommerce platform

Manufacturing execution system

Strong Revenue Growth and Increasing Gross Margin



We are Building a Diverse Portfolio of Businesses



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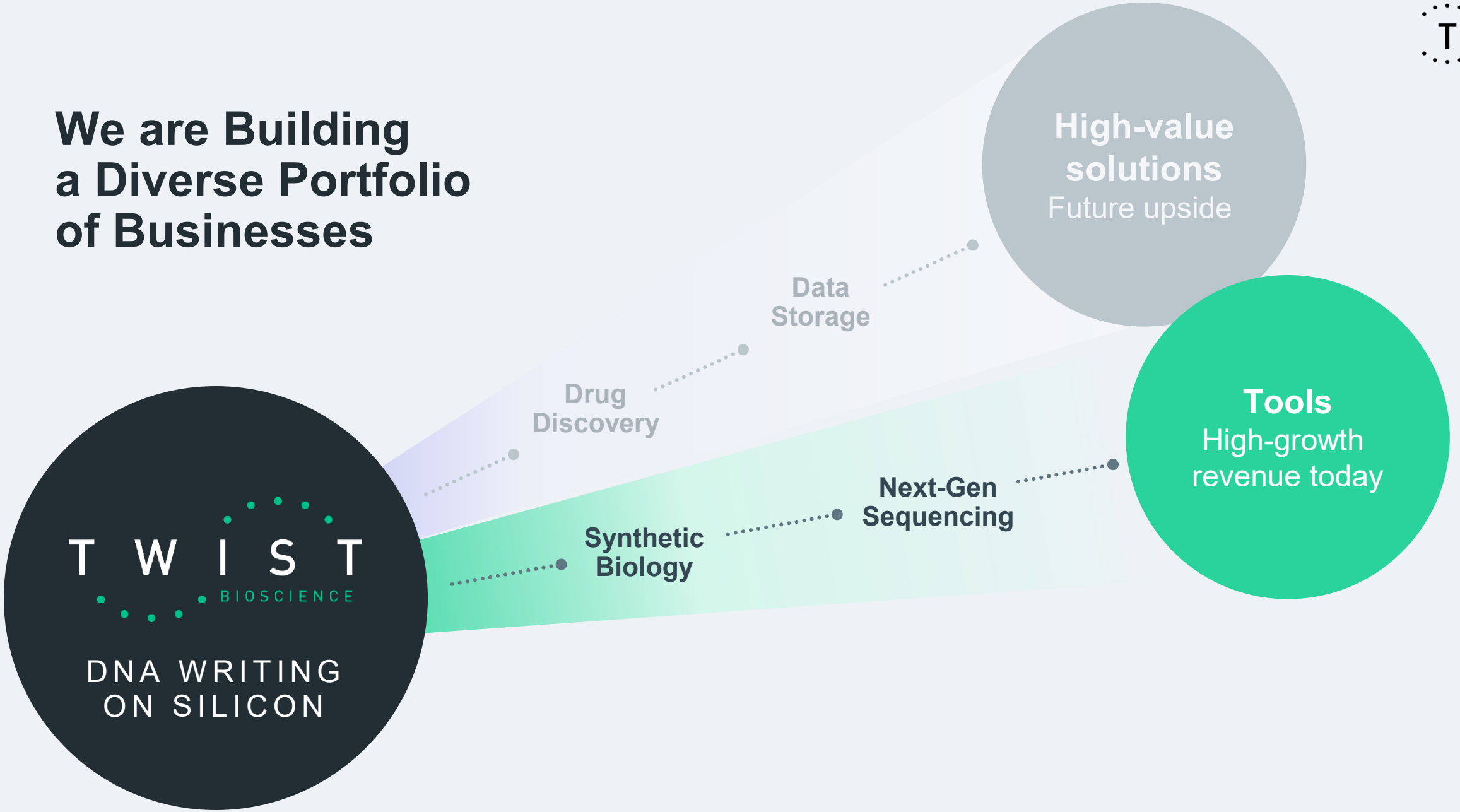


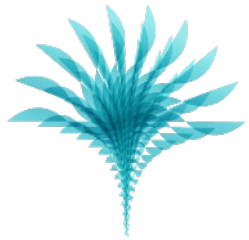
Synthetic Bio: Largest Selection of DNA Offered

