



Powering the **Synthetic Biology** and **Genomics** Revolutions

Advances in Genome Biology and Technology

Marco Island, Florida

February 28, 2019



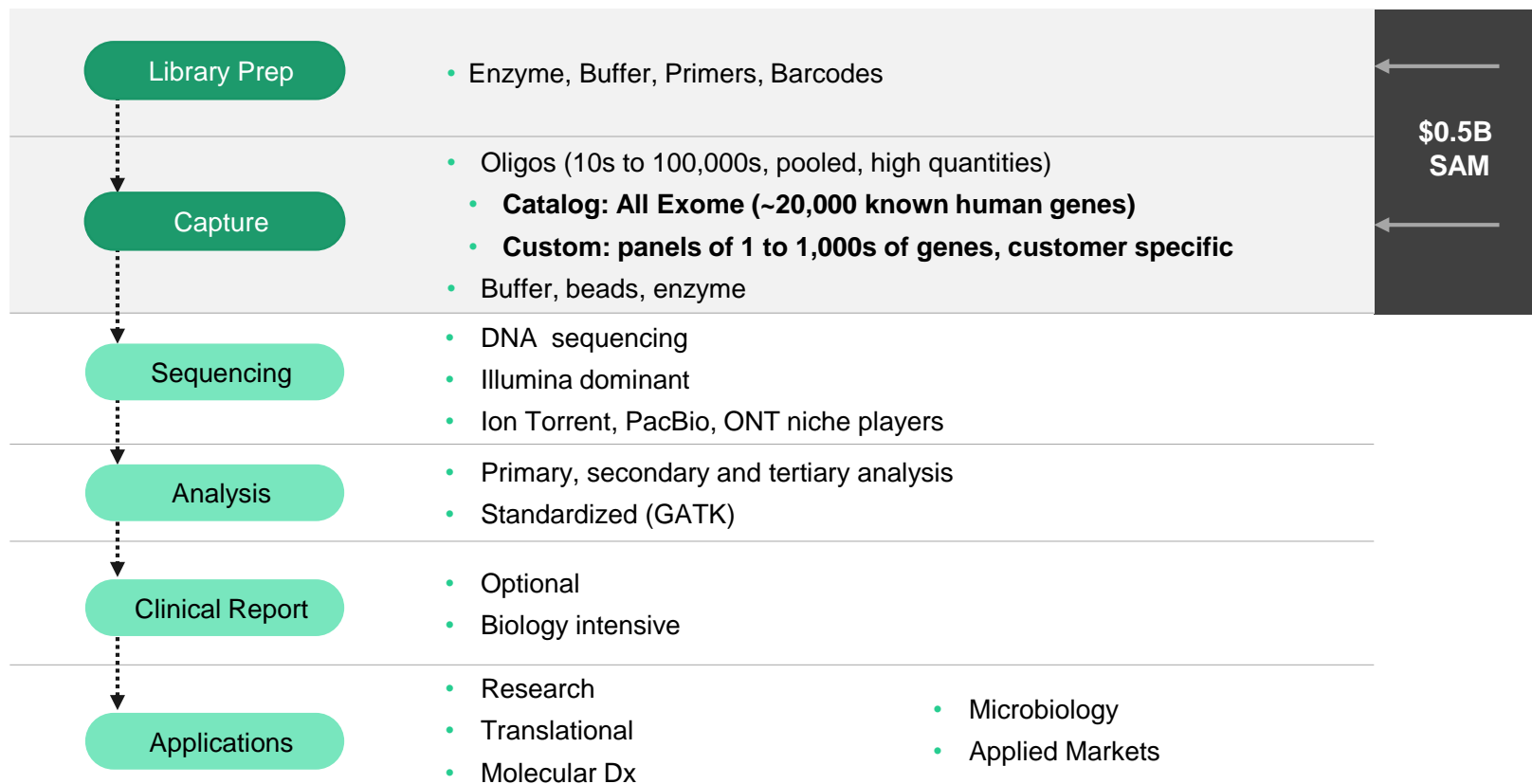
Safe Harbor Statement

This presentation contains forward-looking statements. In particular, statements regarding future economic performance, finances, and expectations and objectives of management constitute forward-looking statements. Forward-looking statements can be identified by the fact that they do not relate strictly to historical facts and generally contain words such as "believes," "expects," "may," "will," "should," "seeks," "approximately," "intends," "plans," "estimates," "anticipates," and other expressions that are predictions of or indicate future events and trends and that do not relate to historical matters. Although the forward-looking statements contained in this presentation are based upon information available at the time the statements are made and reflect management's good faith beliefs, forward-looking statements inherently involve known and unknown risks, uncertainties and other factors, which may cause the actual results, performance or achievements to differ materially from anticipated future results. Important factors that could cause actual results to differ materially from expectations include, among others: our estimates of the size of our market opportunity; our expectations regarding our ability to increase gene production, reduce turnaround times and drive cost reductions for our customers; and our ability to enter new markets. You should not place undue reliance on these forward-looking statements, which speak only as of the date hereof. We do not undertake to update or revise any forward-looking statements after they are made, whether as a result of new information, future events, or otherwise, except as required by applicable law.

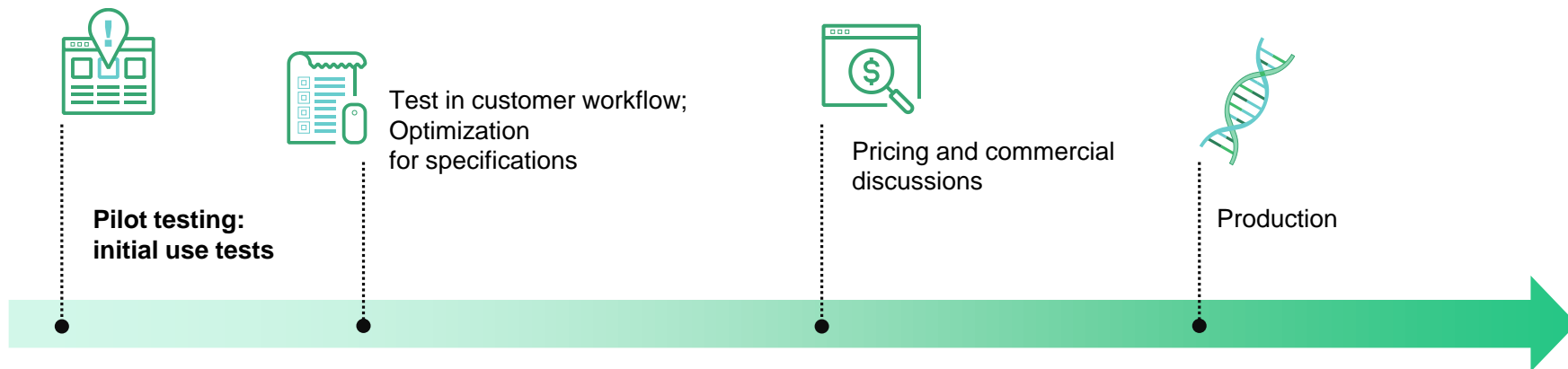
This presentation also contains estimates and other statistical data made by independent parties and by us relating to market size and growth and other data about our industry. This data involves a number of assumptions and limitations, and you are cautioned not to give undue weight to such estimates. Neither we nor any other person makes any representation as to the accuracy or completeness of such data or undertakes any obligation to update such data after the date of this presentation. In addition, projections, assumptions and estimates of our future performance and the future performance of the markets in which we operate are necessarily subject to a high degree of uncertainty and risk.

By attending or receiving this presentation you acknowledge that you will be solely responsible for your own assessment of the market and our market position and that you will conduct your own analysis and be solely responsible for forming your own view of the potential future performance of our business.

Targeted NGS value chain



NGS Conversion – Pilot to Production Pipeline



- Pilot to production cycle typically requires 9 to 18 months
- First Twist customers moved to production Q4 2018
- Capturing more orders and increasing average order size as customer scale-up:

Shipped to over 100 customers in Q1-FY19*

Out of 74 major potential customers: 18 have adopted Twist in their production

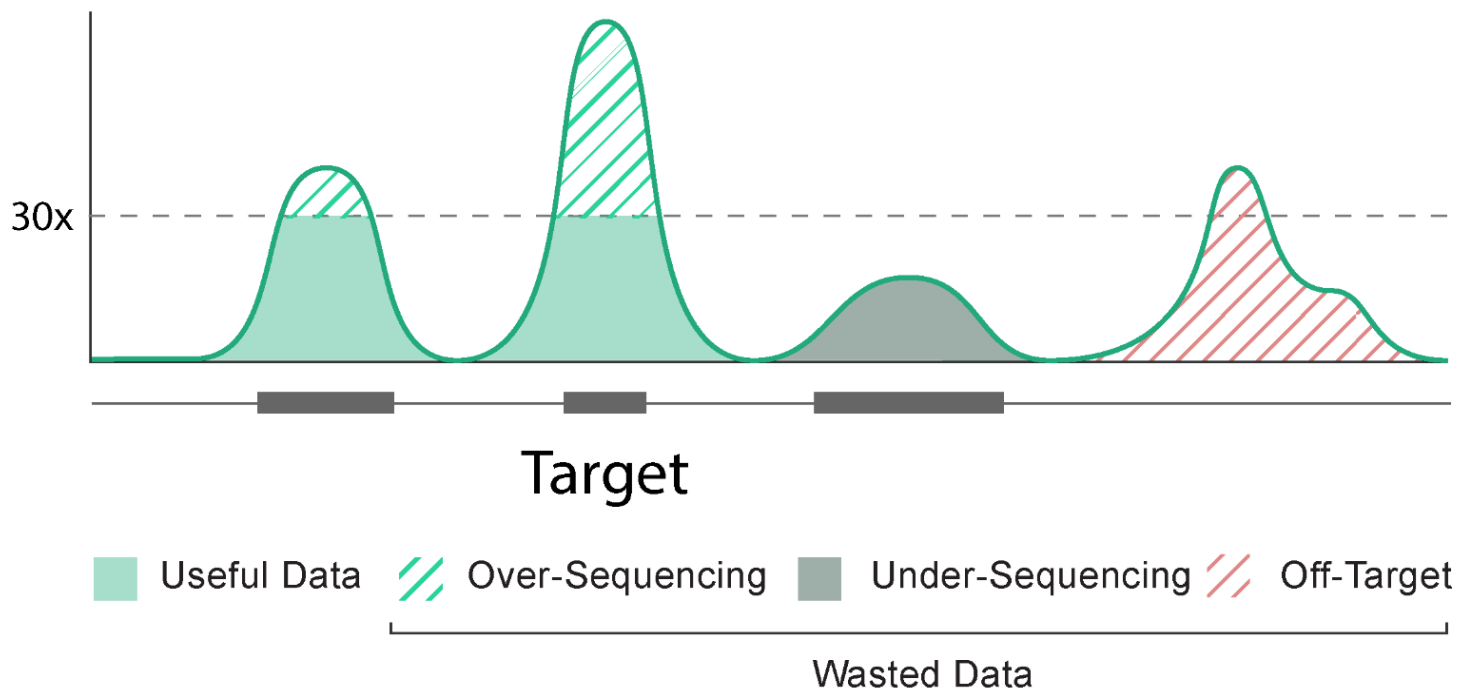
*unaudited



Twist Bioscience Corporation

Goal of Targeted Sequencing

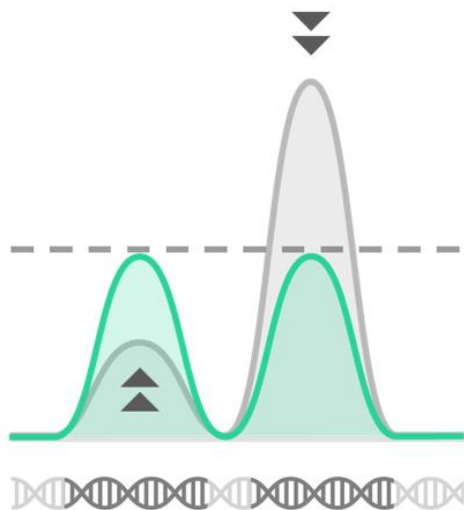
Target enrichment is used to get the **most information** with the **least amount of sequencing and effort**



Target Enrichment

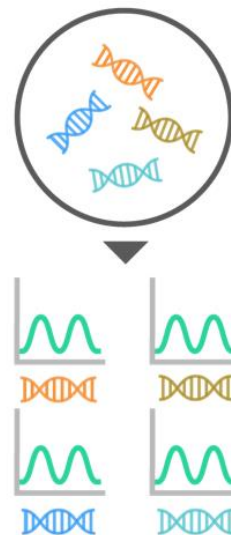
Getting more information less sequencing and less effort

Sequencing Efficiency



Fewer reads needed per sample

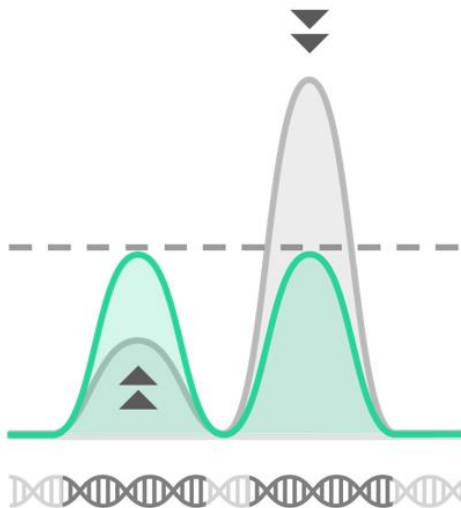
Sample Throughput



Less effort per sample

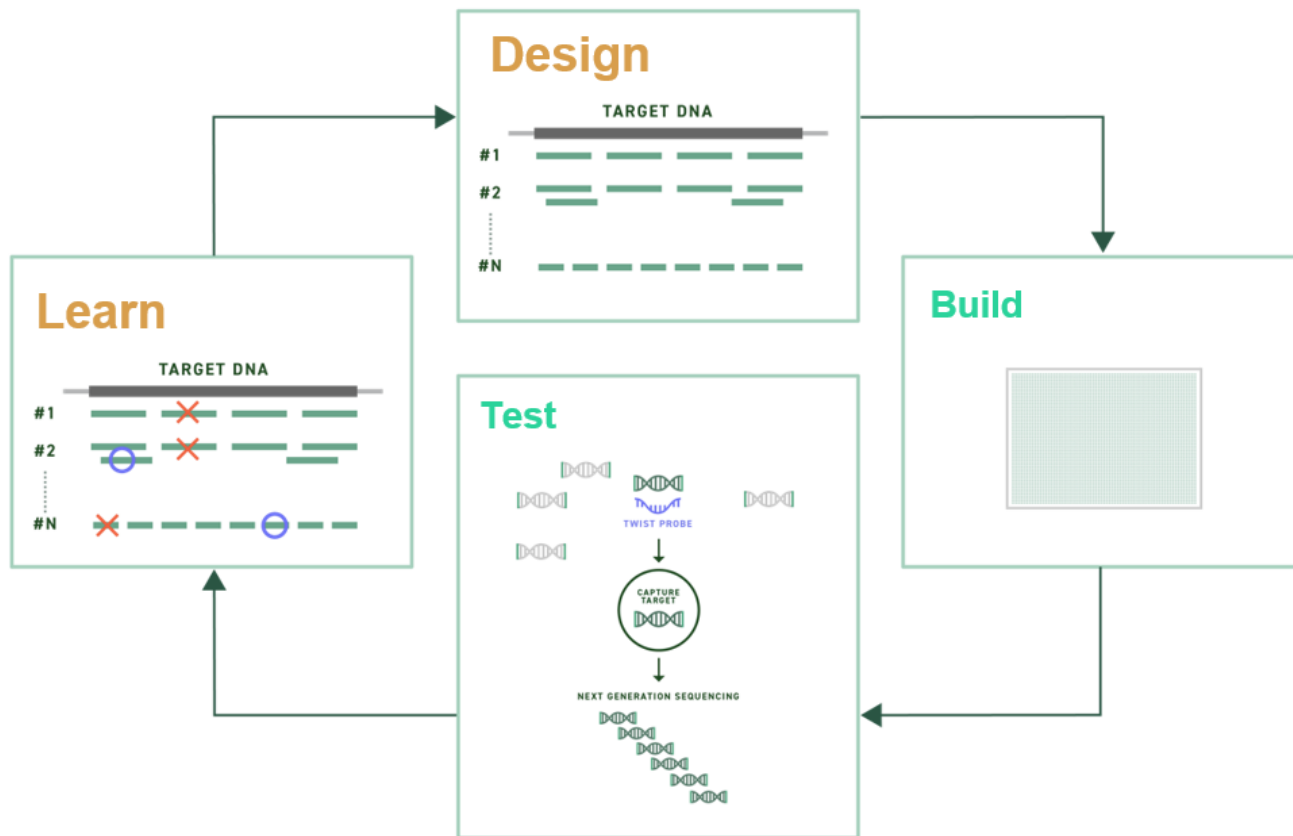
Sequencing Efficiency - fewer reads needed per sample

