BERKELEY LIGHTS (NASDAQ: BLI)

Fleecing Customers And IPO Bagholders With A $2 Million Black Box That's A Clunker, While Insiders and Silicon Valley Bigwigs Race To Dump Stock. Just Another VC Pump at 27X Sales. Target Price: $0.

$2.3B market cap | $33/share | ADV 870k shares | Short interest 5.2% of shares out. *per Capital IQ, Markit 9/14/21*

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Part 1: A trail of customers who allege they were "tricked," misled, or over-promised into buying a $2 million lemon. The reality is so far from BLI's grandiose hype that we believe its product claims and practices may constitute outright fraud.

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1. **Total addressable market is negligible, according to virtually every ex-employee we interviewed; one indicated the TAM numbers that BLI promotes are "ridiculous" and implied the company is misleading investors; another stated the market is at most 300 machines over the next five years, which is $600MM in total or $120MM/year, and thinks it could soon shrink to $60-80MM per year; another indicated the TAM is no more than "a couple hundred machines" worldwide, or $400MM – versus BLI's current market cap of $2.3B.**

2. **Sales are close to saturated given the small TAM; already hit the "ceiling to the growth"; ex-employees indicate that there are only ~30 large pharma/biotech companies who can afford a $2MM machine; most have already bought a machine to try it out; a board member at a competitor painted a grim picture - BLI has peaked, losing ground, and "not selling many instruments" with competitors viewing their volumes as "a bloody disaster."**

3. **Disastrous customer experiences are widespread, echoing and confirming our findings by conveying the experiences of customers we didn't speak with directly,; for example, Bayer, a top 30 pharma company with ~$50B market cap, was allegedly "pretty furious" and sent the machine back**

4. **The instrument is wildly overpriced at $2MM and BLI needs to slash pricing by 50-80%; every single ex-employee we interviewed indicated the pricing is an albatross around BLI's neck; former executive called it "ridiculous," "stupid," "nuts", "so ludicrous" and a reason it's "having a tough go"; an extreme outlier versus other lab tools, perhaps 99th percentile, with competitors like 10X Genomics, Abcellera, Isoplexis, and others selling comparable products and capabilities for a mere 3 to 5% of the price of BLI's machine.**

5. **Operating costs are too high, compounding issues created by the upfront $2MM capital cost; need for dedicated FTE's can add hundreds of thousands per year; maintenance and service contract can add an additional 10-20% per year, potentially adding another $1MM over 5 years; cost of consumables per run can approach >$12-15K for chips and reagents.**

6. **BLI's launch of a lower priced instrument in 2019, called Lightning, has been a total dud with an ex-employee indicating that only 6 to 8 instruments have been placed in its first 18 months; various academic institutions sent it back after trying it for a few months and failing to get any publishable data out.**

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1) Introduction to the real Berkeley Lights; warning signs of a looming collapse and other red flags

Even amidst the recent mania of gambling on vaporous SPAC's and meme stocks, Berkeley Lights stands out for its *prima facie* absurdity and reckless valuation of $2.3B and 27X revenue. We doubt most of its investors can even explain what it does, but all it takes is a casual glance at the financials to recognize that it is a raging dumpster fire and that BLI has no ability to survive as a going concern. Revenues are basically flat over the last 4 quarters – a striking fact for a "growth" stock; losses have doubled and are accelerating; gross and operating margins have tanked, falling sequentially in each period; the CFO and Chief Accounting Officer just fled; and accounts receivable have spiked despite flattening sales – typically an ominous sign that the final meltdown is near. In the June quarter, BLI posted a dismal $19MM of sales – and $18MM of losses.

in millions USD	Q3 Sep-20	Q4 Dec-20	Q1 Mar-21	Q2 Jun-21
Revenue	18.2	21.7	18.6	19.3
Gross profit	12.8	14.8	12.5	12.7
Operating income	(8.2)	(11.8)	(15.1)	(17.8)
Net income	(8.6)	(12.1)	(15.4)	(18.2)
Free cash flow	(12.5)	(4.4)	(11.8)	(16.7)
Accounts receivable	15.2	14.2	17.8	21.5
Gross margin	70.3%	68.1%	66.8%	66.1%
Operating margin	-45.0%	-54.3%	-81.1%	-92.5%

Source: Capital IQ financials; free cash flow calculated as operating cash flow less capital expenditures

1) Introduction to the real Berkeley Lights; warning signs of a looming collapse and other red flags

BLI is a one product company, selling a lab instrument called the Beacon – for $2 million. Launched in 2016, it comes in an entry-level version called Lightning, which ex-employees indicate is an even bigger flop with only 6 to 8 units sold in its first 18 months. What BLI's technology does is not easy for investors to deduce. Even in an era of fraudulent "black-box" IPO's that reveal scant details and mesmerize investors with fancy jargon and sky-high TAM's, BLI stands out for the number of nonsensical phrases, newly-invented words, and drivel it uses to describe itself.

PROPRIETARY DIGITAL CELL BIOLOGY PLATFORM

The Beacon® Optofluidic System

DEEP OPTO PROFILING

OPTOSELECT CHIPS

OptoSeq™ Barcoded BCR

NanoPen chambers

nanofluidics

Source: BLI JP Morgan presentation https://investors.berkeleylights.com/static-files/63363a46-1dd2-4345-828c-d5bdb78bded7; BLI website https://www.berkeleylights.com/systems/beacon/; https://www.healthcare.nikon.com/en/lifescience/sorting-platform/index.html

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BLI seems to fancy itself as a player in "Synthetic Biology." In our experience, synthetic biology is another meaningless term and may as well be a synonym for publicly-traded scam. We have successfully shorted whatever the current cult stock is in the space for the better part of a decade, such as Intrexon. The inevitable endings tend to be notable for their pyrotechnic flair – most recently Zymergen (ticker: ZY), which sported a $3.5B market cap and fell 72% in a single day last month, less than 5 months after IPO.

Shares of Synthetic Biology Hopeful Zymergen Plunge as CEO Departs

BARRON'S

Berkeley Lights website

Zymergen stock fell from $35 to $8 on 8/4/21

Source: https://www.barrons.com/articles/shares-of-synthetic-biology-hopeful-zymergen-plunge-as-ceo-departs-51628032927; BLI website https://www.berkeleylights.com/workflows/synthetic-biology/; BarChart.com;

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While BLI promotes its technology as "Digital Cell Biology" – a vacuous label it appears to have concocted – the Beacon is little more than a glorified flow cytometry and cell sorting machine. Flow cytometers, developed in the 1950's, have been a standard, commodity tool in labs for half a century. Dozens of vendors like Sony, Thermo Fisher, and others sell cytometers, typically for $75-100K vs. BLI's Beacon at $2MM. Cells in a solution are stained with a fluorescent reagent and "flowed" past a laser. The optical scatter is analyzed to determine the number of cells, their size, and other characteristics. FACS machines ("Fluorescent Activated Cell Sorter") are a subset of cytometers, for sorting cells into containers for further analysis or processing.

Sony

Becton Dickinson

Thermo Fisher

Source: https://www.sonybiotechnology.com/us/instruments/sp6800/; https://www.bdbiosciences.com/en-us/products/instruments/flow-cytometers/research-cell-sorters/bd-facsymphony-s6; https://www.thermofisher.com/pr/en/home/life-science/cell-analysis/flow-cytometry/flow-cytometers/bigfoot-spectral-cell-sorter.html

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The use cases for flow cytometers and BLI's machine are identical. BLI's purported and rather underwhelming value proposition is merely that its tool - a comical 20X the price - does the same screens…faster. Single cell screens and sorting assays with cytometers are a daily staple in clinical and research labs. "Assay" is just a fancy way of referring to a specific analysis on a biological sample. For example, countless assays can be run on a blood sample, where different cell types may be counted, analyzed, and separated into red blood cells, B cells, T cells, eosinophils, antibodies, etc. for diagnosis, drug development, or research.

BLI's marketing revolves around the notion that its machine is faster, not that its technology enables radically different capabilities than currently used lab instruments.

BLI key target markets/use cases	Value proposition per BLI's website
Antibody Discovery Lead molecules against any target. At record pace.	**Target to lead molecule in weeks, not months.** *"...Beacon system enables high-resolution screening of plasma B cells with unprecedented speed."*
Cell Line Development The new standard for quality, capacity, and speed	**Select for Even the Most Complex Molecules in Just Days** *"Replace 8-12 weeks of challenging well plate steps with Opto™ CLD on the Beacon™ optofluidic system."*
Synthetic Biology We Provide the Fastest Path to Production Ready Organisms In Synthetic Biology.	**Accelerate the Design-Build-Test Process.** *"Testing used to take months. Our platform makes it happen in hours to days."*

Source: BLI website https://www.berkeleylights.com/platform/

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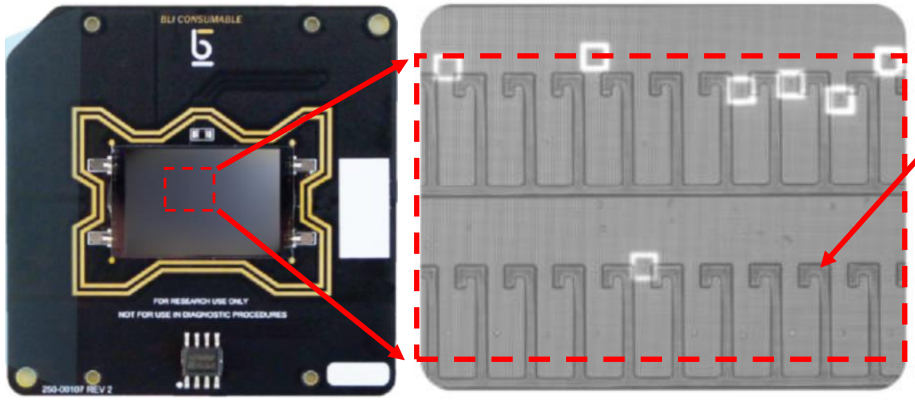
The heart of the Beacon and BLI's origin is based on what it calls an "Optoselect chip" – their purported secret sauce. The chips are the consumable "blades" BLI sells for each run on the Beacon "razor," up to 4 chips per run at around $12-15K. Each chip is etched with thousands of chambers, where cells are deposited and grow. While BLI calls the chambers "NanoPens" and uses words like "Nanofluidics" and "Optofluidics" to make them sound magical, they're just a miniaturized version of plastic well plates. Well plates are a common lab accessory found online for $1 each, with standard numbers of wells – 96, 384, 1536, etc. – where each well is a tiny test tube for culturing cells.

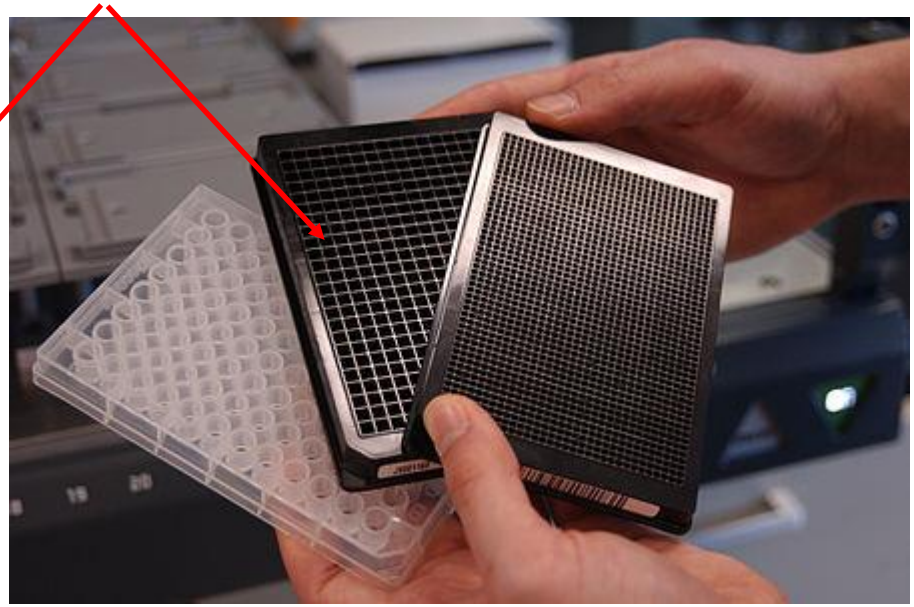
Core of the Optoselect chip is a series of individual wells or test tubes, which BLI calls "Nanopens"



"The OptoSelect chips replace typical well plates. Each OptoSelect chip contains thousands of NanoPen chambers, which are like wells on a microplate. This is where cells are deposited, where they grow…" – BLI website

Typical well plates in 96, 384, and 1536 well sizes

Individual wells or test tubes



Red ours for emphasis, not to scale

Source: BLI website https://www.berkeleylights.com/systems/beacon/; https://en.wikipedia.org/wiki/Microplate

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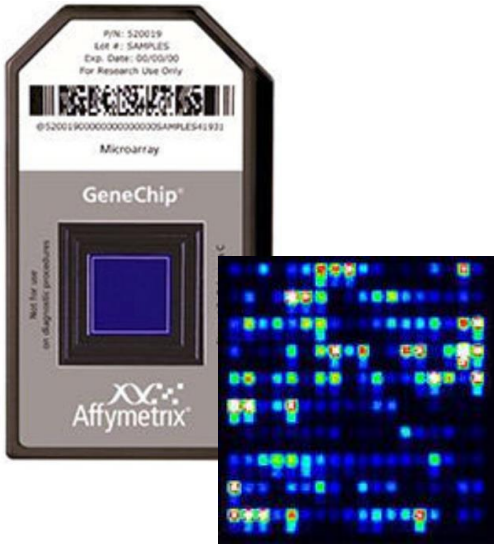
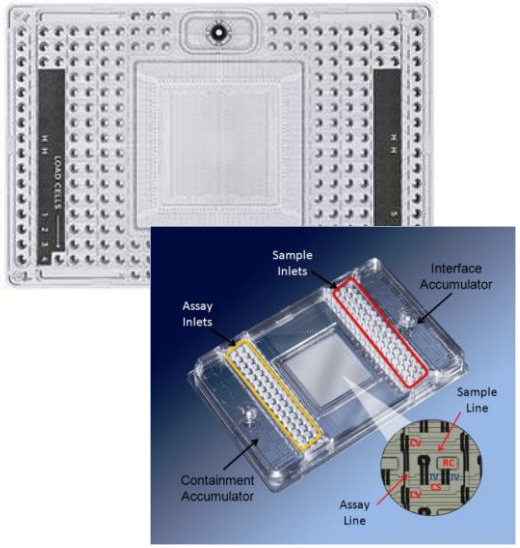
The chips that BLI promotes as revolutionary are based on ancient semiconductor technology and nothing particularly novel. Microfluidics products – where biologists use microarrays on a chip to analyze cells and fluids - have been around for decades and are now a $50 commodity. The microfluidics space is littered with companies that went public and quickly blew up after promoting a "revolutionary biochip" like BLI's. Affymetrix launched its "GeneChip" in 1994 and went public in 1996. Fluidigm launched its "Integrated Fluidics Circuits" in 2003 and went public in 2011. It sells a laundry list of IFC's for various lab tasks, available for as low as $55 each - while BLI prices them in the thousands.

Affymetrix GeneChip – launched 25 years ago



Fluidigm Integrated Fluidics Circuits – launched 20 years ago



Sample price list for IFC's from Fluidigm and other suppliers

Cost per 1 biochip $55-300

Company	Catalog Number	Product Name	Cost per 1 C1 IFC
Fludigm	100-5319	C1 Single-Cell Auto Prep Reagent kit	$60
Life Technologies	4458237	Ambion Single Cell-to-CT qRT-PCR kit	$55
Fluidigm	100-5757	C1 IFC for PreAmp (5-10 µm)	$300

Source: https://www.thermofisher.com/order/catalog/product/902113#/902113; https://www.researchgate.net/figure/A-4848CS-dynamic-array-showing-the-position-of-the-sample-inlets-and-the-assay-inlets_fig1_40037108; https://store.fluidigm.com/Genomics/ApplicationsGenomics/SingleCell/C1%E2%84%A2%20Single-Cell%20Open%20App%E2%84%A2%20IFC-%2010%E2%80%9317%20%C2%B5m; https://www.uab.edu/medicine/rheumatology/uab-cfcc/cost

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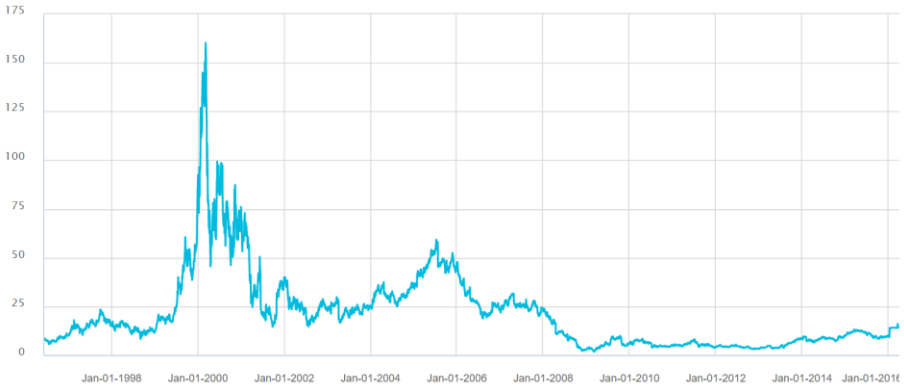
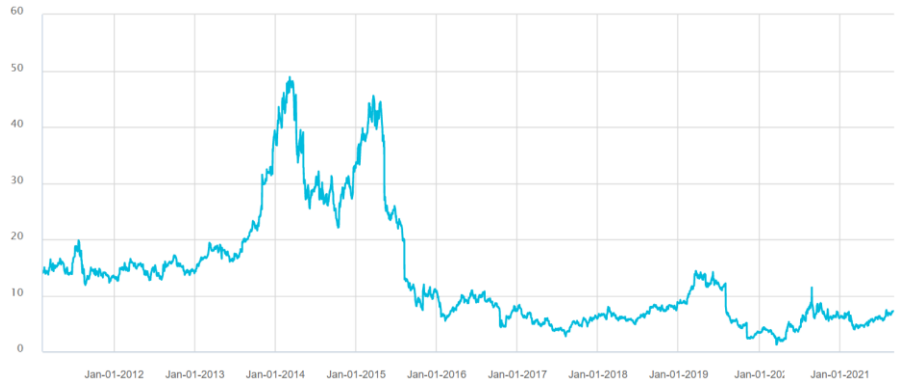
Microfluidics IPO's like Affymetrix and Fluidigm are a cautionary tale for BLI investors and the canaries in the coal mine. Both spiked on early hype only to crash and burn, and illustrate the insignificant TAM, atrocious economics, and tiny market caps in the space. Affymetrix sales were flat for 11 years at ~$350MM before it was put out of its misery by Thermo Fisher in 2016. It traded at 2X sales and was acquired at 3.5X. FLDM has been public since 2011 and trades at 4X sales with a ~$500MM market cap. It quickly grew to ~$100MM in sales – same as BLI - and then crashed with sales flat around that level since 2014. It has racked up massive losses in every year of its existence, peaking at $1.2B market cap and spending most of its time between $90MM and $300MM.

Affymetrix (AFFX) stock price 1996-2016



Fluidigm (FLDM) stock price 2011-present



Source: Capital IQ data

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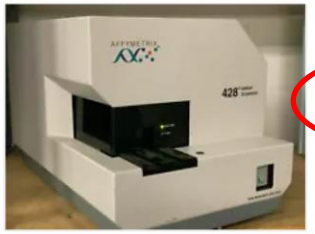
The typical lifecycle of fancy microfluidics instruments sold by players like Fluidigm and Affymetrix is a pretty good analogy for their stocks – and a preview of the future for BLI investors. They start off shiny, new, and expensive – and end their days in the gutter section on eBay and lab equipment sites at 95-99% off.

Fluidigm C1 Single-Cell AutoPrep DNA/RNA Preparation Unit2
Pre-Owned
$3,995.00
Buy It Now
Freight
from United States

AffyMetrix GeneChip Station 400 Microfluidics Workstation
Pre-Owned
$810.00
Was: $900.00 10% off
or Best Offer
+$139.00 shipping
from United States

Fluidigm AX system with FC1 Cycler, Pre and Post PCR BMK-IFC-AX
Pre-Owned
$599.00
or Best Offer
+$12.00 shipping
from United States



Affymetrix Scanner 428 Array Scanner
Pre-Owned
$500.00
or Best Offer
Freight
from United States

Fluidigm AX PCR BMK-IFC-AX
Pre-Owned
$399.00
or Best Offer
+$48.00 shipping
from United States

Affymetrix GeneAtlas Imaging Station
Pre-Owned
$1,199.99
or Best Offer
Free International Shipping
from United States
Top Rated

Source: Ebay listings https://www.ebay.com/sch/i.html?_from=R40&_trksid=p2334524.m570.l1313&_nkw=fluidigm&_sacat=0&LH_TitleDesc=0&_osacat=0&_odkw=affymetrix&_sop=12;;
https://www.ebay.com/sch/i.html?_from=R40&_trksid=p2334524.m570.l1313&_nkw=affymetrix&_sacat=0&LH_TitleDesc=0&_odkw=fluidigm&_osacat=0&_sop=12

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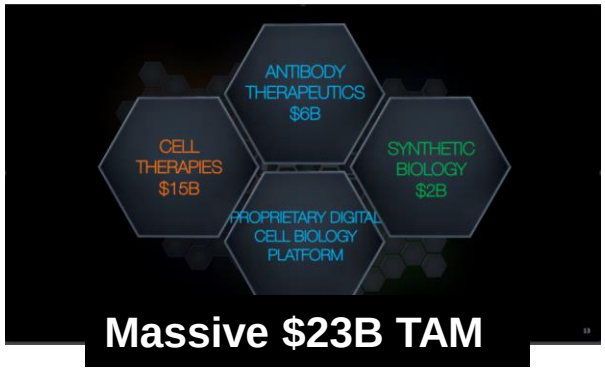
Of numerous red flags at Berkeley Lights, one simple and obvious question led us to investigate the company. The bull case is 1) a massive $23B TAM and 1,600 potential customers; 2) a revolutionary technology; 3) an overwhelming value proposition; and 4) amazing customer validation from leading players like Amgen. Yet BLI launched its flagship machine in 2016. Which leads us to the elephant in the room….

If all this is true, why is their installed base still a pitiful 92 systems… FIVE YEARS after launch?

Bull case from BLI JP Morgan presentation



Massive $23B TAM

Revolutionary technology

Overwhelming value proposition

Amazing customer validation

Source: BLI JPM presentation https://investors.berkeleylights.com/static-files/63363a46-1dd2-4345-828c-d5bdb78bded7; black captions with white font are ours for emphasis.

We noticed other signs that something is amiss, such as the record speed with which BLI's venture capitalists and management began to dump stock after the IPO. The prospectus indicated a standard 180 day lockup, yet on Nov 16, 2020 – 4 months after IPO – BLI announced a secondary offering for its holders with no proceeds to the company. Early releases from lockup are not only aggressive but relatively rare. VC firms that were among the largest holders at IPO have completely fled or are in the process of doing so. Even Nikon, its partner/distributor with an 8% stake at IPO, who we presume has visibility into the sales pipeline, already appears to have bolted. We note another bearish sign: insiders opened a flurry of 10b5-1 plans near ~$60, yet have continued to sell at progressively lower prices in the $40's and now $30's – more than 40% below the plan inception price.

Largest holders at IPO already bolted earlier this year….

Holder	Mar-31-2020	Jun-30-2020	Sep-30-2020	Dec-31-2020	Mar-31-2021	Jun-30-2021	Latest
Khandros Ph.D., Igor Y. Co-Founder & Independent Director	-	-	11,921,016	10,211,628	9,711,628	9,711,628	9,059,898
Celesta Capital	-	-	10,488,198	9,416,084	0	-	-
Sequoia Capital Operations LLC	-	-	8,048,013	8,048,013	4,828,808	3,499,443	2,554,524
Nikon Corporation (TSE:7731)	-	-	4,360,713	3,976,734	0	-	-
Walden International	-	-	3,183,158	2,860,225	0	-	-
Wu Ph.D., Ming C. Co-Founder & Member of Scientific Advisory Board	600,000	600,000	1,200,000	1,094,335	1,094,335	1,094,335	1,094,335
Marks, Michael E. Former Independent Chairman	-	-	1,049,654	19,230	1,302,408	1,302,408	1,302,408
FMR LLC	-	-	1,033,459	1,349,427	1,067,115	677,652	677,652

Source: Capital IQ data; BLI SEC filings

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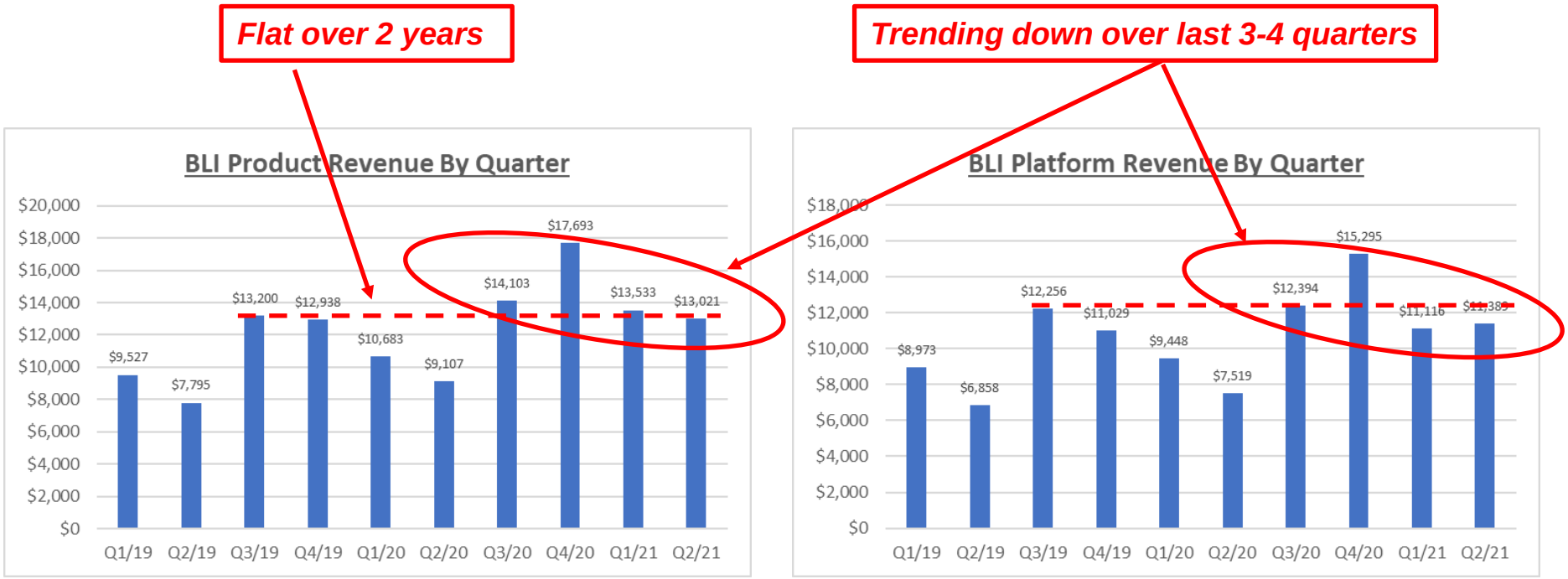
We observed warning signs in the financials, hiding in plain sight, that indicate a business treading water and floating sideways – a startling fact for a "growth" stock at ~30X sales. Product revenues have been basically flat for 4 quarters – typically a death knell for a company that sells a box with chips. Except for one strong quarter, they have actually gone nowhere for 2 years – the recent June quarter posted product sales lower than mid-2019. Platform revenue – just machines, excluding consumables – has been equally anemic for 2 years.

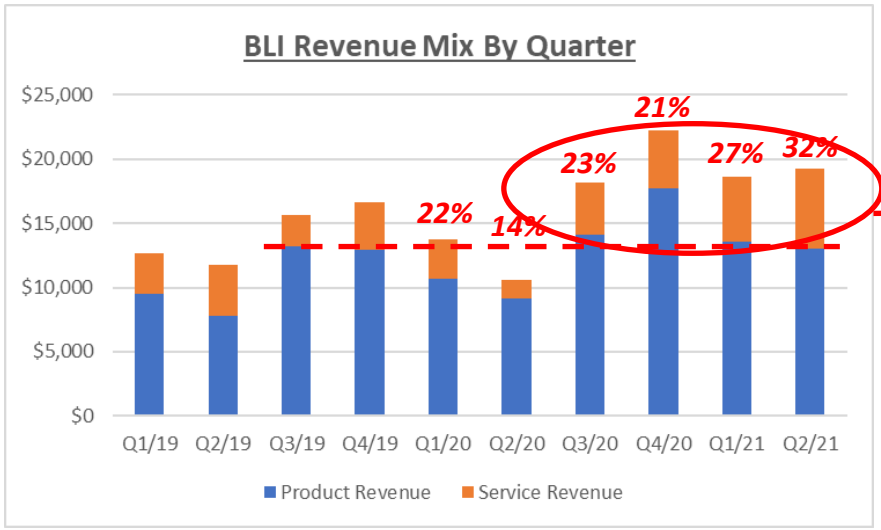


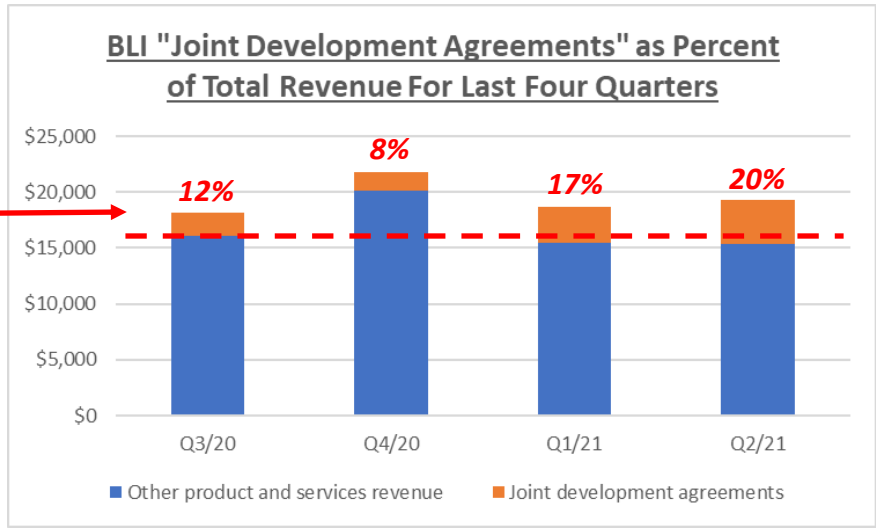
Source: BLI SEC filings; Capital IQ data

The quality of revenue and its mix has rapidly deteriorated as well, on top of flat product revenue in general. BLI appears to be struggling to scrape together enough shards of revenue to try and keep the story going while insiders dump stock. First, services revenue – training, support, and other low quality items - as a percent of total has spiked and accelerated in recent quarters, to 32% of total revenue in the June period. Second, the mix of services revenue itself is troubling. The percentage from "joint development agreements" – a glorified term for time and materials for handholding on custom assays and such – has grown to an alarming 20% of sales. We find it telling when a one-product platform company tries to plug slowing growth with bespoke projects.

With product revenues flat for 2 years, services are increasingly plugging the hole

…and an increasing reliance on custom projects in recent quarters





Source: BLI SEC filings; Capital IQ data; Scorpion Capital analysis and estimates

In addition, the fine print in BLI's filings suggests that its machines are barely utilized by customers and basically mothballed – and that the remaining usage has declined significantly in the last 3 quarters. BLI breaks out instrument vs. recurring revenues. Recurring revenues are the consumables used for each run/assay, namely disposable chips and reagents. Our customer interviews suggest that chips are $12-15K per run and reagents add another 25%, or $15-19K per run. We then pieced together the total installed base at various points in time. For the latest quarter, we calculate consumable revenues per machine at a mere $43K – or about 2 to 3 runs per quarter per machine. Even more troubling, the trend has recently worsened, as consumable revenues are down 18% over the last 3 quarters, despite the installed base going from 75 to 92.