Genes

Clonal

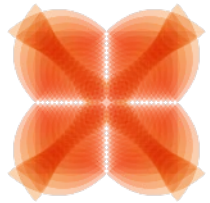
Non-clonal fragments

Clonal-ready gene fragments



Oligo Pools

sgRNA



Variant Libraries

Site saturation

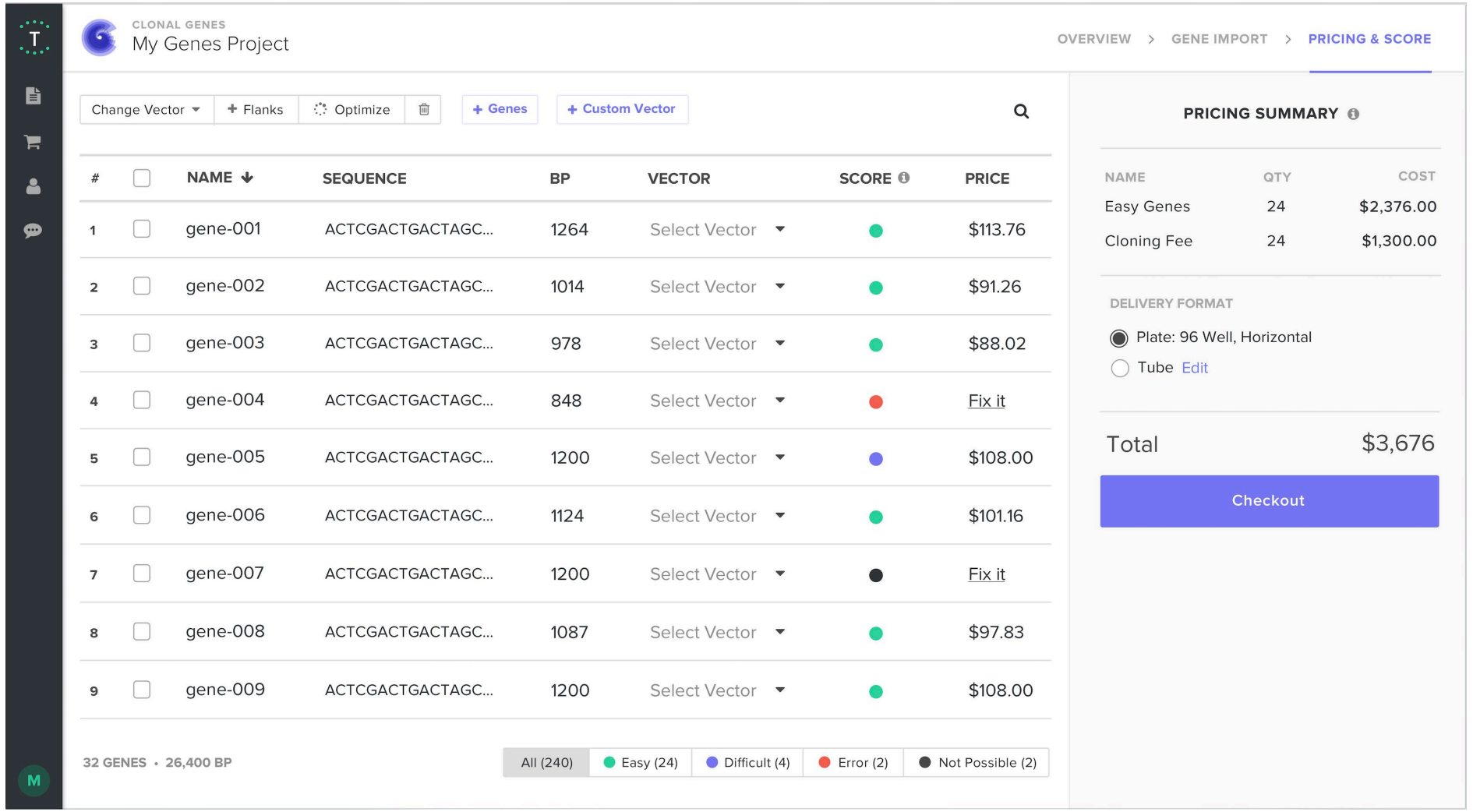
Combinatorial

Pharma / Biotech Solutions

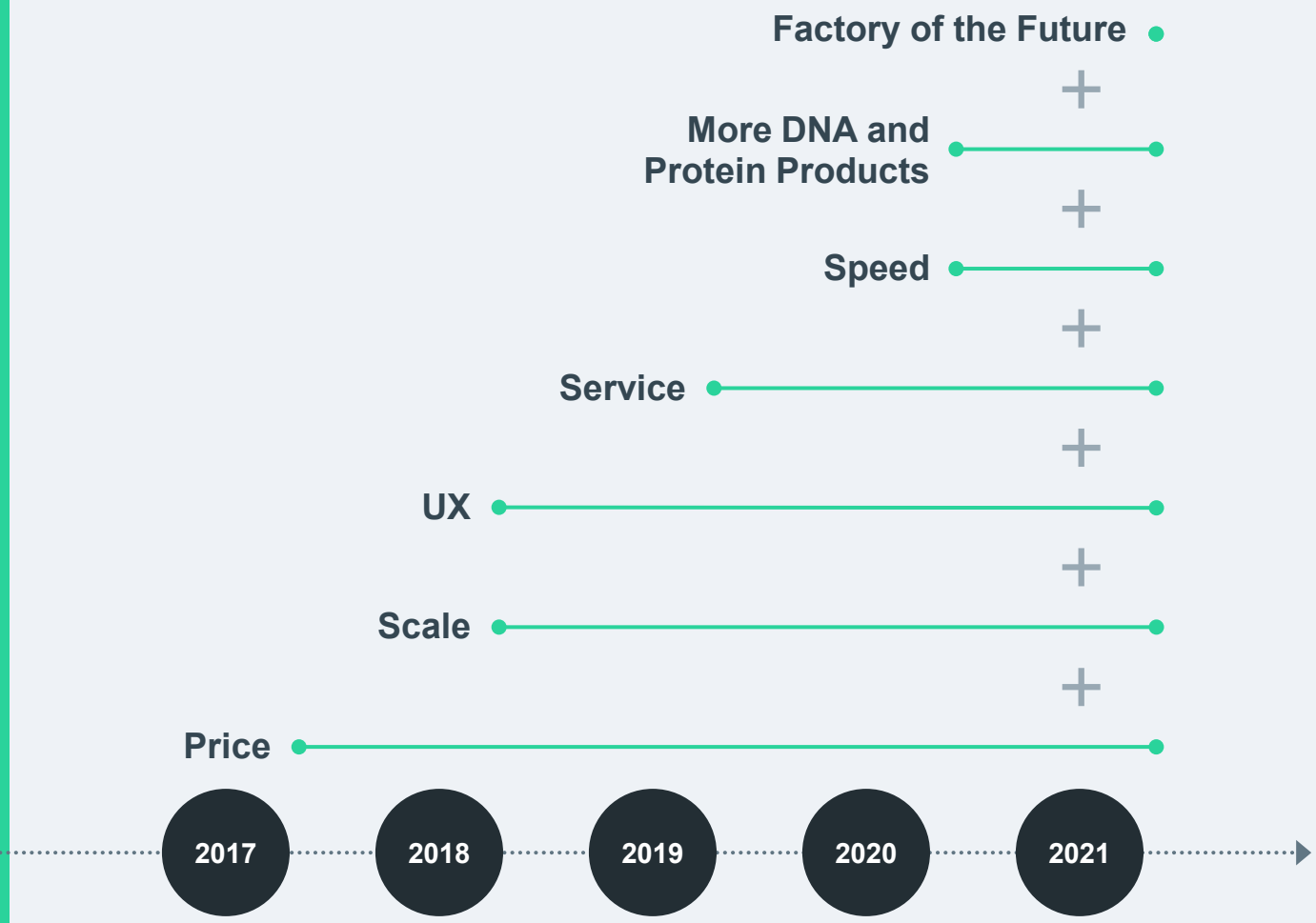
DNA preps

IgG

Innovative Buying Experience



Synthetic Bio: Why We Win



We Deliver

- High-quality DNA
- Competitive turnaround times
- Affordability
- High throughput
- Unique customer experience
- Innovative products and solutions

VANDERBILT UNIVERSITY MEDICAL CENTER

"Twist's very high-throughput platform allowed us to quickly and efficiently examine thousands of possible antibodies in order to select the best results faster than ever before."

Robert Carnahan, Associate Director, Vanderbilt Vaccine Center

Synthetic Bio: Scratching the Surface

FY20 Proof Points

1,590
Customers

339K
Genes shipped

99%
Orders via ecommerce

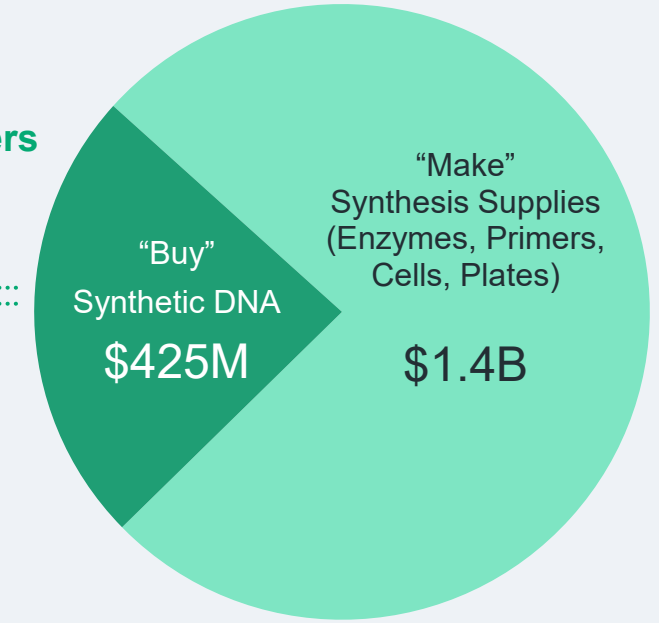
Strategy to Capture Large Market Potential

$1.8B / year

1 **Large-scale commercial users**

~10% of market today

2 **Long tail**



3 **Convert makers to buyers**

Source: BCC Research, Markets and Markets Report, Twist company estimates

Synthetic Bio: Roadmap to Expand Our Leadership

IgG	Clonal Ready Gene Fragments	Business to Business Integration	Factory of the Future (2022)
Commercial ramp in pharma	Serving long tail of the market	Software to accelerate order processing	**New Portland facility to:** • Double capacity • Reduce turnaround time • Target new segments

NGS: Broad Offering to Meet Expanding Applications

Today

- Human Core Exome
- Fixed Panels
- Custom Panels
- Library Preparation
- Reagents and Kits
- Synthetic Viral Controls
- Targeted Methylation (early access)
- SARS-CoV-2 NGS Assay

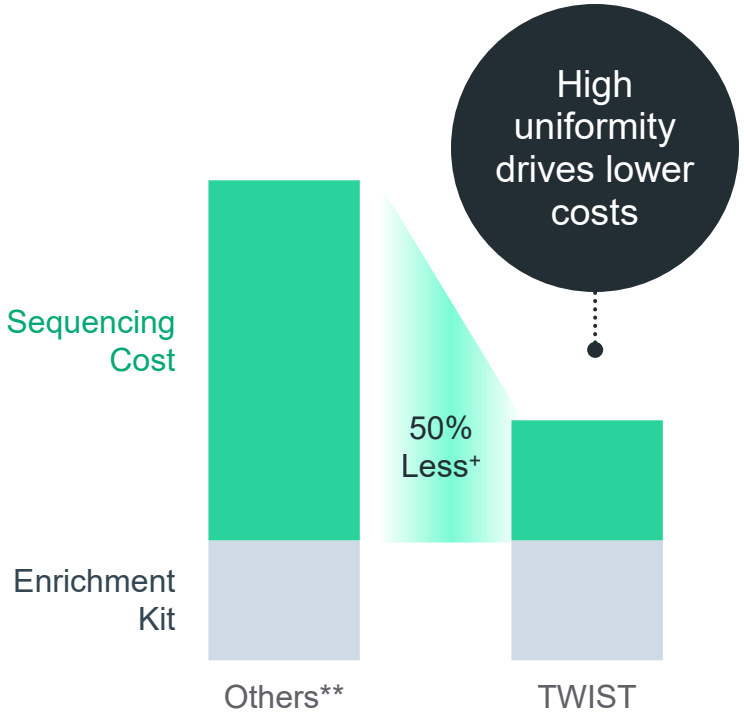
Targeted Sequencing

is powering new applications

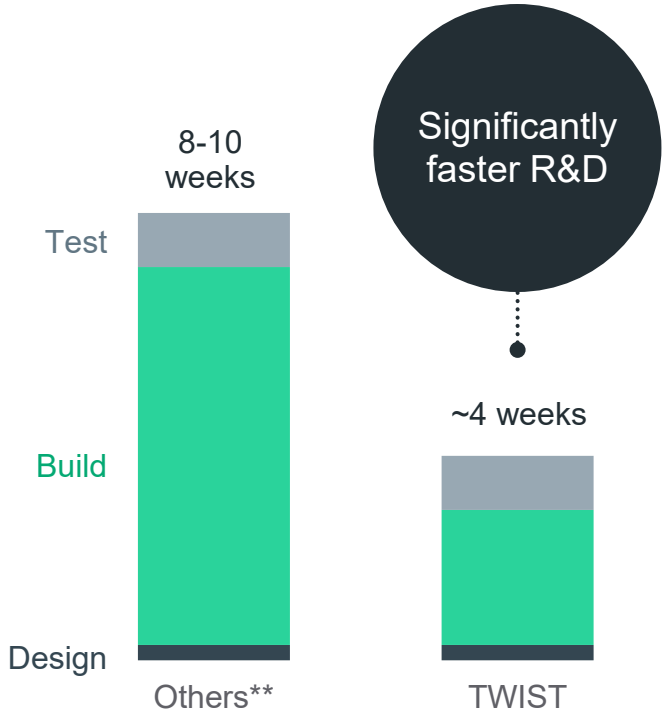
- Liquid biopsy
- Rare disease
- Oncology
- Population genetics
- Infectious diseases