Sequencing Efficiency

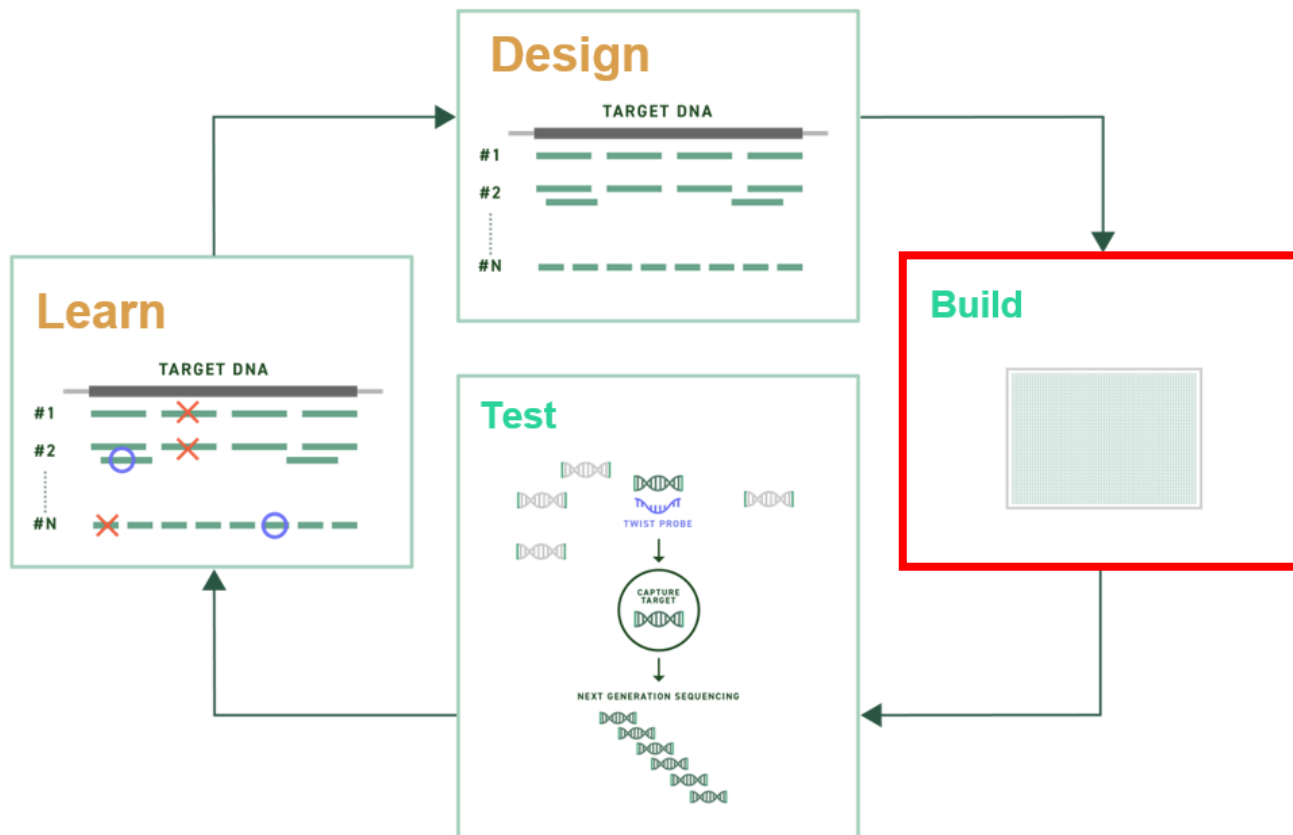


Fewer reads needed per sample

Improving Capture with Design-Build-Test-Learn

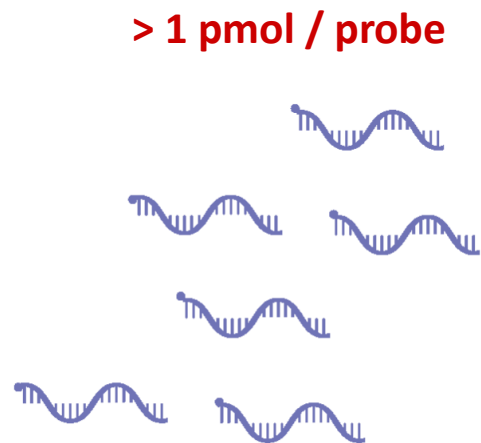
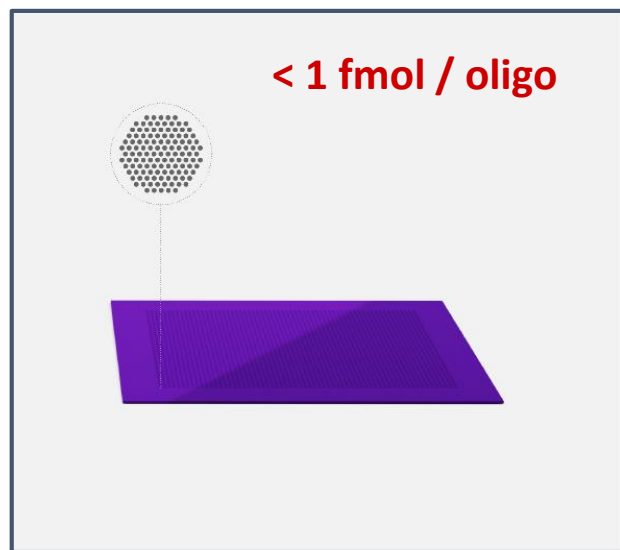


Improving Capture with Design-Build-Test-Learn



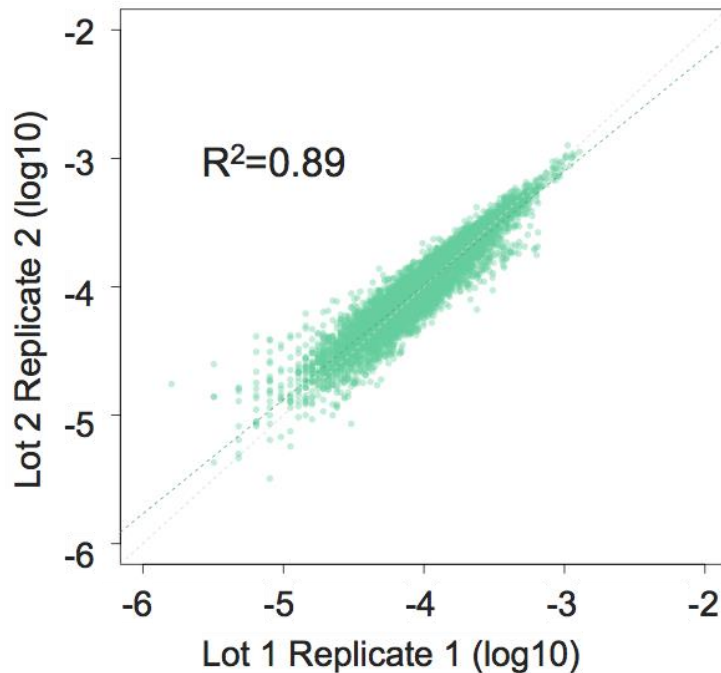
Build – Silicon Based Oligo Synthesis

Twist silicon-based DNA synthesis platform coupled to amplification technology, generates **exome-scale** probes with **fast turnaround time**