Consumables revenue of $3.9MM divided by 92 machines in the field yields $43K of consumable revenue per machine – or 2-3 runs, by our estimate.

In 000's	Q1/19	Q2/19	Q3/19	Q4/19	Q1/20	Q2/20	Q3/20	Q4/20	Q1/21	Q2/21
Installed base	27	N/A	N/A	48	54	N/A	N/A	75	85	92
Recurring revenue	1,340	1,742	1,914	3,025	2,479	2,922	3,671	4,816	4,394	3,946
Recurring revenue per machine	50	N/A	N/A	63	46	N/A	N/A	64	52	43

Consumable revenue has only grown from ~$3MM to $4MM since end of 2019 – while the installed base has gone from 48 to 92.

Recent trends have worsened, as consumables revenue has dropped 18% over the last 3 quarters while the installed base has grown by 17 machines.

Note: A slightly more precise calculation would divide recurring revenue by the average of the installed base over the start and end of each quarter, versus the ending size of the installed base, but we use the ending size for consistency as figures aren't available for each period.

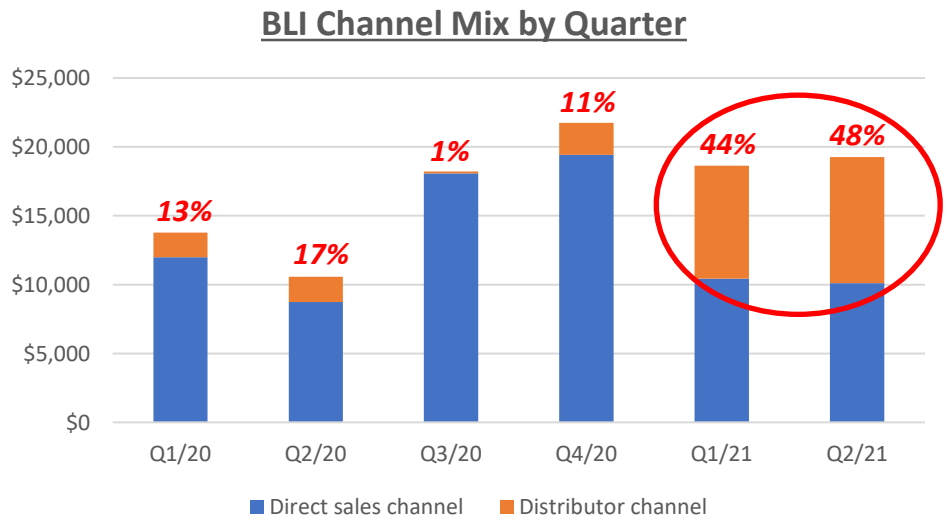
Source: Scorpion Capital analysis and estimates, based upon BLI SEC filings, earnings call transcripts from Capital IQ, and BLI press releases

1) Introduction to the real Berkeley Lights; warning signs of a looming collapse and other red flags

We believe that BLI has now begun to stuff the channel to mask a sales decline, given a sudden, unexplained shift to distributor-based revenue over the last 2 quarters, from almost nothing to half of sales. A common red flag in Asia-based frauds we have shorted, a channel mix change this dramatic may also indicate questionable related-party transactions. We note BLI has a distributor in Asia, an increasing region of focus. The usual giveaway is spiking receivables – as is the case at BLI, where A/R has jumped 50% in 3 quarters while sales fell 11%. The other tell is customer concentration – also jumping, with a large unidentified customer comprising 27% of revenue and 28% of A/R in the June quarter. The top 3 were 56% of sales, and the top 4 were a steep 73% of A/R.

Distributor channel has spiked from 11% to 48% of revenue in last 2 quarters

A/R jumped 51% over 3 quarters while sales fell 11% and customer concentration spiked



Accounts receivable

	Q3/20	Q4/20	Q1/21	Q2/21
Accounts receivable	15.2	14.2	17.8	21.5
Total revenue	18.2	21.7	18.6	19.3

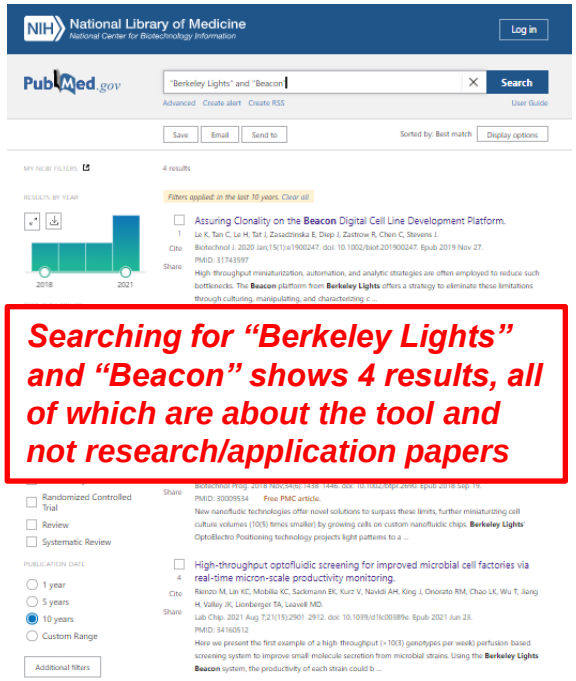
Customer concentration per most recent 10Q

"For the three months ended June 30, 2021, three customers accounted for 27%, 18% and 11% of revenue…four customers comprised 28%, 18%, 17% and 10% of accounts receivable."

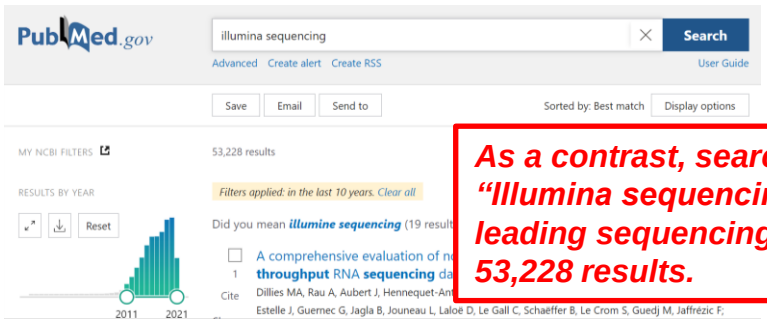
Source: Scorpion Capital analysis and estimates; BLI SEC filings, earnings call transcripts from Capital IQ, and BLI press releases

1) Introduction to the real Berkeley Lights; warning signs of a looming collapse and other red flags

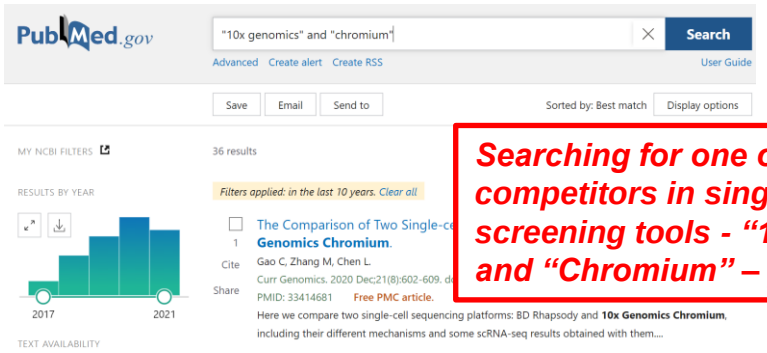
We then did a search for Berkeley Lights on PubMed, the search engine for life sciences research and publications. The search indicates there are basically no academic papers that reference the application of BLI's platform for its purported use cases. After additional digging, we finally located one paper that briefly alluded to it for some COVID work. PubMed suggests BLI has zero traction or impact in academic research or real-world commercial drug discovery – strange, for a supposedly game-changing technology. Numerous ex-employees and customers we interviewed highlighted the lack of publications as an Achilles Heel and the absence of research validation as dooming its commercial potential.



Searching for "Berkeley Lights" and "Beacon" shows 4 results, all of which are about the tool and not research/application papers



As a contrast, searching for "Illumina sequencing" – the leading sequencing tool – yields 53,228 results.



Searching for one of BLI's competitors in single cell screening tools - "10X Genomics" and "Chromium" – yields 36 hits.

Source: PubMed searches - https://pubmed.ncbi.nlm.nih.gov/?term=%22Berkeley+Lights%22+and+%22Beacon%22&filter=datesearch.y_10; https://pubmed.ncbi.nlm.nih.gov/?term=illumina+sequencing&filter=datesearch.y_10; https://pubmed.ncbi.nlm.nih.gov/?term=%2210x+genomics%22+and+%22chromium%22&filter=datesearch.y_10

1) Introduction to the real Berkeley Lights; warning signs of a looming collapse and other red flags

We began to notice a pattern of press releases that appear grossly misleading. BLI announced a deal with perhaps the most prominent lab in immuno-oncology, whose founder developed CAR-T. A former BLI employee/scientist laughed and told us that the lab never even received the machine. Just last month, BLI put out a press release about a deal with Bayer, the terms of which "are not disclosed." The deal was the talk of the last earnings call. We saw no mention of a detail we heard from ex-employees, who stated that Bayer had a disastrous experience with a BLI machine, "were pretty furious," and "sent it back." This of course explains the language buried below the headline - that the deal, which sounds like some free consulting work, is not with Bayer's pharma side in Germany, but an irrelevant seeds and crops group in St. Louis.

BLI press release about a deal with famous lab

Berkeley Lights Announces Collaboration with University of Pennsylvania to Advance CAR-T Therapeutics

…but former employee says the lab never even received the instrument

"The Carl June lab did not receive a Beacon. They were supposed to *receive a Beacon…We actually did work internally for UPenn****…No, there was never an agreement****."* ***– Former BLI employee and scientist***

BLI recently announced an agreement with "Bayer"

Berkeley Lights and Bayer announce a multi-year agreement aimed at revolutionizing the discovery of next-generation traits

…but failed to mention that Bayer allegedly lost important samples, "were pretty furious," and sent the machine back

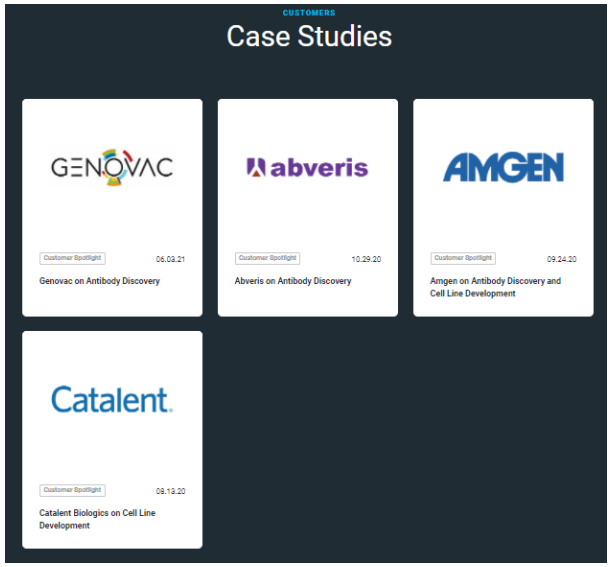
"Customers who didn't like it at all, I would say probably Bayer*…They had several issues that were mostly related to hardware. They lost a few runs trying to troubleshoot...They lost some precious samples so* ***they were pretty furious…Bayer was evaluating the tool on their premises and then sent it back."*** ***– Former BLI employee and scientist***

Source: https://investors.berkeleylights.com/news-releases/news-release-details/berkeley-lights-announces-collaboration-university-Pennsylvania; https://investors.berkeleylights.com/news-releases/news-release-details/berkeley-lights-and-bayer-announce-multi-year-agreement-aimed; Scorpion Capital consultation calls with experts

1) Introduction to the real Berkeley Lights; warning signs of a looming collapse and other red flags

We noticed red flags on BLI's "customer testimonials" page. At every chance, the CEO talks up how much Amgen loves the machine – so much so that the entire bull case seems to be that "Amgen likes it." As we detail later, two senior scientists at Amgen and BLI ex-employees painted an entirely different picture. Moreover, the "Customers" page on BLI's site lists only 4 customers, only one of which is a pharma/biotech company and two of which seem too small to have actually paid for a $2MM machine – Amgen; Genovac, a North Dakota-based contract research organization (CRO) with 15 employees on LinkedIn; Abveris, another CRO with 32 employees listed; and Catalent, a public CRO/CMO. Oddly missing are testimonials from Pfizer, Novartis, Bristol Myers, Gilead, AbbVie, IQVIA, Takeda, Lonza, UCSF, NIH, and other "users."

BLI "Customers" page lists only four



CEO plays up Amgen's "success" at every opportunity

"Due to the superiority of our workflows, Amgen has shut down legacy cell line development process and converted wholly to Berkeley Lights**, and we're working through a similar process in antibody discovery. I think this is a great example of how we expand across our customers' organizations…" - **BLI CEO, 1/12/21, JP Morgan conference

*"**They [Amgen] had a big problem there. And we solved that problem**. Now Amgen, the -- all cell lines are coming out of Amgen are made on Berkeley Lights Beacon, right?" – **CEO, 3/4/21, Cowen conference***

*"And case in point is that we worked on cell line development with Amgen early on. That was one of our early partners. And **once they got a hold of our technology and saw how they could use it**, they've dramatically -- they've switched wholesale over to Berkeley Lights to make cell lines at Amgen." – **BLI CEO, 3/24/21, KeyBanc conference***

Source: BLI website customer testimonials page, https://www.berkeleylights.com/customer-spotlights/; : Scorpion Capital consultation calls with experts

1) Introduction to the real Berkeley Lights; warning signs of a looming collapse and other red flags

We took note of the company's turbulent past, and that it was founded – and is still run by – semiconductor engineers with no discernible background or experience in biology or drug development. The founder and CEO appears to have been fired by the Board in 2017. A recurring theme of our interviews with ex-executives and employees was of a wayward company founded by a clique of semiconductor specialists who thought they knew better than biologists; who didn't add biology talent to the management team; who "didn't value or listen to their biologists" internally; and who then face-planted by coming up with an ill-conceived product that reflected no understanding of their user or target market.

> ***BLI was built by "semiconductor guys" who "didn't value or listen" to biologists, creating an internal "rift"***
> *"The founder of the company and all the people that he brought over were **all semiconductor guys**. The company is really built around semiconductor engineers who were getting into biology. So, there's definitely this rift in the company between engineers and biologists. They're making equipment for biology and were kind like we're in charge. **They didn't value or listen to their biologists so much."*** ***–Former BLI executive***

> ***Product was not designed by biologists and doesn't reflect an understanding of the end user or market***
> *"It was engineered by people who are not biologists, and it had some conceptions of biology that didn't match biologists' views…The problem is that **they built this thing without a biologist's point-of-view,** and so, in the beginning, **they were battling biology**. But these are the people that you're supposed to be selling equipment to…There was a conflict, engineers thinking they knew better how to do something than the biologists. It was this general-purpose concept-driven thing then had to try to find a home in terms of commercial or research value."* ***-Former BLI executive***

> ***Lack of biology expertise or input has taken "a toll" and inflicted "a long-lasting impact"***
> *"For the longest time, we were missing a really good biologist at the executive level. **I think that took a toll**. Some of the mismatch was the semiconductor guys trying to understand biology, how biologists think, how research happens. That has a long-lasting impact. **It was hard to get the biologists a voice there**. There were a lot of engineering-driven decisions." -* ***Former BLI senior scientist***

Source: Scorpion Capital consultation calls with experts

Ex-executives and employees pointed to BLI's semiconductor roots as its fatal flaw and the source of its troubles. The founders thought they had a cool way to move cells inside a chip, and then struggled and failed to find a value proposition or problem that their technology actually solves. Our interviews painted a consistent picture of a one-product company conceived on a fundamentally flawed premise and which never found product-market fit. We note comments by 3 BLI ex-employees below: an ex-executive, a product manager, and a scientist.

> ***BLI has struggled and failed for a long time to find product-market fit***
> *"it is **not a trivial task to find product-market fit**. I think the entire technology came out of a prominent professor at UC Berkeley. It sounds very cool that you can move cells with electromagnetic waves and that you can repurpose semiconductor technology to assist with this movement. There was a search for a long time for, like, what could be applications where this is useful? The origin of the company wasn't a huge problem that no one else can figure out, so let's find the best solution. **It was like, they found some great phenomena. Let's see what we can do with it.** And sometimes, it does take a long time to figure out the best applications."* **–Former BLI executive**

> ***BLI was founded on the concept of a "cool technology" but could never figure out an application for it***
> *"I can give a little bit of history on the company side. The company started as this cool technology that could move cells. So, now what do you do with the with it? **They tried to do many different research applications on it. None of it really stuck."**.* **– Former BLI product manager**

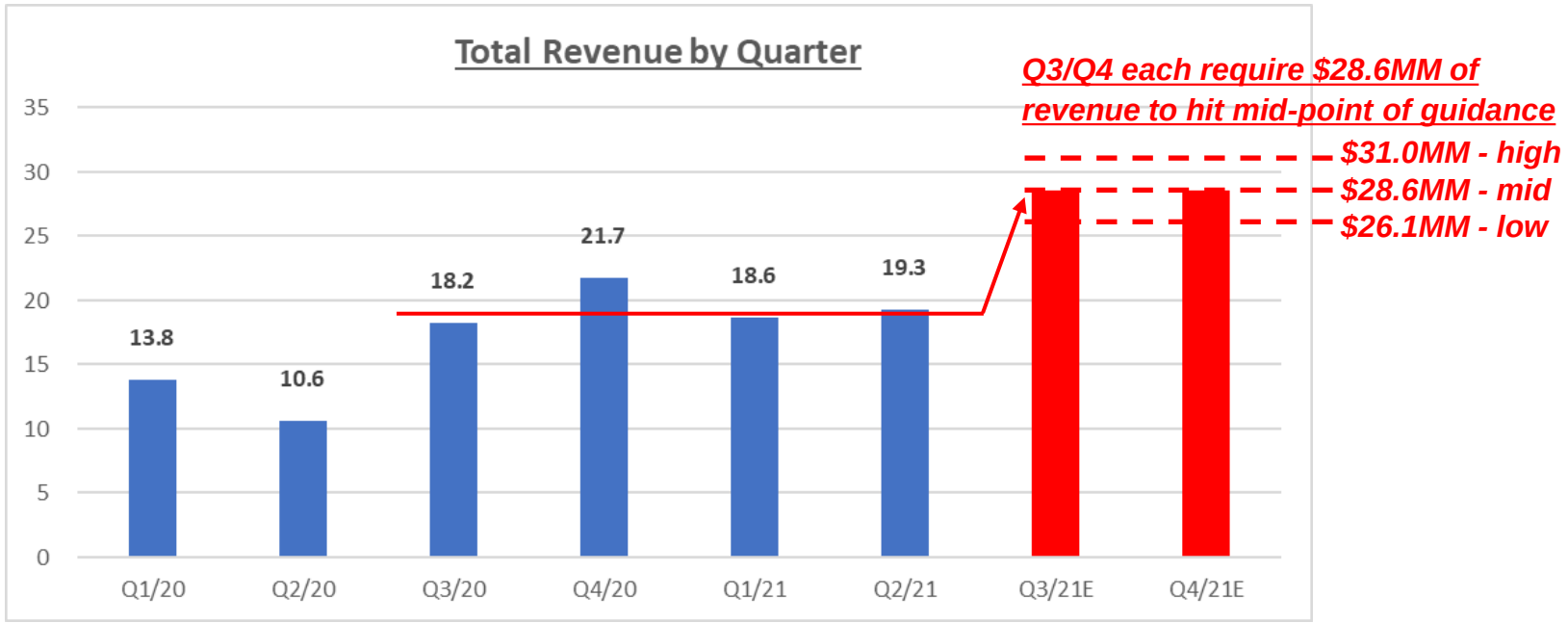
> ***BLI never figured out a value proposition or the problem their technology actually solves***
> *"This wasn't like a typical company that I worked at. It was like they built a technology thinking it is going to do something, and then they had to figure out where to apply it …**I think a lot of people get into the wow, it's cool, but how exactly does the rubber hit the road?** What application am I running? What's the data on the application? Is it robust? What's the price point for me to run it? **What's my value proposition?"*** **–Former BLI executive**

Source: Scorpion Capital consultation calls with experts

1) Introduction to the real Berkeley Lights; warning signs of a looming collapse and other red flags

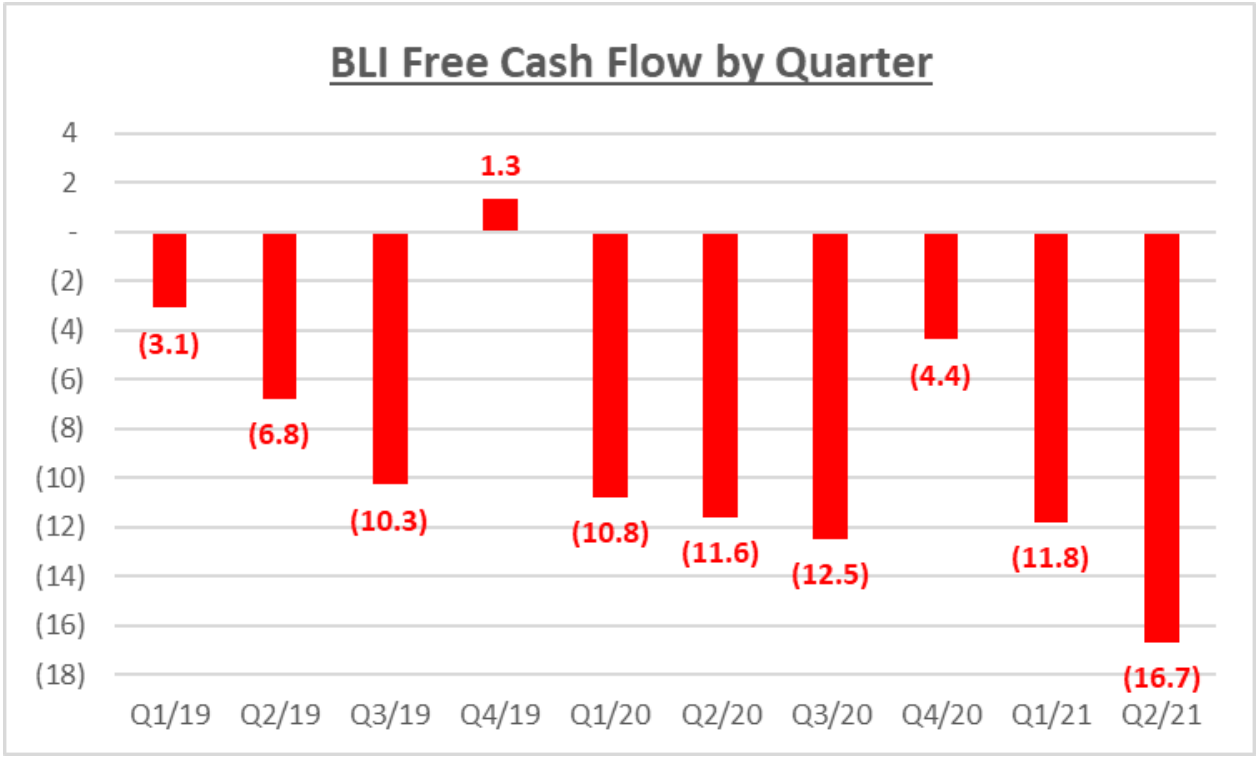
We further examined the company's 2021 guidance of $90-100MM, which BLI reiterated in August. In our opinion, the guidance is an illusion that BLI simply cannot meet - a finger in the dike while insiders continue to sell - given recent quarterly performance and other red flags that suggest an underlying deterioration. We expect BLI to slash 2021 guidance or miss badly in Q3/Q4. The sequence of events is likely to be typical of the genre: the lack of growth becomes impossible for investors to overlook, and the stock accelerates its inevitable march toward the 4X sales multiple and ~$5 level at which a no-growth microfluidics comp like FLDM trades.

BLI 2021 guidance of $90-100MM requires all-time record revenue in Q3 and Q4 – an implausibly sharp spike from a flat trend. "Back half weighted" is the usual canard of companies about to miss.



Source: Scorpion Capital analysis and estimates; BLI SEC filings and press releases; Capital IQ data

The sheer number of red flags leads us to conclude that BLI is worth $0 over time: 1) no present value based on earnings or cash flows, given atrocious and worsening losses and no ability to sustain operations over the long-term without one capital raise after another; 2) no value from growth using an imaginary growth stock multiple, as sales are already basically flat; and 3) no net asset or product value to offset an annualized $67MM of FCF burn, as a one-product company where the product has no value proposition, is trashed by key customers, and is over-priced by 20X versus cheaper, better competitive offerings that have already rendered it irrelevant.



BLI's worsening trajectory is self-evident

Source: Capital IQ data; Scorpion Capital estimates and analysis; free cash flow calculated as operating cash flow plus capital expenditures.

2. Summary of findings from customer interviews

2) Summary of findings from customer interviews

We conducted research interviews with 17 scientists and users across 14 of BLI's largest customers. All 14 customers indicated that BLI's machine is a flop. We cannot recall hearing feedback as scathing and universal during customer checks. We summarize takeaways from each interviews.

AMGEN employee #1, a scientist and group leader at what we believe to be BLI's largest and most important customer: error rate is a shocking "50% higher" than a standard lab instrument; our staff don't want to use it

- Has **interfaced closely with BLI for 5+ years**; stated Amgen has between **5 to 10 machines**
- Remains unenthusiastic despite trying to help it succeed this entire time
- Machine is **prone to major errors, creating distrust and hesitation internally**; error-handling protocol alone is 4 pages; errors are mysterious to troubleshoot.
- **Amgen staff strongly resist using it; mind-numbingly difficult to use**, scaring even tech-savvy scientists at the company; "very hard" to develop a new process on it; still have to hack it get it to work
- **Massive downtime due to contamination** and other malfunctions
- Instrument errors are frequent and force users to resort to **manual handling of samples and assays; takes months of full-time practice** to learn the instrument; so difficult to use that Amgen basically has to dedicate one full-time employee per machine
- **Upfront cost of $2MM makes approval challenging**; ongoing operating costs of consumables and FTE's turn off users, despite Amgen's infinite budget.

AMGEN employee #2: can't trust the data; machine breaks down; "probably not" worth buying

- A scientist and group leader who has been "living" with the system "on a daily basis" for two years
- BLI is "probably not" worth buying and **can't say whether it has an ROI**
- **Data it produces can't be trusted; others at Amgen "worry or complain"** about its accuracy and question if it's worth it.
- BLI system breaks down; **assay results are unpredictable**; questions whether it's worth the hassle versus traditional methods of running assays
- Machine is time-consuming to use and "not really rocket science";.
- Competing machines are "a small fraction of the cost" with better use cases versus BLI's complexity
- **TAM for BLI is a "pretty limited number"** of systems.

Source: Scorpion Capital consultation calls with experts

2) Summary of findings from customer interviews

BRISTOL MEYERS SQUIBB employee #1: BMS originally funded BLI and championed it; one of their largest customers; now "not being used much"; a waste of money; scientists are skeptical and reluctant; no value proposition; onerous and unusable.

- Began working with BLI years ago and have about 5 machines; **still "not operational," just "tinkering"** and testing; **implies it was a waste** as big companies tend to "blow a lot of money"
- Slammed BLI system as not that new or innovative; **no value proposition** for big pharma; hasn't enabled anything meaningful for them as a customer; no one at Bristol seems to care much about the technology; hard sell to scientists internally; already have similar capabilities "much more cheaply."
- **Scientists are highly resistant to adopting BLI** and more trusting of cheaper flow cytometers; has little incremental benefit and "doesn't make sense" versus existing tools.
- **Skeptical of BLI's technology and thinks it'll be short-lived**; too difficult to integrate into pharma workflows; requires an onerous process of re-engineering existing assays, which may not even work on the instrument; scientists are extremely reluctant as they'd have to "rebuild their entire research platform" on a BLI system that may quickly become obsolete.
- The instrument spews "an insane amount of data" that's difficult to process and turns off scientists; BMS vendors and CRO's don't use BLI, making it **"not in BMS scientists' interest" to use it**
- Competitors don't see enough opportunity in BLI's niche but could crush them with a far cheaper device if they wanted; BLI is not the next Illumina and will fizzle out; thinks 10X Genomics will be much more successful.
- Lack of BLI adoption in academia and **absence of anything meaningful in the literature** dooms its trajectory and scientific credibility; leads scientists to instantly dismiss the instrument.

BRISTOL MEYERS SQUIBB employee #2: Pitifully small TAM; already saturated; "very expensive doorstop" prone to "lot of false positives and negatives"; overpriced vs. alternatives.

- An ex-senior executive involved in bringing and championing BLI: total addressable market is pitifully small, **limited to ~10 to 50 of the largest biotech companies**; not viable for mid-tier biotech's; already saturated within large pharma as **most have already bought some machines to try it out**.
- Takes **6 months to learn; complex and difficult to maintain**; can become a "very expensive doorstop"; easy to break with high downtimes; Bristol wouldn't let the "average scientist" use it.
- Prone to a "lot of false positives and negatives"; the machine's **throughput is poor** for antibody discovery efforts; and is at least **4X as expensive** as its closest substitute, FACS machines.

Source: Scorpion Capital consultation calls with experts

2) Summary of findings from customer interviews

PFIZER, senior scientist in antibody discovery group, describes a debacle: error rates of 50-100%; implies key product claims and capabilities are false; struggled for 2-3 years; speaks with other large customers – "consensus is very similar"

- Pfizer has gotten no value from the machine; no interest in buying any more; prefer to drop it completely and stick with legacy workflows.
- Instrument is **plagued by false hits and error rates of 50-100%** that render it as undependable; sometimes **unable to confirm a single antibody** and runs are total failures.
- Machine is so useless that Pfizer barely utilizes it; suggests everyone in their antibody discovery group **loathes the instrument**; described a Dilbert-type political dynamic where they're forced to occasionally use it to save face, after someone got bamboozled and blew $2 million.
- Machine is prone to a **long list of errors and malfunctions; "there's always something" wrong**; Pfizer has struggled for 2-3 years to optimize it; "constant uncertainty" about if it will function properly.
- Instrument can't even do functional assays properly which renders it **useless for antibody discovery** and defeats it's entire purpose; suggests that BLI's claims around antibody discovery are false
- Speaks with **other large biotech/pharma customers like AbbVie** and states that their experiences are **equally disastrous**: "consensus is very similar," "not worth the investment"

NOVARTIS, ex-manager closely involved in using BLI machine, describes a farce: we got "tricked" and machine doesn't work; "failed purchase" that he wanted to return; 50% error rates; data couldn't be validated and was "all over the place"; too unreliable for FDA submissions; using it again would put the reputation of his current employer (a CDMO) at risk; other large customers also regret the purchase.

- Machine **never made it past pilot stage evaluation** due to error rates, data quality, reliability issues, lack of scalability; data the instrument produced was inconsistent and **couldn't be validated**; had to re-run assays using traditional methods, defeating its entire purpose.
- **No value proposition versus traditional flow cytometers** that are a fraction of the price and have lower operating costs, can run more assays, and have higher throughput and better data.
- BLI marketing is misleading; "not worth the hassle" in trying to get it work; expert is now at a contract drug manufacturer and "would never use the Berkeley Lights instrument" after Novartis experience; doing so **would put his CDMO's reputation and the work of its client at risk.**

Source: Scorpion Capital consultation calls with experts

2) Summary of findings from customer interviews

NOVARTIS (cont'd)

- BLI instrument **only works 35-40% of the time** and even then the data had to be double-checked by traditional methods; difficult to troubleshoot
- Other groups at Novartis beyond cell and gene therapy, such as antibody discovery, evaluated the instrument and rejected it; reliability and stability issues led to machine being barely used.
- BLI instrument is too unreliable to be used in an FDA submission; would need to submit parallel data using traditional methods as independent verification, eliminating any time or cost savings.
- States that Bayer, Pfizer, and others have also had a disastrous experience; machine is a hodge-podge with no clear target market or use case.

ABBVIE, scientist who leads drug discovery teams says they have 2 machines: implies it's a failed purchase that AbbVie regrets; equipment mostly sit idle; portrays a disaster where 40-50% of cells are ruined during runs; 50% error rate; still "kind of like a beta version" despite being launched in 2016; "major headache," "tedious."