NGS: Why We Win

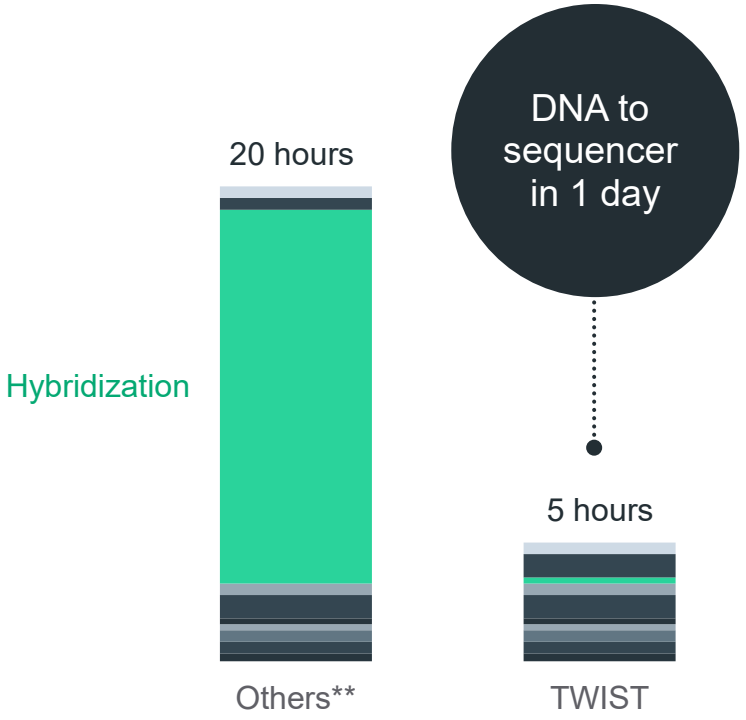
Low Cost per Sample



Rapid Customization



Fast Throughput*



+ Based on customer testimonial and Twist's experience
*Includes pooling, pre-hybridization, hybridization, binding, wash steps, amplification, purification, target environment QC, and NGS prep
**Illustrative models based on Twist's knowledge of competing technologies.