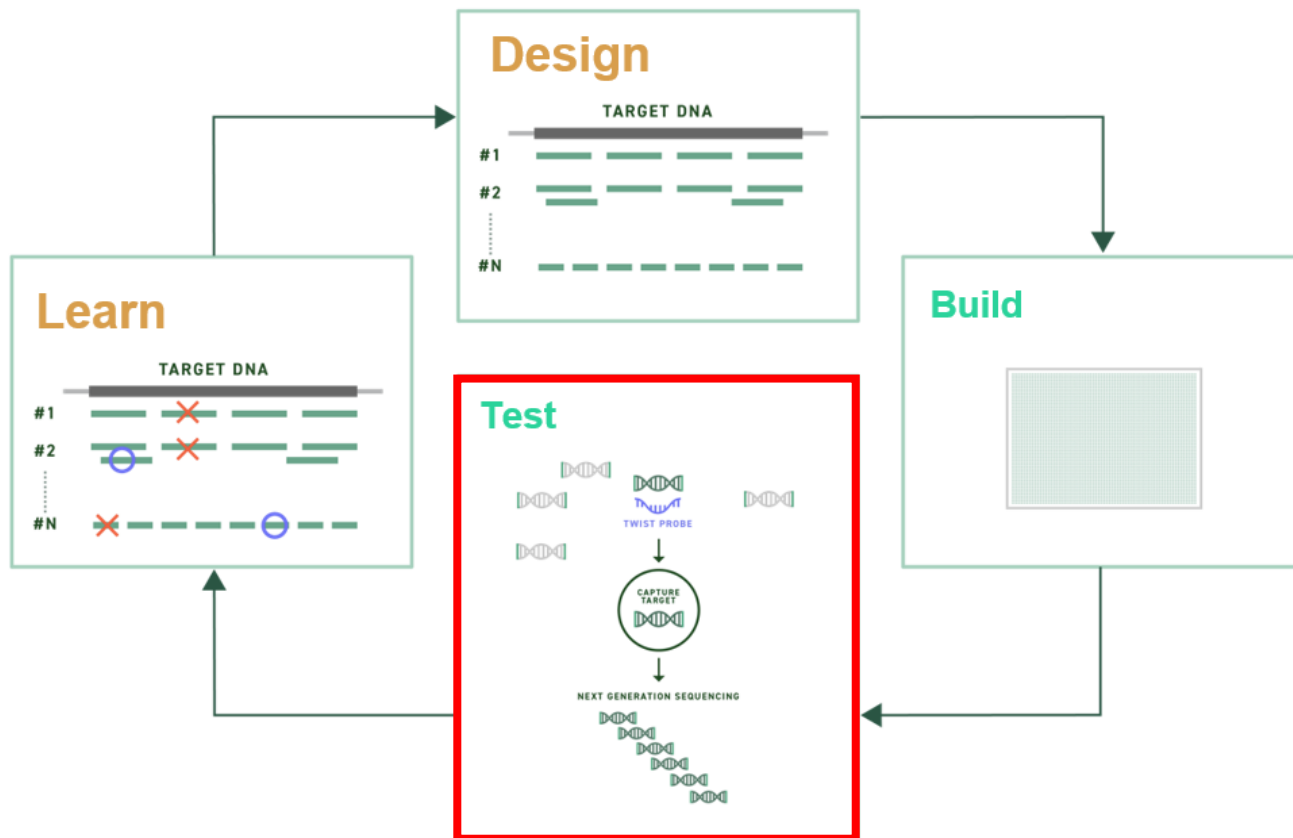


Build – Reproducible Probe Production

Twist probe production process results in reproducible probe synthesis

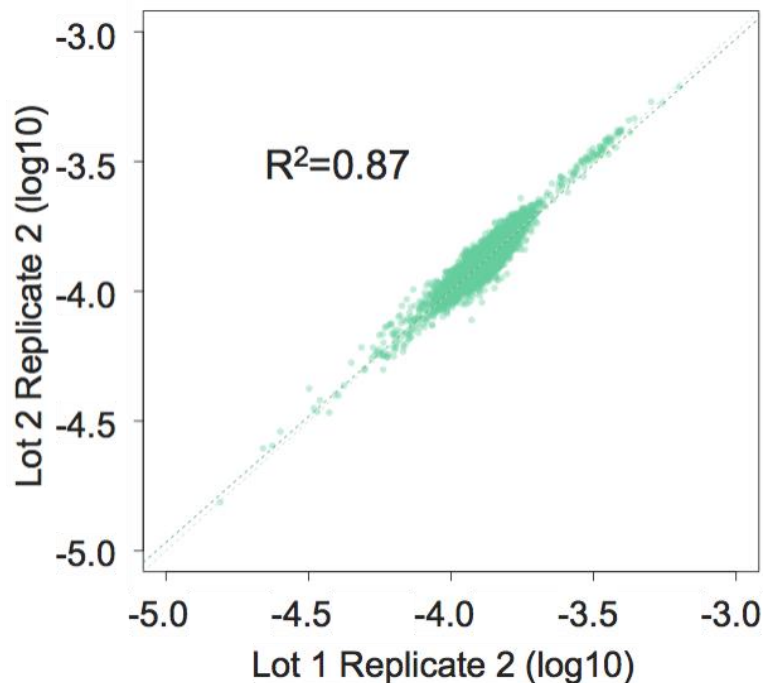


Improving Capture with Design-Build-Test-Learn



Test – Reproducible Lot to Lot Capture

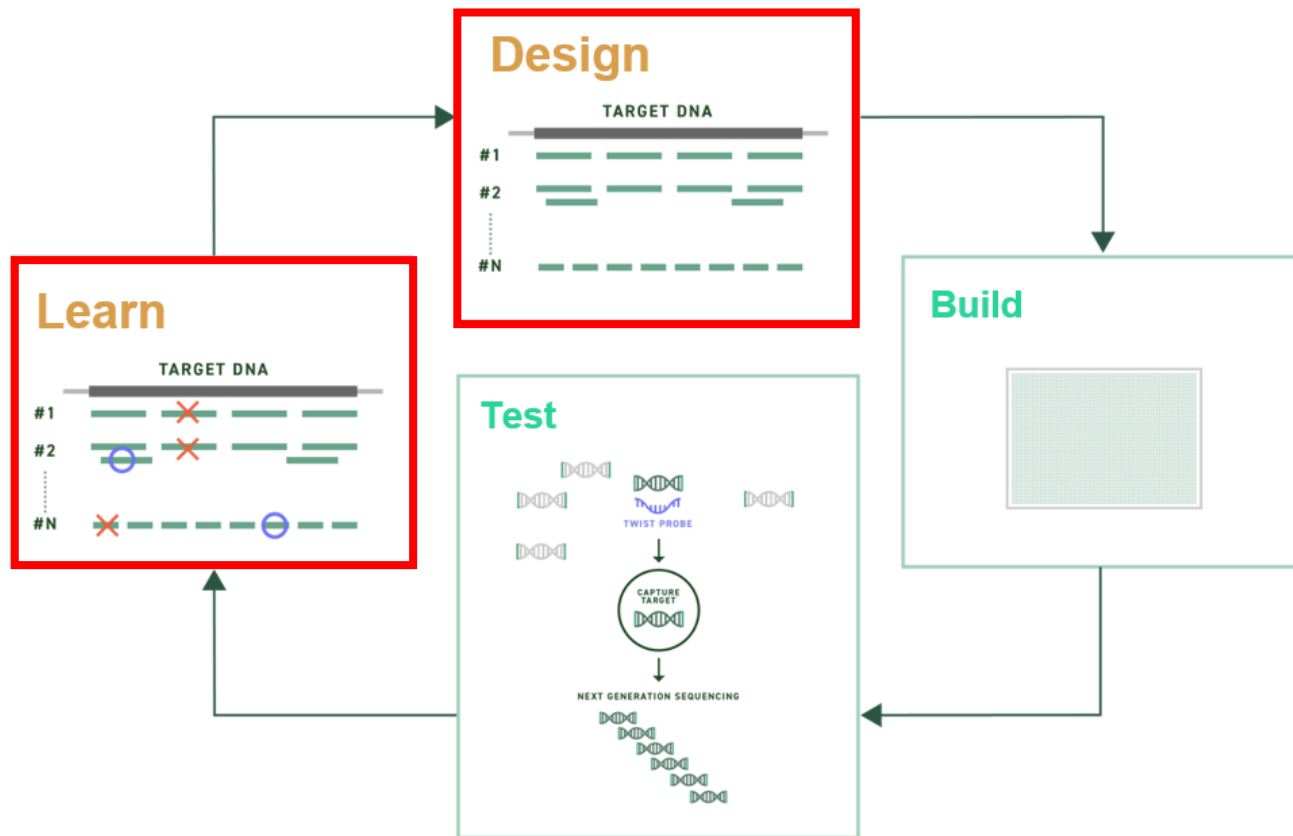
Twist target enrichment process gives reproducible probe performance



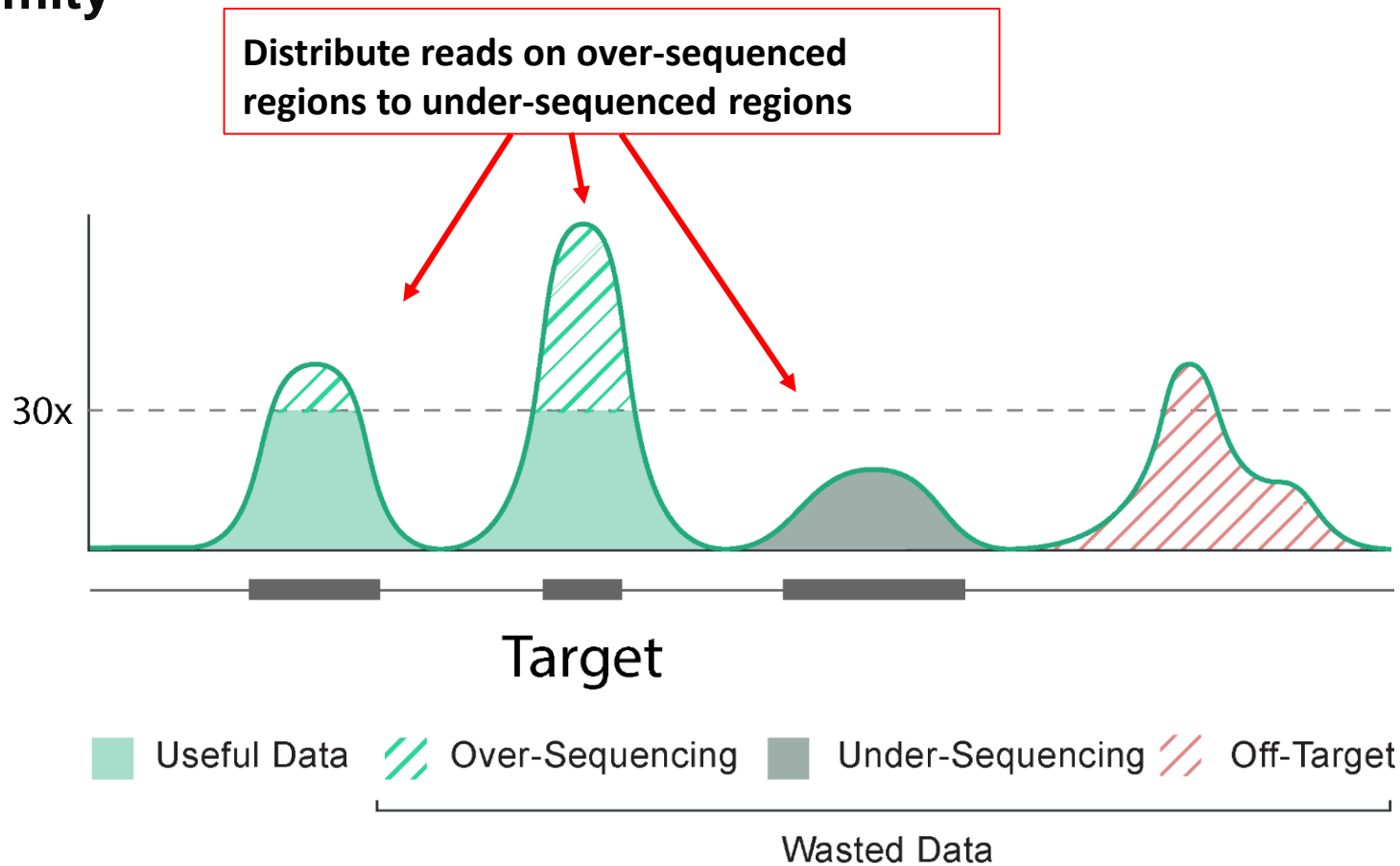
1500x Raw Sequencing
2x76 PE reads



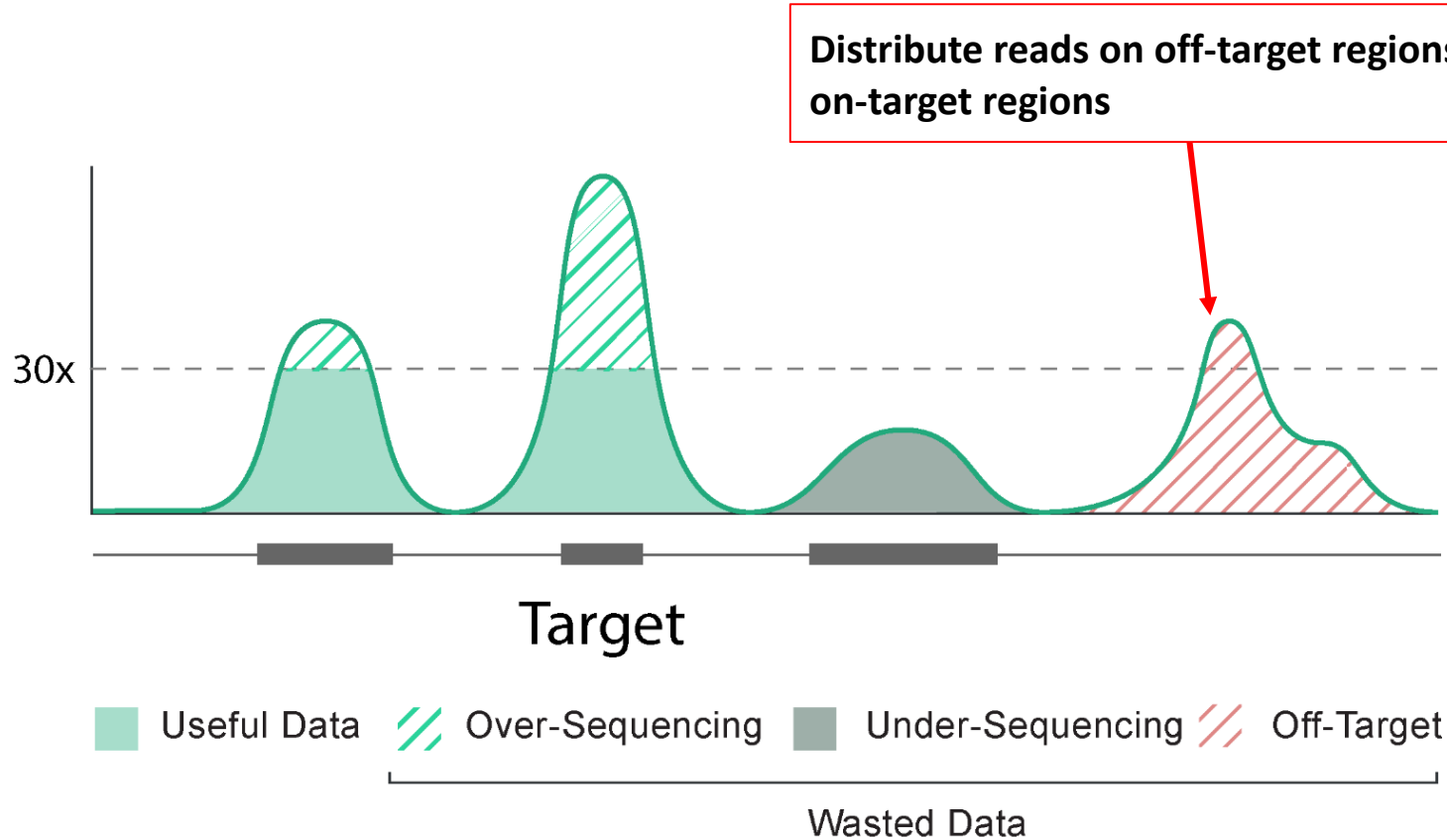
Improving Capture with Design-Build-Test-Learn