- Instrument hasn't reduced reliance on legacy methods for antibody discovery – it's entire value proposition; describes a farce where machine **ruins cells in about 1 out of every 5 runs**; 40-50% of cells are lost during steps like PCR or sequencing, compounded by false positives.
- Little interest in buying another despite a large number of antibody programs; suggests BLI's growth is lacking and won't disrupt the space.
- Instrument remains immature ~5 years after launch; using it is "time consuming"; unusable by other groups at AbbVie due **lack of assays and other limitations**.
- Machine remains **vastly inferior to the traditional hybridoma-based antibody discovery** workflow it's supposed to replace;; "definitely" won't replace current discovery methods; **lot of false positives** with an error rate of 50%; "not very reliable"; requires onerous manual handling to fix.

IQVIA executive: world's largest CRO has broad visibility into how pharma/biotech customers view BLI; key accounts are unhappy and not referenceable; BLI claims are bogus; warns IQVIA customers to stay away from BLI's tool; one of the worst vendors they rate; no traction in industry; not winning much new business.

- Extensive experience **working with BLI as a partner** and with some of BLI's largest customers; IQVIA has 70K employees; advises customers on how to implement BLI's system.

Source: Scorpion Capital consultation calls with experts

IQVIA executive (cont'd)

- Slams BLI's instrument based on feedback from large pharma/biotech users: "**old," completely outdated," "not very user friendly," "prone to errors," "cumbersome,"** and states AI and machine learning **claims are bogus.**
- Large BLI **customers are unhappy and not referenceable**; level of dissatisfaction is an outlier relative to other vendors they use; customers generally rate BLI's system at 2 on a scale of 1 to 5.
- BLI has **no traction in the industry**; striking out; doesn't seem to be winning much new RFP's; not even involved in many RFP's IQVIA sees; no buzz or disruptive impact.
- Large BLI customers have passed on buying more machines or selected other vendors; have had no particular success with the instrument.
- **We warn our customers away from BLI's instrument** and caution them to first do their own due diligence and speak to references.

GILEAD scientist, who has 5 years of experience with the instrument at previous employers, has declined to recommend a purchase at Gilead: instrument often fails; standard assays that "just flat out didn't work; key parts of value proposition are misleading and/or false; extremely small TAM; suggests BLI pipeline has dwindled in last 4-6 months.

- Instrument gives incorrect signals; "confounded the algorithm"; **numerous problems with mysterious causes; every run has something crop up.**
- Value proposition is limited; no time savings in cell development; doesn't work well for more complex molecules; extremely difficult to optimize and use; **needs dedicated staff, tweaking, workarounds.**
- Cell line development is **a commodity** and better for most customers to outsource at a fraction of the cost of buying a BLI instrument.
- Extremely small TAM; a handful of the largest contract drug manufacturers don't need more than 1-2 machines each; **"limited market" with competing technologies about to take share**; not much growth potential; annual user meeting gets almost no people.

Source: Scorpion Capital consultation calls with experts

2) Summary of findings from customer interviews

TAKEDA, lead scientist: spent a year trying to find uses for the instruments and now it's barely used; dismayed at lack of evidence/data proving its value; unusable for early stage drug discovery; negligible TAM; just an overpriced mash-up of cheap, commonplace lab tools; emerging competitors are cheaper and better.

- Lead scientist in immuno-oncology was closely involved in buying BLI machine; thinks Takeda globally may have 3 in total; use case is extremely limited, **maybe one assay run every 2-3 weeks**; now skeptical and have soured.
- Were unable to expand BLI use case beyond one simple cytotoxicity assay, despite a year of trying
- Wouldn't even use it "even if it was affordable"; extremely niche tool for **occasional, one-off use**.
- Total addressable **market is extremely small, at most 150 machines (that is, $300 million** at $2MM per machine) across the 60-70 largest biotech/pharma companies; target market limited to companies greater than $5B market cap, given high cost.
- Instrument **overwhelms the user with unusable and unanalyzable amounts of data**; can't figure out how to optimize an assay; **no time savings** (one of the machine's most important selling points) for cell therapy; just an "exploratory" tool that provides some incremental data.
- Technology is **nothing special; just an expensive mash-up of cheap, lab tools** like flow cytometers and fluidics; dismissed it as a glorified cytometer, which sell for $50-$500K.
- Emerging **competitors are cheaper and better**; would replace BLI with them today; alternative tools are not only radically cheaper but the data they generate may be more meaningful.

HARBOUR BIOMED, former executive closely involved in purchase says they would have sent it back for a refund if they could; 80-90% failure rate for complex antibodies; "lot of false positives" and errors; cost to buy and operate is out of control; BLI can't support the machine and staff seemed out of their depth.

- Harbour is a publicly-traded mid-tier biotech based in Asia, focused on antibody development for oncology and immunology; machine **failed on many levels - high operating cost, data/output issues, lack of support.**
- Can't really screen for complex antibodies, which is where antibody discovery is now gravitating; BLI technology is **built around older, simpler antibodies**;
- **BLI staff exhibited little know-how or experience**; couldn't even answer Harbour's questions; customers left to try and figure it out on their own; was difficult to reach BLI staff.

Source: Scorpion Capital consultation calls with experts

2) Summary of findings from customer interviews

HARBOUR BIOMED, former executive (cont'd)

- Plagued by "a lot of false positives"; **"a lot of energy and effort" only to fail**; seems to work for simple antibodies but only ~70-80% of the time; only ~10-20% of the time for more complex ones.
- Numerous **costs add up quickly and led them to curtail usage**: $2MM up front, $15K per run, $300K per year for support; plus **two dedicated FTE's to operate the tool**, given its complexity.
- Machine is still **only used 3-4 times per month**; re-purposed it for simple antibodies to try and scrape together some utility after a huge capital investment; still no time savings, even for simple use-case, given false positives; difficult to trust the data.

LONZA, the world's largest contract drug developer with $60B market cap: scientist in leadership role in a key division says two different business units "extensively tested" the machine and passed: "value proposition was not there"; will be obsolete in 2-3 years; slammed the tool as absurdly expensive to own and run; price needs to drop by 75-85% to have a shot; others sell "a lot more functionality" for a fraction.

- Scientist in cell and gene division says machine doesn't shorten development times or eliminate the need for traditional workflows, both key to its value proposition and $2MM price; **capabilities are lacking** for both cell line development and antibody discovery, BLI's two key target markets.
- Repeatedly criticized the instrument's **cost as "prohibitive" and a "major shortcoming"**; at least $3MM with annual service contract vs. $2MM up front; then need to add cost of full-time employees to operate the machine; "uphill battle" to purchase despite Lonza's size and budget.
- Machine's **pricing needs to drop 75-95% to be viable**
- Executive says a couple of machines may have been purchased few years ago in another Lonza division' unclear usage and ROI for that use case is an "open question."
- **TAM is small, limited to 75-80** of the largest biotech/pharma/CDMO players.

SAMSUNG BIOLOGICS, ex-lead scientist: Samsung may be #1 or #2 contract drug manufacturer globally with $54B market cap, yet appears to have only one BLI machine; "not a good investment"; "I don't think it's worth $2MM"; virtually no time savings in cell line development

- Barely used for customer projects; only aware of 3-4 customer projects last year using the instrument; **not enough customer interest** to justify more machines; doesn't think Samsung plans to buy more.
- Time savings in a typical 3-4 month cell line development project is only 2 to 4 weeks

Source: Scorpion Capital consultation calls with experts

2) Summary of findings from customer interviews

SAMSUNG BIOLOGICS, ex-lead scientist (cont'd)

– Scientist **recently left Samsung to join a $2.5B biotech that's "not that interested"** despite BLI approaching them as a potential customer

CHAN ZUCKERBERG BIOHUB, a nonprofit initiative funded by Facebook's founder, may be BLI's second largest customer with 5 machines. Scientist closely involved in purchase decision suggests they have to exhaust a $700MM cap ex budget within 3 years and are blindly gambling on anything "new"; says wouldn't personally buy the machine; "would not feel comfortable"; tool not suited for commercial drug discovery where you have to "actually deliver" something.

– CZ Biohub appears to have bought 5 machines in the last 2 years. A scientist involved in the purchase decision, who has little direct experience with the tool, implied the **center is spending recklessly - "we just spend money; we don't make money."**
– Center appears to have **done no diligence** on BLI; became **nervous at our questions** and asked us for details about other customers' experience.
– Despite buying 5 BLI machines, the feedback is revealing – better ways to spend $2MM; only bought because free to gamble on machines that may not work as advertised; are **also buying "everything" from all of BLI's single cell competitors.**

UCSF, NIH, AND OTHER ACADEMIC CUSTOMERS. Former BLI scientist details how universities and research institutions had experiences as disastrous as commercial pharma/biotech customers: UCSF and NIH both returned the equipment after 6-9 months; couldn't get publishable data of the system; chose cheaper, faster boxes from 10X Genomics and others.

– Former scientist was closely involved in efforts to onboard and support these customers
– States UCSF stopped using the machine much after a couple of months; BLI extended the trial to 9 months and still failed; NIH tried running several experiments; "they wanted out."
– Detailed obstacles at other centers such as U-Pitt, La Jolla, City of Hope; couldn't use the tool without extensive handholding and support.

Source: Scorpion Capital consultation calls with experts

2) Summary of findings from customer interviews

A LEADING ACADEMIC INSTITUTION purchased a machine and employs a former BLI scientist in a senior role. The scientist helped develop the instrument and is one the most knowledgeable experts in single cell technology. We redact the institution's name, given the startling nature of the scientist's feedback: machine fails in 90% of experiments; the field is 'very skeptical and rightfully so"; can't get BLI data through peer view; software bugs; contamination issues; doesn't recommend the tool and not suited for commercial pharma/biotech customers; unusable by most scientists.

- As an ex-employee and current customer, the scientist is uniquely positioned to comment and keeps "a close eye on the market and competition"; **1 out of 10 experiments are successful**; "immensely frustrating"; stops working for weeks at a time; **"lot of turmoil" for users**.
- Wouldn't recommend the machine for "the vast majority of people"; **other technologies are a "much better place to start"**; "really incredibly challenging" for commercial customers to get the tool to work.
- Extremely niche instrument with "**very limited" use cases, generally low risk, low value assays**; anything else requires "a crop ton of validation work" to double-check the data with legacy tools.
- **Can take a year to get data out of it**; customers get frustrated and want to send it back; took the scientist – who helped develop the technology – **2 years of countless tries to get an assay working**;
- Instrument is not usable by most scientists; "technically very challenging to use"; using it actually slows down projects versus speeding them up; takes years to learn the ins and outs of the machine.
- Instrument is **perceived harshly in the field; "anybody" familiar with single-cell analysis is "very skeptical** and rightfully so" particularly for critical applications like FDA submissions; scientists are skeptical that cell assays can "behave normally" in the instrument; makes it "really hard" to get the machine's data through peer review, forcing "absolutely crazy" amounts of extra validation
- **Numerous problems with the software**; customers are constantly blindsided with software and hardware changes, resulting in bugs, delayed experiments, need to re-learn the equipment.
- Instrument is prone to contamination - **"a contamination nightmare" – "was always a big concern"** and company still struggles with it; "definite weak points from a biological standpoint" in the machine.
- Instrument is based on chips that contain silicon, and **cells don't behave naturally against a silicon surface**; company never thought through the problems it creates.

Source: Scorpion Capital consultation calls with experts

2) Summary of findings from customer interviews

GINGKO BIOWORKS announced a purported "$150MM deal" with BLI in 2019. We spoked with two Gingko executives, both of whom hesitated and expressed concerns when we asked if they'd ever personally invest in BLI; both were surprisingly cautious about the collaboration and wouldn't confirm if they actually paid for their 3 machines; "jury is still out" 24 months later, still just "a concept on paper"; challenged the tool's value proposition and hesitated to recommend it; not usable by typical biotech/pharma companies; have had to hack the machine and develop new chips to make it usable; still 50/50 whether experiments work or fail; suggested the deal will never approach the headline "deal size."

- Executive #1 said it's too early to say whether the tool can compete against other screening technologies – a troubling statement given the deal was inked two years ago; not obvious what to use the instrument for and still trying to figure it out; executive **doesn't "want to be unnecessarily pessimistic" but was nonetheless highly circumspect about the partnership**.
- Still **just "a concept on paper"** that hasn't been operationalized; unclear if machine is built for the right set of applications; **"hard to know"** how it compares to other ways of screening; "just so early."
- Challenged the machine's purported value proposition: **doesn't speed up overall workflows** for pharma/biotech customers; **throughput is a limitation**; instrument is difficult to use and not usable by typical pharma/biotech companies nor as appealing to regular Gingko staff either
- Executive #2 stated they have 2 BLI FTE's on site to operate the machines and that their experience is not applicable to typical biotech/pharma customers for antibody discovery or cell line development.
- Stated that they have extensively hacked and re-engineered BLI's machine to get it to work for certain purposes: **re-designed BLI's chips, optics, and other components**; machine they're using is not typical and has a different architecture.
- Gingko hires from **Amgen, Genentech indicated "consistency issues"** with the instrument.
- Demurred on personally investing in BLI; wants to see "success"; **space is crowded; other companies have "been smarter"** in designing their machines; doesn't see BLI "taking off" in the antibody discovery space.

Source: Scorpion Capital consultation calls with experts

2. Detailed findings from customer interviews: case studies of 13 BLI customers

- **A. Amgen employee #1**
- **B. Amgen employee #2**
- **C. Bristol Meyers Squibb employee #1**
- **D. Bristol Meyers Squibb employee #2**
- **E. Pfizer**
- **F. Novartis**
- **G. AbbVie**
- **H. IQVIA**
- **I. Gilead**
- **J. Takeda**
- **K. Harbour Biomed**
- **L. Lonza**
- **M. Samsung Biologics**
- **N. Chan Zuckerberg Biohub**
- **O. UCSF, NIH, and other academic customers**
- **P. Leading academic institution (name redacted)**
- **Q. Gingko Bioworks**

2A) Amgen employee #1

Amgen employee #1, a scientist and group leader has interfaced closely with BLI for 5+ years. Remains unenthusiastic about the instrument; machine is prone to major errors, creating distrust and hesitation among Amgen staff; still have to hack it get it to work for various workflows.

> ***Amgen scientist has interfaced closely with BLI for 5+ years***
> *"I cannot share the exact number – we have something between 5 and 10 machines. Amgen began a collaboration, an initial investment early on from 2013 or so, and they were at the very early stages...**I know all the pros and cons of this company…We began working on the instrument itself in 2016**, and we co-developed several processes from antibody discovery to bioengineering further down the line on yeast display, cell line development and different types of assays whether we were doing secretion assays or functional assays."*

> ***Scientist doesn't "love" the instrument and has to basically hack it to be useful, others at Amgen "have a lot of hesitation"***
> *"**I cannot say that I love it**…The people who have **a lot of hesitation** on the instrument are the ones that require training. One of the downsides of the Berkeley Lights instrument is that it's advanced. At the early stages, when I and some colleagues of mine began working on it, we **had to run our own software** for the processes and workflows that we wanted to run and to put together scripts required to make the instrument do what we wanted it to do. There are still boxes that you put together for the particular workflow that you want to run."*

> ***Scientist reiterates lack of enthusiasm for the instrument, which has major errors and makes it difficult to get adoption at Amgen***
> *"Another downside is that, about two years ago, **there were errors that were showing up, and it was not clear how to identify what they were related to**. And if you're the technician and you're running an instrument for a big project, that shows up as a major problem. These are the two main areas that a lot of people, as well as I, were trying to get it across different departments—these are **definitely challenges. Absolutely, I couldn't say that I love the instrument."***

Source: Scorpion Capital consultation calls with experts

2A) Amgen employee #1

Amgen employee #1 (cont'd): BLI instrument has so many problems that Amgen staff strongly resist using it; have to be occasionally forced to do so; machine is mind-numbingly difficult to use and error-prone, scaring even tech-savvy scientists at the company; error-handling protocol alone is 4 pages; "very hard" to develop a new process with the device.

> ***Amgen employees and biologists strongly resist using BLI's machine; have to be forced to do so.***
> *A: "A standard full-time employee at Amgen that is asked with the idea of using Berkeley Lights for a process that he has done for 10 years, **there is a very strong hesitation. I can say that with 100% confidence**. It depends on who you ask and at what level that particular person is. If you ask a biologist that is going to run a process, **there is very strong hesitation**. I remember when I began developing several processes, and I was working both with chemists and biologists, they're kind of like, **ah, we'll use Berkeley Lights another time. Another time. There's very, very strong hesitation** because it is complex. **I can tell you that for a fact."***
> *Q: "That's why the biologists at Amgen are hesitant to use it - they just don't want to bother with it?"*
> *A: **"Unless they are required to use the instrument.** Unless there's the right person that you can identify. But, in general, at the level of the scientists that will be running the processes, there is **quite a bit of hesitation."***

> ***Machine is mind-numbingly complex and error-prone, scaring even tech-savvy scientists from using it***
> *"The user has to understand, I'm loading the cells. What type of cells am I loading? What type of force or magnitude of the deamination process do I need to use for the right type of cells? What type of chip preparations do I need to know? And then, further down the line, what tilt of the angle should I keep the cells that I loaded on the chip? Having all these details put together and fully understood by a person that uses the instrument—and I just gave you the very first step that someone needs to have a good understanding—for some people, **they're like, Oh my god, this is way too complex. I cannot pick up all of this very quickly**. There are some people that are technology-savvy and will spend a couple of weeks to understand it very well and go for it, and then make errors for the first month."*

> ***Various challenges in getting users at Amgen interested in BLI, such as a long protocol with four pages dedicated to potential machine errors; "very hard" to develop a process with the instrument***
> *"However, there is a full protocol that has been developed with all the pros and cons. The protocol is two pages, and then it has an additional **four pages for error addressing** or challenge addressing because I mentioned at the very beginning, there are several points that you have to know the tricks for this complex instrument…it's very hard to put together a process in this novel instrumentation fully integrated in a protocol. So, **this is the main challenge for new people to be interested in this instrument to use it."***

Source: Scorpion Capital consultation calls with experts

2A) Amgen employee #1

Amgen employee #1 (cont'd): Error rate is a shocking "50% higher than a standard instrument"; massive downtime due to contamination and other malfunctions; complexity and difficulty create widespread reluctance within Amgen; prone to a long list of mysterious errors.

> ***BLI instrument error rate is "at least 50% higher than a standard instrument"; takes months to learn how to use it***
> *"I would start by saying that there is no way not to make errors, whether it is Berkeley Lights or other instruments. However, **the error percentage in a Berkeley Lights is at least 50% higher than a standard instrument**. In order to call someone an expert on a Berkeley Lights, I can say that it's definitely several months."*

> ***Machine has massive downtime due to issues such as contamination, tubing, needles, or malfunctions with other components***
> *Q: "How much downtime does it have? How often is it down?"*
> *A: **"25%. I would say between 10% and 25%. It really depends on the month."***
> *Q: "What causes the downtime?"*
> *A: "It really depends. **Sometimes, it's contamination. Sometimes, it's a problem with the tubing**. Sometimes, it's a problem with the gas flow. It's a broad range of areas that an issue can arise. Sometimes, it's with the needles. Sometimes, with the camera. It is a very multiplex instrument with hundreds if not more components."*

> ***Machine is complex and difficult to use, creating widespread hesitation to use the instrument***
> *"Users have to have a deep understanding of what the instrument does and how it does it in order to use it properly as well as have experience on the problem that might show up along the line. From my experience, **one of the strongest hesitation for people to be on board** and completely use it, it needs a lot of deep training and deep understanding and learning. And a lot of people in the biotech environment are not up for that. This is one hesitation."*

> ***Instrument is highly prone to a long list of mysterious errors, requiring them to unplug it for a hard reset***
> ***"By errors, I mean something shows on the screen when you running a process**. Three years ago, it used to simply be kind of like a cold, r2c1534 error, and you read it and you're like, what the heck happened? Let's say you're loading the cell in the instrument. Why did it pause? What do I need to do? What was the error? Is it a problem with the complication of myself? Is it a problem with a camera? Or it is a problem with the fluid, the fluidic system? **Many days, we had to completely unplug it from power to do a full reset**. But when you have an important process, you don't want to do that; you want to address an error quickly."*

Source: Scorpion Capital consultation calls with experts

2A) Amgen employee #1

Amgen employee #1 (cont'd): Instrument errors are frequent and frustrating, forcing users to resort to manual handling; takes months of full-time practice to learn the instrument; so difficult to use that Amgen basically has to dedicate one full-time employee per machine.

> ***Instrument remains prone to frustrating, frequent errors which requires staff to resort to other manual processes; example of ongoing problems with the machine's needles***
> ***"Sometimes the needle didn't actually properly mix your solution. Let me give you an actual example****. Normally, you have your cell or your reagent solution in a 96 well plate. And there are needles that would pick it up from the 96 well plate. Sometimes the well plate is sitting for half an hour and cells in solution have settled down. You don't want that because then the needle doesn't go all the way to the bottom of the well plate because it would crush them. Previously,* ***this was absolutely an error that no one could figure out****, the high-dose needle, where it was going.* ***Now, one error that shows up frequently*** *is that the needle did not, at the proper speed, mix out the solution. They tried to count the cells, and they were like, no cells—the mixer didn't work—error one. Sometimes fastest way to fix the problem is do it manually, I'm using my pipette and I'm going to mix the solution because I want the cells to go on the chip and solve the problem. So, I manually mix it again, and then kind of manually make the instrument load itself again from the same well plate and then continue the process. This is an actual example that still at times comes up."*

> ***Takes months to learn the instrument; Amgen has to dedicate about 1 full-time employee per machine***
> *Q: "It takes several months to become proficient on it?"*
> *A:* ***"Yes, several months, absolutely."***
> *Q: "Of full-time practice?"*
> *A: "Yes.* ***There are dedicated, full-time employees for that particular instrument. There aren't a lot that are fully knowledgeable and experts on the instrument****. Yes, there are others at the antibody discovery group as well as cell line development that are dedicated to them. I would say there are about between two to four in cell line development and around two to three for antibody discovery fully dedicated or primarily dedicated."*
> *Q: "It sounds like there are about five to eight full-time people across five to ten machines, just for those machines."*
> *A: "Yes."*

Source: Scorpion Capital consultation calls with experts

Amgen employee #1 (cont'd): BLI upfront cost of $2MM makes it challenging to get approved; ongoing operating costs of consumables and FTE's turn off users. We note that Amgen has a $130B market cap and has one of the largest budgets on earth – if they are complaining, we wonder what chance that leaves BLI with small and mid-tier biotech's, much less academic institutions who typically presage and lead discovery, publications, and commercial adoption.

> ***Amgen, even with its essentially infinite budget as one of the largest biotech's, complains about the upfront and ongoing cost of BLI's instrument***
> *"One instrument is $2-million.* ***That's very, very challenging to get approved. I think that's one of the main reasons [they've sold so few machines]****, as well as the cost of running the experiments, which is not cheap. Let's say one instrument has four chip holders. One chip for one process is between $1500 to $1750. So, one chip, one run. And then you have the critical reagents; they are between $200 to $500 depending on which process you are running. And then, of course, the FTEs and then all the other areas.* ***The overall cost is high, and I think that's the hesitation as well as the budget."***

Source: Scorpion Capital consultation calls with experts

2B) Amgen employee #2

Amgen employee #2, also scientist and group leader has been "living" with the tool "on a daily basis" for two years but can't say whether it has an ROI; says its data output can't be trusted; and that others at Amgen "worry or complain" about its accuracy and question if it's worth it.

> ***Two years of extensive experience with Berkeley Lights system***
> *"In the last two years, I've been almost living with the BLI system on a daily basis."*

> ***Unable to say whether the $2 million machine even has any ROI***
> *Q: "Do you think there's been a great ROI, or are you more neutral on this?"*
> *A:* ***"I think it's a little hard to say at this moment."***

> ***Other users at Amgen "worry or complain" about machine's accuracy and question whether it's worth it***
> *"I know people have been doing some other assays with this machine besides cell line development, where* ***people worry or complain about specificity or accuracy in the readouts, saying is the machine worth it or not."***

> ***Machine's data cannot be trusted and must be double-checked using traditional assay methods***
> *A: "Can you directly transfer a qualified or validated to assay to run on the Beacon? That takes time. Every so often, you get a readout from an optimizing assay.* ***How much can you can trust the data?*** *You have to rerun those assays to prove whether this actually meshes with the classical assay or not."*
> *Q: "You get data from this that you don't trust, and then you have to rerun it?"*
> *A: "At the optimization stage. It's still mostly at the development stage and every so often,* ***you have to use the classical method to prove what you're reading is correct****. If it's not, you have to figure out a way to improve the assay conditions."*
> *Q: "What percentage of the time do you have to double-check these inhibition assays from the Beacon?"*
> *A:* ***"If it's a brand-new assay, I'd say 100% that you have to check for the first few times****, and then once you run—we call this qualification process—you have to have different operators on different days with a different batch of material to prove the reading is accurate and meaningful. This is an absolutely necessary process you have to go through. And then how do you know if this one is actually working? You compare it with your known assay, like your known standard."*
> *Q:* ***"You spend $2-million on a machine, but you can't even trust that the data it produces is accurate?"***
> *A:* ***[Laughs] "Yes, indeed."***

Source: Scorpion Capital consultation calls with experts

2B) Amgen employee #2

Amgen employee #2 (cont'd): BLI system breaks down; assay results are unpredictable; and machine is time-consuming to use and "not really rocket science"; questions whether it's worth the hassle versus traditional methods of running assays.

> ***Need a backup Beacon machine given breakdowns and downtime***
> *Q: "How often does the machine break down – what's the downtime?*
> *A: "My experience in the last two years—that's why I have two. I always have to have a backup with any kind of machine. You cannot really absolutely say there's no downtime.* ***Things can break."***

> ***Results are unpredictable and requires "a lot of optimization"***
> *"This is still fairly a new, innovative technology that really* ***needs a lot of optimization*** *because every molecule is different. It* ***may not necessarily behave the same way, especially the assay."***

> ***Time consuming to develop assays on Beacon and questioning whether it's worth it versus traditional methods***
> ***"Developing each new assays on this machine takes time. Do you really want to spend the time to do that*** *or do you want to continue with your old way of doing this?"*

> ***BLI incrementally automates a standard, commodity process – when it works – and isn't anything revolutionary***
> ***"This is not really rocket science. People have been doing this for years****. There are like 100 monoclonal antibodies on the market already thinking about there are thousands of cells in development—I'm not exaggerating. People do these cell lines either within a pharmaceutical company or with a contract research lab. People specialize in this type of activity. if I can make some kind of analogy—if you're thinking about the last few years like next-generation sequencing becomes a routine kind of practice. That, to me, is something that you can't do with a classical approach. You can't really just buy thousands of those standard sequencers to get the same kind of result of next-generation sequencing. However, with this Berkeley Lights for cell line development, can you still do it the classical way? I think the answer is yes.* ***I****t's just more tedious, more labor-intensive.* ***It's not really that you are doing something that the other method cannot do, but this is just making it more efficient, and you get better quality... hopefully."***

Source: Scorpion Capital consultation calls with experts

2B) Amgen employee #2

Amgen employee #2 (cont'd) indicates BLI is "probably not" worth buying for single-cell analysis; competing machines are "a small fraction of the cost" with better use cases versus BLI's complexity; and that the TAM for BLI is a "pretty limited number" of systems.

> ***Competing machines like 10X Genomics and others are radically cheaper with better use cases versus BLI's complexity***
> *"At this moment, the machine is really just for cell line development. They also claim we can do all these single-cell analyses, just like other people have been doing.* ***If you're thinking about single-cell analysis, 10X genomics, and Mission Bio, and more recently IsoPlexis—those machines are just a small fraction of the cost—a couple of hundred thousand dollars. You just bring it in, it does one thing and does one thing very well****. Compare that to the complexity of the Berkeley Lights system where you really have to design those kinds of assays that you can do with some other traditional method."*

> ***Would probably not buy BLI "at this moment" for single-cell analysis; other approaches "even more mature"***
> ***"If you compare it at this moment and say do I buy this machine for single-cell analysis? I'd say probably not****. Because it's really not designed—if you want to run genomics or proteomics, you want to see the gene express, what genes are there, gene expression, protein biomarkers, and things like that. The last few years, a number of companies actually came up with a technology platform to allow you to analyze all these on a single cell basis so that you can look for the heterogeneity at the resolution of single cell. And comparing that, the design idea of Berkeley Lights is also a single cell, so rather than do a whole population of cells, but they put each single cell in its own pin in there to do assays on just a single cell. But if you just want to do single-cell analysis, two mutations happen in one cell, or there are two mutations happening in two different cells, and you don't really need to use this technology at this moment.* ***There are other ways of doing it, that are maybe even more mature."***

> ***TAM for BLI machine is "pretty limited"***
> *"If this Beacon is only designed for cell line development, it's probably going to have* ***a pretty limited number*** *[of machines they can sell]."*

Source: Scorpion Capital consultation calls with experts

2B) Bristol Meyers Squibb employee #1

Bristol Meyers Squibb employee #1, a group leader: We began working with BLI years ago and have about 5 machines; still "not operational," just "tinkering" and testing; implies it was a waste as big pharma companies tend to "blow a lot of money" on new technology; Bristol prefers to stick with cheaper, conventional cytometry machines.

> ***BMS began using BLI in 2018 and has several machines, though they're "still not widely used"***
> *"BMS started working with Berkeley Lights in 2018 I think with a kind of proof of concept phase. It was mostly around immuno-oncology, biotherapeutics, and then morphed into cell therapy when we acquired Celgene.* ***It's still not widely used*** *across all of our research centers. We have at least three Berkeley systems at BMS. We have at least one machine at each R&D hub. Juno should have at least one in Seattle, and I'm still learning about Celgene's setup. Celgene has at least one as well, and that would probably be located in San Diego. Altogether, all of BMS, I'd say five at least."*

> ***"Not being used much"; suggests BMS wasted money on the system as it often does in R&D***
> *"****The Berkeley Lights machines are not being used much. Not beyond tinkering****. People are just trying these things out to see if they can use them—from what I've seen, there's limited use. They're using them for really basic cell screening applications. All the stuff you see on the marketing stuff on their site, they're not really using it for that from what I see. We tend to waste a lot of money in R&D. It's frustrating to see.* ***We waste a lot of money. Berkeley Lights isn't the only one. We have machines just sitting around that were used once a twice that we spent half a million on****. So, that's not an entirely problematic concept, unfortunately. We blow a lot of money."*

> ***Not interested in buying more BLI machines; more interest in sticking with cheaper, conventional flow cytometers***
> ***"In my understanding, there isn't a plan to buy more machines. They're buying more flow cytometers*** *at quite a clip and mass cytometers. But they're not, to my knowledge, buying more Berkeley Lights machines. If they could buy four flow cytometers for the cost of a Berkeley Lights machine, they'll buy four flow cytometers because they know the vendor, they know what they're going to use them for, there's no downtime in implementing something or retraining the whole staff."*

> ***Despite acquiring BLI's technology years ago, machines are still only in testing and "not operational"***
> *"I don't think they're gathering dust.* ***I think they're just still in testing. And so, they're not being used; they're not operational.*** *I don't see any data from a production workflow coming to us, and I would definitely see it. If there was a production workflow, I would see it, or I would know about it, and there isn't one. I don't think there's anything operational—I know there's nothing operational. Everything is still in testing, and they've been doing it for a long time. You know, labs here and there will use it for specific purposes because someone bought it, you know, it's there. But it's not operational the way flow cytometers are operational, or our Illumina machines are operational."*

Source: Scorpion Capital consultation calls with experts

2C) **Bristol Meyers Squibb employee #1**

Bristol Meyers employee #1 (cont'd): Slammed BLI system as not that new or innovative; has no value proposition for big pharma like Bristol; hasn't enabled anything meaningful for them as a customer; no one at Bristol seems to care much about the technology; hard sell to scientists internally; already have similar capabilities "much more cheaply."