NGS: Investing in Growth

FY20 Proof Points

>1,000
Customers shipped

55
in production

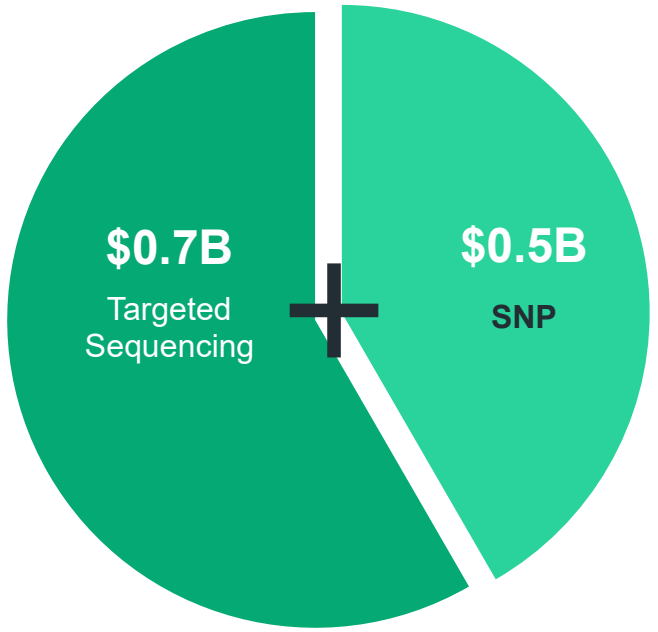
13
OEM partners

3
SNP microarray conversion

Strategy for Expanding Market to >$1B

1 More pilots

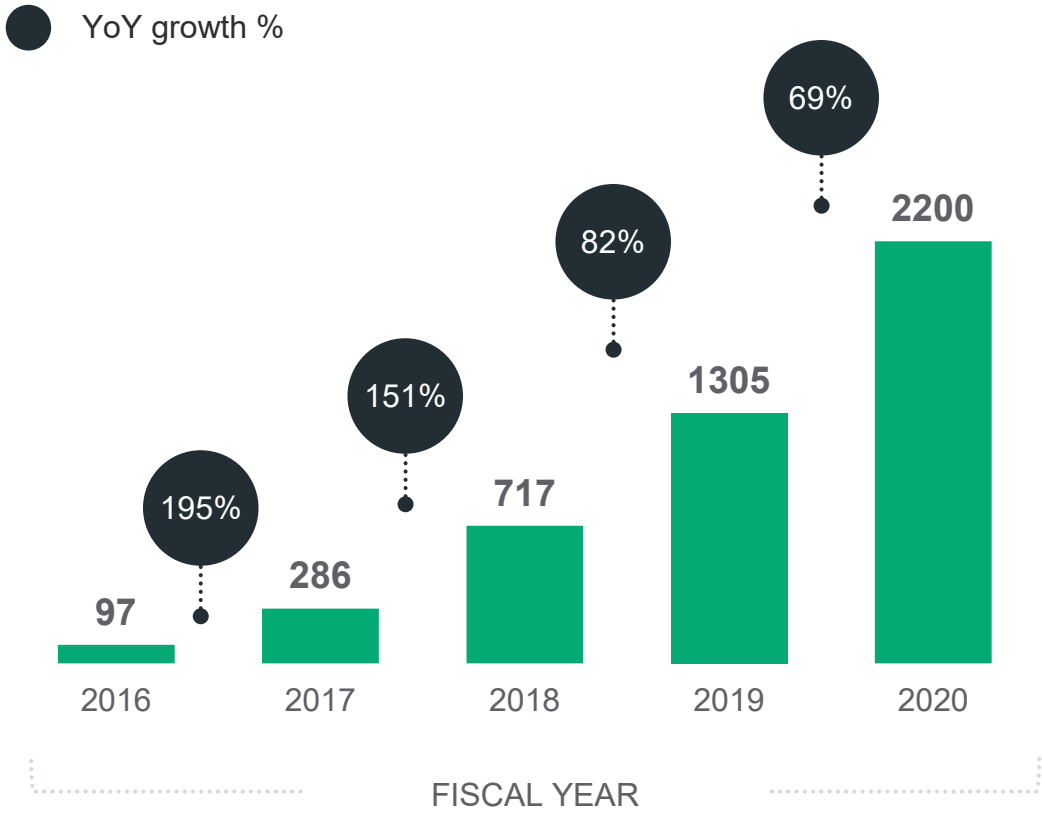
2 Drive conversion



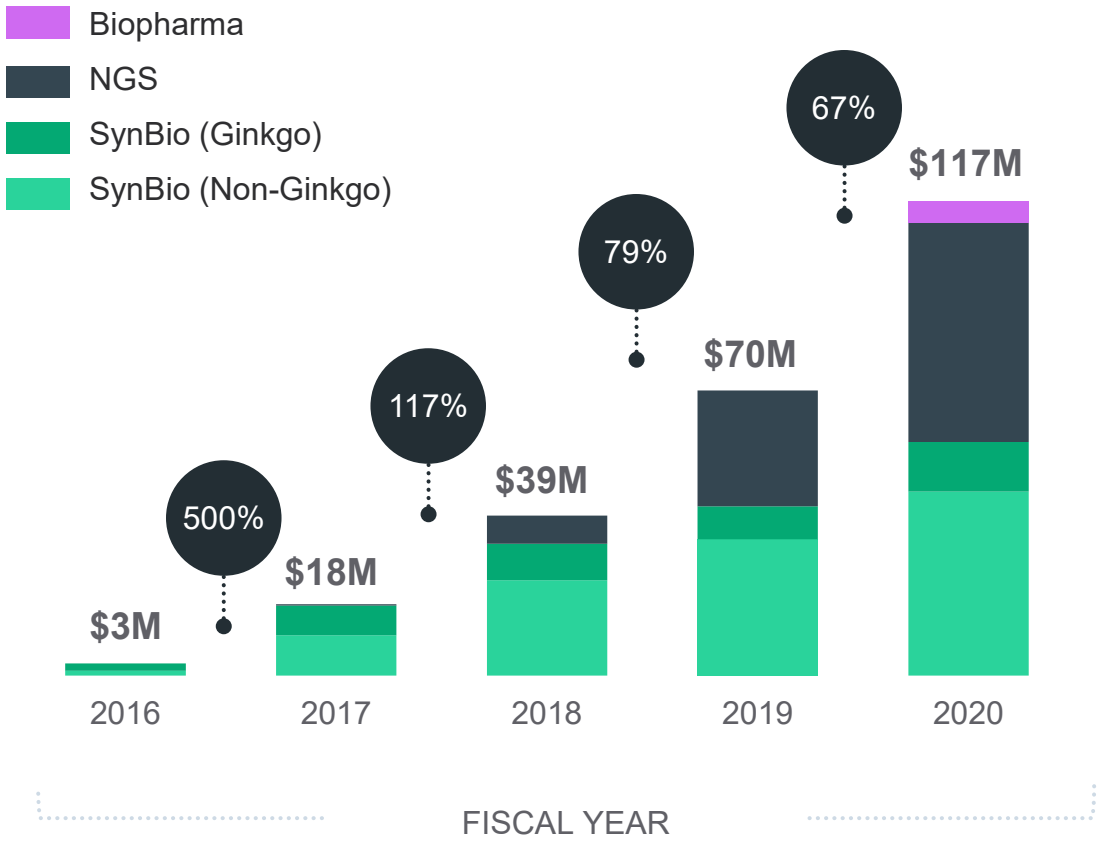
3 Add applications

Core Business Growth

Total Customers
(SynBio & NGS)

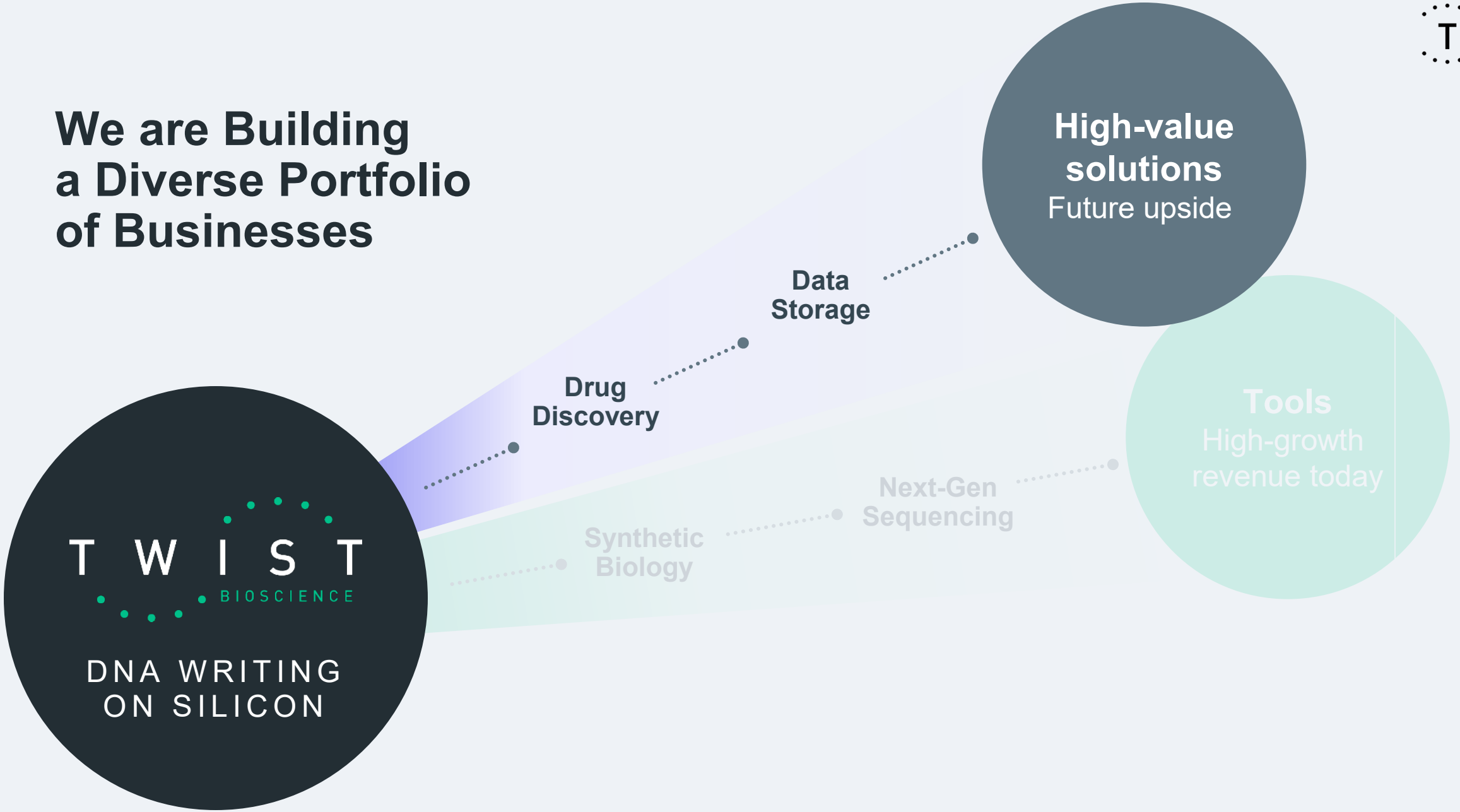


Orders



FY Ends September 30

We are Building a Diverse Portfolio of Businesses



Biopharma: Validated and Expanding Offering

Our Partners Bring Targets

DNA Libraries

Antibody Discovery

Antibody Optimization

HTP IgG Production

Partners Receive Preclinical Ready, Optimized, Fully-Human, High-Affinity Antibodies

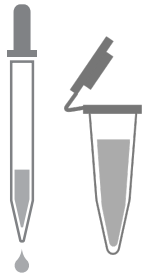
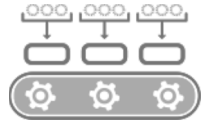
TWIST BIOPHARMA

Potential for Upfront Milestone and Royalty Payments

Biopharma: Why We Win

Everyone Else	TWIST
1 library 	Library of libraries fully validated libraries

Everyone Else	TWIST
	

Everyone Else	TWIST
	

Broad “DNA” Buffet

Allowing us more shots on goal with more diversity

Every Sequence Always Explicitly Synthesized

Never random —
All our DNA is human-derived and higher quality,
following human repertoire rules

Automation and Miniaturization

Most of our process, including library production, screening, reformatting, affinity and functional testing increasing efficiency and speed

Biopharma Partnerships by the Numbers

Broad

Disease Indications

Cancer, Neurology, Immuno-oncology, Infectious Disease, Canine / Feline, Other

Varied

Modalities

mAbs, Bispecific Antibodies, VHH, ADC, Protein Engineering, More

09 Completed Programs

21 Partners

25 Active Programs

17 Milestones/ Royalties

Biopharma: Pipeline of Preclinical-Ready Functional Monoclonal Antibodies

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DNA WRITING ON SILICON

TARGET	INDICATION
GLP1R	Diabetes & rare metabolic diseases
PD1	Immuno-oncology
TIGIT	Immuno-oncology
CD3	Immuno-oncology
ADORA2A	Immuno-oncology
CXCR4	Oncology
ACE2	COVID-19
SARS-CoV-2 S1	COVID-19
SARS-CoV-2 N	COVID-19

Leveraging Twist platform to discover functional monoclonal antibodies against high value targets

Pursuing opportunities to maximize value for these assets

Biopharma: Immuno-oncology Target ADORA2A

Checkpoint Inhibitor Market is Growing Rapidly

This market is expected to reach $40 billion by 2025

Significant Unmet Needs Remain

Only ~20-30% of eligible cancer patients benefit from first generation checkpoint inhibitors

Large Opportunity for Novel Immunotherapies

Twist can rapidly discover and optimize antibody-based immunotherapy leads across oncology indications

Adenosine A2a Receptor

(ADORA2A)