Uniformity

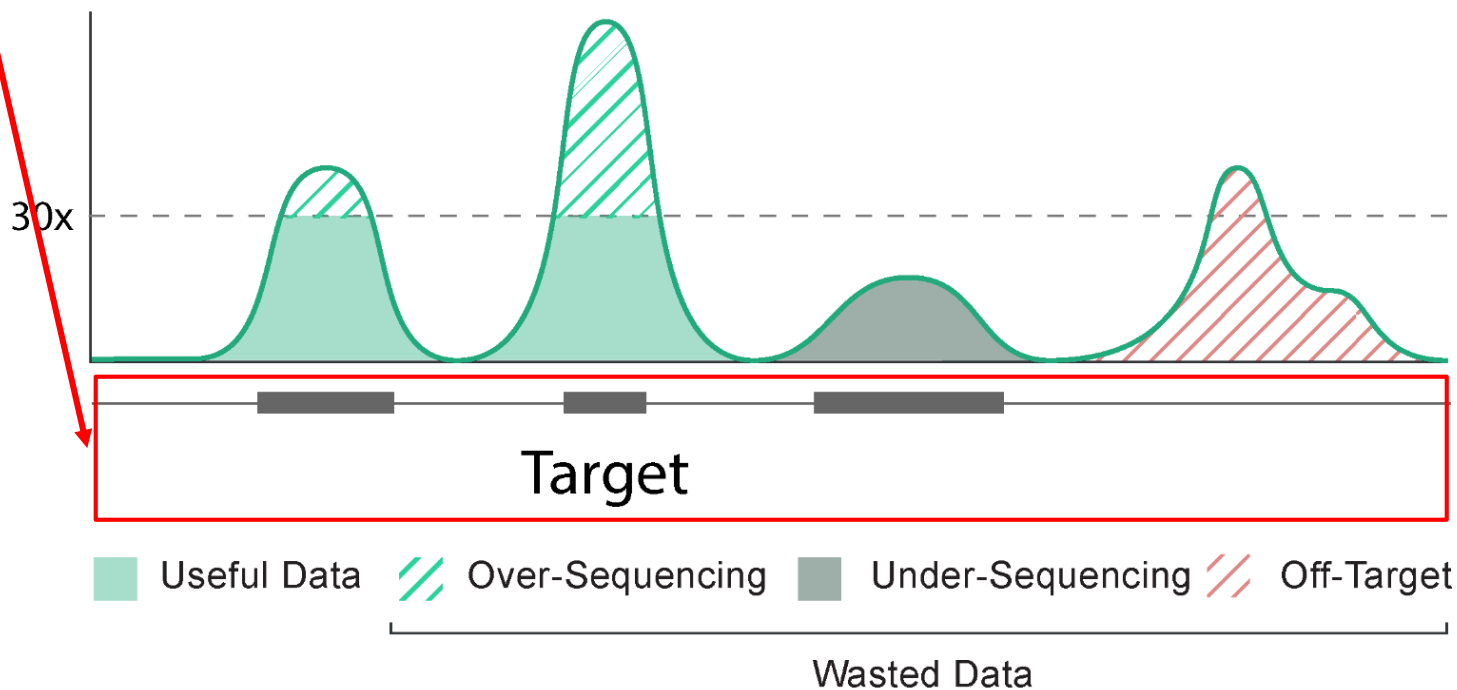


Off-Target



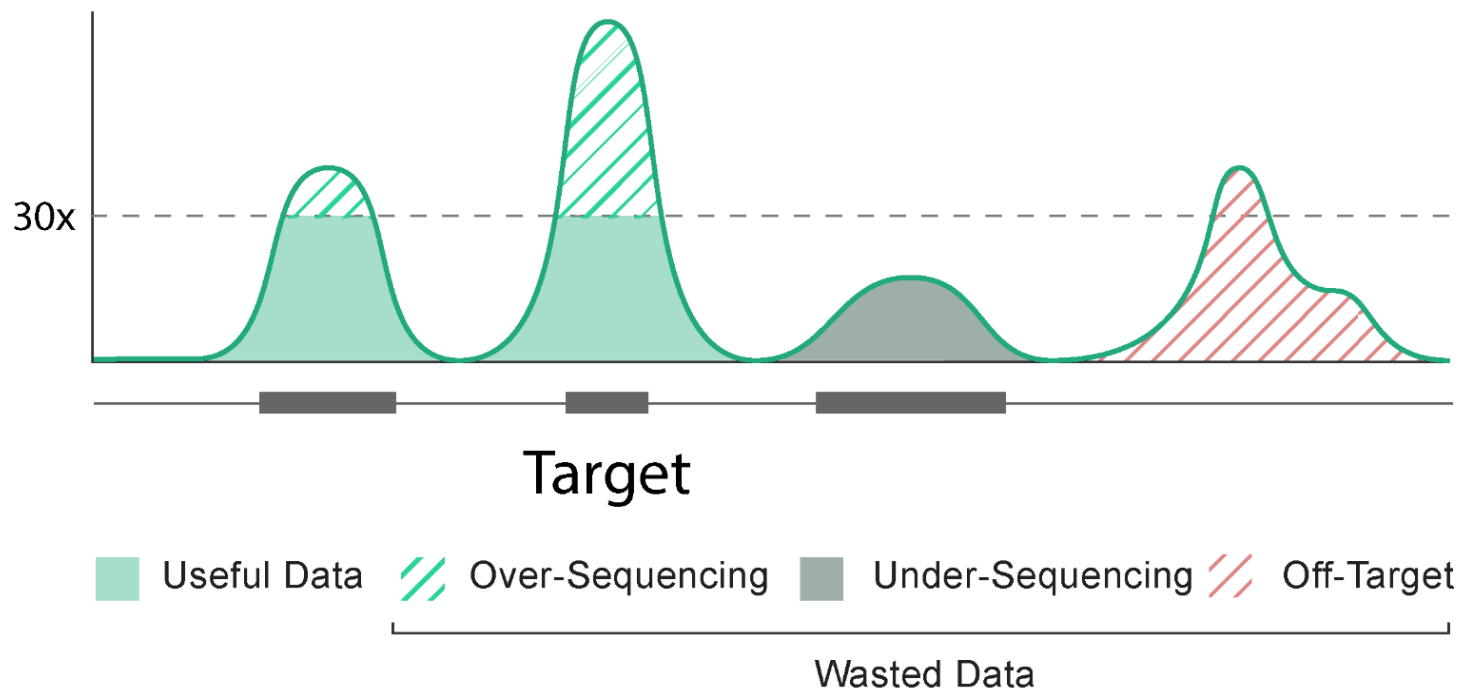
Achieving High Performance Across Applications

Target heterogeneity and complexity



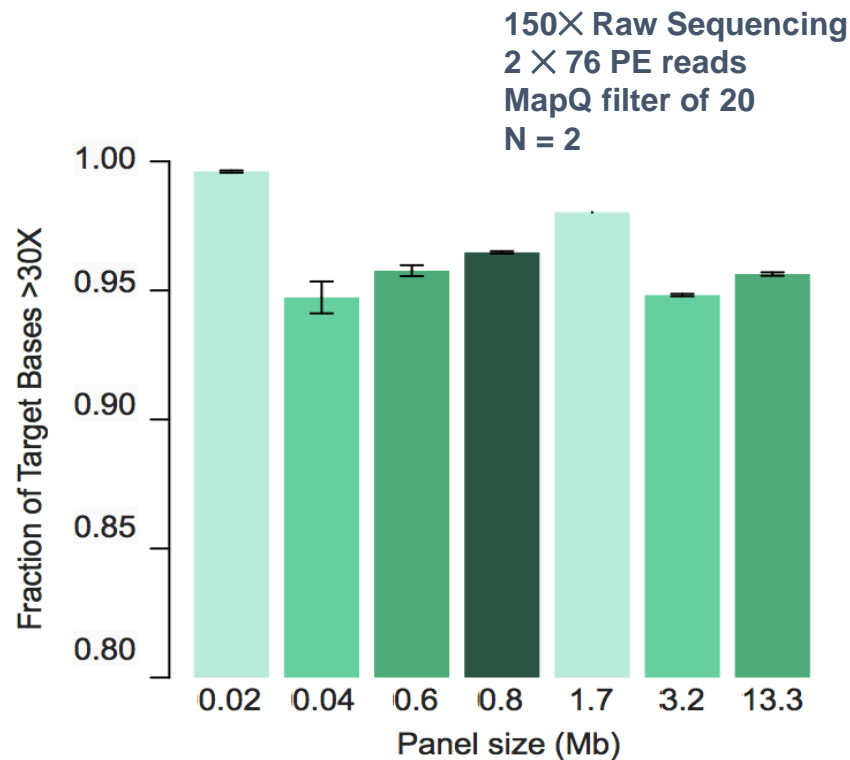
Sequencing Efficiency - Objective Metrics

Target coverage versus sequencing effort is used to assess efficiency.