> ***Dismissive of BLI's system as not that new or innovative; already have similar capabilities "much more cheaply"***
> *"The single-cell stuff is really interesting, but* ***you can sequence single cells already. We already have single cell processes in place****, and we can use cell sorting to get to those cells. That's correct. So, it is a really fancy cell screening instrument. That's a good way of putting it, actually. You can do that stuff, but* ***you can do it much more cheaply with methods that scientists actually use."***

> ***No one at Bristol Myers seems to care much about BLI's technology; hasn't enabled anything meaningful.***
> *"I don't hear any executives talking about Berkeley Lights. There's no push from executives for this that I've heard of, and we're on all of their townhalls internally and everything.* ***I haven't heard anything about Berkeley Lights****. I've heard about potential generically about digital cell biology and digital technologies as a whole, but* ***nothing specifically that, oh, Berkeley Lights enabled this discovery or did this or that. It's just not operational."***

> ***Doesn't feel BLI has a value proposition for companies like BMS; "hard sell" given resistance from scientists***
> *Q: "In your opinion, does BLI even have a viable value proposition today?"*
> *A: "That's a tough one. in terms of a viable a value proposition for a pharmaceutical company... they want to operationalize these methods pretty quickly.* ***There are too many legacy processes that have to be reengineered and pharma scientists just don't like to do that. They will throw cold water on this*** *as soon as they can because it's not in their interest. Even with an unlimited amount of money, it's still hard to operationalize it because you still have to get people on board to use it, to promote it, to drop other things that they've been working on for years, and reengineer something that they thought was already done, like designing an assay. They don't like designing assays.* ***If they already designed an assay for a flow cytometer, why go and redo it for Berkeley Lights because it's a different platform? It's a really hard sell. So, the answer, unfortunately, is no."***

Source: Scorpion Capital consultation calls with experts

2C) Bristol Meyers Squibb employee #1

Bristol Meyers employee #1 (cont'd): Scientists are highly resistant to adopting BLI and more trusting of cheaper flow cytometers. Beacon is not competitive with legacy machines like cytometers; has little incremental benefit; and "doesn't make sense."

> ***BMS scientists are highly resistant and have more trust in conventional flow cytometry than BLI's system***
> *"Our group will work directly with Berkeley Lights or 10X or any of these companies and develop cell assays and start rolling them out as prototypes or POCs for other groups and show them how to use it.* ***We even have a challenge in R&D in recruiting scientific groups to use these new methods****. It partially might be learning a new technology, which is a barrier, but it's also scientists get set in their ways.* ***With flow cytometry, it's an old technology, but it works. They can trust the data*** *because they've used it in their training, their peers use it, they know all the assay panel development, they know all the software to find an antibody for a receptor. They don't actually have an incentive to use a new technology. It goes to job security—people don't want to automate away their own teams or positions."*

> ***BLI's system is not competitive with cheap, legacy machines like cytometers; little incremental benefit and "doesn't make sense"***
> *"We have hundreds of flow cytometers all over the company, and we can buy new flow cytometers more easily, start using them more quickly because everyone's trained on those things. We have multiple core facilities for flow, imaging flow cytometry, mass cytometry. We have all of these things already in production.* ***So, bringing in a new instrument that essentially does the same thing for cell sorting doesn't make sense to scientists****, even if it's cool, because they already have a method. Even if Berkeley Lights, if you only have to generate 100 cells to do a cell assay, and for a flow cytometry process, you have to generate a million cells, they'll say okay fine, we'll generate a million cells, that's not that much more expensive. The benefit you get from 100 cells versus a million is not really seen in pharma because even though you can do it doesn't mean it's going to be useful. BMS spends at least $100-million a year on flow cytometers. On mass cytometers, flow cytometers, all kinds of cell analysis equipment.* ***We have so many flow cytometers; we have at least 1,500 now*** *across both heritage companies who use flow cytometry regularly, Molecular biologists tend to gravitate to technologies that they were trained in grad school.""*

Source: Scorpion Capital consultation calls with experts

2C) Bristol Meyers Squibb employee #1

Bristol Meyers employee #1 (cont'd) is skeptical of BLI's technology and thinks it'll be short-lived; too difficult to integrate into pharma workflows; requires an onerous process of re-engineering existing assays, which may not even work on the instrument; scientists are extremely reluctant as they'd have to "rebuild their entire research platform" on a BLI system that may quickly become obsolete.

> ***Skeptical of BLI and thinks it'll be short-lived; too difficult to integrate into pharma workflows***
> ***"I've been around a long time, so I've seen a lot of these technologies come and go***. *I have been in the lab. There's a difference between the theory and the marketing, and what's actually true. What I've noticed with technologies like Berkeley Lights…is that even though the promise is there, operationally, it's really hard to integrate these emerging technologies into a conventional workflow."*

> ***Using BLI requires an onerous process of re-engineering existing workflows for assays, some of which aren't even portable to a new technology***
> ***"The problem is that you have to completely redo all the assay development****; you have to learn a new instrument, but learning how to operate the instrument is the least of it. They have to change all of their experimental design processes. They'd have to change how they select for antibodies; some antibodies aren't going to work in a single-cell channel, they won't bind as much as a flow cytometer would detect, a fluorophore, you don't know if you could just reuse those antibodies in a Berkeley Lights platform.* ***So, you have to essentially reengineer the whole process."*** *matter."*

> ***Scientists don't 'want to use BLI because they'd have to "rebuild their entire research platform" with a technology that will be don't 'want obsolete in a few years***
> *"The issue on the operations side, it's not as much cost as it is* ***convincing scientists that they'll have to essentially rebuild their entire research platform****, and I'll tell you, scientists will say this—and they're usually right about it—they say, why would I do this because the next thing is going to come along in five years and then I'll have to redo that. I might as well stick with what I know works. So, that's what I hear all the time with new stuff, not just about Berkeley Lights. They don't get any extra credit for Berkeley Lights versus flow cytometry on the science side. To them, it doesn't matter."*

> ***Extremely difficult to convince scientists to change their established workflows to use BLI***
> ***"It's really hard to change a scientist's workflow or mindset****. I bang my head against the wall They basically just gravitated to what they knew, which was a very limited, narrow view. Ironically, we have these technologies, but the scientists who are supposed to be using them are* ***not trained to wrap their heads around that much data."***

Source: Scorpion Capital consultation calls with experts

2C) Bristol Meyers Squibb employee #1

Bristol Meyers employee #1 (cont'd): The instrument spews "an insane amount of data" that's difficult to process and turns off scientists; BMS vendors and CRO's don't use BLI, making it "not in BMS scientists' interest to incorporate" the system.

> ***Instrument spews an overwhelming amount of data that turns off scientists***
> *"Every time we demo it to scientists, it's an insane amount of data.* ***Every cell, we're generating 50,000 data points****, and that's a cell across entire tissue sections, so there are hundreds of cells. Each has 50,000 data points. It is mind-boggling how you're going to go through that. The Berkeley Lights problem isn't that bad, but we still get this from cell biologists. The cell biologists aren't used to looking at this amount of data. They like straightforward gating processes with flow cytometers looking through automated microscopy, for example. That's about as much automation as they're used to."*

> ***Not in BMS scientists' interest to use Berkeley Lights, as BMS vendors and CRO's don't use the BLI instrument***
> *"Another issue is that* ***our vendors don't use it yet, and a lot of our R&D is outsourced to CROs now****. So, we'll innovate and invent new methods in the lab and basically script the entire protocol and recruit a CRO to just develop a lab workflow with them. If CROs aren't trained on it either, it's even more of a problem—the PPD and all these larger CROs aren't using it, then* ***it's not in BMS scientists' interest to incorporate Berkeley Lights."***

Source: Scorpion Capital consultation calls with experts

2C) Bristol Meyers Squibb employee #1

Bristol Meyers employee #1 (cont'd): Competitors don't see enough opportunity in BLI's niche but could easily crush them with a radically cheaper device; BLI is not the next Illumina and will fizzle out; thinks 10X Genomics will be much more successful.

> ***Doesn't think competitors see enough opportunity in BLI's niche to compete, but that they could easily crush them with a radically cheaper device if they saw BLI gaining any traction***
> *"I don't know what they own the IP on if it's the cell channels or the process—the optofluidics thing to move a cell. So, it's hard for me to say. Here's the thing,* ***there are so many different ways that modern nano and micro-fluidics can come up with something that would compete with Berkeley Lights that could be cheaper****, if a competitor were to get in, it would be because there was an opportunity there, and I'm not sure they're seeing that opportunity. Like Thermo Fisher makes tons of money on their flow cytometers. Beckman Coulter makes tons of money of flow cytometers, mass cytometers. They don't actually need to get into this. I think they might be sitting back and watching; hey, let's see if this starts getting adoption.* ***If people start using it, then we'll come up with something that costs a quarter of what this costs, and we'll low-ball them because all these pharma authorities spend $20-30 million with us every year."***

> ***BLI is not the next Illumina and will fizzle out***
> *"I've been in the biotechnology industry for a long time. These types of companies are* ***really hard to scale and to make money off****. Illumina is an anomaly because they did something very clever in the late '90s where they basically cornered the market on sequencing. Whenever people get greedy looking at a company like Berkeley Lights, they think this is the next Illumina.* ***It is not the next Illumina. It's probably going to fizzle out****. Berkeley Lights is going to go more the way - and this is totally me speculating - have you heard of a company called Affymetrix? They used something call photolithography to make these micro rays grow all the nucleotides on a chip. It was really cool, and it was cheaper than the way arrays were made before. But then Illumina put out their next-gen sequencing instrument and completely obliterated Affy because it became way cheaper to sequence all the RNA strands than to hybernize them on an array and it was more accurate to count them. And Illumina made all sequencing cheaper and it basically just blew away Affymetrix and Affy got acquired by Thermo a few years ago, but it was making a lot less money.* ***It's going to fizzle out."***

> ***Thinks 10X Genomics will be more successful than Berkeley Lights***
> *"Illumina had 90% market share in five years, and 10X is doing the same thing with these data structures. I'm bullish. I don't know if they're going to be as successful as Illumina, but I am really impressed with the acquisitions they've made and our work with them. The data you get is amazing.* ***I'm more bullish on 10X than I would be on Berkeley Lights."***

Source: Scorpion Capital consultation calls with experts

2C) Bristol Meyers Squibb employee #1

Bristol Meyers employee #1 (cont'd): Lack of BLI adoption in academia and absence of anything meaningful in the literature dooms its trajectory and scientific credibility; leads scientists to instantly dismiss the instrument.

> ***Lack of meaningful use within academia dooms BLI's adoption potential and scientific credibility***
> *"Unfortunately, they really should have gotten this into academia sooner. That actually explains a lot because, scientists, you always have to retrain them with stuff like this. And they're like, well, why didn't I learn this? I went to Stanford for my Ph.D., or I went to MIT; how do I not know about this?* ***They don't trust it*** *immediately because they never heard about it at their leading institution.* ***If they don't have that many academics on board, that's a big problem for them****."*

> ***Called out the lack of anything meaningful in the literature about Berkeley Lights being used successfully***
> ***"You have to have application papers****. Not the paper about Berkeley Lights. It's that Berkeley Lights was used for this. So, you have your answer there. There aren't any. I mean, that doesn't surprise me. The first thing I did a couple of years ago, when Berkeley Lights came to me, and I was like, wait, what is this?* ***I don't see anything in the literature****"*

> ***The lack of published papers and discoveries leads scientists to instantly dismiss BLI's instrument***
> *"If papers aren't coming out that show that Berkeley Lights was used for a particular method, not the technology itself, but like, we discovered a novel T-cell that does x, y, and z, and in the method section, Berkeley Lights' platform was used for this, this, and that—they need papers like that. Illumina had it; Affymetrix even had it. Scientists in pharma still read all those papers. The first thing they're going to do is what I did when I first heard of Berkeley Lights. They're going into PubMed and typing Berkeley Lights.* ***And if they see 15 papers come up in five years, they'll say this hasn't been vetted in real-time."***

> ***Dependence on a few big pharma customers and lack of academic following are a huge red flag, as pharma wastes "so much money in R&D" while academic labs drive long term adoption in the field***
> *"I don't want to say that they've already fizzled out…but* ***it's a bad sign for them if most of their customers are big pharma's that have tons of money like us, and they have very few academic customers****. That is very bad because scientists gravitate toward vendors they were trained with in academia. If they don't have a presence in academic labs, which Illumina was shrewdly cultivating for years, which is why they're so successful right now. If Berkeley Lights instruments are scattered across companies like BMS that have tons of money and have no problem chucking an instrument and just taking that as a loss—we waste so much money in R&D—it's not a good business model to rely on pharma, even though it looks good on paper, pharma's. It's all about cultivating the long-term loyalty of scientists in operationalizing stuff in academic labs."*

Source: Scorpion Capital consultation calls with experts

2D) Bristol Meyers Squibb expert #2

Bristol Meyers expert #2, an ex-senior executive closely involved with bringing in BLI: total addressable market is pitifully small, limited to somewhere between 10 to 50 of the largest biotech/pharma companies; not viable for mid-tier biotech's; opportunity is already saturated within large pharma as most have already bought some machines to try it out.

> ***BMS first became involved with BLI in 2012/2013 with seed development money***
> *"At the very beginning. Maybe 2012 or 2013, we gave them $50,000 as seed money to create proof of confidence to see that can we move individual hybridoma cells into a well. BMS didn't take an equity position. What we did was we gave them development money, and the idea was we had a real problem, and we wanted them to solve it for us with the Beacon."*

> ***Total addressable market is only top 50 biotech/pharma companies and at most 250 machines total***
> *Q: "How many customers are there when you look at big pharma? Just being realistic, how many companies are there that can buy one or two of these machines that are willing to undertake all this?"*
> *A: **"You're talking probably the top-50 biotech and pharma companies**. It's going to be somewhere between 1 and 5 machines per each."*

> ***TAM for antibody discovery – BLI"s "largest" market – is limited; only ten or so mega-cap companies have enough screening volumes; each of them needs at most 1-2 machines***
> *A: "There's **less of a market for antibody hybridoma because very few companies have as high a throughput** antibody screening operation as BMS, and it was because of the immuno-oncology race that we did it. Genentech would run about 50 projects a year internally. We were running four times that. But I can tell you just knowing the industry **how many groups do that kind of high throughput antibody discovery; it really is probably like 10."***
> *Q: "And each of those people would use like one or two machines to automate it?*
> *A: "Yeah, that's **all you would need, one or two machines."***

> ***BLI opportunity is small and already saturated within large pharma; not viable for mid-tier to spend $2 million***
> *A: "For the big pharma, if you look at companies that do biologics—Lilly, Pfizer, BMS, Amgen, Roche—they all have it, But it's a $2-million machine, so **your mid-size biotech is simply not going to be able to do it."***
> *Q: "Is the market opportunity already saturated within big pharma companies?"*
> *A: "I don't know what their sales process is, but the [installed base] numbers that you just said would have to tell me that, yeah, if they're not there, they're not too far away from it. For that one use case of cell line development, it's been out there for a couple of years…so I think **everybody who could afford it probably has mostly bought it."***

Source: Scorpion Capital consultation calls with experts

2D) Bristol Meyers Squibb expert #2

Bristol Meyers expert #2, an ex-senior executive (cont'd): It takes 6 months to learn how to even use the machine; extremely complex and difficult to maintain; can become a "very expensive doorstop"; easy to break with high downtimes; Bristol wouldn't let the "average scientist" use it.

> ***Takes six months to become proficient on Beacon***
> *"It's a process where probably for them to get really good at it, it's a six-month process."*

> ***Machines were down 20% of the time, but may have been longer if BLI offices/technicians weren't nearby***
> *Q: "How often would things break and you can't use it for a week or a month because you're waiting for Berkeley Lights to send some part or send a technician?"*
> *A: **"The downtime was 20%**. The good news is they were right across the bridge, and the technician who would fix it actually lived up the street in San Mateo from where we were. Generally, we would get within a day or two; they would have somebody, have gotten the part, come and fix it."*

> ***Instrument is complex and difficult to maintain, can easily become a "very expensive doorstop"***
> *"It's got a lot of fluidics, and high-end FACS machines have the same problem. If you don't know how to take care of them, they become a **very expensive doorstop** very fast. Maybe because BMS and Amgen were their first users and we had very sophisticated people on the project, and I know my counterpart at Amgen did too, they may not have really gotten a clear vision of **how bad it would be if they just released this into the general population** big pharma without making sure that the training was sufficient. I've heard these same complaints, definitely, and I knew that it's just a really complex machine."*

> ***Machine is easy to break, and BMS wouldn't let the "average scientist" use it***
> *"We saw the machine from the beginning could see it was a very high complexity piece of machinery. It's very similar to a BD high-end FACS like a Fortessa with 16 colors. You have to hire people that take care of it. It's kind of like driving a Ferrari. It has to be maintained. And so, I had an automation staff that was very, very sophisticated. We had 17 large-scale, million-dollar PerkinElmer, Thermo, and Berkeley Lights robot systems. So, I had a staff that had a really strong engineering background. **We wouldn't let the average scientist walk up and use these machines because they're too complex**. They're too easy to break, and they require maintenance."*

Source: Scorpion Capital consultation calls with experts

2D) Bristol Meyers Squibb expert #2

Bristol Meyers expert #2, an ex-senior executive (cont'd): BLI instrument is prone to a "lot of false positives and negatives"; the machine's throughput is poor for antibody discovery efforts; and is at least 4X as expensive as its closest substitute, FACS machines.

> ***Instrument is prone to "lot of false positives and negatives" unless users have sophisticated assay development capabilities***
> *"It does take sophisticated assay development also. You have to have that capability in-house. If you don't, you're going to get a* ***lot of false positives and negatives****, probably a lot of false negatives because it's very small volumes. You're talking about a cell producing a few molecules, and then you're doing a fluorescent assay at the very tip of the pen where the diffusion goes out into the fairway—a high level of sophistication."*

> ***The machine's throughput is poor for antibody discovery efforts***
> *"And* ***throughput isn't all that great for that kind of B-cell screening*** *unless you have a really good upfront B-cell enrichment protocol first. And that would either be a FACS or a MACS where you are sorting for different classes of B-cells."*

> ***Beacon is at least 4X as expensive as high end FACS machines, its closest substitute***
> *"Generally, people use FACS machines for that. A high-end FACS order is no more than half a million dollars. The capital equipment* ***costs of a Beacon are pretty high."***

Source: Scorpion Capital consultation calls with experts

2E) Pfizer senior scientist

PFIZER senior scientist in the antibody discovery group describes BLI experience as a disaster: Pfizer has gotten no value from the machine; no interest in buying any more; not robust enough to be useful for their antibody discovery programs.

> ***Expert uses various technologies in the antibody discovery group including Berkeley Lights***
> *"My role here as [redacted] within the antibody discovery group is to essentially identify functional antibodies requested by various research units within Pfizer. We use platforms such as phage display or hybridoma to identify those antibodies;. However, we have tried to look out for newer and faster technologies that include microfluidics and also Berkeley Lights for our antibody discovery platform. We started evaluating the Berkeley Lights Beacon about two to three years ago. We have slowly been integrating the platform for our portfolio of projects for our antibody discovery."*

> ***Pfizer has gotten no value from BLI's machine, prefer the traditional method of antibody discovery as it's more robust and reliable***
> *"If I had to pick one platform, say hybridoma versus Berkeley Lights, for our antibody discovery effort, I tend to be more comfortable with the hybridoma approach, just because* ***it's more robust, it's more reliable. Some of the issues we often encounter are the reliability of the instrument, and we haven't really gotten good hits derived from Berkeley Lights."***

> ***Doesn't think Pfizer has any interest in buying more BLI machines***
> *"I don't think Pfizer is going buy more machines because one is already pretty expensive. It's hard to justify buying another instrument because we haven't been using it that extensively. We don't run it every day. There are days in which the machine is off."*

> ***Instrument is not robust enough be Pfizer's main antibody discovery tool; just a supplement to traditional methods***
> *Q: "Has this speeded up or really help your antibody discovery program?*
> *A: "At this moment, I think we would use Berkeley Lights to supplement our hybridoma or phage effort.* ***I don't think it is robust enough to be our bread and butter, our main platform."***

> ***Hasn't really benefited Pfizer's antibody discovery efforts; benefit from BLI has been "relatively minor"; minor benefits achieved merely supplement what traditional antibody discovery methods have yielded***
> *"Up to this point, I think the benefit is* ***relatively minor considering the amount of money*** *and investment.* ***I don't think this has significantly benefitted the discovery effort****. Yes, we do have some benefits, but again, those additional hits are generally used to supplement what we have gotten from other platforms."*

Source: Scorpion Capital consultation calls with experts

2E) Pfizer senior scientist

PFIZER senior scientist (cont'd): Machine is so useless that Pfizer barely utilizes it; suggests everyone in their antibody discovery group loathes the instrument; described a Dilbert-type political dynamic where they're forced to occasionally use it to save face, after someone got bamboozled and blew $2 million.

> ***Pfizer barely utilizes the BLI machine, given Pfizer's ongoing reliance on traditional antibody workflows like hybridoma and their overall volume of antibody work***
>
> *Q: "You're saying you use the instrument **one or two days out of every two weeks**, or is that not accurate?*
>
> *A: "Yes, something like that sounds right."*
>
> *Q: "So, **80-90% of the time, it's not even utilized?"***
>
> *A: "Right, because Berkeley Lights, you're supposed to be able to identify the hits in one to two days. Within a week, if you have a project entering the Beacon platform, you just need one to two days to get your so-called hits because you're supposed to be able to import, screen, and export in a day. That is how we essentially function because the animals need to also be utilized for a hybridoma, and we don't do a hybridoma project every week.*
>
> *Q: "So, it's used just to confirm one or two days every two weeks roughly based on the volume of what you have?"*
>
> *A: "More or less. We try to optimize it further for other purposes. But, in general, that's about right."*

> ***Pfizer's antibody discovery group described a political dynamic where they are forced to use an instrument that' doesn't work in order to save face for a failed purchase, that initially looked great on paper***
>
> *Q: "Did you use it because somebody told you to use it? It sounds like you would just much rather do hybridoma. It sounds like it's just adding an extra step because you have to show some usage."*
>
> *A: "Definitely, there is that component, because we have bought the instrument and **now we have to justify that there is some usefulness to this instrument**. There are other people involved that are very eager to push the technology forward, and on paper, it does look good."*
>
> *Q: "It sounds like you're using it because you're being forced to use it. Is that fair, or is that not fair?"*
>
> *A: "Yeah, yeah—in a way, yes. I mean, the whole group, essentially, not just me, but the whole hybridoma platform group is being told to do it that way."*
>
> *Q: "And how do the other seven or eight people in the hybridoma group feel about Berkeley Lights?"*
>
> *A: "They have a similar sentiment. Initially, there's that excitement because, on paper, it does look cool; it does look amazing. But then when we start going through the motions and seeing the data and how much we have to struggle with it, **it's not like 10X technology, for example, where out of the box, it starts to work. It's not like that."***

Source: Scorpion Capital consultation calls with experts

PFIZER senior scientist (cont'd): Instrument is prone to a long list of errors and malfunctions; "there's always something" wrong it whether door jams, problems with cells; Pfizer has struggled for 2-3 years to optimize the machine; requires significant "chaperoning" from BLI; machine can't even do functional assays properly which renders it useless for antibody discovery.

> ***BLI system is prone to a long list of malfunctions; the instrument can't even do standard functional assays for antibody discovery***
> *"We encounter **errors, door jams, cells not penning properly, bubbles**—all of these little issues. The cells are not penning into the chip properly, for example. In other words, **there's always something**, and at the end of the day, for the most part, we tend to **only be able to screen binders and not so much functional assays in the instrument**. Binders meaning just throwing in protein and see whether the antibody that is secreted by the plasma cells binds to those proteins or cells. Those tend to be the most robust basic approach. Proteins tend to do slightly better than cells. Cells tend to form crumbs, tend to aggregate, especially when the area, the volume needed—within the chip, it's relatively small—so it is understandable why you tend to encounter troubles as such."*

> ***Pfizer has been struggling to optimize the instrument for two to three years; machine required significant "chaperoning" from BLI***
> *Q: "How long has Pfizer been trying to optimize this to get it to work?*
> *A: "Two to three years, but initially, it was structured in such a way that we wanted to first establish and complete the milestones. Because of that, **they were not letting us play around with the instrument on our own without them chaperoning the whole procedure**. We began to get the freedom to tinker with the instrument toward the end of last year or starting the end of summer, where we started to seriously try and optimize the instrument on our own and have the flexibility to do that."*

Source: Scorpion Capital consultation calls with experts

2E) Pfizer senior scientist

PFIZER senior scientist (cont'd): "Constant uncertainty" about the machine's ability to function properly; reliability pales in comparison to competitors like 10X Genomics; lack of reliability makes the instrument basically unusable for antibody discovery – it's main hoped-for use case.

> ***"Constant uncertainty" about the instrument's ability to function properly, in contrast to robust technology by competitors like 10X Genomics; leads Pfizer to view it as a "sidekick" for its antibody discovery efforts***
>
> *Q: "You're saying it's not like 10X technology where it works out of the box?"*
>
> *A: "Right. It is not.* ***With 10X, the protocol is clearly laid out, every single component is guaranteed to work, but with Berkeley Lights, there is always this worry whether something will not function properly****. whether there's a bubble, whether the export is not happening properly, whether they need to upgrade the software. So, there's this* ***constant uncertainty*** *whenever you use this. Hence we push it as a sidekick, as a backup to hybridoma."*
>
> *Q: "****How often does it break down or need service?"***
>
> *A: "It's hard to say.* ***Maybe on average once a month."***
>
> *Q: "So, if you're only running it once a week, once every two weeks, it's breaking down like 25%. 50% of the time when it runs?"*
>
> *A: "Right, something like that. So, I don't know whether other groups or other companies have the same experience, but* ***that's what I mean by the issue with the robustness of this instrument."***
>
> *Q: "What does Berkeley Lights say when you bring them up with them? What is their response?"*
>
> *A: "They just say, oh, these things happen."*

> ***Machine is plagued by massive reliability issues that render is unusable for antibody discovery***
>
> *Q: "Talk to me about the reliability issues at Berkeley Lights and not getting hits. You said it's not robust?"*
>
> *A: "First, we struggle with export. There was a question about whether we are exporting the right cells, whether the cells that were being exported are healthy enough to the point that you can isolate the RNA for the subsequent molecular cloning workflow. Eventually, we started to tinker with the single-cell VH and VL cloning. For the most part, initially, we were struggling. We could only get maybe 40 to 50. But eventually, we got better, and let's say* ***our best VH and VL recovery rate was in the 70 to 80 range. This has got to do with maybe multiple issues, maybe export issues, maybe cell condition, maybe the media, exporting the cells in the right well, or are the cells being blocked during export by your reporter assay, by your cell line****, for example. Some of these are part of the issue. But out of the 70% or 80% that we could identify the VH and VL sequences, only a fraction of them can be recapitulated once we have the recombinant."*

Source: Scorpion Capital consultation calls with experts

2E) Pfizer senior scientist

PFIZER senior scientist (cont'd) elaborates on why the instrument is a non-starter for antibody discovery, given it doesn't work well for functional assays that are integral to the workflow; near-impossibility of functional assays defeats the machine's entire purpose.

> *"**Almost impossible" to set up functional assays on the machine, which defeats the entire purpose of it***
> *"In our hybridoma screening funnel, in the functional screening assay, we tend to be able to do that reliably well.* ***Whereas with Berkeley Lights, even binding assays sometimes can be rather questionable. So, it's almost impossible at this moment, at least, to set up a functional assay on Berkeley Lights****. So, you would just be sequencing and identifying binders. If you can only identify binders, you would then have to do the molecular cloning and then subsequently clone it into a vector before you can express the recombinant antibody. Once you have the recombinant antibody, you'd need to go back and first confirm, and secondly,* ***then set up a functional assay outside of the Berkeley Lights platform, which defeats the whole purpose of Berkeley Lights*** *because they are saying you should be able to identify the IDD secretor, the binder, and the function all within a day, and then subsequently export those. But here, we are not quite there yet in a sense that some of the functional assay is not built-in, so at the end of the day, we are exporting a bunch of binders for them to be further confirmed and then rescreened for function."*

> ***The machine is a non-starter for antibody discovery since it doesn't work well for functional assays***
> ***"To develop functional assays specifically for Berkeley Lights tends to be something that's more challenging****, in my opinion. So, at the end of the day, we tend to only export binders, be it binding to the protein or cells and then subsequently do a single cell VH VL cloning versus followed by generating the recombinant before confirming and subsequently developing the functional assay based on our standard, non-Berkeley Lights approach. In other words, a functional assay that we routinely develop for a hybridoma, meaning using the supernatant from those antibodies generated."*

Source: Scorpion Capital consultation calls with experts

2E) Pfizer senior scientist

PFIZER senior scientist (cont'd) suggests that BLI's claims around antibody discovery are misleading.

Pfizer implies that BLI's machine can't even do full functional assays for antibody discovery, suggesting BLI's claims are misleading

*A: **"The number of hits that it can spit out is somewhat underwhelming**. The issue has to do mostly with the fact that we can only export binders at this moment, yet it would be much better if we could screen not only binders but also the function of those antibodies so that we can quickly identify the right antibodies with the right function."*

Q: "Is that just the capability of Berkeley Lights? You can only export binders?"

*A: **"No. No. They don't advertise it as such. They advertise it as something that's supposed to be grander**. But the truth of the matter is, for the most part, for many of the targets—you know, each target is unique. For each target, you need to come up with almost a bespoke assay, depending on what sort of function you're going after."*

Q: "For each sort of antibody target, you need a bespoke assay?"

*A: "Correct. And it is **pretty hard to develop an assay** even for hybridoma supernatant. So, that's already pretty challenging. It's been the bottleneck in Berkeley Lights being more useful, **even though they advertise that you're supposed to be able to do functional assays on the instrument."***

Q: "I mean, their entire pitch is that you can do functional assays, and you can use it for antibody development, and you're saying, that's marketing, that's not true?"

A: "I'm sure it's true for some targets, but for the most part, most of our targets don't have the functional assay built in Berkeley Lights, even for cell binders, that depending on the kind of cell lines you use, is already pretty questionable. So, proteins tend to be the most robust, the most reliable, but even then, once you generate the recombinant antibody and then you try to reconfirm whether they still bind to the protein, quite a significant amount of those antibodies actually fail the confirmation step."

Source: Scorpion Capital consultation calls with experts

2E) Pfizer senior scientist

PFIZER senior scientist (cont'd) goes further and implies the antibody discovery claims are false; Pfizer sees no value proposition from the machine and prefers to drop it completely and continue using legacy workflows which are superior.

> ***BLI's claims for antibody discovery are false and Pfizer sees no value proposition; prefer to drop the machine and stick with the traditional method of antibody discovery, which is superior to BLI***
>
> *Q: "Is that something unusual in terms of the antibodies Pfizer is going after? Or are you just saying, no, the device just has a very limited number of antibodies it can go after, functional assays?"*
>
> *A: "No, generally with hybridoma screen, we tend to be able to reconfirm a high number of it, but I think, for some reason with Berkeley Lights, maybe it's because of the fact that it's a single cell and therefore the cloning is slightly more challenging, even to be able to get the antibody sequence, even though supposedly there are cells in a given well, just because it is a single cell, sometimes you don't get the VH and VL sequence.* ***It's much harder to do molecular cloning on a single cell than a pool of cells like you would from hybridoma.*** *So, from there, you try to generate recombinant even if you can get recombinant* ***for reasons that are still quite mysterious; the result is not consistent with what Berkeley Lights is saying****. Now, is it because the cells failed to be exported? Is it because it's exporting the wrong cell? That's pretty hard to track.*
>
> *Q: "Does Berkeley Lights even have a value proposition for antibody development today if they can't even handle a functional assay?"*
>
> *A:* ***"[Chuckles] Like I said at the very beginning, if I were given one option, I would drop Berkeley Lights and rely on hybridoma. Yes, it takes time, and it's labor-intensive, perhaps, but it's still one of our most robust and reliable ways to identify an antibody of choice."***

Source: Scorpion Capital consultation calls with experts

2E) Pfizer senior scientist

PFIZER senior scientist (cont'd): Instrument is plagued by false hits and error rates of 50-100% that render it as undependable; sometimes unable to confirm a single antibody and runs are total failures.

BLI is plagued by false hits and an average error rate of around 50% and sometimes 100%, ie, it's unable to sometimes confirm a single antibody, leading Pfizer to view it as undependable

Q: "What percentage of the time is it giving you false positives and hits? So, it's telling you that you have a functional antibody, and then you're realizing, no, Berkeley Lights says it binds, but it doesn't. What percentage of the time is it giving you a false signal?"