Adenosine pathway is a **master checkpoint** in the tumor microenvironment

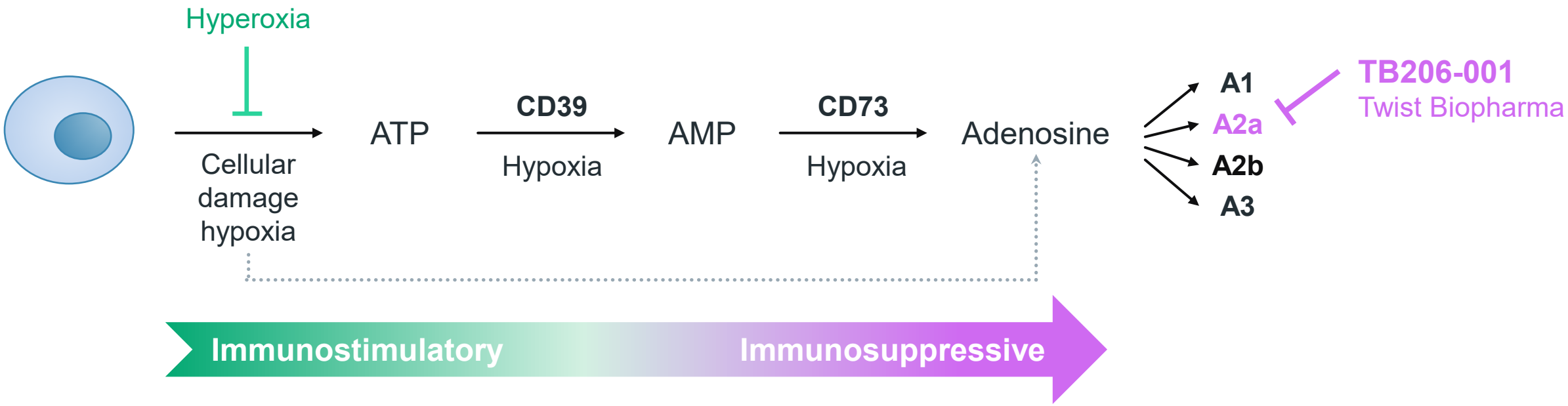
Highly expressed in:

Lung
Colorectal
Prostate cancer

A2a antibody antagonist has the potential to have high potency and specificity, improved dosing, and low CNS permeability

Twist's TB206-001 is a Potent A2a Antibody Antagonist Candidate

Biopharma: Adenosine Pathway Targets Master Checkpoint in TME



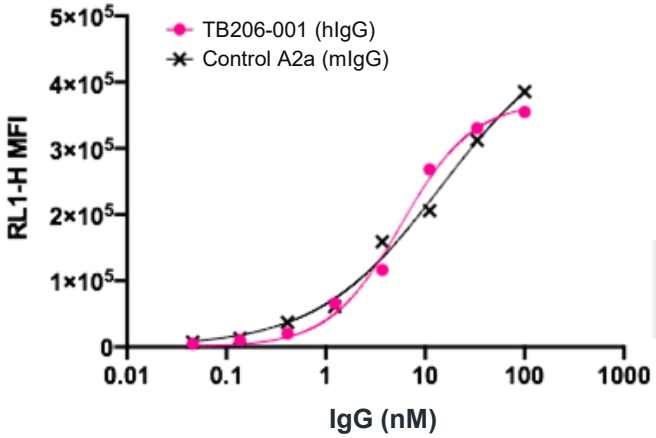
Tumors can evade immune responses from first generation checkpoint inhibitors by usurping the adenosine pathway

Incomplete inhibition of upstream enzymes in this pathway would still produce adenosine and thus drive immunosuppressive signaling

TB206-001 directly targets the A2a receptor, the primary adenosine receptor on immune cells, to block immunosuppression

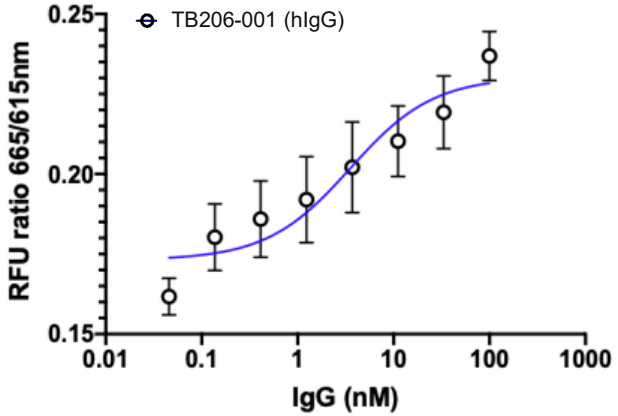
Biopharma: TB206-001 Potent A2a Antibody Antagonist Candidate

TB206-001 is a high affinity binder to hA2a receptor



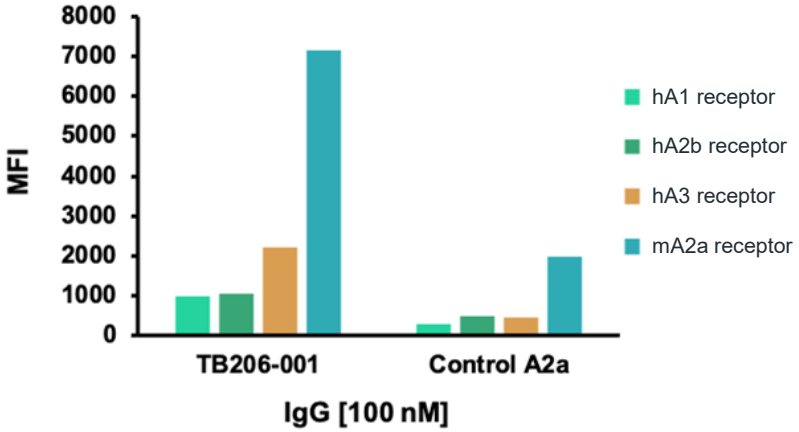
	TB206-001	R&D A2a
EC50	5.76	14.35

TB206-001 is a functional antagonist *in vitro*



	TB206-001
IC50	3.52

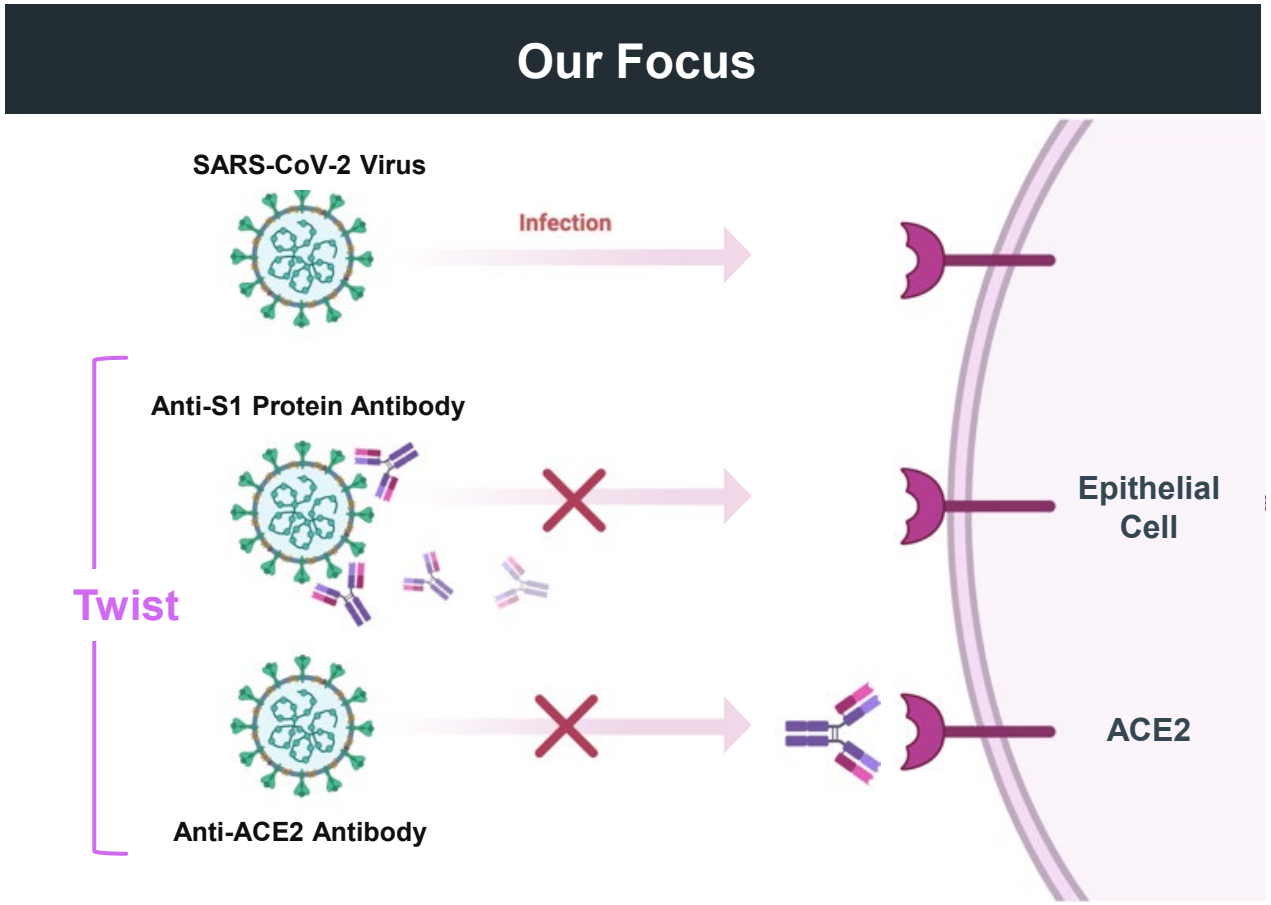
In vitro specificity with TB206-001 in cross reactivity study



TB206-001 was screened against cells expressing each of the adenosine receptors.
This lead is specific to A2a and is a human/mouse cross-reactive antibody.