Culmination of Effort Leads to Excellent First-Pass Performance

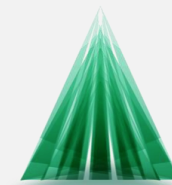
Panel Name	Size (Mb)	Probes	Genes
Mitochondrial DNA	0.02	139	37
Cancer Hotspot	0.04	384	50
Neurodegenerative	0.6	6,024	118
Cancer + Hotspot	0.8	7,446	127
Actionable Cancer	1.7	19,661	522
Pan-Cancer	3.2	31,002	578
Exploratory Cancer	13.3	135,937	5,442



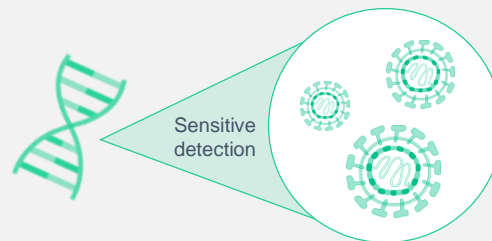
Twist Pan-Viral Panel Show Sensitivity and Specificity

Dilution Series	Viral Copies per Sample	% Mapped Reads to Zika	Number of Zika Reads
Sample 1	36	0.36	106
Sample 2	206	1.22	502
Sample 3	3130	27.68	10,468
Sample 4	57989	67.55	57,688
Negative	0	0	2

10,000x enrichment

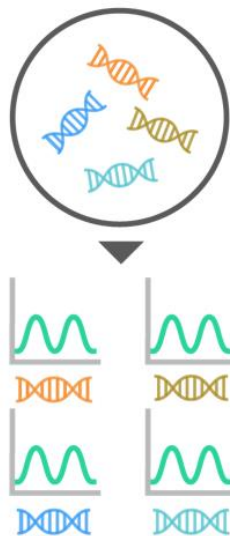


Utilizing the OneCodex database we found identification of Zika in all samples relative to the negative control.

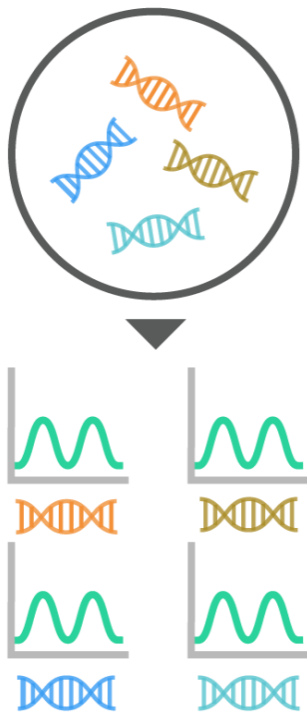


Sequencing effort - higher sample throughput

Sample Throughput



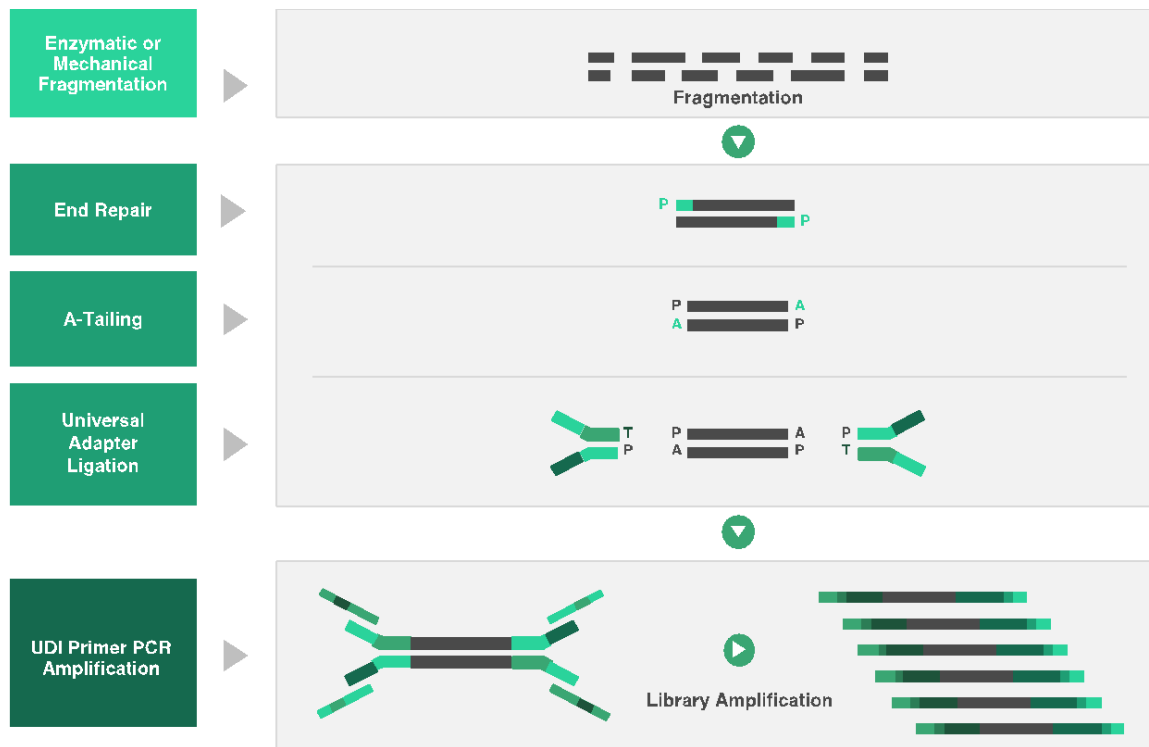
Sequencing effort - higher sample throughput



- **Utilize sequencer capacity** - barcodes and adapters
- **Multiplex barcoded samples** - universal blockers
- **Faster turnaround-time** - fast hybridization system

Library Prep – New Universal Adapter System

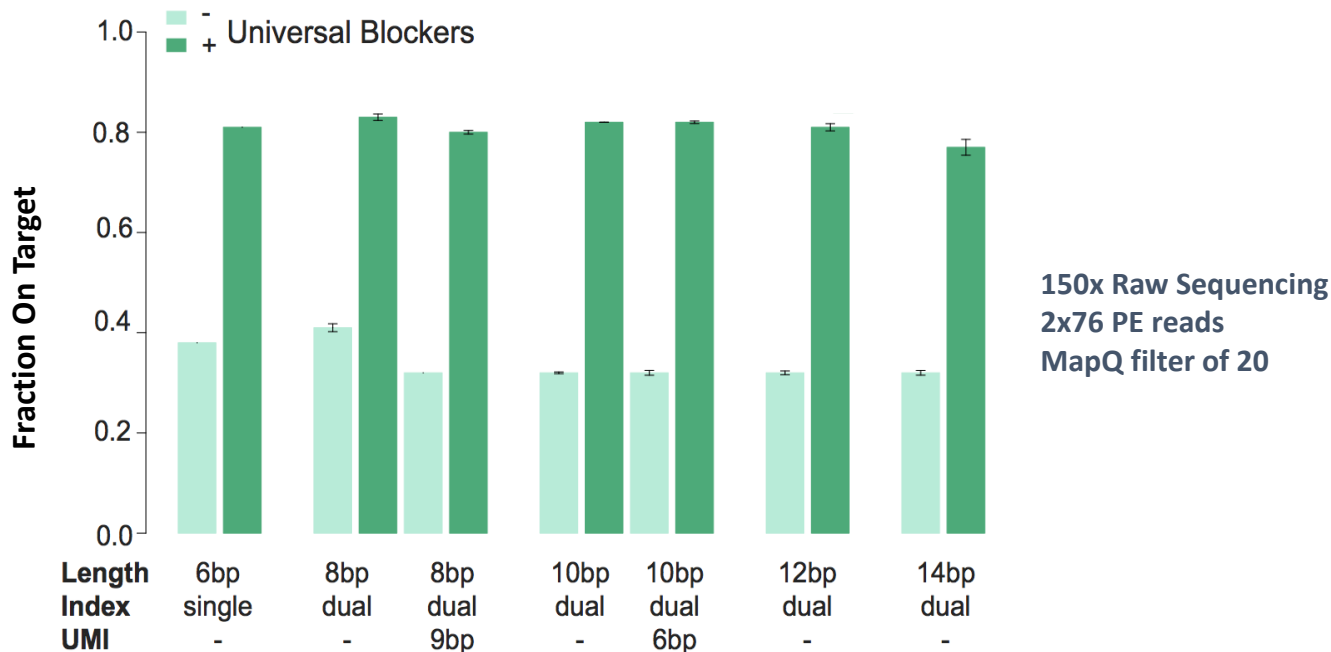
Twist Universal Indexing system can be used to uniquely tag samples and fully utilize the scale of sequencing available



- Maximum Efficiency and Yield
- Available with up to 384 sets of Twist 10bp UDI Primers
- Potential for 1000s of barcodes