A: "On average, only about 50% to 60% can be confirmed, and sometimes we cannot confirm a single one."

Q: ***"So, it's basically a 50% to 100% error rate a lot of the time?"***

A: ***"[Chuckles] So, on average, maybe I would say 50% to 60% can be confirmed on average."***

Q: ***"How can you trust it as a piece of lab equipment if that's the case?***

A: "Hence, this notion of supplemental effort, meaning if we get something out of this, that's good, but if not, we don't have to worry about it because we have other hits coming from hybridoma or others platforms."

Antibody runs are often total failures

*A: "****Sometimes, for example, we get zero, meaning we could not confirm a single recombinant antibody even though we are exporting 20, for example, with identifiable VH and VL sequences."***

Q: "When you say you couldn't confirm, what does that mean? So, you have an antibody, and you're exporting it; what are you trying to confirm or verify?

A: "Once those plasma cells have been exported, we would want to identify the antibody sequences, and there are two sequences that are needed to generate an antibody—heavy chain sequence information and the light chain sequence information. If you can isolate the sequences from these plasma cells, you would then clone it into a vector and then do a transient transfection to re-express these antibodies in the form of the recombinant antibody. And now you'll be able to express this antibody in a large quantity, and then what you do next is you would want to reconfirm that these antibodies can truly bind to the protein of interest by doing some kind of a binding assay, like how you would with hybridoma supernatant. And when I say there is a big attrition rate is when we try to confirm that these identified antibodies from Berkeley Lights exported cells, whether or not they can still bind to the protein, ***sometimes you don't get any recombinant antibody derived from the Berkeley Lights experiments that can bind to the protein that Berkeley Lights says should be able to bind to the protein. "***

Q: ***"So, it's giving you false positive, false hits?"***

A: ***"Correct."***

Source: Scorpion Capital consultation calls with experts

2E) Pfizer senior scientist

PFIZER senior scientist (cont'd) speaks with other large biotech/pharma customers of BLI and states that their experiences are equally disastrous: "consensus is very similar," "not worth the investment"; mentions AbbVie in particular as also having reliability issues.

> ***Expert speaks to several BLI customer who share the same view***
> *Q: "Do you talk to other customers of Berkeley Lights?"*
> *A: "Yes.* ***Their consensus is very similar to what I have essentially told you."***
> *Q: "Can you say which companies or what kinds of companies you've talked to?"*
> *A: "I probably should not be sharing information with them, but obviously, because we know we have Berkeley Lights. So,* ***the bottom line coming from them is that it's not worth the investment****, according to what they have seen so far.*
> *Q: "How many of these customers have you talked to that you've compared notes with?"*
> *A: "Two to three."*
> *Q: "What kinds of companies are these? Are these Pfizer-scale major biopharma companies?"*
> *A: "They're both. For example,* ***AbbVie, for example, has Berkeley Lights too. And they voice the same kind of complaints that I've been sharing with you. It's not as reliable,"***
> *Q: "You're saying AbbVie's viewpoint is the same as Pfizer's, that this thing doesn't really work right now?"*
> *A: "It works to some degree, like I told you, it works in identifying binders, assuming those binders can be reconfirmed eventually. But when you want to build a functional assay, it's not as easy. Some of are overseas. I don't know if you would be able to reach out to them, like Biocytogen is another one based in China."*
> *Q: "Are they having the same experience? "*
> *A: "Yeah."*

Source: Scorpion Capital consultation calls with experts

2F) Novartis

NOVARTIS cell and gene therapy division: Former manager closely involved in using BLI's machine describes a disaster; never made it past pilot stage evaluation due to error rates, data quality, reliability issues, lack of scalability; data the instrument produced was "all over the place" and inconsistent; couldn't validate data sets; had to re-run assays using traditional methods, defeating the entire purpose.

> ***Expert recently left Novartis, which used a BLI machine in the cell and gene therapy unit***
> *"I used to be with Novartis in their cell and gene therapy division for five years. As part of the clinical workflow, not the commercial workflow,* ***we used to use Berkeley Lights for certain cell characterization assays and certain early development phases. I believe it was acquired at the end of 2018****. This one was in a clinical development pilot line for cell therapies, and they just had a single machine for the cell and gene therapy unit This is for cell line development, particularly for T cell therapies."*

> ***Machine never made it past pilot phase due to error rates, data quality, reliability issues, lack of scalability***
> *"From a quality perspective,* ***the error rate in the reliability of the data wasn't up to par; The biggest challenge is the quality of the data, the error rates*** *- for lack of a better term, the machine is very finicky when you load the chips and the samples. It's not something that is ideally suited for scalability, and that is predominantly the reason why it never made it past the pilot line, past Novartis cell and gene."*

> ***Data produced was "all over the place" and inconsistent; couldn't validate data sets; had to re-run assays using traditional methods, defeating the entire purpose of the instrument***
> *"We would start with the same cell line and load the different chips. Even though we freely characterize these cell lines, it is coming from the same assay and the same cell culture.* ***We got data that is all over the place where we would spend a ton of time trying to investigate*** *whether is the lack of homogeneity of the sample or what the issue is. Is it something with the cell line degrading over time as it stays in the culture? These were actually loaded in the Berkeley Lights and also ran the common assays, which is the old school and takes a longer time. But* ***the biggest problem with Berkeley Lights was the consistency of the data. The assay to assay variability is huge. For us, we really cannot validate the data set****. It's not a one and done. We are always in a situation where how to run traditional old-school flow or some other characterization assay to confirm the data, and that* ***really defeats the purpose."***

Source: Scorpion Capital consultation calls with experts

NOVARTIS cell and gene therapy (cont'd): Views the machine as a "failed purchase" and would have sent it back if they could; has no value proposition versus traditional flow cytometers that are a fraction of the price and have lower operating costs, can run more assays, and have higher throughput and better data.

> ***Novartis views the machine as a failed purchase that didn't shorten their development timelines; would have sent the machine back if they could***
>
> *A: "Initially, the plan was to develop a very specific assay that'll shorten the release time of these therapies to the market and eventually come to a point where we can better characterize the cells as they actually grow because some of these allogeneic products would be like a 10 to 15-day manufacturing process, and the current market yield is on 65% to 70%, meaning 30% of the cells do not make it to harvest. We wanted to characterize and quantify what are those variables that we need to look at so that I'm not investing 15 days of manufacturing time.* ***So, that was the intent. We never achieved it."***
>
> *Q:* ***"So, it's basically a failed purchase."***
>
> *A:* ***"Yes."***
>
> *Q: "Would you have retuned the machine if you could have?*
>
> *A: "If I had spent my own money, I would have, yes."*
>
> *Q: "****You would have sent it back if you could get the money back?"***
>
> *A:* ***"Yes."***

> ***Machine has no value proposition versus traditional flow cytometers that are a fraction of the price and have lower operating costs, can run more assays, and have higher throughput and better data***
>
> *Q: "How would you compare this machine to a FACS or a cell-sorting machine? How is it unique? My understanding is flow cytometers can be $50,000 to $500,000. This is $2 million."*
>
> *A: "The closest comparison that this would come to is the flow cytometer. Obviously, it's much more expensive.* ***The running cost for this machine is much, much higher*** *because with a flow cytometer; you're looking at basic pipettes and sheets, that's about it. This one, the Beacon,, you're looking at a modular tool, the custom reagents. The running costs are much higher, and generally, from a commercial standpoint, they're looking at least* ***three or four assays; that's about it****. And that's a very low number.* ***With that kind of throughput, this Berkeley Lights machine doesn't really pay out. I'd rather use my traditional flow cytometer, it's much easier to validate, and it's much more stable and predictable. That's how this compares."***

Source: Scorpion Capital consultation calls with experts

2F) Novartis

NOVARTIS cell and gene therapy (cont'd): We got "tricked" and machine doesn't work; BLI marketing is misleading; "not worth the hassle" in trying to get it work; "machine does not live up to its hype"; expert is now at a contract drug manufacturer and "would never use the Berkeley Lights instrument" after Novartis experience; doing so would put his CDMO's reputation and the work of its client at risk.

> ***Novartis got tricked, machine doesn't work and "does not live up to its hype"***
> *"**"What we got tricked by** is we thought, okay, let's get a machine that offers every single feature under the sun and the moon, and we realize **none of it actually works"**…If I were to summarize in one phrase how Berkeley Lights was perceived at Novartis, it's basically **a realization that we were oversold and overpromised. The machine does not live up to its hype**. The feeling was we shouldn't be putting in all of this effort to troubleshoot when this machine was a really expensive piece of equipment that we bought so that we can run and use it."*

> ***BLI marketing is misleading; can only handle a few assays, else "not worth the hassle" trying to troubleshoot it***
> *Q: "What you're saying [about data integrity] is devastating. What's the point of spending $2MM on a machine when you have to run all of your traditional methods just to make sure that what the machine is giving you isn't crap?"*
> *A: "It is. And that's why I say it's not ideally suited to expansion because what they marketed as a multi-omic platform, so you can run a variety of assays in a single sample where you load up the chips, and it take cares of all that for you. But **that wasn't really the experience that I had**. It can handle one or two assays running simultaneously. Anything more than that-- **it's not worth the hassle—too much time spent on troubleshooting than actual discovery."***

> ***Expert is now at a mid-tier CDMO; would never use the BLI instrument after his Novartis experience; doing so would put the CDMO's reputation and the work of its clients at risk***
> *A: "I am at a CDMO for cell and gene therapy. It is a midsize CDMO, about a billion and a half in revenue. For lack of a better term, **we don't want to be sitting out with the technologies that really don't work**. It's one thing for in-house development companies to actually need technology, but from a CDMO perspective, if I'm actually recommending a machine to some customer or a client of ours, I'm not only putting the machine at stake, I'm also putting my company's reputation at stake."*
> *Q: "You're basically saying that as a CDMO, **you would never use the Berkeley Lights instrument because it would put your reputation and the customer's work at risk?"***
> *A: **"That is correct."***

Source: Scorpion Capital consultation calls with experts

2F) Novartis

NOVARTIS cell and gene therapy (cont'd): BLI instrument only works 35-40% of the time and even then the data had to be double-checked by traditional methods; error rates are about 50%; "readings all over the place"; difficult to troubleshoot; implied Novartis was misled.

> ***Error rates are about 50%; "readings all over the place"; difficult to troubleshoot***
>
> *Q: "**What were the error rates?** Where did you observe as far as false positives, fake hits where the machine is telling him that the antibody is actually binding for killing some cells, and it's not doing that when they tried to validate it using their traditional methods. How off was the data?"*
>
> *A: **"I would say that about 50% is a fair number**. There are a couple of variables here. One of the biggest selling points of the machine is you don't need a lot of events to actually count because generally, for flow cytometry, looking at a minimum cell population. So, the promise of this machine is that in a typical cell therapy setting where cells are valuable, this can start and work with a much lower cell concentration and begin the assay, and it can give you a live readout. The problem comes when your actual indicator molecules have a very close light spectrum. So, **that throws up some errors…For some reason, the instrument gives you readings all over the place, and then you try to troubleshoot, they'll say, it's too close of a light spectrum** and that side's overlapping; you've got to try something else."*

> ***Machine only works 35-40% of the time and even then the data had to be double-checked via traditional methods; implies Novartis was misled.***
>
> *Q: "What percentage of the time does it work? Or were you never really able to get it to work at a point that you trusted it?"*
>
> *A: "**That summarizes it. I would say it worked about 35% to 40% of the time, but even those times, I would need an independent assay to confirm."***
>
> *Q: "It sounds like this made your life a little painful - it didn't add anything?"*
>
> *A: **"It did not meet our expectations in the way it was sold to us."***

Source: Scorpion Capital consultation calls with experts

2F) Novartis

NOVARTIS cell and gene therapy (cont'd): Came to view machine as too high-risk for operational use; other groups beyond cell and gene therapy, such as antibody discovery, evaluated the instrument and rejected it; reliability and stability issues led to machine being barely used, around 3-4 times a month.

> ***Machine was used only 3 to 4 times a month***
> *Q: "How often was this machine being used?"*
> *A: "This is a development environment, so you're talking* ***about three or four times a month****. It depends on how intense the program is. At certain times, we used to how to read out every other week, so it might be twice a week. Typically would have been used three or four times a month."*

> ***Novartis initially planned to wide use from discovery to manufacturing, where most of the ROI is, but "it never panned out" given lack of reliability and stability***
> *A:* ***"This is not a scalable investment****. The initial plan was to use it in this particular setting, and then widen use to other discovery programs, and then eventually make its way to manufacturing, which is where the biggest bang for the buck.* ***If we start using this machine in a manufacturing setting, that's where the real big money is. It never panned out."***
> *Q: "You're saying that the real utility of the machine is if you can use it for manufacturing, but it's just not reliable and stable enough for that?"*
> *A: "That is correct."*

> ***Machine was too high-risk to use in actual operations; other groups at Novartis like antibody discovery evaluated the instrument and declined to use it***
> *Q: "So, you just thought the machine was too high-risk to use in a manufacturing environment?"*
> *A: "That is correct."*
> *Q: "Did other groups in Novartis, whether it's antibody discovery or anything else, try to use the machine at all?*
> *A: "The other group that I was aware of was the antibody drug conjugate group.* ***They did consider using the machine, but…they did not really see the benefit for the extra effort or the hassle."***
> *Q: "So, the antibody discovery group at Novartis evaluated the machine, and they took a pass?*
> *A: "That is correct."*

Source: Scorpion Capital consultation calls with experts

2F) Novartis

NOVARTIS cell and gene therapy (cont'd): BLI instrument is too unreliable to be used in an FDA submission; would need to submit parallel data using traditional methods as independent verification, eliminating any time or cost savings.

> ***Expert believes BLI machine is too unreliable to be used in an FDA submission; would need to submit parallel data using traditional methods as verification, therefore saving no time or money***
>
> *A: **"As the data stands and as the reliability stands, you wouldn't really use the data to file with the FDA or any other reputable agencies to prove your scientific finding."***
>
> *Q: "You're saying the data from this machine, you would not be able to use it with the FDA or any other scientific agency?"*
>
> *A: "That is correct."*
>
> *Q: "Wow, that's pretty damning."*
>
> *A: "You have to do your homework if you were to present that data because it's a lot more they put on your end when you're using a nontraditional data source like for monoclonality, for example, or cell line characterization and present it to the FDA because you're not saving any kind of money or legwork by relying just on this data. Because **I know that I would have to prepare and independently submit a separate traditional assay data source."***
>
> *Q: "You're belief is the FDA wouldn't even really kind of accept data from this machine without validation from a traditional source?"*
>
> *A: "That is correct."*

Source: Scorpion Capital consultation calls with experts

2F) Novartis

NOVARTIS cell and gene therapy (cont'd): Ex-manager states that Bayer, Pfizer, and others have also had a disastrous experience; suggests they regretted the purchase; machine is a hodge-podge with no clear target market or use case; delayed vs. speeded up development efforts.

> ***Expert's contacts at other biotech/pharma companies have had a similar experience; machine is a hodge-podge with no clear target market or use case***
>
> *Q: "Did you ever compare notes with any other large pharma customers get a sense of their experience?"*
>
> *A: "I do have a couple of colleagues who had experience with this. Essentially, if I were to summarize, they wanted to build the machine to cover every single scenario this could ever be used within pharmaceutical drug discovery and development. That's where the catch is. It's too complicated with too many variables that are very hard to control. It's like trying to build a car; you've got to at least have a target market in your mind.* ***They tried to combine a souped-up car with an economy car with a mom-and-pop van with a soccer mom van, and ultimately, it's too complicated. It's not repeatable and usable. It's a master of nothing."***

> ***Expert confirms that Bayer and Pfizer's experience was just as disastrous and suggests that both regretted the purchase; instrument delayed development vs. speeding it up – it's key selling point***
>
> *Q: "Bayer and Pfizer - was their feedback similar to your experience with the machine?"*
>
> *A: "Pretty much. They were just mentioning the expectation was far higher and it* ***did not really meet any of those expectations and saying it would have made sense to stick with traditional assays, and we would not have wasted that much time; we would still be on track*** *because the huge selling point was at that time, you could really cut down your interaction as far the characterization timeline by probably 1/3 or 1/4. In hindsight,* ***if we would have had stuck the traditional methods, we would have actually cut the time by half."***
>
> *Q: "So, you're saying that if you used the traditional method, you would have done it 50% faster than using the Berkeley Lights?"*
>
> *A: "That is correct because of the number of troubleshooting steps needed. The promise of the machine was the compression of the characterization of the cell line. Typically, depending on the cell line, it's a year to two years of work, and that runs in parallel with the clinical development and so on."*
>
> *Q: "And so, the promise of this machine was to cut that down substantially?"*
>
> *A: "Substantially, yes."*
>
> *Q: "And in reality, it took twice as long?"*
>
> *A: "It took longer, spending the time troubleshooting and doing all the validation work on our end to stand behind the data.* ***This is the question - at what point do you call it quits?"***

Source: Scorpion Capital consultation calls with experts

2F) Novartis

NOVARTIS cell and gene therapy (cont'd): Only potential use case is very occasional pre-phase 1, pre-clinical development which is a puny market compared to Phase 3 or commercial usage; Beacon is a vanity machine that's "very, very" expensive with double the cost per assay of traditional methods.

> ***Beacon is a vanity machine that's "very, very" expensive with double the cost per assay of traditional methods***
> *Q: "It sounds like this thing is a vanity machine, based on your description of this car that's a mashed-up Lamborghini and minivan, some weird franken-thing."*
> *A: "Probably, as it stands right now, that would be a fair summary. As the machine stands right because to run the machine,* ***the total assay cost is very, very—it is much more compared to traditional methods."***
> *Q: "t's much more expensive than traditional methods; the per assay cost?"*
> *A: "It is, yes."*
> *Q: "And what is that cost per assay?"*
> *A:* ***"I would say it is about two times more****. So, the biggest cost is the reagent and the consumables."*

> ***Only potential use case for BLI is very occasional pre-phase 1, pre-clinical development; puny market compared to Phase 3 or commercial usage.***
> *"As it stands now, it is basically a good tool for very early cell line development, and* ***you're talking about pre-clinical development on early-stage development, not even phase-1 or anything like that.*** *So, this is useful in those settings, but if you are working with Berkeley Lights, you're not getting much money selling into those settings because those people, it's an* ***on and off seasonal thing****, they come nowhere close to the continual usage when it's used in a phase-3 or commercial setting."*

Source: Scorpion Capital consultation calls with experts

2G) AbbVie scientist

ABBVIE scientist who leads drug discovery teams says they purchased 2 machines; implies it's a failed purchase that AbbVie now regrets; little interest in buying another despite a large number of antibody programs; equipment is barely used and sits idle most of the time.

> ***AbbVie purchased two BLI machines about two years ago, one each for antibody discovery and cell line development***
> *"We got Berkeley Lights about two years ago. Actually, we bought two. We were using this mainly for B-cell cloning. The other one is currently in the cell line development group."*

> ***Little interest in buying another BLI machine, despite AbbVie running a large number of antibody screening projects***
> *Q: "Would you ever buy a second Berkeley Lights for your group?"*
> *A:* ***"I think one is sufficient."***
> *Q: "How many antibody discovery projects does AbbVie do every year roughly that require screening?"*
> *A: "I'd say between* ***25 to 50 each year."***

> ***Instrument is barely used, sits idle most of the time***
> *Q: "How often do you use the Berkeley Lights machine?"*
> *A: "I would say* ***two to three times a month."***
> *Q: "Each run is how long - like a day or so?"*
> *A: "It depends on the workflow designed. Sometimes it takes several hours. Sometimes if we do a micro-step, it takes longer."*
> *Q: "If you're using it two or three times a month and it takes a few hours, so the machine is basically* ***only used at 5-10% capacity utilization at most?***
> *A:* ***"For B cell cloning, yes."***

> ***Expert implies the BLI machine is just another failed purchase that AbbVie now regrets***
> *"I don't know if it's a comment on big pharma or not. You purchase a piece of big equipment,* ***and then half a year later or whatever, you regret that you purchased it****…That's just a reality."*

Source: Scorpion Capital consultation calls with experts

2G) AbbVie scientist

ABBVIE scientist (cont'd): Instrument is immature and "kind of like a beta version" despite being launched in 2016; using it is "a major headache," "time consuming," and "tedious"; machine ruins cells in about 1 out of every 5 runs; unusable by other groups at AbbVie due lack of assays and other limitations.

> ***Instrument is immature, like a beta product; simple, generic protocols that don't translate to the real-world***
> ***"It's not like other instruments that are fully developed. It's kind of like a beta version****. Sometimes you have to work with their customer service or tech support to try to customize and develop some customized assay. They probably have some kind of generic protocol for you, but cell line development or antigens or whatever won't work with generic protocols, so you have to spend time to develop this."*

> ***Using the machine is "a major headache," "time consuming." and "tedious"***
> *"What is bothering me is that I have to* ***manually process all the images. That's a major headache and the time-consuming*** *part…****It's tedious****. You have to babysit it."*

> ***About 1 in every 5 runs is ruined by the machine***
> *Q: "****Have you ever had experiments or runs that got ruined because of the Berkeley Lights?"***
> *A: "Yes. It's not totally ruined, but you definitely lose hits. During the processing, the machine freezes or stops. You'd probably only lose your cells on the chip. It wouldn't be 100% ruined, the whole sample…****Like once every five runs."***

> ***Machine is not usable by other groups at AbbVie, due to limitations in and lack of assays***
> *Q: "How do other people at AbbVie feel about the Berkeley Lights system?"*
> *A: "Only the antibody generation and cell line development groups at AbbVie are using this. The other groups are not really using it.* ***I think it's due to the limitation of the assay or the screening it can do."***
> *Q: "Is it not usable beyond cell line development and antibody discovery, essentially?*
> *A: "Yes, I would say so.* ***It's not providing a ready-to-use assay for other uses."***

Source: Scorpion Capital consultation calls with experts

2G) AbbVie scientist

ABBVIE scientist (cont'd): BLI remains vastly inferior to the traditional hybridoma-based antibody discovery workflow it's supposed to replace; too many promising candidates are lost during runs; "definitely" won't replace current discovery methods; lot of false positives with an error rate of 50%; "not very reliable"; requires onerous manual handling to fix.

> ***BLI's technology remains vastly inferior to the traditional hybridoma-based antibody discovery workflow it aims to replace; too many promising antibody candidates are lost; too immature to replace traditional methods***
> *Q: "Why is Berkeley Lights such a small percentage of your workflow compared to other antibody discovery methods?"*
> *A: **"We're losing a big chunk of the hits of the B cell. We can't really afford that. We don't like losing that many candidates."***
> *Q: "You only lose that many with the Berkeley Lights, not with the hybridoma approach?"*
> *A: "Yes."*
> *Q: "Why do you lose that many with the Berkeley Lights versus the hybridoma approach?"*
> *A: "For Berkeley Lights, it's starting with single cells. But for hybridoma, we can start with a cell pool, and then for the pool, we can further have the clonal, like the single cells clonal. And then, step by step, we test the strong bonders. But if we start with a single B cell, about 50% are lost through the process."*
> *Q: "Is it accurate to say that Berkeley Lights is not going to replace traditional antibody discovery efforts?"*
> *A: "I think it still needs further development. Many things could be improved. In the current stage, **I definitely don't think it will replace the traditional hybridoma approach."***

> ***Lot of false positives with an error rate of 50%; "not very reliable"; requires onerous manual handling to resolve***
> *A: "Only a portion of your Berkeley Lights' positive hits are going to be validated downstream. That part is true. I would say, **more than 50% of the cases, it's not very reliable. We have to manually go over the chip."***
> *Q: "You said 50% of experiments or cases are not reliable? "*
> *A: "If we totally relied on their automatic image processing and the detecting."*
> *Q: "If you rely on that, **you're saying that the error rate is about 50%?"***
> *A: "**Yes, approximately.** To resolve that, we have to manually select the screen. We just manually move the cell to the well or pick the perfect clone or some see the fluorescent probably bleeds through the next well. It also treats that as a positive and then manually goes over the image and says that's a false positive image."*
> *Q: **"That sounds like a real hassle."***
> *A: **"Yes, it is."***

Source: Scorpion Capital consultation calls with experts

2G) AbbVie scientist

ABBVIE scientist (cont'd): Instrument hasn't reduced reliance on legacy methods for antibody discovery – it's entire value proposition; describes an ongoing disaster where 40-50% of cells are lost during steps like PCR or sequencing, compounded by false positives; suggests BLI's growth is lacking and won't disrupt the space.

> ***Machine hasn't reduced AbbVie's legacy antibody discovery workflows; too many false positives to be reliable; 40-50% of cells are lost during steps like PCR or sequencing***
>
> *Q: "Are you still trying to figure out how to run enough assays to use the machine properly?"*
>
> *A: "The binding assays are kind of routine. But for our antibody generation, more than 60% of it still relies on hybridoma generation, and then another 20% to 30% is phage display technology. For instance, when you get blood from a patient, we probably rely on the Berkeley Lights to do the screening."*
>
> *Q: "You're using the traditional hybridoma approach, and then you're using phage display, and then you sometimes use Berkeley Lights.* ***So, Berkeley Lights is not allowing you to eliminate the other antibody discovery methods?"***
>
> *A:* ***"No, definitely not."***
>
> *Q: "That's what the promise is, so why doesn't it replace all that?"*
>
> *A:* ***"I think there are many reasons. The Berkeley Lights chip has false positives****. A false negative is hard to really estimate, but a false positive for sure. And it is then converting from the single B cell to sequencing.* ***Roughly, we lost 40% to 50% of the positive B cells."***
>
> *Q: "You said you're losing 40% to 50% of the positive B cells in the Berkeley Lights system?"*
>
> *A: "Yes, because from the single B cell, either you cannot PCR it or the sequencing part. For 50% of this, you don't get a final heavy chain/light chain variable region sequence."*
>
> *Q: "So, you're saying that 40%-50% of the time you did B cell screening the Berkeley Lights system, that you can't even sequence the B cell?"*
>
> *A: "Yeah, for instance,* ***if you start with a thousand cells, probably in the end you only get 500 or 600 sequencing pairs. The rest, either you lost during the PCR or during sequencing."***

> ***Expert suggests growth is lacking and BLI won't disrupt the industry; steep learning curve; complex to operate.***
>
> *Q: "Do you see the industry flocking to this machine?"*
>
> *A:* ***"I feel it's not very fast growth****. First, the price tag is pretty high. And then, it needs dedication to develop the protocol. The* ***learning curve is kind of steep****. We hired a person who had previous experience before but if you start learning this from scratch, I would expect it would take much longer. It's kind of a* ***complex machine to operate."***

Source: Scorpion Capital consultation calls with experts

2H) IQVIA executive

IQVIA executive has extensive experience working with BLI as a partner as well with some of BLI's largest customers. IQVIA is the largest contract research organization in the world, and consults with customers on how to implement BLI's system. With 70,000 employees, it has an expansive view of how BLI is viewed by biotech/pharma accounts.

> ***IQVIA is the largest CRO in the world; expert oversees a large division***
> *"IQVIA is the largest CRO on the planet today, a clinical research organization. From a revenue standpoint, the company does over $10 billion a year; we're a public company with over 70,000 employees. I oversee a $[redacted]-million division for IQVIA."*

> ***IQVIA has worked with BLI as a partner and with some BLI's largest pharma customers, such as Amgen and AbbVie***
> *"We have worked with Berkeley Lights in a partnership perspective as part of an RFP with one or two large pharma accounts. We work with a couple of large customers that actually utilize the Berkeley Lights machine.* ***We work with customers that are using Berkeley Lights****. We, as a company, don't work with the Berkeley Lights directly; we work with them in a partnership capacity or, if they're in clinical trials - like the Amgen, Allergen, AbbVie's of the world, there are a couple of drugs that we are involved with that they utilize Berkeley Lights on. I can say that—that's all public knowledge. So, we partner up with the Berkeley Lights from an integration standpoint. IQVIA consulting offers people that have worked on Berkeley Lights at previous customers, that we sell to our customers from an implementation standpoint. We're like an Accenture."*

> ***IQVIA's BLI-specific experience appears to include other large players like Johnson and Johnson, Novartis, Astra-Zeneca, and Bayer***
> *Q: "How many of your large pharma customers use Berkeley Lights right now?"*
> *A: "Out of the top 17, we're engaged with 3 of them, and the* ***biggest one I will just say is Johnson & Johnson*** *The top 17 customers, out of your top—they're over a billion dollars in revenue in North America. We're talking about your* ***Novartis, Astra-Zeneca, Bayer, Amgen, AbbVie, Allergen*** *of the world. They are working with Berkeley Lights."*
> *Q: "You're saying three of the top 17 IQVIA customers use Berkeley Lights?*
> *A: "That's right, IQVIA customers."*

Source: Scorpion Capital consultation calls with experts

2H) IQVIA executive

IQVIA executive slams BLI's instrument based on feedback from large pharma/biotech users: "old," completely outdated," "not very user friendly," "prone to errors," "cumbersome," and states AI and machine learning claims are bogus.

> ***BLI system is "old," completely outdated," "not very user-friendly," prone to errors***
> *"Our resources that are working at customer sites, the feedback is actually very on-point. The biggest thing that they're seeing is that Berkeley Lights is still the* ***old system. They haven't really evolved the technology stack, and the data that is coming is not very user-friendly. There is no innovation. It's completely outdated****. The user interfaces, the way they see the data, how they're collecting it, and that's where the errors are coming from being on-prem."*

> ***Technology is "outdated" and "cumbersome"; AI and machine learning claims are bogus***
> *"From a dealer standpoint,* ***the technology is outdated, the workflows are cumbersome****, and they don't really have the capabilities they're calling AI and machine learning, next-generation stuff. That's the feedback that we have seen."*

> ***Workflows are not user-friendly, difficult to configure and customize to customer needs; forces extra steps***
> *"The feedback was the Berkeley Lights workflows that they have defined for that particular customer are all out of the box. There are* ***no configurations or customizations that could be done****, which is then forcing the customer to follow the Berkeley Lights ways rather than Berkeley Lights having to make the configurations or customizations, so they fit the customer's needs. So, they had something called a decision tree workflow as part of their technology stack that's* ***not very user-friendly, and that forces customers to take extra steps*** *to get the work done, from how they're collecting their antibody discovery to cell line development to cell therapy development and synthetic biology—those are the most common ones that we come across."*

Source: Scorpion Capital consultation calls with experts

IQVIA executive (cont'd): Large BLI customers are unhappy and not referenceable accounts; level of dissatisfaction with BLI is an outlier relative to other vendors they use; customers generally rate BLI's system at 2 on a scale of 1 to 5, based on scorecard results.

Large pharma customers of BLI that IQVIA works with closely are not referenceable and are not happy; BLI is an outlier

Q: "It sounds like you're saying that the three customers are not terribly happy using Berkeley Lights?"

*A:: **"Let me put it this way, they're not referenceable either**; I can even share that. They're not happy, and they're not referenceable. One of their scorecard results, at the bottom, is a checkbox. **Would you want to be a reference, a user reference? And they said "no."** That was one thing that Berkeley Lights was the only vendor that actually stood out."*

Lack of satisfaction with BLI sticks out versus other vendors those customers use, based on IQVIA's experience with the 3 specific customer divisions they are engaged with

*Q: "Your customers work with a lot of different vendors, and you're saying the lack of satisfaction, **Berkeley Lights sticks out relative to the other kinds of vendors that they use. Is that correct?"***

*A: **"That's correct**. But then again, we've only been engaged with three of them. I want to make sure that when I'm speaking to this, it's at the division level, not at the company level. If I mention a name like Johnson & Johnson or Amgen, I don't want the assumption to be made that the whole company of Amgen is not happy with them. But on the life sciences side, with a particular drug or the antibodies division that we're engaged with…"*

Customers generally rate BLI at 2 on a scale of 1-5, based on scorecard results

Q: "Is it driving any dramatic benefit in their customers' antibody development efforts?

*A: **"The overall feedback is not positive**, but it's not extremely negative where if you were to rate it from 1 to 5, no one really gives them a 1.*

Q: "Is it like a 2?"

A: "Yeah, absolutely. You have to realize when these meetings happen, they have scorecard results, so they do this in an open manner, where each division has 5/6 of the top vendors that they have annual spend on and IQVIA is one of them, and Berkeley Lights is in there as well. And that's where they get the feedback, and they share it as part of their vendor alliance program openly."