We are optimizing and developing this preclinical lead candidate (TB206-001)

Biopharma: Rapid Discovery of SARS CoV-2 Antibodies



Novel Therapeutic Antibody Leads

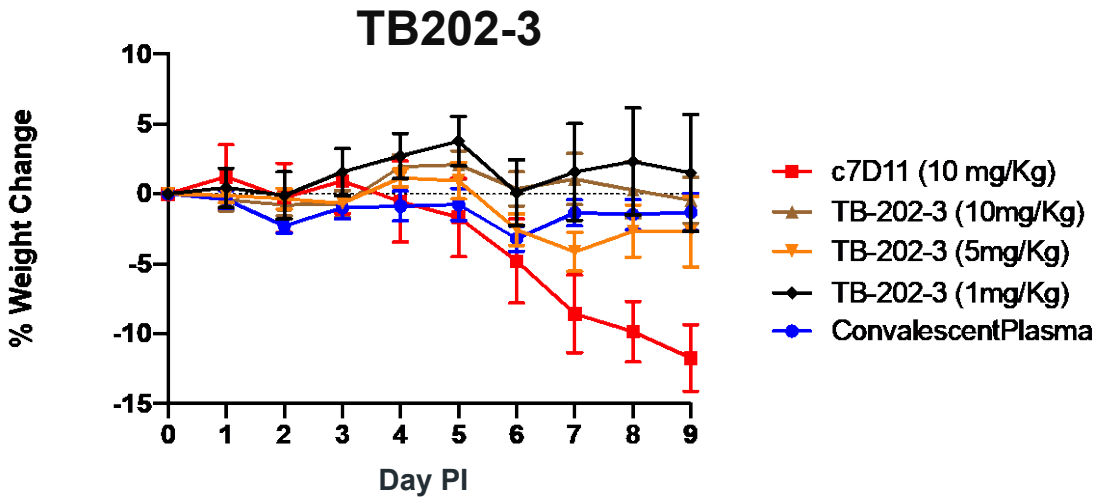
IgG (TB181-8, 28, 36)
VHH (TB201-202)

Well-Characterized and Well-Validated

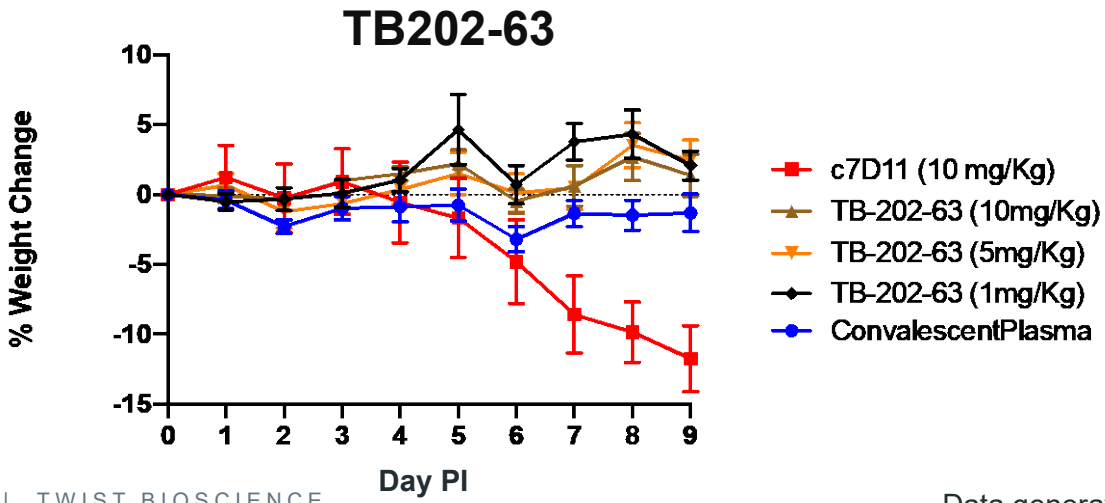
High-affinity and unbiased, with extensive pseudovirus and live virus, preclinical animal data

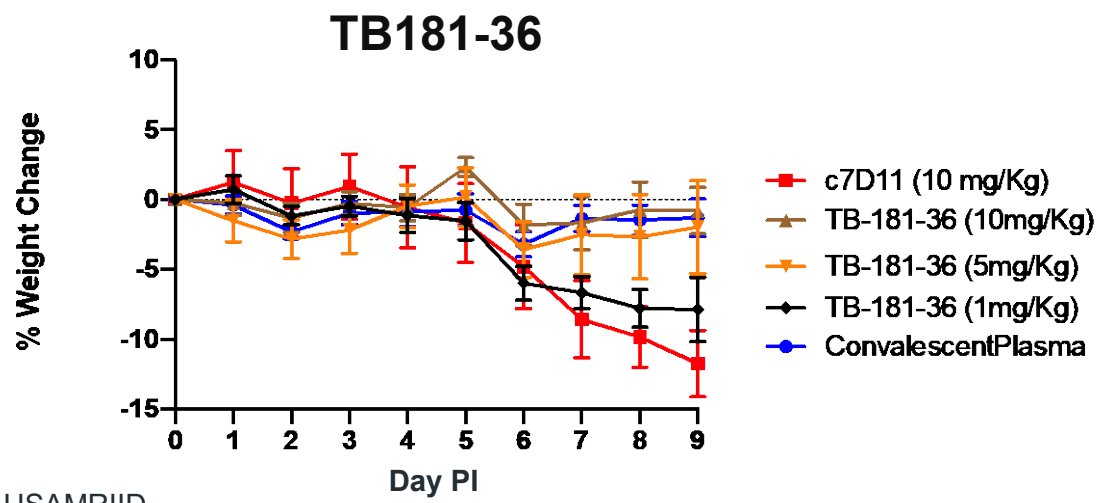
Biopharma: VHH Single Domain Leads (TB202-3, 63) and IgG Lead (TB181-36) Show Potent *In Vivo* Activity in Hamster Model