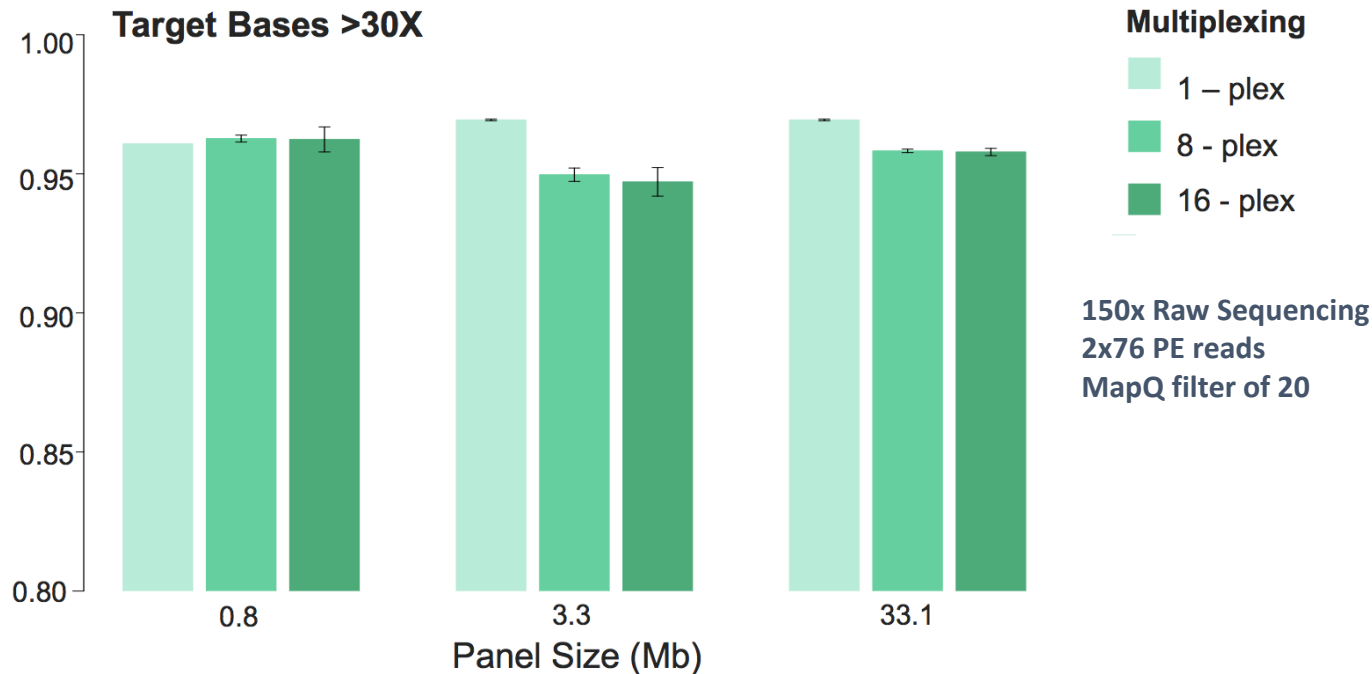
Universal Blockers Enable Large Scale UDIs

Twist Universal Blockers are effective **independent of index size**, thereby **unbounding index scale**



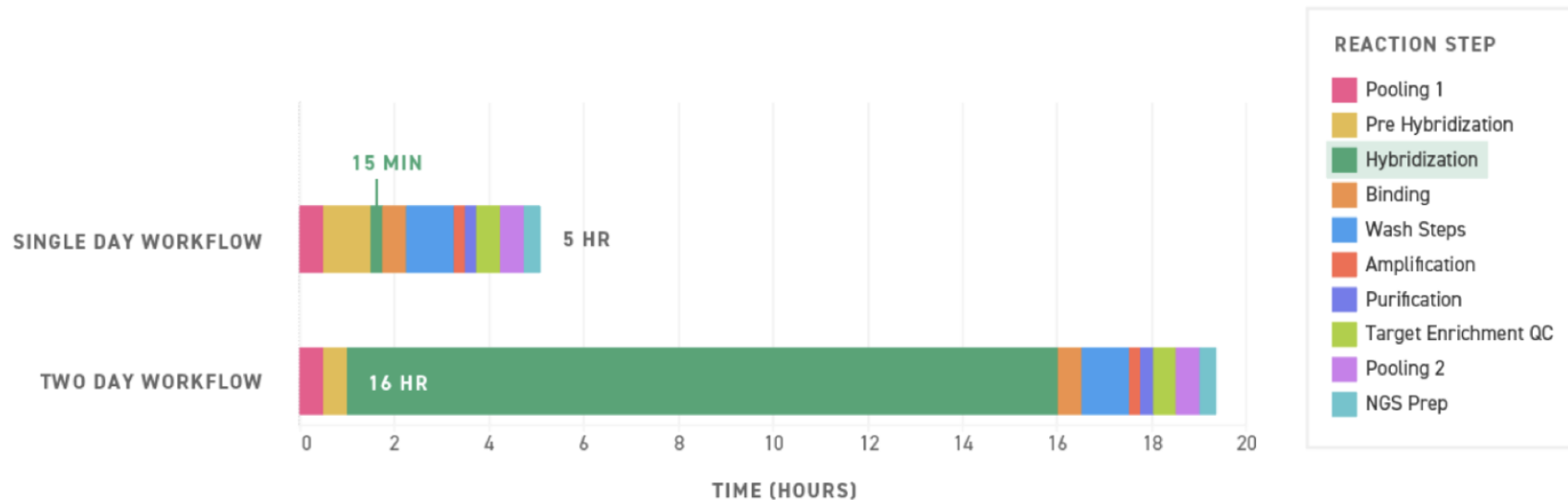
Multiplexing Throughput

Twist Probes, Universal Blockers and UDIs can be used to create **robust multiplexing performance**.



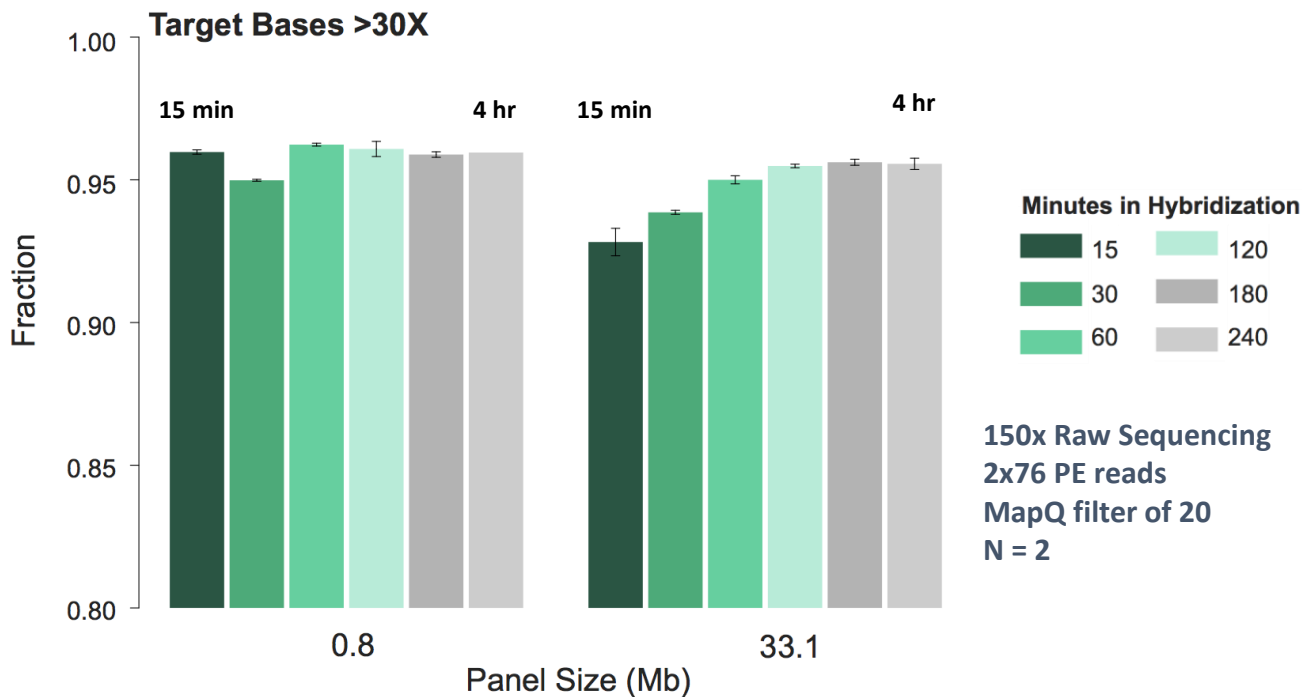
Hybridization Throughput – Fast Hyb

Throughput can be improved to **single-day** with FastHyb buffer system

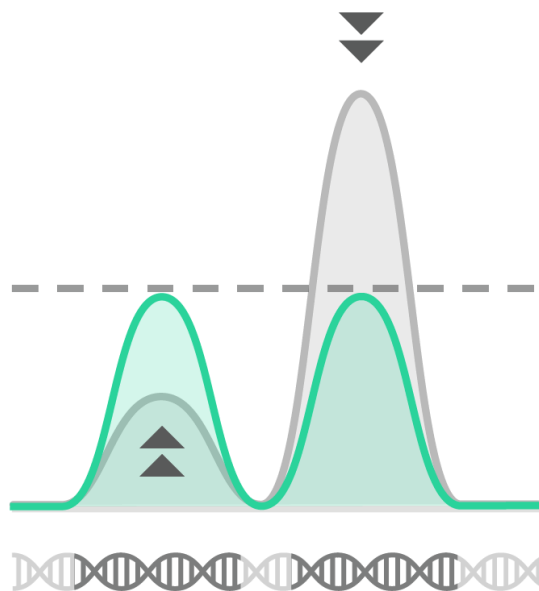


Hybridization Throughput – Fast Hyb

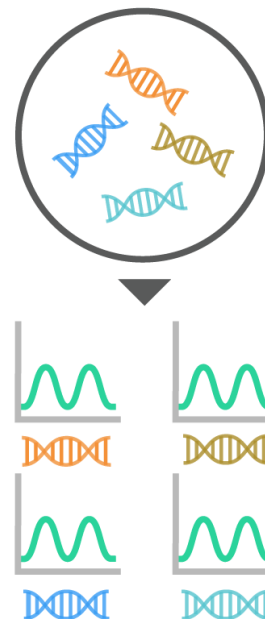
High quality capture across a range of hybridization times ranging from 15 minutes to 4 hours



Sequencing Efficiency



Sequencing Effort



What's New at AGBT?

New NGS Products

(available to Early Access customers), providing dramatic time savings and lowering sequencing costs, foundation for High Throughput

- Twist Fast Hybridization and Wash Kit
- Twist Universal Blockers (to allow flexible blocking and improved on-target capture)
- Twist Universal Adapter System (to maximize performance for library preparation)
- Twist Mechanical Fragmentation Library Prep Kit (to amplify highly-degraded samples)



NGS Customer Presentations

Demonstrating the power of using the Twist NGS Target Enrichment Solutions to identify neurological and inherited diseases, quickly scale consumer DNA testing, and the development of liquid (blood) biopsies.



NGS Campaign Overview

Our technology means we are at the forefront of target enrichment and we enable our customers to lead within their own field, by providing them with exceptional performance, greater flexibility and maximum sequencing efficiency.