Source: Scorpion Capital consultation calls with experts

IQVIA executive (cont'd): BLI has no traction in the industry; striking out; doesn't seem to be winning much new business or RFP's; not even involved in many RFP's IQVIA sees; has no buzz in the industry or disruptive impact.

> ***BLI is a "very niche" player involved in only a small percentage of RFP's that IQVIA sees***
> *"A good estimate would be **2 out of 10 RFPs** that we're involved in on a clinical research organization with large pharma customers; they are involved. What Berkeley Lights is doing is **very niche**, so you don't see a lot of players coming in wanting to play in that segment, you don't see a lot of webinars about them, you **don't see them speak at conferences**, you don't really see Berkeley Lights attending those conferences or engaging them at that level."*

> ***BLI is striking out; doesn't seem to be winning much new business or RFP's***
> ***"I just don't know how much of the business they're winning**. I know they're getting to bat on these a lot; I just don't see it. There's a lot of proactive marketing, where they're hunting for new business. If they are, we don't know it. I know they have one person in the alliance's manager that has been here for the last five-plus years that has engaged IQVIA and our competitors as well to open up doors and see if there are partnership opportunities for us, so I'm not sure how successful they are with other companies."*

> ***BLI has no buzz in the industry and is having no disruptive impact***
> *"They haven't really had any kind of marketing buzz, an impact where they're disrupting the market today. **No, there's no buzz at all about them.** They're not even doing anything to put the buzz out there."*

Source: Scorpion Capital consultation calls with experts

IQVIA executive (cont'd): Large BLI customers have passed on buying more machines or selected other vendors instead; have had no particular success with the instrument.

> ***IQVIA's large pharma customers have passed on expanding use of BLI and buying more machines, or have selected other vendors***
>
> *Q: "Are there large pharma customers that you're aware of that kicked the tires on Berkeley Lights and said no way, they just passed?*
>
> *A: **"They have passed on them numerous times for expansion**, for buying new machines, yes. Those are the ones that are already engaged with them.*
>
> *Q: "But those are the three current customers; you're saying they passed on expansion?"*
>
> *A: "Correct."*
>
> *Q: "But of those other 17, those 14 out of the 17 that aren't using them, are you aware of customers that have kicked the tires and just said, we're not going to use Berkeley Lights? Have they evaluated it and just passed? Are you aware of any of those?"*
>
> *A: **"A couple of them, I'll be honest with you, they have utilized someone else."***

> ***IQVIA has not seen any of its large pharma users of BLI have any particular success with the machine***
>
> *Q: "Have you guys seen any of these three customers have big product success using Berkeley Lights or not really?*
>
> *A: **"Not at all, actually."***

Source: Scorpion Capital consultation calls with experts

IQVIA executive (cont'd): We warn our customers away from BLI's instrument and caution them to first do their own due diligence and speak to references; IQVIA's overall opinion is negative and dismissive.

> ***IQVIA has warned its customers away from BLI and cautioned them to do their due diligence on the instrument***
> *Q: "You said earlier that IQVIA would never partner with BLI?"*
> *A: "As part of our protocol, we don't really recommend this company or the other. We are very unbiased. But in closed doors, we'll have those conversations, absolutely."*
> *Q: "But even if you're vendor-neutral, **has IQVIA warned people away from it, behind closed doors?"***
> *A: **"Absolutely, we've given them candid feedback**, for example, Johnson & Johnson. That's a [redacted]-dollar account for us, and we'll give them feedback and say, this is what we have heard in the industry, and look at their references. So, we position it that way.*
> *Q: "What is that feedback that you're giving them based on what you've heard from the industry, like how do you summarize it?*
> *A: "The system is **outdated and they need a lot of innovation** on their workflows. That's the feedback we have gotten. But I would definitely recommend doing their due diligence and also speaking to the references, and I think that kind of sums it up. I tend to use this line quite a few times."*

> ***Overall customer feedback is poor and IQVIA cautions customers to be careful***
> *"Overall the feedback from our current customers **hasn't been very positive**. We recommend to our customers to do your due diligence in detail and request referenceable customers."*

> ***IQVIA's opinion of BLI is negative and dismissive***
> *"IQVIA is the largest CRO, they are in the business of acquiring and merging with companies, so **Berkeley Lights is not someone we really want to invest in or partner up with."***

Source: Scorpion Capital consultation calls with experts

2I) Gilead scientist

GILEAD scientist with five years of experience with BLI, across several large pharma/biotech companies, is one of the most experienced users and has declined to recommend purchase at Gilead; suggests BLI's pipeline has dwindled in last 4-6 months; "limited market" with competing technologies about to take share.

> ***Expert has experience with BLI, purchasing 2 machines at two large pharma/biotech companies prior to Gilead***
> ***"My history with Berkeley Lights goes back to around 2016****. At that time, I was at [company name redacted] Pharmaceuticals. One tool was supporting our pipeline programs, and the second was used more for research and development, proof of concept antibody discovery efforts. We purchased two at [company redacted] and one at [company redacted]."*

> ***Expert has declined to recommend that Gilead purchase the instrument***
> ***"The senior staff has brought it up. So far, to date, I've declined to recommend a purchase for Gilead****. The reason is right now, we don't have the pipeline to warrant it. We can't justify the current expense based on the number of FTEs we have in the cell line development team and the number of programs running through from research…it's a capital request that I don't necessarily need to put in at this moment."*

> ***Would rather spend the money somewhere else versus a BLI machine***
> *"If the senior Gilead staff came to me and said, here's $5 million, the internal pipeline* ***still can't justify that expense****. . So, there are different things that I would use the money."*

> ***Has taken calls on behalf of BLI before, but "have not gotten too many calls recently"; not one in 4-6 months***
> ***"I haven't done a call for Berkeley Lights in four to six months****. Maybe I wasn't a good enough reference in terms of sales of the unit, and they found another target to use for that. I don't know the reason for it; I have not gotten too many calls recently."*

> *"****Limited market" with competing technologies that are about to take share***
> *"If they don't continue to allocate resources to further develop the technology,* ***there are competing technologies coming along that can hack into what is already a somewhat limited market. I've been on calls*** *with early-stage companies with competing technology. They're not there yet, but there are other companies looking at that space very intelligently."*

Source: Scorpion Capital consultation calls with experts

2I) Gilead scientist

GILEAD scientist (cont'd): Instrument often fails, including with standard assays that "just flat out didn't work"; incorrect signals; "confounded the algorithm"; numerous problems with mysterious causes; every run has something crop up.

> ***Experienced assays that "just flat out didn't' work"; couldn't pinpoint the error***
> *"There have been assays that **just flat out didn't work**, and we had to reload and complete, and we really weren't able to necessarily pinpoint the source of the error. For one of the errors, it would be not necessarily a false positive, but an amplification of potential candidates due to whether it was the phase that the cells were in, the aggregation rate of the cells within the nano-pens…"*

> ***Assays that didn't work were standard ones; incorrect signals; "confounded the algorithm"***
> *Q: "What were some of the assays that you couldn't get to work?"*
> *A: "**It would be the standard assay**, so that's the fluorescent antibody expression technology that they have. The particular clones were positive and secreting the antibody that we were targeting. We were getting **a really over-inflated or amplified signal** coming out of those wells, and not the overall well fluorescence that's preferred, but more of a punctate starring within individual nano-pens. And it wasn't across every single colony or every single well or NanoPen, but it was enough that **confounded the algorithm."***

> ***Instrument often fails to work; numerous causes that are mysterious and which require workarounds***
> *"Whether it's the aggregation of the cell, whether it's the propensity of a particular NanoPen to have antibody aggregation in the well causing that punctated assay response, that's what I'm talking about being potentially impacting both the cell line development and antibody discovery work. Again, that's why I talk about **I can't ferret out whether it's reagent, if it's cells, or if it's the specific antibody. I know it happens. [Company name redacted] and [Company name redacted] weren't the only users to have the issue. There are workarounds** that I figured out how to deal with before they had done the fix in the software. There's a visual inspection that's required, I think. Again, it comes down to user experience, knowing what nano-pens to utilize and which ones not to, how to adjust the algorithm itself."*

> ***Every run has something crop up, needs deep expertise***
> *"**Every run has some little twist** and that's why I said you have to have somebody that is the product owner on the staff who knows how the thing works."*

Source: Scorpion Capital consultation calls with experts

GILEAD scientist (cont'd): Value proposition is limited, the key parts of which are false and/or misleading; no time savings in cell development; doesn't work well for more complex molecules; extremely difficult to optimize and use; needs dedicated staff, tweaking, workarounds.

> ***BLI's claim that the machine speeds up cell line development is false – key part of the value proposition; BLI claims 5 days but 3 months in reality***
> ***"One thing where I find that the Berkeley Lights story is a little bit of stretch is truly the time savings****. We never used it as being able to do cell line development in five days, which I think they do use as one of the selling points. It's five days for that particular step of cell line development. The fastest I've ever been able to go from start to finish with the Beacon and without the Beacon is just* ***under three months' time."***

> ***No time savings from using the machine***
> *Q: "They say there's a time savings - you said there really isn't one?*
> *A: "****It's the same amount. I can be a little bit faster, but we're talking about days, not weeks****. It is a new technology. The staff that you have, have to do their homework, and they have to do both qualification and validation of particular steps so that you can use it for the FDA."*

> ***Limited value proposition; doesn't work well for more complex molecules***
> ***"If you're doing something more exotic, recombinant enzyme, any blood factors, bispecific molecules****—those types of things, that's got to be done in my mind internally with the experts. That's where development on the Beacon needs to improve to be able to support those molecules. I think* ***that's where the value proposition is limited****, to me. Right now, its utilization is for monoclonal antibodies or FC-containing molecules. As soon as they're able to apply different assay techniques to look at different types of molecules, then it jumps."*

> ***Instrument is extremely difficult to optimize and use; needs dedicated staff and customer tweaking***
> ***"It is not a plug-and-play instrument****. When you're paying that $2 million-plus upfront cost, it's not something that you can park in your facility and have people just walk up to with a protocol and operate.* ***You do need a dedicated staff*** *to continually optimize and work with it. We did find that the protocols and the initial platform that was provided to us did need to be tweaked, and that included both off-chip, our handling, our preparation of the cells as well as the on-chip parameters. Again,* ***it's not just something you wheel in there****, and you have an intern doing a couple of projects and then being able to successfully complete those projects."*

Source: Scorpion Capital consultation calls with experts

2I) Gilead scientist

GILEAD scientist (cont'd): Extremely small TAM; a handful of the largest contract drug manufacturers don't need more than 1-2 machines each; not much growth potential; annual user meeting gets almost no people; cell line development is a commodity and better for most to outsource at a fraction of the cost of buying a BLI instrument.

> ***The largest contract drug manufacturers in the world don't need more than 1-2 instruments each; "not worth the investment" for smaller companies***
> *"On the CDMO side I think all the Lonza, Wu-Xi, Samsung's of the world* ***should probably have one or two instruments****, depending on how many programs they're supporting. But a relatively small-staffed, lean pipeline company, it's not necessarily worth the investment."*

> ***Expert doesn't see much growth potential for BLI; run by semiconductor people not biologists***
> ***"I don't see a huge growth rate potential*** *for it. The staff, starting from Eric Hobbs down,* ***they're chip people****. They're not necessarily originally biologists."*

> ***Annual user group conference appears to get only 20-30 people***
> *"My experience with the user groups has been mixed. Yeah, there's a user group meeting. I believe it's every September. They do it in Napa. I'm guessing based on feedback from my scientist. I would say* ***somewhere between 20 and 30."***

> ***Cell line development is a commodity; better for most companies to outsource it versus buying a Beacon***
> *"And in that stage also, I recommend that they didn't even do cell line development internally. It's* ***getting close to being a commodity,*** *where you can just reach out to any of these CDMOs and say, can you make us a cell line. If it's just one or two programs and it's not a highly challenging molecule, then yeah, it's a better business decision in my mind to outsource the cell line development activities."*

> ***Only costs $300K to outsource cell line development vs. $2MM on a Beacon plus high ongoing costs***
> *Q: "How much does it cost to outsource a cell line development project to a CDMO?"*
> *A: "It would cost, depending on where you go and the amount of work you do, you can do it for as little as, I would say,* ***$300,000 for the service****. Whether you're doing it internally or externally, raw materials should be the same, except for maybe a 10% markup. So, it would largely be about $300,000 for a cell line development program for monoclonal antibodies."*

Source: Scorpion Capital consultation calls with experts

2J) Takeda ex-lead scientist

TAKEDA lead scientist in immuno-oncology was closely involved in buying and using BLI machine: use case is extremely limited, maybe one assay run every 2-3 weeks; Takeda barely even uses the instrument anymore, may have three in total; now skeptical and have soured on it; dismayed at ongoing lack of evidence/data proving its value.

> ***Expert was intimately involved in purchasing and using BLI machine, mainly for immuno-oncology/cell therapy***
> *"I think globally, maybe Takeda has two or three machines; I don't know for sure. I believe it was the fall of 2019 when we evaluated, and it must have been late 2019, early 2020 when we got it. My experience with Berkeley Lights is primarily in the cell therapy space. In my previous job at Takeda Oncology, I was working in engineered cell therapies."*

> ***Primary use case running a cytotoxicity assay***
> *"Primarily we would do their cytotoxicity assay and look at cytokine profiles. You could do that using your typical assay, but with Berkeley Lights, you would be able to capture the cytotoxicity on the fraction of cells that are cytotoxic and how cytotoxic they are, what fraction of cells are producing three different cytokines. Cytotoxicity was the main assay."*

> ***Use case for machine is extremely limited, maybe one assay ever 2-3 weeks***
> *"But if we were to implement that in a real-world setting, your guess is about right.* ***This would be not for typical research purposes****; this would be really for defining your clinical product, which would mean* ***you would do one assay every two to three weeks****, which is how long the manufacturing runs."*

> ***Takeda barely even uses the instrument***
> *Q: "How much is Takeda using the product now?"*
> *A: "I would say* ***maybe a couple of times a month. Yeah, not very often****. Yeah, we wouldn't run assays on that every day."*

> ***Skeptical and now soured on BLI given ongoing lack of evidence/data proving its value***
> *A: "If we had this same phone call a year and a half ago, I think we both would be more optimistic than we are today."*
> *Q: "And that's because what haven't you seen? You just haven't seen any breakthrough products developed on it?"*
> *A:* ***"Yeah, I haven't seen anything****—if this was so groundbreaking,* ***I mean, this was launched in 2019*** *or earlier, some clinical trial would have leveraged this, and* ***by now we would have seen some kind of a correlate from field data****. And that's what other companies are doing, companies like Olink and other proteomic companies; they're not just selling their machine based on assays. They're really actively trying to generate some kind of research data that shows that there is a real valuable impact rather than saying that you can generate more data on this."*

Source: Scorpion Capital consultation calls with experts

2J) Takeda ex-lead scientist

TAKEDA lead scientist (cont'd): We were unable to expand BLI use case beyond one simple cytotoxicity assay; original plan was to start with one assay and find other applications; spent a year trying to figure out what to do with it and failed given difficulty of using the instrument.

> ***Takeda was unable to expand BLI use beyond one assay; couldn't find other use cases for it***
>
> *Q: "**Why was Takeda only using it for one assay? Just because it was too much of a pain in the ass?"***
>
> *A: **"Yes**. I guess the idea was to start with one and then expand. So, gene expression profiling, let's say, do we want to do that using the Berkeley Lights chip, or do we want to just do it on a standalone product and just do a single-cell RNA seek? And just capture within that sense, or do we really need to have it downstream with Berkeley Lights because then you have to buy their chips and do their workflow and all that stuff. That was a complicated workflow because then it required sorting the cells out of those NanoPens. It would have required us to develop an in-house sequencing facility. So, it wasn't ideal, and we didn't go that route."*
>
> *Q: "So, you're saying you had this one use case inside cytotox, you had a second use case, you concluded would have required you to build a sequencing facility, so it was just too much."*
>
> *A: "Yeah."*
>
> *Q: **"Did Takeda just have difficulty finding other use cases for the product that made sense?"***
>
> *A: **"I would say probably yes**. It needs time. This is something that really needs time."*
>
> *Q: "You used it for a year, and over the course of a year, Takeda wasn't really able to expand it beyond one assay, the cytotox assay?*
>
> *A: "I would agree with that."*

Source: Scorpion Capital consultation calls with experts

2J) Takeda ex-lead scientist

TAKEDA lead scientist (cont'd): Not much benefit from the machine, at most incremental; unusable for early-stage drug discovery given its lack of throughput; wouldn't use it "even if it was affordable" extremely niche instrument for occasional, one-off use.

> ***Not much benefit from the machine, at most incremental; can't even say if it's been useful***
> *Q: "Was there a concrete ROI or benefit that you can point to that you got from Berkeley Lights – if somebody had taken away the Berkeley Lights, would it have prevented you from doing your job?"*
> *A: "It's one of the analytical tools that give you **a little bit extra power compared to the existing technologies, like flow cytometry**. Whether or not that translates to clinical benefit, that's the overarching question, and that's where the investment was made…**I don't think this is a benefit** - it's a little bit of a hard question to answer. It's more like, you have a new cell phone every year from Apple, and this year they had a better camera. Would you live without it? Yeah, you would be able to live without it. But does it add something to your lifestyle? Maybe it does, and that's where I would position Berkeley Lights. If you remove the equipment from a process flow, and we just use traditional flow cytometry and cytotox assays - I mean, people are doing routinely CyTOF now, which can give you a deeper profile of your product, and maybe that's more powerful than Berkeley Lights."*

> ***BLI instrument is not usable for early-stage drug discovery given its lack of throughput; extremely niche and specialized for one-off use cases***
> *A: "In traditional drug development, you start with 100 different clinical candidates, a couple of hundred constructs that you need to screen that will be engineered into cells. **When you narrow down to five candidates** that stand out based on your initial high throughput screening analysis; now you want to understand them a little bit more. And **that's where you would do Berkeley Lights**. You would do more deeper profiling like transcriptomics and all that stuff to really understand the product at a deeper level, and then maybe that data will now help you pick the one out of the five or one out of the three."*
> *Q: "But what you're saying is this is a tool that's for going very deep on a small number of cells?"*
> *A: "Yes."*
> *Q: "So it's sort of like you're taking your telescope and zooming at one particular point in the sky instead of scanning the entire sky."*
> *A: "Yeah, exactly. **I wouldn't be able to use this for early-stage drug discovery; even if it was affordable, I wouldn't use it.**"*

Source: Scorpion Capital consultation calls with experts

2J) Takeda ex-lead scientist

TAKEDA lead scientist (cont'd): Total addressable market is extremely small, at most 150 machines (that is, $300 million at $2MM per machine) across the 60-70 largest biotech/pharma companies; target market limited to companies greater than $5B market cap, given high cost.

> ***TAM is at most around 150 machines, partly because BLI isn't groundbreaking and has no proven clinical impact***
> *Q: "If you had to estimate, how big is the market?"*
> *A: **"Let's say 15 large pharmaceutical companies that have commercial products, and let's say another 30 to 40 companies** who are enlisted clinical development and are planning to go commercial in the next five years. I think those are the only other companies that would probably want to invest in something like this because they are going commercial; when you're going commercial, you're expecting a lot of funding, but then you're also expecting to reinvest some of that money in your next-generation pipeline."*
> *Q: "So, 60-70 companies, maybe one or two machines for each one."*
> *A: **"Yeah, yeah. Not more than that**. It's not even about the price tag...It has to be a groundbreaking technology that has a proven clinical impact, and Berkeley Lights does not have that today."*

> ***TAM is generally limited to pharma/biotech companies greater than $5B market cap, given $2MM cost per machine***
> *Q: "How big of a company do you think you have to be before you'd invest $2 million?"*
> *A: "That's what I said if they have an asset promising clinical data in phase-2 or phase-3 trials, and if they have plan a BLA filing in the next two years, those are the companies that are able to invest in something like this. **Typically, those are upwards of a $5 billion market cap."***

Source: Scorpion Capital consultation calls with experts

2J) Takeda ex-lead scientist

TAKEDA lead scientist (cont'd): Instrument overwhelms the user with unusable and unanalyzable amounts of data; can't figure out how to optimize an assay; no time savings (one of the machine's most important selling points) for cell therapy; just an "exploratory" tool that provides some incremental data.

> ***Instrument overwhelms the user with unusable and unanalyzable amounts of data; thousands of data points per sample; can't figure out how to optimize an assay***
> *"Yes, there were some error rates. But it really comes down to how many things you want this machine to analyze.* ***One sample is getting converted to a few thousand data points*** *because you're analyzing 3,000 cells in each sample. Each cell within a sample, each one of those 3,000, has its own data points. You need to analyze each of those data points as opposed to a data point coming from a population. So, if you try to complicate that with 10 different endpoints, you're just not going to know—it's* ***not going to be able to figure out how to analyze that data and to optimize each of those assays."***

> ***Instrument has no time savings for cell therapy; just an "exploratory" tool that provides some incremental data***
> *Q: "How much of a time-savings is there if you have to double-check everything using traditional methods?"*
> *A:* ***"For cell therapy, it's not a time-saving feature****. For cell line development for biologics, that's the other place where Berkeley Lights are advertising their product quite a bit, for example, generating antibodies, for generating engineered cell lines to produces biologics; that's another area where they claim they can save money.* ***But for cell therapy, there's no time saving; I mean, this is exploratory too. It's purely exploratory too."***
> *Q: "To get some additional high-resolution data, that's it?"*
> *A: "Yes, that's it."*

> ***Takeda was worried enough about BLI error rates that it would re-do and double-check assays using traditional methods***
> *Q: "So, you're saying that even after optimization****, there's enough worry about error rates that you have to basically double-check everything*** *using traditional methods?"*
> *A: "Yeah.* ***I would say yes****, especially autologous therapy because each product is going to be different, so let's say you wanted to get confident in this instrument; you would have to do your traditional assay and a Berkeley Lights assay and compare them on at least 10 different donors to be able to say this is reproducible."*

Source: Scorpion Capital consultation calls with experts

2J) Takeda ex-lead scientist

TAKEDA lead scientist (cont'd): Technology is nothing special; just an expensive mash-up of cheap, existing lab tools like flow cytometers and fluidics; dismissed it as a glorified cytometer, which sell for $50-$500K; called out lack of data showing any real-world impact from the instrument.

> ***Instrument is just an expensive mash-up of cheap, existing lab tools and nothing special***
> *"If you talk to someone who just started working on it last week, that's going to be their initial response.* ***Yeah, whatever, this is an expensive piece of machine. What does it do? They haven't built anything new****. It's built of flow cytometry and some optofluidics, which already exist, and they just married the two, and now they're claiming that they can do something fancy. I agree. And considering the amount of optimization that needs to be done, that is really the initial response."*

> ***Only revolutionary "on paper"***
> *Q: "You characterized the product of a combination of flow cytometry and microfluidics or optofluidics, and that's all it is. It's just a hodgepodge of two things."*
> *A: "Yeah."*
> *Q: "Is this a revolutionary thing that really leads to breakthrough science?*
> *A: "****At least on paper, it sounds like it's a breakthrough."***

> ***Dismissed BLI as a glorified flow cytometer – cheap, legacy equipment in every lab – and called out the lack of data showing any real-world impact from the technology***
> ***Q: "Is this basically just a somewhat souped-up or glorified flow cytometer—is that all it is?"***
> ***A: "Pretty much, yes****. Their innovation is the optofluidic chip. Their innovation is not a flow cytometer. There are 20 other companies that make flow cytometers that are better than that, and they have better interfaces and everything. Their innovation is the optofluidic chip, which they now use to measure flow cytometry data, but I guess for a $2 million machine, in a company that has a breakthrough designation and all that, I would have expected that by now, in the last couple of years, they would have generated some kind of clinical research data showing the impact that the data has had in the field, and I haven't seen that."*

Source: Scorpion Capital consultation calls with experts

2J) Takeda ex-lead scientist

TAKEDA lead scientist (cont'd): Emerging competitors are cheaper and better; would replace BLI with them today; alternative tools are not only radically cheaper but the data they generate may be more meaningful; similar instruments began cropping up last year.

> ***Emerging competitors like IsoPlexis are cheaper, better, and eliminate the need for BLI***
>
> *A: "Other similar platforms have come up. You can do IsoPlexis. It gives you more depth. It doesn't have the fancy NanoPen that allows you to sort out single cells, but we're not doing that anyway. What IsoPlexis can do, it can give you single-cell resolution; it can give you longitudinal analysis; it can do more analyzing. We haven't bought it yet; we just started evaluating it. I think it's definitely not $2 million; I think it's more like the price of a flow cytometer. Yes, something like that, $500,000 to $700,000."*
>
> *Q: **"Can you eliminate the need for a Berkeley Lights if you get an IsoPlexis machine?***
>
> *A: "**I think so, yeah**. I think for Berkeley Lights to be able to have its place; you would want a use case where you're sorting the cell out of that nano-cell and using it for downstream applications. But if you're not doing that, Berkeley Lights is replaceable If you don't want to isolate a cell, you just want to get cells, cytotox data, which is what we were doing at Takeda; **I would replace it with IsoPlexis today."***

> ***Radically cheaper platforms are alternatives and may generate even more meaningful data than BLI***
>
> ***"Besides, IsoPlexis, there is CyTOF**. So, mass cytometry—that's not new; CyTOF has been around for quite some time. The pioneer in the CyTOF technology is Fluidigm. You must have heard of this. CyTOF is basically flow cytometry with a higher throughput, but instead of using a fluorescent signal, you're using mass spectroscopy. You can do up to 300 different analytes in a single sample. So, that's like high throughput proteomics, and it's based on antibodies. That's in terms of cellular phenotype. In terms of the secreted proteome, it's not single-cell level, but there are now technologies where you can look at 3000/5000 proteins secreted from a population of cells, not individual cells, but **there's the Olink platform, there is SomaLogic, Quanterix. Those kinds of platforms and maybe those will generate more meaningful data. And for a lot of those, you don't need to buy fancy equipment**; you can just do fee-for-service experiments."*

> ***Simpler, cheaper instruments have begun cropping up in the last year***
>
> *"Again, there are other platforms that have come to market; even in the last year, there are **other platforms that have come up that offer similar advantages**. I spoke about IsoPlexis. There's another machine we use - you would just put the whole thing into a tissue culture incubator, and it would measure some kind of ionic signal coming from the cell, and it would give you real-time data. For example, in a cell-killing assay, you would track in real-time. Incucyte can do that. It can give you longitudinal data but not single-cell data. Those are much simpler platforms, easier to implement, and they're benchtop."*

Source: Scorpion Capital consultation calls with experts

2K) Harbour Biomed ex-executive

HARBOUR BIOMED, based in Asia and focused on antibody development for oncology and immunology. Former executive closely involved with purchase and use says they would have sent it back for a refund if they could; lack of ROI; only worked 50% of the time; failed on many levels - high operating cost, data/output issues, lack of support.

> ***Expert was an executive involved in the decision to purchase BLI machine, for antibody discovery in immunology and oncology applications***
> *"**I was involved in the decision to buy it**, in 2019. Harbour has owned the Berkeley Lights system for about two and a half years. Harbour is a biotech company with about 300 people. The use was around primarily B cell, single-cell detection of different antibodies that were being manufactured/generated by the B cells. We have a transgenic mouse platform. We have two of them, and so we would infect the mice with certain targets that we were interested in. They would generate antibodies against it, and then we would use the Beacon system to screen several different clones and identify the right ones that we wanted to move forward with… **The idea was to speed things up in terms of antibody discovery**, with Beacon."*

> ***Harbour would have sent the machine back if they could; lack of ROI***
> *Q: "f you could have just returned the Berkeley Lights machine and gotten back the $2 million, would you have done it?"*
> *A: "Yes."*
> *Q: "**It sounds like, you would have returned it in a heartbeat?***
> *A: "**Yes**, because again, as I said, the cost of operating it, the amount of time that we were spending troubleshooting and learning, and finally, at the end of the day, the amount of benefit that we were receiving was just not a good return on investment."*

> ***Machine only worked about 50% of the time; cost per run is too restrictive to keep troubleshooting it***
> *"We had some luck with it. At other times, we did not that much luck. In terms of expectations against reality, I would say **it's somewhere around the 50% hit or miss rate**. It's a compounding story there. First because in order to maximize the utilization of any machine, you need to understand every single detail, every single process that goes into it, and with the cost of the chips and everything being so restrictive, you can't just try and try, do 10 runs to get the 11th one right."*

> ***BLI failed on multiple dimensions: too expensive to operate; lack of data/output; lack of support***
> *"But **given that each run ran $15,000 to $17,000**, we were apprehensive about spending that kind of money on it. But from the get-go, to go in with that kind of pricing, **not being able to get the level of data and output that you're expecting**, I think that probably didn't work out in the right way, and the marketing tactics and the support that they decided to have."*

Source: Scorpion Capital consultation calls with experts

2K) Harbour Biomed ex-executive

HARBOUR BIOMED (cont'd): Machine can't really screen for complex antibodies, which is where antibody discovery is now gravitating; limits its usability; BLI technology is built around older, simpler antibodies; company seems to have little know-how and couldn't even answer customer questions, who were left to try and figure it out on their own.

> ***Machine isn't sensitive enough to screen for more complex antibodies, which is where the field is moving to***
> *"When you start thinking about some of the more complex antibodies that we were looking at like bispecifics and others, those became a little bit difficult to screen in terms of the sensitivity and the specificity of the system. So,* ***that's where most of the field is moving. Single monoclonal antibodies are fine, but as soon as you start going toward the more complex structures, that becomes an issue."***

> ***Machine's inability to screen more complex antibodies is a major limitation***
> *Q: "****What percentage in the field today is moving toward those kinds of antibodies, these more complex ones?"***
> *A: "****A significant amount*** *because a single target is getting more and more complicated. People have pretty much looked at all different targets that you could possibly find, Most of the known targets, there is some other antibody that is already there; it's either in preclinical or clinical and so on and so forth. So, more and more of the field is going to it, especially on oncology; it's going to bispecific because you're trying to go beyond that 24%, 28%, 30% efficacy rate combining these different targets. Or even in certain cases, even in our case, we were looking at novel formats that we could potentially put together even for known targets, and* ***that's where the field is going, and that's where some of the complex work takes place that wasn't able to be done with the Berkeley Lights system."***

> ***BLI's technology is built around older, simpler antibodies; company appears to have little expertise and ability to support screening for complex antibodies; unable to support the machine.***
> *"They tried to troubleshoot, that's where some of the communication gaps came in, in terms of them trying to understand the evolution of the field toward more complex antibodies and more complex structures versus* ***their focus was always on the simpler forms of the antibodies*** *and the simpler antibodies that pretty much a significant amount of technical knowhow was built on. So, they would give you those answers, and you'll be like, no, but that's not what I'm looking for. And* ***you wouldn't get anything beyond the typical traditional answer, which means you have to go out there and try it out for yourself****, rather than them being helpful, them trying to do it for you. Of course, there's a level of propriety stuff that we can't share targets and all of those kinds of things with them. It takes that experience spending that time on using the machine, and it just becomes from the perspective of cost, time, access, and technical support."*

Source: Scorpion Capital consultation calls with experts

2K) Harbour Biomed ex-executive

HARBOUR BIOMED (cont'd): Instrument is plagued by "a lot of false positives" and errors; required "a lot of energy and effort" only to fail; seems to work for simple antibodies but only about 70-80% of time; only worked 10-20% of the time for more complex ones.