TB202-3 and TB202-63 Protect Against Weight Loss at the Lowest Dose of 1 mg/kg



c7D11 = Negative control mAb
ConvalescentPlasma = Positive control

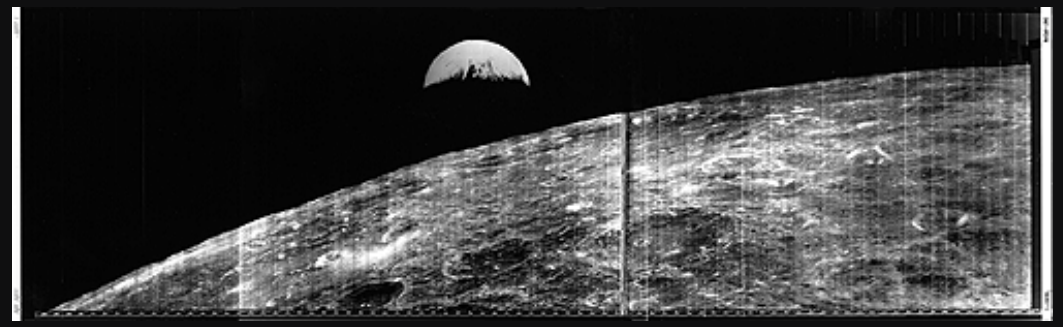




Data generated at USAMRIID

Data Storage in DNA

Recovered from Lunar Orbiter 1 Tapes

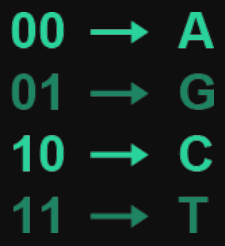


DNA for Archival Storage of Digital Information

Permanence
Density
Random access
Universal format

Data Storage: How It Works

1 **Coding**

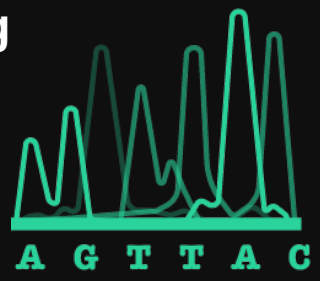


2 **Synthesis**

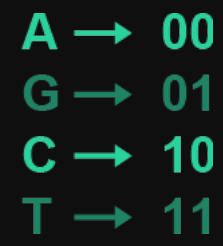
3 **Storage**

4 **Retrieval**

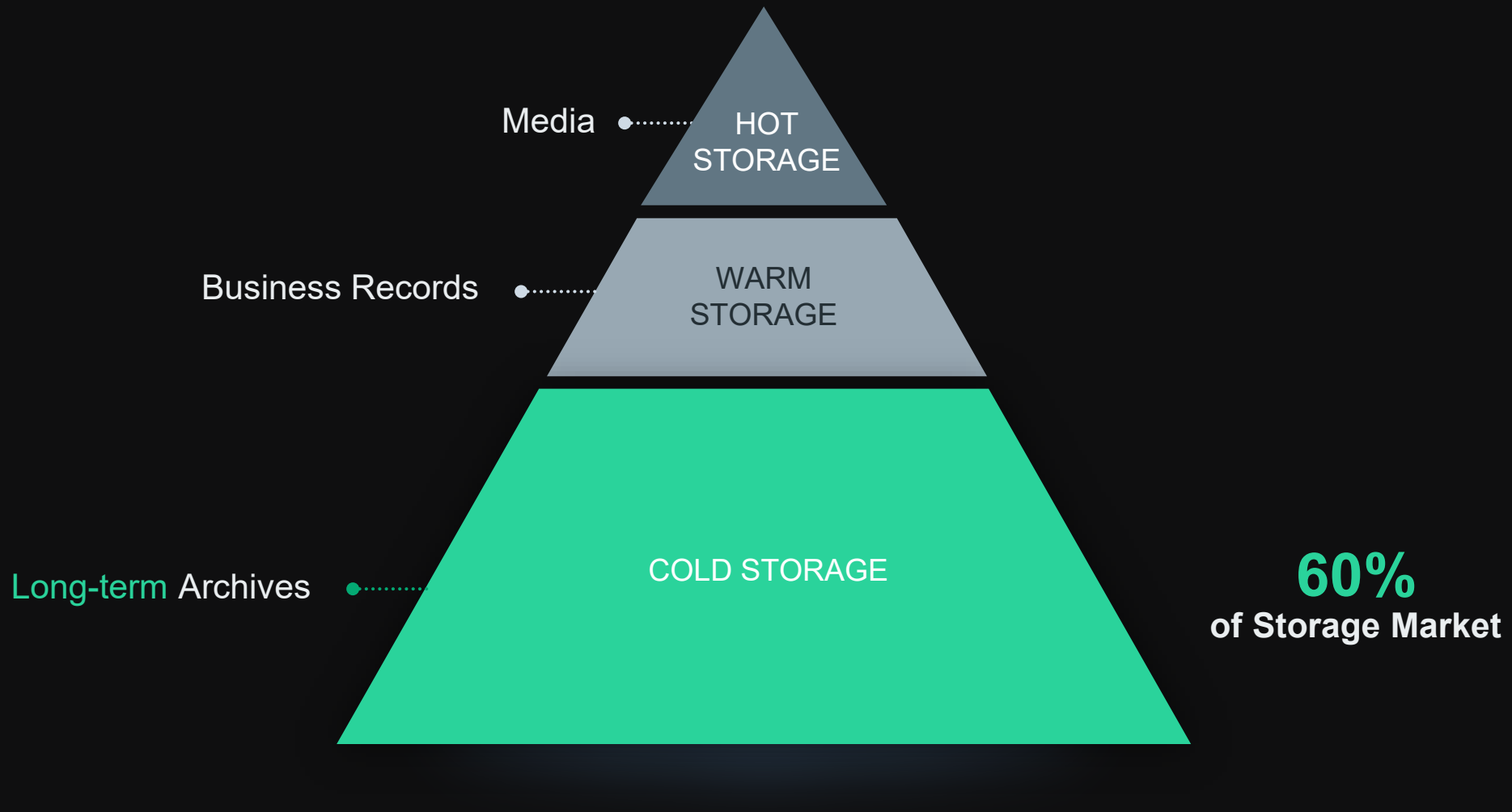
5 **Sequencing**



6 **Decoding**



Data Storage: $35B Large Market Opportunity



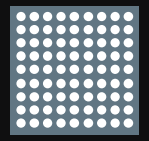
60%
of Storage Market

Data Storage: Clear Development Path

OLIGO SYNTHESIS TECHNOLOGY 50µm: $1000/Mb

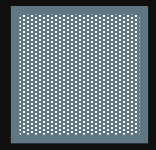
CHIP DESIGN > CHIP FABRICATION > TEST & DEBUG

10µm pitch



1µm pitch

2021



150nm pitch

2022

$100/Tb

PROTOTYPE
COMMERCIAL
PRODUCTION

Proven Approach

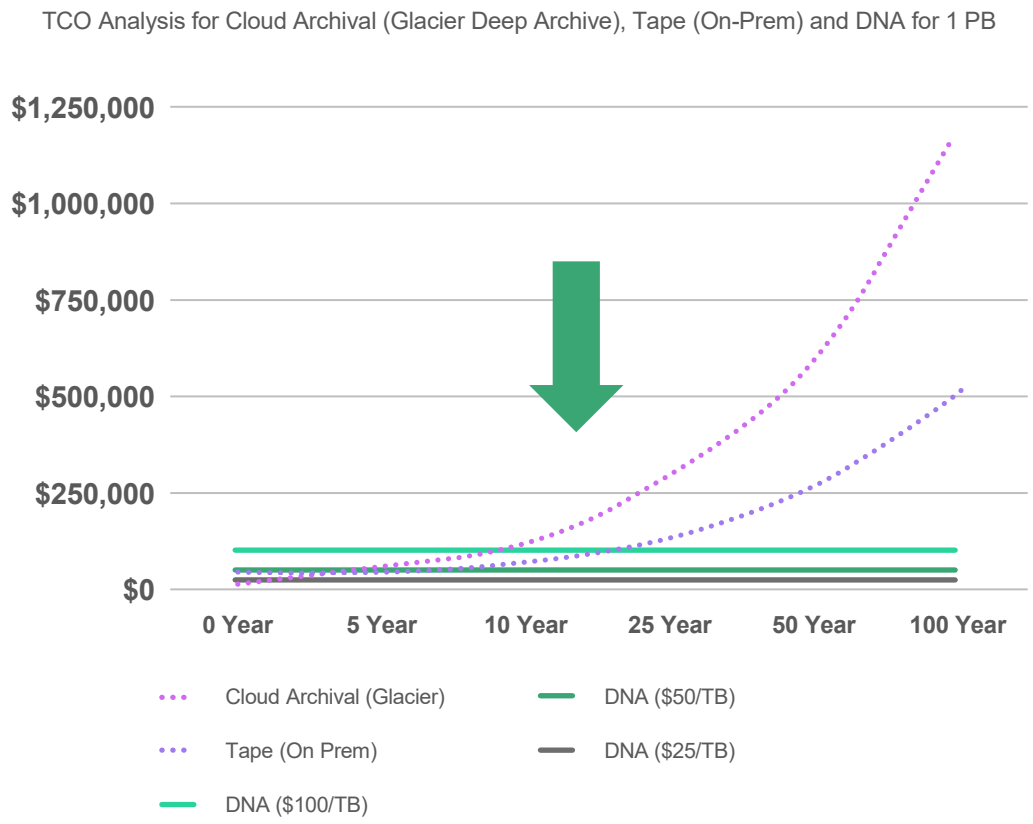
Standard CMOS Integrated Circuit design and fabrication

DNA Data Storage:

Cost for Digital Film Preservation

- As resolution increases, films and tv episodes get more expensive to store, and each additional copy multiplies the cost
- DNA copies are almost free due to the PCR process
- Cost of storage on Tape/Cloud will grow over time due to required data migration while the cost of DNA will remain flat
- When DNA reaches $100/TB it will be more economical to store any data on DNA if it needs to be preserved for 15+ years

TCO COMPARISON



DNA Data Storage Alliance

30 Industry Leaders Joining Forces to Advance DNA Data Storage

Twist Bioscience	**Illumina**
Microsoft	**Western Digital**
DNA Script	EPFL
Catalog	Claude Nobs Foundation
IMEC	University of Washington
Molecular Assemblies	ETH Zurich
PFU, a Fujitsu company	Iridia
Ansa Biotechnologies	Quantum

Generate industry roadmap

Develop use cases

Educate for broader awareness and adoption

by 2024

30%

of digital business will mandate DNA storage trials

– GARTNER, OCT. 2020

DNA Data Storage Alliance

30 Industry Leaders Joining Forces to Advance DNA Data Storage

Twist Bioscience
Microsoft
illumina
Western Digital
PFU a Fujitsu company
imec
CATALOG
DNASCRIPT
EPFL
Ansa Biotechnologies
MOLECULAR ASSEMBLIES
ETH zürich
UNIVERSITY of WASHINGTON
CNRS TECHNOLOGIES
IRIDIA
Quantum