- 01 | Our platform means we can iterate panels quickly
- 02 | Our modular kits means we can adapt to any workflow
- 03 | Our uniformity means you can lower your sequencing costs
- 04 | We can increase customers confidence in their variant detection
- 05 | NGS QC means every probe in every panel
- 06 | New products are laying the foundation for High Throughput



TWIST
BIOSCIENCE

LEADERS DON'T FOLLOW

**YOUR ANSWERS AT LOWER SEQUENCING COSTS
THROUGH EXCEPTIONAL PERFORMANCE AND
UNPARALLELED UNIFORMITY**

- Increase confidence in variant detection
- Sequence 2x more samples per lane
- Every probe in every panel
- Leverage Twist silicon-based technology to deliver exceptional content faster
- ISO 13485:2016-Certified QMS

Visit us at the Osprey 1 Room

DON'T SETTLE FOR ANYTHING LESS IN TARGETED SEQUENCING.
Learn more at [TWISTBIOSCIENCE.COM/NGS](https://www.twistbioscience.com/ngs)

AGBT Twist Roadmap – March 1, 2019

10:20-10:50 AM

Twist Booth Presentation

By Dr. Ramsey Zeitoun, Director, NGS Research, Twist Bioscience

Osprey 1 Room, Mezzanine Level 2

12:00-2:00 PM

Twist Gold Sponsored Lunch Workshop, Palms Ballroom

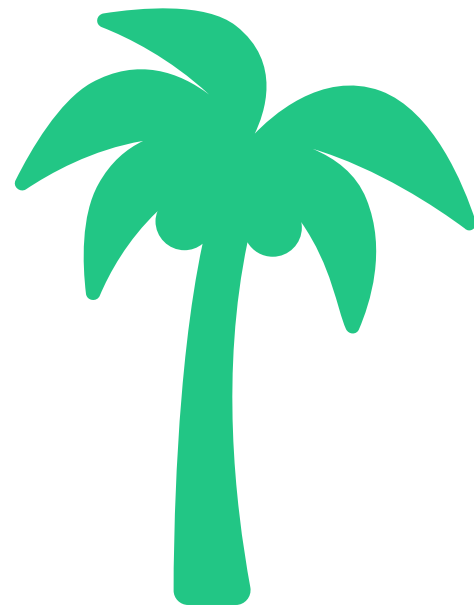
Leading the Way in Target Enrichment: Exceptional Performance,
Improved Efficiency and Rapid Customization of Targeted Sequencing.

- Emily Leproust, PhD, CEO, Twist Bioscience
- Renata Pellegrino, PhD, Technical Director, The Children's Hospital of Philadelphia
- William Lee, PhD, VP Bioinformatics, Helix
- Brendan Blumenstiel, PhD, Associate Director, Broad Institute of MIT and Harvard
- Pertteli Salmenperä, PhD, Molecular Technologies Director, Blueprint Genetics

4:45 PM - 6:10 PM

Poster Session, Banyan Ballroom, Level 1

- Data-Driven Improvements in NGS Target Enrichment Performance by Yehudit Hasin, PhD
- Development of a High-Throughput Target Enrichment System by Ramsey Zeitoun, PhD
Banyan Ballroom



T



Synthetic Biology

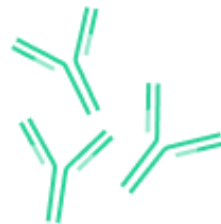
5kb Genes

at disruptive price

- Increase serviceable market
- Enable maker to buyer conversion



3.2kb → 5kb

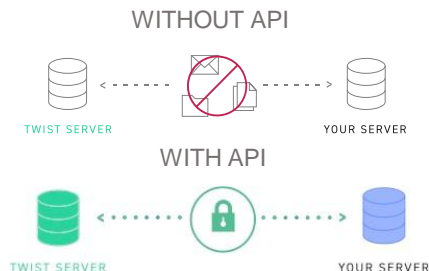


Twist Biopharma

Twist API

(TAPI)

- Seamless integration
- Increase service stickiness



Early POC Data

- Generated early proof-of-concept data
- GPCR library and antibody optimization





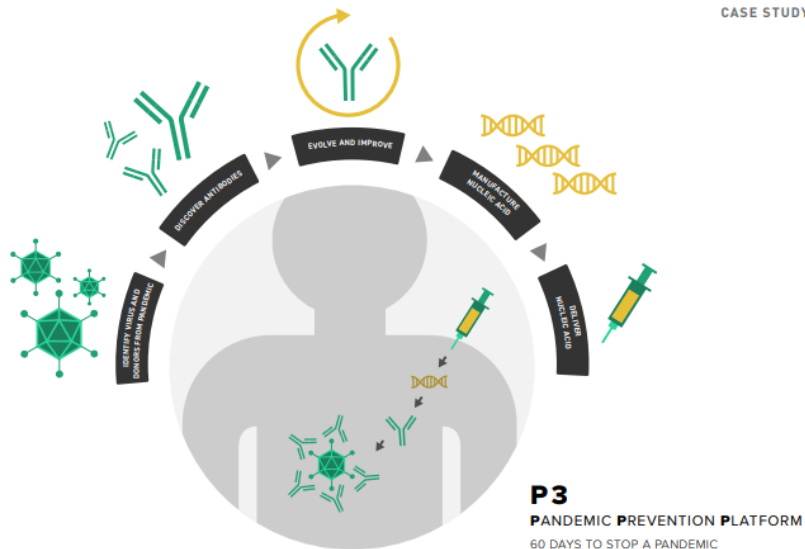
VANDERBILT
UNIVERSITY
MEDICAL
CENTER

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 PROFESSOR OF PEDIATRICS, VACCINE CENTER AT VUMC

CASE STUDY



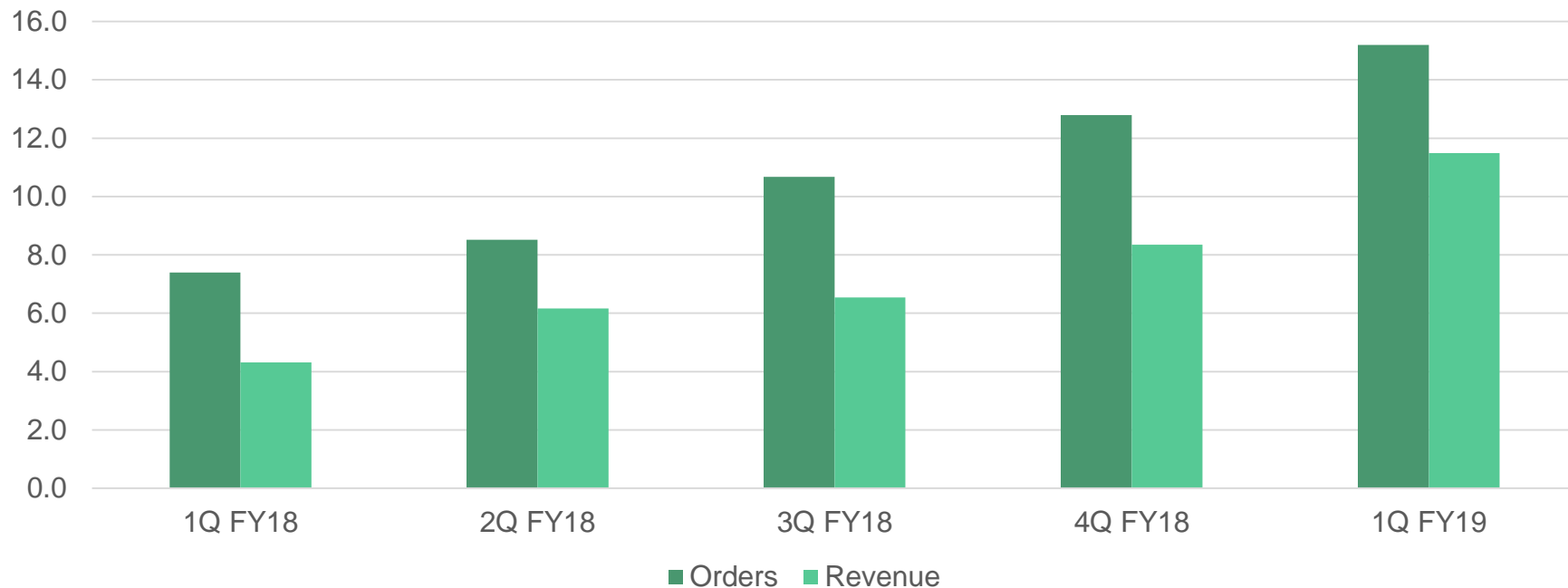
Tasked with an ambitious goal from DARPA to develop a rapid response to help medical workers fight viral diseases in the field, Vanderbilt University Medical Center has already reduced the time to develop antibodies significantly. High-throughput, synthetic genes from Twist Bioscience have allowed the lab to expedite this process.

- Scale to high quantities with Twist's gene synthesis platform
- Affordable synthetic DNA
- High-throughput platform allowed VUMC to accelerate the antibody identification process
- Delivered 100s of genes in 9 business days







Strong Sequential Growth – Global, NGS and Synbio

Orders and Revenue Growth \$M



Twist Bioscience Pipeline

MARKET OPPORTUNITIES	EXPLORATION	PROOF OF CONCEPT	BETA	COMMERCIAL	NEXT STEPS
Synthetic Biology: Synthetic Genes, DNA Libraries and Oligo Pools ¹					<ul style="list-style-type: none"> Continue to drive growth, add market share NPI roadmap
Genomics: Targeted NGS ²					<ul style="list-style-type: none"> Continue converting NGS pilot accounts to production Launch NGS e-commerce platform Backend in China
Biological Drug Discovery and Development ³					<ul style="list-style-type: none"> POC GPCR library and Ab optimization solution Establish partnerships
Digital Data Storage in DNA					<ul style="list-style-type: none"> Continue to develop partnerships to explore digital data storage in DNA

¹ Products addressing this market include clonal, non-clonal genes (gene fragments), oligo pools and DNA libraries

² Products addressing this market include NGS exome capture and NGS custom capture

³ Products addressing this market include custom DNA libraries, our proprietary GPCR-targeting antibody library and our antibody optimization solution





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