> ***Instrument is plagued by "a lot of false positives" and errors; required "a lot of energy and effort" only to fail***
> *"The sensitivity and the specificity of the binding, the nanomolar binding levels that you need to get the right candidate selection and eventually to get the right candidate antibody.* ***We did not see that level of specificity. We got a lot of false positives*** *that then you pull those cells out and clone them, and eventually try them on gels and stuff for detection of the target protein, and they would just not bind to them. So, there was* ***something that was happening in the Berkeley Lights system that gave us false positives, and we would then spend a lot of energy and efforts*** *to take these clones forward, but they would not pan out."*

> ***Machine seems to work for simple antibodies about 70-80% of time; only worked 10-20% of the time for more complex ones***
> *"When you look Harbour's portfolio, there are some simple targets and simple antibodies that they're working on, and for that purpose, this seemed to work fine. But as you exhaust that initial screening of these simple antibodies or even if you're thinking about bispecifics and go down that route using antibody engineering eventually, then for those single-arm antibodies, those would work fine.* ***For the full-length antibodies, it will work fine; for the heavy chain-only antibodies, it probably worked on maybe two or three projects of the 20 or 30 that we ran****. Then as we started exhausting the monoclonals and started going into the bispecifics and more complex versions of target combinations, that's where it almost always failed on us and started giving us too many false positives that did not pan out with the traditional analysis…****For the full-length antibody, which is the heavy-chain and the light-chain, you have about 70% to 80% success rate****, which is given that it would compress the time and everything, it's good output to go with.* ***But when you're looking at the heavy-chain only antibody, that would drop down to 10%, 15%, 20% tops."***

Source: Scorpion Capital consultation calls with experts

HARBOUR BIOMED (cont'd): Numerous costs add up quickly and led them to curtail usage, on top of lack of hits and difficulty of use: $2MM up front, $15K per run, $300K per year for support; plus two dedicated FTE's to operate the instrument, given its complexity.

> ***Ongoing cost of chips/consumables is prohibitive; limited their use of the machine***
> *"Once out scientists started using it with the chips and the cost of the chip, that was a little bit prohibitive for them to just try things out, if you will, to get some hands-on experience. That was another limiting factor.* ***The machine itself is $2 million, but beyond that, the chips cost a significant amount of money, which for a biotech or someone who is cost-conscious, it becomes a limiting factor at that point."***

> ***Costs $15,000 per run just for chips, before including reagents and other consumables***
> *A: "it was around $2000 to $3500 per chip."*
> *Q: "And there are four chips in a machine? So, it's* ***almost like $15,000 per run?"***
> *A: "Exactly."*

> ***Cost of chips adds up quickly. on top of lack of hits and difficulty of use***
> *A: "That is exactly why the runs were not as many as we would like them to be."*
> *Q: "You basically started not doing that many runs because they were too expensive?"*
> *A: "Yes, the cost of the chips started adding up very quickly."*
> *Q: "So, you rapidly scaled down the number of runs."*
> *A: "****Yes. It was a combination of the cost of the chips, the learning curve, and not getting the number of hits that we were expecting from it."***

> ***Machine's ongoing cost included an additional $300K/year in maintenance, plus two FTE's, and about $15,000 per in consumables***
> *A: "****I think we had a two-year contract that was about a 15% mark."***
> *Q:* ***"So, about $300,000 a year in maintenance and service. And then each run was about $15,000 for the chips?"***
> *A: "Yeah, each run would be about three chips, about $10,000, $11,000, depending. The reagents and other consumables were, I could go back and look at the exact pricing, but they were probably another 20% to 25% of the cost of the chips because I remember looking at budgets, and the chips were the big buy there, and probably 20% in terms of running costs for the additional reagents.* ***Of course, you would need two people to be trained in terms of the FTE dedicated to using the machine."***

Source: Scorpion Capital consultation calls with experts

2K) Harbour Biomed ex-executive

HARBOUR BIOMED (cont'd): Machine is still only used 3-4 times per month; re-purposed it for simple antibodies to try and scrape together some utility after a huge capital investment; still no time savings, even for simple use-case, given false positives; difficult to trust the data.

> ***Instrument is only used 3-4 times per month***
> *Q: "How often is it used?"*
> *A: "I would say about **three to four times a month."***

> ***Harbour has re-purposed the machine for screening of simple antibodies, but even then has experienced no time savings given false positive; difficult to trust the data.***
> *Q: "How much of a time savings do you get for these simple antibodies by using this machine versus a traditional method?*
> *A: "A traditional method, if I were to go on an average, will take me anywhere between 7 to 10 months. Given what we have with the Berkeley Lights and the amount of analysis that we would be able to do, it does cut it down to 4 to 5 months, but again, if we just take that one step beyond in terms of the additional validation that we have to do before we learned all of these things that I just told you about, **it probably comes up to the same amount of time, given the false positives** that added a significant amount of time on top of the runtime for the machine itself."*
> *Q: "You're saying that because you have to validate the results you're getting, you add those extra steps, and it ends up being the same amount of time anyway?*
> *A: "Right."*
> *Q: "And **is that because you don't fully trust the output from the machine**? I've heard this from other customers. They have to double-check everything with their traditional workflow. Is that what eats up those three to four months' savings?"*
> *A: "Exactly. And that's what I said until you build that trust, and the way to build that trust turns out to be extremely expensive with Berkeley Lights because the chips are so expensive, that amount of time to get to that comfort level of trusting the data coming out from the machine is, first of all, prolonged and second of all, too expensive to do."*

Source: Scorpion Capital consultation calls with experts

2K) Harbour Biomed ex-executive

HARBOUR BIOMED (cont'd): BLI can't support the machine and seem out of their depth; little know-how or experience; couldn't answer Harbour's questions; support is poor and was difficult to reach staff.

> ***BLI staff believed their own hype but had little experience and know-how; couldn't answer customer questions***
> *"They probably believed that the machine could do whatever they envisioned it to do, but as they started getting more real-world evidence and data from actual end-users, I guess that did not add up to what they were expecting. When we had those conversations with them, I think they really believed that the machines could do everything under the sun and more, but that was probably based on a limited amount of experience. That's where I think the limitations from a service perspective and a support perspective comes in is, you know, they knew as much as they knew based on their own experience, but beyond that, when you start going in certain directions,* ***they just didn't have the know-how or the knowledge*** *to support those kinds of complex antibodies, complex questions that were coming from some of us.*

> ***Instrument is difficult to use; took scientists long time to get up to speed; was difficult to reach BLI for support and get a "robust response"***
> *"The system is* ***not intuitive*** *in terms of using it. It* ***took our scientists a while to really get up to speed*** *in terms of understanding how to use the system and the support. It took us a while to get the right response, get connected to the right people, get the answers that we were looking for, and get moving forward. It was difficult to always reach back to San Francisco and talk to people who knew things here with different time zones and really get a more robust response from the team. That became a limiting factor again for us at that point"*

> ***BLI appears to have little knowledge of complex antibodies and can't properly support customers***
> *Q:* ***"Did they even know what they were talking about?*** *Did they even have the capability to properly support a customer like Harbour?"*
> *A: "****For the simpler antibodies, yes. For the complex, no."***

Source: Scorpion Capital consultation calls with experts

2L) Lonza scientist

LONZA scientist, part of the leadership team within the cell and gene division, "extensively tested" the machine across two different business units and passed: "value proposition was not there"; "was hard to justify"; couple of machines purchased few years ago in another Lonza division, unclear usage, ROI is an "open question."

> ***Expert regularly evaluates new technologies for Lonza***
> *"My position is that I lead all the activities within a business unit within Lonza, which is focused on cell and gene. Part of that responsibility is serving as the* ***gatekeeper for bringing in new technology*** *that would be implemented within our workflows."*

> ***Lonza may be the largest contrast drug manufacturer and developer in the world, with $60B market cap and 14k employees***
> *"I think an external report some time ago saying that I think* ***we touch almost 40% of the biologics market in total****. That's for everything, though. So, that's not just antibodies; that would be cell and gene as well."*

> ***"Extensively tested" the machine across two business units and concluded it didn't' have a value proposition; even "ran some specific studies"; "was hard to justify"***
> *"My team extensively tested the Beacon for uses in immuno-oncology cell therapy but felt* ***the value proposition was not there*** *because of the hardware cost…The groups that I run as well as the bioprocessing group, which is primarily on the cell line development, MABs, etc., type of manufacturing, we both took a look at the Berkeley Beacon, and then* ***we put it through its paces, ran some specific studies*** *on how it would fit in, and what was the value proposition. For the cell and gene therapy side, it* ***was hard to justify*** *just given primarily the cost of the hardware. When we looked at it from the cell and gene perspective for the Beacon, it just wasn't there.*

> ***A couple of machines were purchased perhaps 5-3 years ago in another Lonza division; unclear usage and ROI***
> *Q: "Is there a concrete ROI that Lonza can point to in the bioprocessing group that has the machine, or is it too loosy-goosy to be able to say at this point?"*
> *A: "I think they're tracking that, but I think* ***at the moment, still ramping up, still getting campaigns under their belt…I think it's still somewhat of an open question*** *…they're still ramping up activities and really figuring it out, They got the machines around two-and-a-half or three years ago."*

Source: Scorpion Capital consultation calls with experts

LONZA scientist (cont'd) slammed the instrument: doesn't shorten development timelines or eliminate the need for traditional workflows, both key to its value proposition and $2MM price tag; capabilities are lacking for both cell line development and antibody discovery, BLI's two key target markets; cost is "prohibitive" and a "major shortcoming": not enough potential usage for ROI – a telling sign for BLI's TAM given Lonza may be the world's largest contract drug developer and manufacturer.

> ***Machine doesn't shorten development timelines – key to BLI's value proposition and $2MM price tag***
> *"When you dig a little bit deeper, you still have to go back and do some other activities. You're not done just because you put some cells into a Berkeley. I can say from the feedback I've gotten, they feel that yes,* ***it doesn't shorten it."***

> ***Berkely Lights doesn't eliminate the need for traditional, legacy workflows – the entire reason it's priced so high***
> *"The primary issue is just now once you've identified for example new antigens that are associated with tumors , now again, you have to take it offline and then do some additional workflows, whether that be sequencing, proteomics—whatever, you're just going to have to do that. So****, that was the major shortcoming for us****."*

> ***Capabilities for antibody discovery are also lacking, on top of no value proposition for cell line development***
> *"They can look and see the secretion of the antibodies, but they can't tell, for instance, the general cell line stability, whether or not there's stable expression, whether it has some of the other ancillary characteristics you're looking for. They do need to take it offline to do some additional testing.* ***they just don't have every capability we like to look for****. I would say that what Berkeley does is it helps us narrow down the number of candidates to a manageable number that we then go back to some of the more traditional testing for it. And I would say that's the same for cell therapies. It's not going to be able to do everything."*

> ***The cost of the machine was "prohibitive" and a "major shortcoming"; didn't see enough potential usage to get a return***
> *"I think the major shortcoming for us was the cost of the hardware was fairly prohibitive for the work that we're doing with it; I mean,* ***we'd really have to do a lot of testing of different programs in order to recoup any investment*** *into the Beacon itself. Any decision given the price point, we weren't going to use it."*

Source: Scorpion Capital consultation calls with experts

2L) Lonza scientist

LONZA scientist (cont'd) bluntly states that BLI has no value proposition versus competing machines, especially at a $2MM price point; can get "a lot more functionality" from others for a fraction of the price; will get disrupted within 2-3 years by newer single-cell technologies.

> ***Expert bluntly states BLI has no value proposition especially at $2mm price point; enough to buy multiple pieces of equipment from competitors and get "a lot more functionality"***
> *Q: "So you're saying that* ***there's not much of a value proposition for cell and gene therapy, period?"***
> *A: "****Not for the Beacon and not at that price point****…if I go and ask for a $2-million piece of equipment, the value proposition and justification is going to have to be substantial. For that amount of money, I can buy a couple of Chromium's from 10X; I can buy a couple of IsoLight's or IsoSpark's from IsoPlexis.* ***You can buy other pieces of equipment that give you a lot more functionality****. It might be more diffuse, but you won't have that amount of money tied up in one piece of equipment. It's a pretty heavy lift to do that."*

> ***Can "cobble together" other equipment for far less and get similar capabilities***
> ***"$2-million for what we get out of it; it's just not there for the value****. We can cobble together other pieces of equipment to give us a similar picture of what Beacon would give us, it's not going to be exact, but it's still going to be pretty close."*

> ***Lonza is tracking BLI competitors; others working on similar capabilities***
> *"****They also have some other competitors*** *that we haven't directly tested yet, but we've been keeping an eye on to see when their technology matures that it might be a good alternative…I think* ***there are others working on similar capabilities in the space****; I mean, we have other competitors that aren't as mature but are getting there."*

> ***BLI is 2-3 years way from being potentially disrupted by newer approaches like Lightcast's***
> *Q: "You said other companies are very close, catching up to this ability to manipulate single cells. Who's close? How far away is the competition?"*
> *A:* ***"I think two/three years. I think probably the closest one is a UK company called Lightcast****—I'm not sure if you've heard of them. They do some pretty cool stuff. They basically—and I saw the videos a while ago—they do basically the same thing, except they do it in droplets of water or media, and then using light, I believe is the basis much like the Berkeley technology, they can essentially move these droplets around, combine them, split them, do whatever, and then can do that based on various things, and they can actually recreate incubator environments, they say they can grow cells. Basically, the droplets are encapsulated in some sort of mineral oil.* ***It's a pretty cool technology, but I think it has the ability to—it would be like having a Berkeley Lights chip without the pens."***

Source: Scorpion Capital consultation calls with experts

2L) Lonza scientist

LONZA scientist (cont'd) repeatedly criticized the instrument's cost: at least $3MM with annual service contract vs. $2MM up front; then need to add cost of full-time employees to operate the machine; "uphill battle" to purchase despite Lonza's $60B market cap; machine's pricing needs to drop 75-95% to be viable; TAM is small, limited to 75-80 of the largest biotech/pharma/CDMO players.

> ***Actual cost of the instrument is at least $3MM, given annual service contracts and need for FTE's; need for FTE's creates "an uphill battle" to purchase***
> *"If we assume $2-million for the Beacon, and the way I have to justify it is actually $3-million because of the $2-million purchase price, then we'll probably keep it for about five years, and you have to have a service contract, which is around 8% to 12% of your purchase price,* ***so that adds around another million bucks just for a service contract. You definitely need FTE's for it****. When I'm looking at new technology, a new piece of equipment, that's something that I think about when I talk to these groups is, do I need to hire somebody that has a special understanding just to run this piece of equipment? Because if so, then that's more of an uphill battle for me."*

> ***Beacon pricing needs to drop by 75-85% to be competitive***
> *A: "****I think the sweet spot for this type of stuff is hopefully $500,000 and below. Anything that's $300,000 or less, I can generally just order without going through a ton of justification."***
> *Q: "So, you're saying pricing basically needs to drop by 75%."*
> *A: "Ideally, yeah. I think in that $300k to $500k range is where they need to be."*

> ***TAM is small, in the ballpark of 75-80 large companies***
> *Q: "What is your sense of the* ***installed base potential?*** *There are not many companies on Lonza's scale."*
> *A: "****Yeah, it's probably not much****. I think in general, though, not a lot of people, there are only certain companies that are really doing a lot of cell line development and antibodies, and a lot of others will come to, say, a Lonza where we have experience in engineering these cell lines across multiple campaigns, multiple clients. We're essentially the experts, and then they just license the final product. They license the cell line that's engineered for their product and then do their own manufacturing. In that case, you wouldn't really need Beacons everywhere, but again,* ***I think 75-80 multi-billion companies whose focus is still antibody development is probably about right."***

Source: Scorpion Capital consultation calls with experts

2M) Samsung Biologics ex-lead scientist

SAMSUNG BIOLOGICS ex-lead scientist: Samsung may be largest contract drug manufacturer in the world yet appears to have only one Beacon machine; "not a good investment"; "I don't think it's worth $2MM"; virtually no time savings in cell line development; barely used for customer projects, not enough customer interest to justify more machines; expert recently left Samsung to join a $2.5B biotech that's "not that interested" in the tool despite BLI approaching them.

> ***Only aware of 3-4 projects at Samsung last year using the instrument***
> *Q: "How many Berkeley Lights machines does Samsung Biologics have?*
> *A: "One in the Korea headquarters and then the U.S. but the U.S. doesn't have the Beacon.* ***I'm aware of maybe last year, three or four projects are using it.*** *They purchased it around the beginning of 2020 or at the end of 2019."*

> ***"Not a good investment"; "don't think it's worth $2 million"; time savings in a typical 3-4 month cell line development project is only 2 to 4 weeks***
> *Q: "So, you said cell line development staff like you don't perceive that much of a benefit from the Beacon?"*
> *A: "That's right. because* ***the time savings can only be two or four weeks****. The overall cell line development process is three to four months. It's a good saving, but if you consider that it's $2-million piece of equipment,* ***it's not a good investment. In cell line development, I don't think it's worth $2 million*** *because of the amount of time-saving and then the supply saving. I don't see that as so helpful…Cells grow at the same speed and won't change whether using Berkeley Lights or typical methods, That's the reason it's not able to change from four months to one month - the cell grows at the same speed."*

> ***Expert doesn't think Samsung plans to buy more machines; not enough customers for whom it's relevant***
> *Q: "Why doesn't Samsung Biologics buy more than one machine?"*
> *A: "I think it's not in the short-term plan because the machine is $2 million, so we really need to make sure we have enough customers to purchase the equipment.* ***It's not there yet."***
> *Q: "Samsung Biologics doesn't have enough customers that want to use it to justify a second machine?*
> *A: "Yes, it definitely needs to have more customers to do it."*

> ***Expert is now at a large biotech that's been approached but not interested in the BLI tool***
> *"They are interested in talking to us, but* ***we are not that interested in Berkeley Lights Beacon*** *because we have a really good platform that can express protein really well."*

Source: Scorpion Capital consultation calls with experts

2N) Chan Zuckerberg Biohub

CHAN ZUCKERBERG BIOHUB, a nonprofit initiative funded by Mark Zuckerberg, may be BLI's second largest customer after Amgen, with about 5 BLI machines bought in the last 2 years. We interviewed a scientist closely involved in the purchase decision, who has little direct experience with the tool and said they have to use up a $700MM capex budget within three years. The center appears to be spending recklessly on anything "new" because it has to; appears to have done no diligence on BLI; and became nervous and asked us for details about other customers' experience: "we just spend money; we don't make money."

> ***Purchased 5 instruments in the last 2 years***
> *"We became a very good customer, and we have bought several of their systems, including the Beacon and its Lightning...* ***We went from zero to five instruments in the last two years."***

> ***Approximately $700MM to spend on capex plus another $700MM on top of that***
> *"As a foundation,* ***we have more than $700 million of budget*** *that we can use up in three years. On top of that,* ***we have another capex budget*** *that is more or less, equivalent to our other budget, a little bit less."*

> ***The center's mission suggests it can be spendthrift***
> *"We are a non-profit, so* ***we just spend money. We don't make money****. Our main mission is not to create patents or to make money. It's to spend the money in a way that can advance science and particular therapies."*

Source: Scorpion Capital consultation calls with experts

2N) Chan Zuckerberg Biohub

CHAN ZUCKERBERG (cont'd): Despite buying 5 BLI machines, the feedback is revealing – wouldn't personally buy the machine; "would not feel comfortable"; better ways to spend $2MM; not suited for commercial discovery where you have to "actually deliver" a drug; only bought because free to gamble on machines that may not work as advertised; are also buying "everything" from all of BLI's single cell competitors.

> ***Not suited for commercial drug discovery; also wouldn't personally buy the machine if he was in a lab focused on research; better ways to spend $2MM***
> *Q: "When you said that machine is not really that great for basic research, what do you mean? "*
> *A: "It costs $2 million. I don't know many labs that can actually afford this kind of machine. For the kind of assay that you can run, it's not the machine that they use for discovery. If you're a lab that wants to do basic research and publish, get your grant, keep publishing, and so on;* ***this is probably not how I would spend a couple of million dollars."***

> ***Scientist says he would "not feel comfortable" buying BLI machines in a commercial setting where they have to "actually deliver" something like a drug***
> *"We have these instruments, we use them, but* ***if I was working in a company that was going to use this instrumentation for a drug development program or something****, which is a high pressure to actually deliver and to have something on the shelf in CVS in five years,* ***I would not feel comfortable with making that kind of choice."***

> ***Chan Zuckerberg is free to gamble and spend money on machines that don't even work as advertised; can take risks on new machines that others can't; are also buying "everything" from all of BLI's single cell competitors***
> *"We have way more freedom on how to* ***spend, on things that may actually even end up not being as good as advertised****. This is something that we do for sequencing or for anything that we think might have a future. If it doesn't work, it's bad, but we are not going to be bankrupt. Or we're not going to fire an entire department just because we invested in the wrong technology…****We clearly don't want to waste that money but are in a position in which we can take some risks*** *in the sense that we can invest in a company like Berkeley Lights and other companies from which we are buying their instruments, for example, IsoPlexis or Mission Bio, everything that is related to single-cell.*

> ***Steep learning curve to make the machine work in a "stable" and "steady" way***
> ***"It takes time to make it work well*** *in the sense that there is a very high entry-level for a fine instrument to make them work in a stable, steady way with good results. The learning curve at the beginning is pretty steep."*

Source: Scorpion Capital consultation calls with experts

2O) UCSF, NIH, and other academic customers

Academic research customers like UCSF, NIH, and others had experiences as disastrous as commercial users: UCSF and NIH both returned the equipment after 6-9 months; couldn't get publishable data out; NIH chose a far cheaper and faster box from 10X Genomics instead. A former BLI employee and research scientist detailed the "obstacles."

> ***UCSF stopped using the tool much after a couple of months***
> *"UCSF received the Lightning, which was our more R&D-focused, smaller, less automated platform, which had been designed specifically for academic labs.* ***They were one of our earlier adopters****, and the plan was to have projects and get publications and data out. The platform didn't really get used a lot. It was used quite a lot in the first couple of months but as soon as we reduced the amount of support that we were giving, they never really became let's say autonomous.* ***We didn't really produce the amount of data that we hoped was going to be enough for publication."*** ***– Former BLI scientist***

> ***UCSF couldn't get publishable data out of the system to ; BLI extended the trial to 9 months and still failed***
> *"The general agreement was that UCSF were going to receive it for free for the first six months and perform a number of projects and then based on the results of the first six months of trial, they were going to purchase a platform, or they were going to stop using it.* ***Because they didn't really get out the data they wanted, the machine was taken back****. It was a bit longer than six months. We prolonged it up to nine months, and then we took it away."* ***– Former BLI scientist***

> ***NIH returned the system after six months; chose radically cheaper box from competitor 10X Genomics***
> *"****NIH had the system for free for six months, and they ran several experiments, and ultimately they wanted out****. They needed a system that had higher throughput than the Lightning.* ***For what they needed to do, a 10X Genomics box was actually more appropriate. The throughput was not high enough*** *for what they ultimately needed. They got it basically in the second half of 2019, and they tested it for a few months, and they did a few runs, but then when their six months of free usage were up, they decided to instead purchase a different system that could grant them the throughput they needed. They bought a 10X Genomics. They were doing T-cell discovery, so obviously, throughput was one of their main goals."* ***–Former BLI scientist***

> ***Obstacles at other research institutions as well; couldn't use the tool without extensive handholding and support***
> *"We had some obstacles because we managed to place several platforms at research institutions and NIH. When I left, we had one at NIH.* ***We had one at U-Pitt, we had one in La Jolla, we had one at, I think, City of Hope.*** *The learning curve was a little bit steep. They needed quite some training to be able to become, let's say, a super-user of the machine. So, we got to a point where there was quite a lot of support that we were providing internally for our customers.* ***–Former BLI scientist***

Source: Scorpion Capital consultation calls with experts

2P) A leading academic institution

LEADING ACADEMIC INSTITUTION purchased a machine and employs a former BLI scientist in a senior role. The scientist helped develop the instrument and is one of most knowledgeable experts in single cell technology. As an ex-employee and current customer, the expert is uniquely positioned to comment and keeps "a close eye on the market and competition." We redact names and titles, given the devastating nature of the expert's feedback.

> ***Expert was involved in the development of BLI's technology and is now in a senior role at a prominent academic institution***
> *"I was recruited as a scientist early on in their trajectory. So,* ***I was in Emeryville at their headquarters working on the development of a number of assays****, some of which are commercially available now, some of which are still in development with the company. I now serve as a research scientist deployed with their instrumentation. In addition to my standard [redacted] role, I'm also the [title redacted] of single-cell technology development.* ***I oversee all of our single-cell collaboration."***

> ***Scientist is one of the leading experts on the single-cell technology landscape and closely works with and follows all vendors in the space***
> *"****We work with a hundred or so collaborators, and I work with them to understand their science and figure out which single-cell approach makes the most sense for them****. In many cases, it's 10x; in some cases, it's Berkeley Lights; in some cases, it's Mission Bio. And we have a really pretty extensive suite of instrumentation that we use. Another aspect of my role is to keep an eye on the technology landscape to make sure that we're also inducting and always at the very cutting edge of adoption, in many cases, early adoption, so that we are always offering the latest and greatest approaches.* ***I really keep a close eye on the market and the competition as well."***

Source: Scorpion Capital consultation calls with experts

2P) A leading academic institution

LEADING ACADEMIC INSTITUTION/EX-BLI SCIENTIST (cont'd) states that the machine fails to work 90% of the time; 1 out of 10 experiments are successful; "immensely frustrating" with a long list of technical malfunctions; machine stops working for weeks at a time; "lot of turmoil" using it.

> ***Machine fails to work 90% of the time; 1 out of 10 experiments works; long list of technical malfunctions***
>
> *A: "**For us, the instrument probably works 10% of the time, maybe 20%, if we're lucky. When it's working 10% of the time, it's great, but the rest of the time, it's just immensely frustrating."***
>
> *Q: "You said you can only get it to work 10% of the time, or that it only fails 10% of the time?"*
>
> *A: "It only works about 10% of the time for us. **I would say if we do 10 experiments, 1 of them works well."***
>
> *Q: "What does that mean - what's happening in the other 90%? That's a little astounding."*
>
> *A: "It's a combination of things. We certainly have plenty of cases where they're just straight-up, **hardware technical issues; something doesn't work right. Something doesn't pen the way it's supposed to. There are microfluidic issues, pump issues**—things like that. That's certainly part of it. Not having a really good grasp on how the project is going to look on the instrument, so not knowing if **the cells stick**, or something like that, so things that you have tried to optimize off-chip in cell culture, for example, that are different now when you put your biological system on the instrument. Those are things that have to be overcome. The stickiness of the cells is a very important thing because, obviously, if they stick, you can't pen them, and you're kind of dead in the water."*

> ***Machine stops functioning for weeks at a time; "lot of turmoil" using it***
>
> *"**At some point, the instrument goes down. And it takes us 3, 4, 5, 6 weeks, and sometimes multiple visits from Berkeley Lights to get it back up to the point where it's running again**, and we can continue to iterate and optimize on the actual experimental part of the project. By that time, something's changed, and we usually have to take a few steps back and start over from part of it. It's a lot of three steps forward, two steps back kind of thing, particularly when you have a lot of downtime with the instrument or a lot of upkeep with things, that there is **a lot of turmoil with the instrument and the software that slows down that process."***

Source: Scorpion Capital consultation calls with experts

LEADING ACADEMIC INSTITUTION/EX-BLI SCIENTIST (cont'd): Wouldn't recommend the machine for "the vast majority of people"; other technologies are a "much better place to start"; not suited for commercial pharma/biotech customers; "really incredibly challenging for them" to get the machine to work"; use cases are "very limited," generally to low risk, low value assays; anything beyond that requires "a crop ton of validation work" to double-check the data with legacy tools.

> ***Expert does not recommend the BLI machine for "the vast majority of people"***
> ***"I would certainly not start by using Beacon****. I think it's one of those situations where if Berkeley Lights had a better model for getting pilot studies, and I was really convinced that was just the way to go, that I was really getting that much more specific data from the instrument, certainly it would be something I would consider. But I think for the vast majority of people, using* ***some other combination of technologies is a much better place to start****. Beacon has a lot of really niche applications, and if you get all of those parameters right, you get some really great data out of it. But I think* ***the vast majority of people who start with it probably shouldn't."***

> ***Machine is not suited for commercial pharma/biotech customers; "really incredibly challenging for them"***
> *"The idea that well, we've invested in this, so now we better figure out what to do with it; that's not the first time I've heard that. We clearly didn't make the full investment in order to have a Beacon. But we're an academic institute that can fail 9 times out of 10, and be totally fine. Our 10th success gets published. But* ***one of the frustrations that a lot of my pharmaceutical peers have expressed, somebody at some level decides to make this investment, and then it becomes their problem to make it work*** *right out of the gate with amazing data that demonstrates great cost-savings and throughput increase, and all these other kinds of things, which is* ***really incredibly challenging for them."***

> ***Use cases are "very limited," generally to low risk, low value assays; anything beyond that requited "a crop ton of validation work" to double-check the data using traditional methods***
> *A:* ***"It's use is very limited. People see it as being good for very, very, very specific things****. I think using it for a secretion assay is perfectly fair if it's been developed appropriately, so some of those antibody screening type assays. Again, it's very limited, and you have to have a very limited view of it."*
> *Q: "Anything else besides secretion assays? Is that it?"*
> *A: "In my mind, that's the safest thing to use it for. We certainly branch outside of that for certain things with the knowledge that we're going to have to do a crap ton of validation work."*

Source: Scorpion Capital consultation calls with experts

LEADING ACADEMIC INSTITUTION/EX-BLI SCIENTIST (cont'd):

Extremely niche instrument; can take a year to get data out of it; customers get frustrated and want to send it back; took this expert – who helped develop the technology – 2 years and countless tries to get an assay working; few users will get any utility out of it; have to be willing to tinker with it for years.

> ***Extremely niche instrument; can take a year to get data out of it; customers get frustrated and want to send it back***
> *"My perception is that the general feeling is it's great when it works. You can really use it to generate some very unique data. It's essentially in our hands. We use it to generate data we can't generate any other way.* ***But it might take us a year to get there, which is not something that other groups have the luxury of, certainly in pharma, they don't have the time or the money*** *to be devoted to that kind of thing. So, this idea that it works great for very specific niche applications, I think, is very true. But, that* ***level of frustration that people feel*** *when they first get it, and it doesn't work in their hands—I think it's very real, and* ***I can certainly understand why there would be customers who would send it back*** *because can you imagine after three years, six months with this instrument that you've paid $2 million for, and you still can't get it to work? At that point, it's like, "What are we doing?""*

> ***Machine only works for extremely limited, one-off use cases for certain customers willing to spend years tinkering with it; took expert 2 years and countless tries to get an assay working; few will get utility out of it***
> *"I can definitely see in certain pharma groups.* ***You've got your one very specific thing that you spent a few years perfecting****, so early adopters like Amgen and some of those places, I can totally see that happening, where they spent a lot of time working through how their biology is best done on this instrument. They've figured it out, and now they just roll with it. For us, we've basically done a similar version of that. We're very fortunate, we have two publications coming out right now on assays that we've developed on Beacon, but* ***it took us two years to get there. It's two years, and I've lost track of the number of times we've done the experiment. It's the kind of thing where it's definitely limited in who gets really significant utility out of it."***

Source: Scorpion Capital consultation calls with experts

LEADING ACADEMIC INSTITUTION/EX-BLI SCIENTIST (cont'd):

Instrument is not usable by most scientists; "technically very challenging to use"; using it actually slows down projects versus speeding them up – the key selling point; takes years to learn the ins and outs of the machine.

> ***Instrument is not usable by most scientists; "technically very challenging to use"***
> *Q: "**You said it's not usable by the average scientist – it just takes too long?"***
> *A: "**Yeah, I personally don't think so**. The technical knowledge that you need to be able to understand why is it different than a standard cell culture experiment. What are some of the caveats with microfluidics? How does the instrument actually work? **There's such a range of knowledge that's required there to be successful**. It really requires somebody with a hybrid background. Pure biologists a lot of times have great difficulty understanding the microfluidics and some of the caveats with the low volume and things like that. And the engineers don't necessarily understand why a cell doesn't grow well on silicon; plus, it's technically very challenging to use. So, you have to have somebody who's willing to dive in and say, all right, I'm going to just sit here and work on this until it works."*

> ***Using the machine slows down projects; takes years of specialized expertise***
> ***"Using it for projects is definitely a slow process**, and it's made even slower by the fact that you have to have somebody who's got really specific expertise working on that. It's not something your average scientist can stand in front of and make work. We're lucky because I've seen the guts of it, I know how it works, I can really do a lot of the project design and troubleshooting that other investigators can't necessarily do. I have two people that I trust to work in the instrument, and they are people who have worked with me for years, and they know the ins and outs of it because they worked on it for that long. **Somebody new standing in front of it is not going to be successful.** You have to just go through the learning curve. And so you kind of stack all of those things on top of each other, it's definitely understandable why stuff takes longer.*

Source: Scorpion Capital consultation calls with experts

LEADING ACADEMIC INSTITUTION/EX-BLI SCIENTIST (cont'd):

Instrument is perceived harshly in the field; "anybody" familiar with single-cell analysis is "very skeptical and rightfully so" particularly for critical applications like FDA submissions; scientists are skeptical that cell assays can "behave normally" in the instrument.