Generate industry roadmap

Develop use cases

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by 2024

30%

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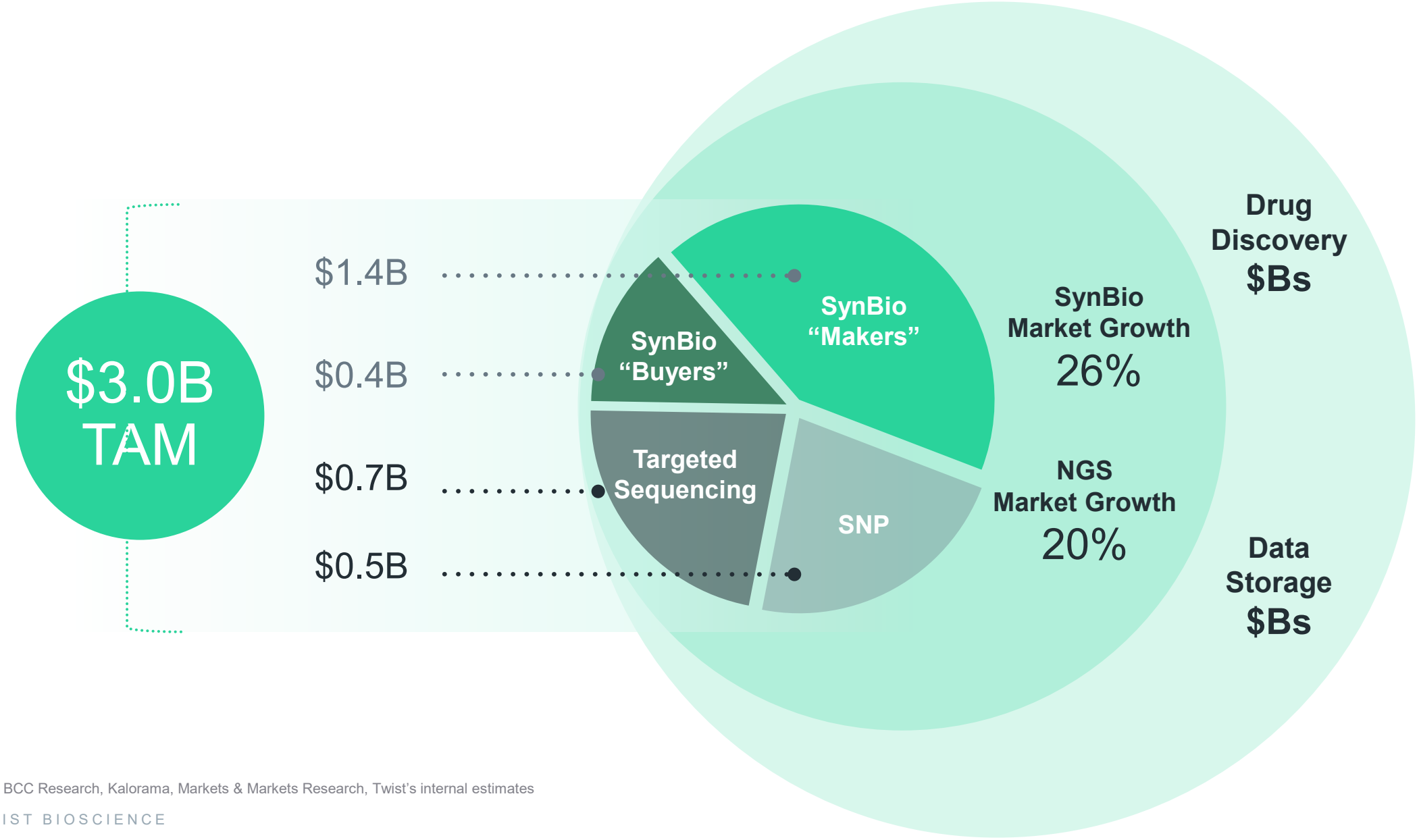
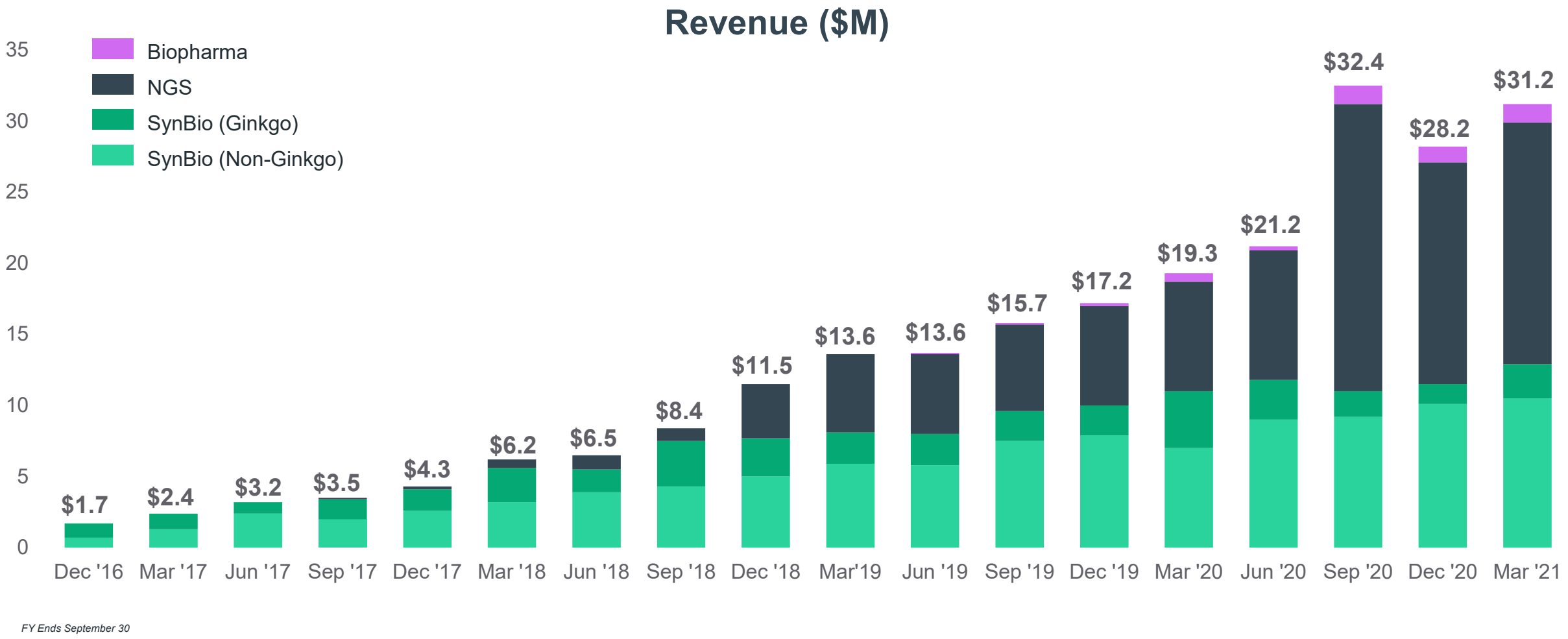
– GARTNER, OCT. 2020

Large and Expanding Addressable Market



Source: BCC Research, Kalorama, Markets & Markets Research, Twist's internal estimates

Quarterly Revenue Growth



FY Ends September 30

Making our Vision a Reality Near Term Objectives

Synbio

- Focus on continued growth and diversification of revenue stream
- Ramping pharma-focused products, including DNA preps and IgG
- ✓ Launch of clonal ready gene fragments
- B2B solutions to allow capture of specific multi-site institutions
- Significant investment in “Factory of the Future”
- Expand OEM Strategy

NGS

- Continued revenue growth and customer ramping production
- ✓ Full launch of methylation solution
- Technical addition of UMIs
- Continued conversion of SNP Microarrays to NGS + sequencing
- Expand OEM Strategy

Biopharma

- Additional partnerships to expand technology base and generate revenue
- Additional internal pipeline of antibodies, pursuing out licensing opportunities by mid-2022

Data Storage

- ✓ Drive technology forward, demonstration of 300 nanometer silicon synthesis on 1-micron pitch
- Execute on IARPA contract

Expand and Accelerate Internal Efforts and Inorganic Investment to Help Ensure Long-term Leadership

TWIST BIOSCIENCE

Writing the Future

Platform for writing DNA on silicon

Large, growing markets

Differentiated value proposition

Portfolio of high growth businesses

Validated business models

High revenue growth

Track record of execution and innovation

TWIST BIOSCIENCE

Writing the Future

EMILY LEPROUST, PH.D., CEO and CO-FOUNDER