> ***Machine is perceived harshly; "anybody" familiar with single-cell analysis is "very skeptical and rightfully so" particularly for critical applications such as FDA approvals; only useful for handful of low risk, low value applications***
>
> *A: **"It is perceived harshly**. And I think people who are sort of new to the field, they're very excited about it because, I think on the face of it, it can be very flashy and very interesting. I think people who are really well-established in the field of single-cell analysis have a very realistic approach, like, "Hey, if you've got time and money to burn, and you can make it work for your particular application, that's great." You'll be able to really at least churn through some experiments, hopefully, demonstrate with some validated data that what you're seeing is pretty realistic. But in terms of why your application or applicability in some of **these critical areas, things that require FDA approval, anybody who is familiar with the field tends to be very skeptical, and rightfully so."***

> ***Scientists are skeptical that cell assays can "behave normally" in the instrument***
>
> *Q: "What are the sources of skepticism? "*
>
> *A: "The sources of skepticism, just as an example, a neuroscientist I work with hates Beacon because he says, "**This is the most unnatural assay I think I've ever seen before. You absolutely cannot expect—anybody with a biological background is going to look at that and be like, the cells are going to behave normally."***

Source: Scorpion Capital consultation calls with experts

LEADING ACADEMIC INSTITUTION/EX-BLI SCIENTIST (cont'd): Skepticism among scientists makes it "really hard" to get the machine's data through peer review, forcing "absolutely crazy" amounts of extra validation; struggle to publish papers given lack of trust by academics; vicious cycle as institutions can't afford the machine, which limits the number of papers; BLI cutting themselves "off at the knees."

> ***Skepticism makes it "really hard" to get machine's data through peer review; required a lot of extra work to validate***
>
> *A: "Our group is actually one of the primary groups that publish on this, and **we have a really hard time getting our publications through peer review because people are skeptical, and rightfully so**, of the work that we do on Beacon because it is unusual, it is a foreign environment, and it is a very different approach to things. **So, we have to do a lot of extra validation**, a lot of really convincing reviewers that what we're showing is actually real. I think that's a big challenge."*

> ***Lack of trust in the data makes it a struggle to publish papers; "certainly not been easy"; requires "absolutely crazy" amounts of extra validation***
>
> *Q: **"In academia, people don't even trust the output of the data from the machine?"***
>
> *A: **"No**, it's got to be benchmarked against something that people recognize and understand…It's still very early in that process to the point where reviewers, whether they're at the FDA or for a publication, are going to look at this and be like, oh, I trust this data. **That is still something that they very much struggle with**. I know they've been trying very hard to enable us and enable other people to publish data specifically for that reason, but it's **certainly not been easy**. I had a paper that I've been trying to get published for almost three years now, and **the amount of validation that we had to do was absolutely crazy."***

> ***Academic institutions can't afford the machine; prevents publications; BLI is cutting themselves "off at the knee"***
>
> *"Academic institutions can't afford to access the instrumentation. So, it's already challenging to develop some of these kinds of projects that are worthy of publication, but **if you're already artificially limiting the number of people who can even attempt it, you're absolutely just cutting yourself off at the knee."***

Source: Scorpion Capital consultation calls with experts

LEADING ACADEMIC INSTITUTION/EX-BLI SCIENTIST (cont'd):

Numerous problems with the instrument's software; customers are constantly blindsided with software and hardware changes, resulting in bugs, delayed experiments, need to re-learn how the equipment functions; expert stopped software updates to avoid unanticipated bugs; "wasn't worth it"; both software and hardware behave unpredictably with "no transparency into why things go wrong."

> ***Customers constantly blindsided with software and hardware changes - bugs, things go wrong, delayed experiments, have to re-learn how it functions***
> *"The other problem that we have is that there's* ***constant change in both the software version that's being deployed or supported, there are hardware changes****, and so we feel like—we get to where everything's been updated, we're ready to start running the experiment, something goes wrong, they come out to maintain the instrument, and it's like, "Oh, by the way, we've changed the software again. We're going to update the version." And then it's something different, and so, we have to go back and kind of start over and say, now how does this version of software function? What sorts of bugs are we going to find?" wasn't worth it."*

> ***Expert stopped updating the software to avoid unanticipated bugs; wasn't worth it***
> *"Early on,* ***we used to not update our software because it would take us so long to figure out what we needed to do differently because we were always finding bugs that were unanticipated****. So, for the longest time, we just wouldn't update our software at all because it just wasn't worth it."*

> ***Hardware and software in particular behave unpredictably; "no transparency into why things go wrong"***
> *And then there's software issues. It's not transparent. So, as they need their process to be more and more workflow-based,* ***there's no transparency into why things go wrong. So, it's not uncommon that something just happens that's completely unexpected*** *based on what you've told the instrument to do; something unexpected has happened, and it's some sort of a software issue."*

Source: Scorpion Capital consultation calls with experts

LEADING ACADEMIC INSTITUTION/EX-BLI SCIENTIST (cont'd): Technology doesn't work for cell line development, one of its two primary target markets and use cases; issues with contamination, cell growth/behavior, problems with BLI's chip; expert is not surprised BLI has basically killed of cell line development vertical, as the field is already satisfied with competing instruments at a fraction of the cost.

> ***Technology doesn't work for cell line development, one of its 2 primary use cases; issues with contamination; cell growth/behavior, problems with BLI's chip***
> *"I think it's an interesting observation because one of the things—in my mind, a cell line development workflow really starts you're penning single cells, you're observing something about them, in many cases, division rate or growth rate, things like that. And then the idea is that you can take the cells off of the chip, put them in a plate, and then grow them up in a GMP-compliant type facility. It's been interesting because* ***there's honestly a lot of problems with that. It's not really all that surprising to me that they kind of de-emphasized that pipeline because there are issues with contamination, there are issues with growth, and the cells don't necessarily behave off-chip the same way they do on-chip****, and so what may be a great growth candidate on-chip may behave differently in so-called chip emissions and things like that."*

> ***Not surprised BLI has de-emphasized cell line development; field is satisfied with competing instruments at a fraction of the cost***
> ***"That's not surprising to me that they de-emphasized that****. I also don't know that there was a ton of other competition in that field. As I mentioned, the Miltenyi Biotech instrument is a lot more rudimentary; it's very liquid-handling focused if I recall correctly. Not necessarily microchip-based, but it does enable high throughput screening of cell growth and cell division. My understanding from talking to a few people is that* ***that's been around for a while, a lot of people are perfectly happy using it, and so they really didn't see the need to invest in something like a Beacon*** *to continue to develop that workflow. It's probably fair to leave it at that for cell line development since I don't think they're really going to do much with that workflow going forward."*

Source: Scorpion Capital consultation calls with experts

LEADING ACADEMIC INSTITUTION/EX-BLI SCIENTIST (cont'd):

Instrument is prone to contamination – "a contamination nightmare" – "was always a big concern" and company still struggles with it; "definite weak points from a biological standpoint that would potentially encourage contamination."

> ***Instrument is prone to contamination ; company struggles with it***
> *"The instrument itself, any sort of cell culture, is open to contamination. If you do 96 well plates and hood, you can certainly get contamination. But it was something, I mean,* ***we struggled with that, and it's certainly something I struggled with*** *when I was working on assay development with them at their headquarters, that there's a lot of microfluidic tubing that can retain bacteria and things like that.* ***There are open areas on the media, which they tried some solutions to try to keep covered. There are definite weak points from a biological standpoint that would potentially encourage contamination****. You have to be really, really careful when you're working with certain cell lines."*

> ***Machine is a "contamination nightmare"; "was always a big concern"***
> *"They tried to mitigate that by altering a lot of characteristics similar to a biological safety cabinet that they tried to merge with the Beacon device. I think it knocked down the contamination by doing a lot of that, but you look at it as a biologist, and as a biologist, well,* ***this is a contamination nightmare, like there are lots of places for things to get in****. You do have the ability to switch out the tubing and things like that. So, it's good in that respect. But* ***it was something that was always a big concern, at least for us when we were taking cells off the instrument. Are they going to grow and end up contaminated?"***

Source: Scorpion Capital consultation calls with experts

LEADING ACADEMIC INSTITUTION/EX-BLI SCIENTIST (cont'd):

Instrument is based on chips that contain silicon, and cells don't behave naturally against a silicon surface; company never thought through the problems it creates; can't model tumors properly with a silicon chip; illustrates myriad problems at the company due to its semiconductor heritage where biology was "an afterthought."

> ***Silicon material in the chips is an unusual surface environment for cells; company never thought the issue through***
> *"Much of the rest of biology is conducted on plastic, which its not necessarily natural, but all of our expertise was developed on these plastic plates and dishes. It makes sense* ***when you move over to silicon; there's going to be a lot of unnatural things that are going to happen*** *as well; I certainly understand that you need the silicon in order for the opto-electronics to work. But* ***how the cells are going to interact with the surface is an afterthought****. They certainly worked on putting into place to where you can coat the surface with things, or don't touch the things. But long before they did that, we were spiking the hell out of our media with different proteins to try to get the cells to grow. So, up until the last couple of years, it was sort of like, well, here's a silicon chip. So, now you go figure out how to make your cells grow on it. The biology was very much an afterthought for them.* ***It's been very engineering-focused, very microfluidic-focused, but if you want to do medical research and you want to do cell biology, you better think about how the cells are going to behave on the chip."***

> ***Cells don't behave naturally against a silicon surface; company never addressed issues it creates***
> *"It's not so much that it's injurious; it's just it's very neutral like the cells get there, and there are no signals for them. The cells need external signals in order to grow and divide and do anything.* ***It's almost like you're putting them in a completely foreign environment and expecting them to behave naturally. If they were smart, this is something that they would have addressed****—that is so much more important than the calling for microfluidics. The surfaces that the cells are seeing and the environment that the cells are seeing is so much more important.* ***For the work that a lot of people do, cell interactions with the surface are critical****. I do a lot of tumor cell biology and things like that, so some of these other types of applications that they've been trying to push into are very impacted by how the cells interact with their microenvironment.*

> ***Can't model tumors if the chip is silicon; semiconductor heritage at BLI where biology was "an afterthought"***
> *"They've tried to position themselves as being, like "Hey, we can help model the tumor microenvironment."* ***Well, you can't model the tumor microenvironment if the chip is all silicon****. So, for a lot of applications, probably for a lot of the customers you've spoken to, it may not be as big of a deal, but I think it's also symptomatic of this idea that the engineering was the be-all and end-all, and that the biology was, in a lot of regards, a bit of an afterthought.*

Source: Scorpion Capital consultation calls with experts

LEADING ACADEMIC INSTITUTION/EX-BLI SCIENTIST (cont'd): Confirmed problems around false positives and errors; instrument has "fairly significant limitations" and requires "a ton of upfront work" to be usable; amount of optimization and tweaking makes people "really, really hesitate to invest."

> ***Machine has "fairly significant limitations" and requires "a ton of upfront work" to be usable***
> *"Actually, I would very much agree with some of the comments that were made by some of your other calls. I'm a fan of the technology, but the instrument has some* ***fairly significant limitations, and there is a ton of upfront work*** *that you have to do to be able to really utilize it in that capacity."*

> ***Instrument requires tremendous optimization and tweaking; people "really, really hesitate to invest"***
> ***"There's a lot of optimization that has to happen upfront. Chips are made of silicon, which is a very unnatural environment for cells to grow in. Many times, there's optimization in terms of media formulation, cell growth conditions****, and things like that, that don't always translate directly from some of the so-called experiments that have been done. Obviously, there's the expense. People really, really hesitate to invest quite so much upfront. Then there is so much optimization that's required."*

> ***Confirmed issues with false positives and errors, as mentioned by most customers we interviewed***
> *"As you mentioned,* ***there are definitely issues with false positives*** *in part because of the transport parameters with some of those pens. You have to get your concentrations of all the reagents and the assay right; otherwise, you could have forced binding and things because the concentration locally ends up being very high."*

Source: Scorpion Capital consultation calls with experts

LEADING ACADEMIC INSTITUTION/EX-BLI SCIENTIST (cont'd): Competitors with radically cheaper machines have already taken share in each segment BLI has targeted; same capabilities "for a substantially lower capital expenditure"; Abcellera ($5B market cap) is biggest competitor, has a "full stack" solution vs. just selling a screening tool.

> ***Competitors with radically cheaper machine have already taken market share in each segment BLI has targeted; same capabilities "for a substantially lower capital expenditure"***
> *"In terms of a competitive landscape, there are **definitely players that took a chunk out of each individual aspect of the market that they targeted**. There are companies in antibody discovery like AbCellera, for example, or even Sphere Fluidics, where **for a substantially lower capital expenditure investment, you can do more or less the same stuff**. There might be some reduction in functionality, some reduction in throughput, maybe some increase in time, but **in terms of ease of use, straightforward data analysis, and things like that, there are definitely competitors that are looking to take advantage of the fact that people don't want to pay $2 million** for an instrument that they might not use all of the utility of, and they might not want to invest the time to optimize."*

> ***Abcellera is "the biggest competitor" as indicated by IP litigation; technologies have "alto of similarities"***
> *"AbCellera is **probably the biggest competitor, which is an interesting conversation because it's really just a very different business model**. AbCellera—I'm sure you've heard of the IP challenge between BLI and AbCellera; it's over the design in some of the features of the binding assay that happens in real-time. So, as that challenge would indicate, there are a lot of similarities between the technology that both companies leverage."*

> ***Abcellera has a "full-stack antibody discovery" solution" offering vs. BLI just selling screening machine***
> *"The difference is that AbCellera really frames themselves as being a **full-stack antibody discovery company**, meaning, if you take a Beacon, you put your own cells on the Beacon, you define your own biological problem, and then when the data comes out, you figure out what to do with it. Whereas, AbCellera, they operate on more of a collaborative partnership model, and so, you approach AbCellera and say, "This is what I'm trying to figure out." And they say, "We've got access to all these different cells; which one do you think would be most appropriate, and we can help you." You go through, and you do all the screening. They have bioinformatic approaches to do modeling, so you can figure out what sorts of modifications to your antibody would make it even more efficient or effective. **Rather than just focusing on the screening, they focus on the whole process. In my mind, AbCellera is their biggest competitor, particularly for people who are looking to get into the antibody screening game without an established biological model at their disposal."***

Source: Scorpion Capital consultation calls with experts

LEADING ACADEMIC INSTITUTION/EX-BLI SCIENTIST (cont'd): In addition to Abcellera, Isoplexis and Sphere Fluidics sell instruments at a quarter of the cost; simpler to operate while retaining "just enough of the functionality of Beacon to make it useful in similar applications."

> ***Sphere Fluidics offers a competing instrument at about $250k, a quarter of the Beacon's cost***
> *"There are also a couple of companies that have gone in the other direction. Instead of adding functionality, they reduced down the assays to make them a little bit more manageable. Sphere Fluidics is one example of that. They're almost like a FACS instrument.* ***You encapsulate your individual cells into these bubbles, along with reagents and whatever antibody you're trying to evaluate. Obviously, the readout is a fluorescent signal, just the same you do in Beacon."***

> ***Isoplexis sells a machine for around $250K, can be used for similar applications***
> *"The last company which is not a direct competitor, but you could certainly use the instrumentation to do antibody screening is IsoPlexis. Right now, they're well-known for cytokine panels, where they're looking at the secretion of different cytokines in different immune contexts. The idea is that you have single T cells; for example, you're looking at what they're secreting. Obviously, you could do the same thing with B cells to look at antibodies. And you basically use their panels to figure out which single cells are secreting what. They're still a little bit early, but it looks to me, based on some of my evaluation of the instrument, that they could take it in that direction. Again,* ***it's a much less expensive instrument. It retains just enough of the functionality of Beacon to make it useful in similar applications. It's on the order of $250,000 as well or $350,000."***

Source: Scorpion Capital consultation calls with experts

LEADING ACADEMIC INSTITUTION/EX-BLI SCIENTIST (cont'd): Other target markets for BLI's tool are a pipe dream, notably in synthetic biology where its technology is challenging to use; ambitions in immuno-oncology are "pie in the sky"; no one has figured out the necessary steps; vastly cheaper instruments from competitors are better for CAR-T.

> ***BLI technology is technologically challenging to apply to synesthetic biology***
> *Right now, obviously, antibody discovery and cell line development are their two legacy workflows. They've been pushing into synthetic biology, single-cell RNA, and then CAR-T type projects. In terms of synthetic biology…my understanding is that they've worked hard to be able to isolate bacteria and other organisms to evaluate for synthetic biology applications. That's* ***technologically challenging because the light cages that they've developed for the penning as part of their opto-electronic positioning approach have to be tweaked pretty heavily*** *to pen smaller things that don't have the same charge profile."*

> ***Radically cheaper machines from competitors are better for CART/immuno-oncology than BLI***
> *"In the CAR-T space, there are a couple of different angles that you can look at. There's CAR-T assay, so if you're looking at T cells, you're trying to evaluate which T cells are interesting, so which T cells secrete something, which T cells show tumor cells, any of those types of assays. Those assays can be performed on IsoPlexis, so that's one of the things that's we've specifically been interested in understanding about the IsoPlexis instrument.* ***In fact, they can be done better on IsoPlexis because you can look at more cytokines in one pass.*** *On a typical Beacon experiment, you can look at three cytokines at one time because they have four channels available. IsoPlexis, you can look at least 34 cytokines at any one given time. It lets you see a broader scope of what's happening with maybe an interesting end result."*

> ***BLI ambitions in immuno-oncology are "pie in the sky"; no one has figured out how to use Beacon assays for that***
> *"I know that the grand plan at one point was to be able to evaluate these interesting T cells and then remove the T cells from the chip and essentially put them back into a patient; that's the grand plan that everybody's got. There are a lot of issues;* ***there are a lot of steps between assays on Beacon and putting back in a patient that I don't think anybody in the field has figured out*** *a really great solution to that, other than very standard cell culture approaches as of yet. That's a little bit too pie in the sky."*

Source: Scorpion Capital consultation calls with experts

2Q) Gingko Bioworks

GINGKO BIOWORKS executive #1 was surprisingly cautious given the purportedly "$150MM deal" with BLI: "jury is still out" and too early to say whether the tool can compete against other screening technologies – a troubling statement given the deal was inked two years ago; not obvious what to use the instrument for and still trying to figure it out; executive doesn't "want to be unnecessarily pessimistic" but was nonetheless highly circumspect about the partnership; not ordering a flurry of machines; can't say whether it'll actually ever be a $150MM deal.

> ***Too early to say and "jury is still out" whether BLI can compete against other screening technologies***
> *"It's still fairly early, and I can't say a ton…We're pushing in directions that have been not something that other folks have looked at because they don't look at microbes. To the extent that it can compete against other screening technologies,* ***the jury is still out****. It's sort of a bet that we've taken with Berkeley Lights to find out if that's the case. That's why I was a little bit qualified."*

> ***Not obvious what to use BLI's instrument for; still trying to figure it out***
> *"And so, we're trying to figure that out together with Berkeley Lights. Have we figured out how to ensure the kind of demand we want on these machines in the future to justify the big numbers? No. It's still early. Do I think that's impossible? No. Do I think it'll take work and trying a bunch of different things? Yes.* ***It's not obvious; oh, this is exactly what we need to use it for****. I think we've unlocked a couple of interesting workflows that we can use internally. But the vision is really, everything we do, we're screening cells if they're making something. How do we generalize the platform so that we can use it for everything we're doing?"*

> ***Executive doesn't "want to be unnecessarily pessimistic" but was nonetheless highly cautious about the partnership; not ordering a flurry of machines; can't say whether it'll actually ever be a $150MM deal***
> *Q: "I'm hearing in your tone that maybe it'll work, maybe it won't work, but at this point in time, do you ever envision this becoming a $150 million deal?"*
> *A: "****Yeah, that's a really good question****… They've been working on it for a long time. I can see a number of applications that we might be interested in developing on there…And I don't know what the bulk of that is going to look like in a couple of years.* ***So, I don't want to be unnecessarily pess****imistic. At the same time, certainly, my tone is openly telling you it's qualified because, you know, we're a couple of years into this, and it's not like it's like we know what we want and we want 20 Beacons tomorrow. No."*

Source: Scorpion Capital consultation calls with experts

2Q) Gingko Bioworks

GINGKO BIOWORKS executive #1 repeatedly stated "the jury is still out" despite ~24 months of partnership; still just "a concept on paper" that hasn't been operationalized; unclear if machine is built for the right set of applications; "hard to know" how it compares to other ways of screening; "just so early."

> ***Repeated several times that the "jury is still out" as to whether it's "commercially useful"***
> *"Does it move Gingko forward to the tune of the $150 million? The* ***jury's definitely still out*** *- is it commercially useful? Like if it accelerates one workflow in one area but not the overall thing... I can say for Gingko, there has been utility, but* ***whether it's broadly commercially useful, the jury is still out."***

> ***Still "a concept on paper" that hasn't been operationalized; unclear if machine is built for the right set of applications***
> *"What's to be determined is* ***how do you move from a concept on paper to a proof of concept on the Beacon to actually running it day in and day out?*** *From proof of concept to running it day in and day out requires software considerations and how one might manipulate the chips and the machine. The machine has been built for a particular set of applications. You might imagine for another set of applications; it could be easier if the machine was built a little bit differently."*

> ***"Hard to know" how it compares to other ways of screening; "just so early"***
> *"One other thing that I'm having trouble wrapping my head around as we progress is* ***how do you compare the technology to other ways of screening?*** *So, one way of screening is just using plates. There's a cost aspect; there's a time aspect. The cost aspect of developing the materials cost also involves labor costs. I don't think we have a good handle yet on what's the comparative labor costs of the two different workflows?* ***It's hard to know*** *yet because one is so new. So, we're always trying to do that analysis for different workflows we're developing, and* ***it's just so early."***

Source: Scorpion Capital consultation calls with experts

2Q) Gingko Bioworks

GINGKO BIOWORKS executive #1 challenged the machine's purported value proposition: doesn't speed up overall workflows for pharma/biotech customers; throughput is a limitation; unclear if/when the Beacon is the right screening tool versus competitors.

> ***BLI doesn't speed up overall workflows for pharma/biotech customers***
> *"It's not surprising to me [that big pharma/biotech customers don't utilize their machines much] because they have two applications they talk about. There's so much more you have to do once you discover the antibody, and the Beacon accelerated a part of that total workflow, but it* ***didn't accelerate everything else, so you push the bottleneck somewhere else."***

> ***BLI throughput is a limitation; unclear if/when Beacon is the right screening technology vs. competitors***
> ***"We always have to consider other competing technologies. What's the Beacon good for?*** *If you ask Berkeley Lights, it's very good for finding rare events. How does it compare to other technologies where you can in one pot screen for a whole bunch of different, let's say, genetic designs that are in cells and then find a winner, the needle in the haystack? That's what we're comparing to, and* ***one of the limitations of the Beacon is the numbers that you can actually screen at the same time*** *because you're not looking at millions [of cells] at the same time; more like the10,000 to 100,000 range. And there are other screening technologies that you can really look at the millions, but you're not looking at them as a function of time in individual wells; you're looking at them in a pooled format and using some sort of next-generation sequencing readout to pull out. And so, for every different type of project, the right screening technology is not clear a priori."*

Source: Scorpion Capital consultation calls with experts

2Q) Gingko Bioworks

GINGKO BIOWORKS executive #1 states the instrument is difficult to use and not usable by typical pharma/biotech companies; not as appealing to regular Gingko staff either; executive hesitated and exhibited concerns when we asked if he would personally invest in BLI.

> ***Difficult to use; not usable by typical pharma/biotech companies; requires hacking and specialized resources***
> *A: "I think it's a machine that **requires highly skilled operators**, and to develop new things on the machine requires a very specialized skillset. So, if you want to buy this thing and just have it do XYZ… As far as is it onerous to use, etc.? We hire technology development specialists who are all about specialized technology. So, their perception might be different—oh, I need to write a bunch of code to actually pull out the data in a way that I can see? No problem. I have to **hack the machine** a little bit to do something new? Sure, let's do that. Those are the types of people we have."*
> *Q: "if you're an average user of a biotech or pharma company, is this usable? Are they going to go through that?"*
> *A: "No, they're not. Again, this is the point of the partnership. I don't think they will. **Do not think of it as a box that you push a button and something happens; that's not what it is… And I think that's the rub. It's not an easy-to-use technology."***

> ***BLI not as appealing to regular Gingko staff who just need to get things done***
> *"I can say that your perspective at Gingko depends on who you are. If you're someone who does technology development, you're super-excited. **If you're somebody who's on a deadline and needs to get the bottom line**, you might be, well, there's technology X, which I know is going to work, but maybe it's not going to be as good as technology Y, but I've got a deadline. And so, should we use it or not? **That, I think, is the challenge."***

> ***The executive demurred and exhibited concerns when we asked if he would personally invest in BLI***
> *Q: "Would you personally invest in Berkeley Lights, knowing what you know about the product and trajectory?"*
> *A: "That's a good question…I wouldn't not consider it. Again - **I'm sorry to be so qualified here because I've seen things that really spark promise, but I haven't seen the whole enchilada**, and so that's where the qualification comes in. At the same time, we never went into this thinking that something's going to happen tomorrow. But two years is a long time, right? Something should happen in two years, and again, things are happening, but it would have been better if things happened in one year… **I think initially; we expected things to move faster**. Like the challenges that we faced were challenges that were hard to predict. Where we thought the challenges would be were not where the challenges were."*

Source: Scorpion Capital consultation calls with experts

2Q) Gingko Bioworks

GINGKO BIOWORKS executive #2 – similar to executive #1 – wouldn't confirm if Gingko actually paid for the 3 machines they have, leading us to wonder if/how BLI has booked it as revenue; stated they have 2 BLI FTE's on site to operate the machines and that their experience is not applicable to typical biotech/pharma customers for antibody discovery or cell line development; hesitated to recommend the machine.

> ***Unclear to us if Gingko paid for its 3 BLI systems; appears to be an offset against their partnership contribution***
> *"The list spend on an instrument, **those count against our collaboration spend targets**, but we can balance the amount of R&D spend and production spend on like off the shelf hardware chips. **But effectively, we have paid** for those three machines."*

> ***Gingko has two BLI FTE's on site that run the machines***
> *"We actually have **two FAS's that work for Berkeley Lights at Gingko**."*

> ***Gingko states their experience with BLI is not typical of other customers, given dedicated BLI staff on site and internal engineers hacking and customizing the tool for various purposes***
> *"Q: **"Is your experience representative** of other customers, if you have two dedicated Berkeley Lights staff on site and custom chips?"*
> *A: **"I don't think so**—very fair comment. We're a bunch of nerds who tend to be power users and have an in-house automation team with hardware engineers and software engineers. We tend to not shy away from **building or at least integrating some of our own stuff** and really committing some spend so that a vendor will make something that meets our needs. We've done the same thing with some of our automated fermentation systems."*

> ***The executive hesitated to recommend the machine for typical biotech/pharma customers***
> *Q: **"Would you recommend the product for a typical biopharma company?"***
> *A: "**I would want to see more data** because, frankly, we haven't run the traditional workflows as much as we have our microbial workflows…I, as a customer, would want them to show me more data, or I would want to see more data before I 100% said, 'Get it.'"*

> ***Gingko use is not representative of typical biopharma workflows in antibody discovery or cell line development***
> *"Q: "So, the Berkeley Lights machine that you're using is not the standard instrument that they're selling to other people."*
> *A: "Yeah, so **we are not running the system like you would run their typical biopharma workflow** for antibody discovery or CHO cell optimization; that's certainly true."*

Source: Scorpion Capital consultation calls with experts

2Q) Gingko Bioworks

GINGKO BIOWORKS executive #2 states that they have extensively hacked and re-engineered BLI's machine to get it to work for certain purposes: re-designed BLI's chips, optics, and other components; machine they're using is not typical and has a different architecture; custom-made chips Gingko is using are "totally new" and made specifically for them.

> ***Gingko states they have extensively re-engineered BLI chips, optics, and other components***
> ***"We are using very differently configured and engineered chips*** *so that the chips are the most different, and then depending on the application for a workflow, they do have to change out optics, need a different objective, need different light sources…* ***And then, the chips, we're quadrupling the number of pens or changing the geometries*** *so that we can better trap cells or other reagent speeds and the like. Those are significantly different in many cases."*

> ***Not using a typical BLI machine; redesigned and fabricated their own versions of BLI's chips***
> *"We defined a number of workflows for them to dig in and* ***change optics and chip architectures*** *that would let us more effectively load and upload cells after we had run some form of imaging analysis on the chips…And then really leaned on them as good card-carrying engineers who are going to* ***redesign chips, fab them with their partners****, and get them tested to make sure that things are reproducible and can actually work."*

> ***Custom made BLI chips, Gingko is using are "totally new"***
> *Q: "You're not using the standard Berkeley Lights chips -* ***you're using a custom chip that's made for you?"***
> *A:* ***"In the vast majority of cases****. We do have some projects that are working in mammalian hosts that cater more toward what they've been working on for longer, using two off-the-shelf Berkeley Lights protocols and then one that's a newly developed workflow that we're working with them on. But then everything else... so 7 to 8 workflows in different kinds of microbial systems is totally new and* ***needs totally new chips."***

Source: Scorpion Capital consultation calls with experts

2Q) Gingko Bioworks

GINGKO BIOWORKS executive #2 added even despite Gingko basically hacking and building their own version of BLI's machine, it's still 50/50 whether "experiments work or fail"; "still failures"; said that Gingko hires from Amgen, Genentech indicated "consistency issues" with the instrument.

> ***BLI machine only works for about half the time for different experiments and workflows***
> *"A: "When folks inside Gingko are showing us data—I think it's **about 50/50 where experiments work or fail** within the different workflows. There are some that work nearly every time now, and we're getting hits, and we're graduating them to other culture formats and follow-on assays. And then, to be fair to Berkeley Lights, in many cases, this is super-early development work. We're looking at data, the first version of a chip, and we say, okay, this measure looks like it works; this one doesn't. **Go back to the drawing board."***
> *Q: "When you say it's 50/50 that it works, what do you mean?"*
> *A: "Executing, like setting up the machine, calibrating it, getting everything flowing and loaded—that goes smoothly for our folks who've been trained to operate. So, to the 50% not working, it's like they're going to try this new cell type and try to load it and get a reasonable distribution in the pens or get full unloading. **There are still failures there when we're developing."***

> ***Ginkgo employees from Amgen, Genentech etc. indicated "consistency issues in the chips"***
> *"I would say that the most direct feedback I've had is from people that we've hired from biopharma, people that we've gotten from Amgen and Genentech and other places, Roche. They were demo'ing the box or bought a box, more like two to four years ago. At the time, they said that **there were consistency issues in the chips**; some assays worked better than others."*

Source: Scorpion Capital consultation calls with experts

2Q) Gingko Bioworks

GINGKO BIOWORKS executive #2 – similar to executive #1 – hesitated to say if he'd personally invest in BLI; wants to see "success"; space is crowded; other companies have "been smarter" in designing their machines; doesn't see BLI "taking off" in the antibody discovery space; says that at most the Gingko could install another 6-10 machines in total over the next 3-5 years – a far cry from the "$150MM deal" that's been heavily promoted.

> ***The executive hesitated to say if he'd personally invest in BLI: wants to see "success"; space is crowded; other companies have "been smarter" in designing their machines***
> ***"I'm borderline. Not a sure bet for me****. I think they need to roll out more things in production that complement their first sets of workflows, and I think that we will only be one part of that. If I could see more data and see more deeply into where else they're trying to get into other markets,* ***I'd want to see success****. Some of the things that I think they're thinking about like agriculture or complementary biotech but not antibody. I think, in general,* ***the antibody space is pretty crowded****, and I think that other companies have found ways to optimize, lead candidates where they've been smarter about how to design diversity at a much greater scale than something like the Berkeley Lights box is going to be able to handle."*

> ***The executive doesn't see BLI "taking off" in the antibody space***
> ***"I just don't see them taking off in the antibody space*** *to the extent that they may claim they will or that they have. And so, they need a couple of other killer markets and killer apps."*

> ***Deal could expand at most from 3 to another 6-10 machines, which at $2MM per unit is $12-20MM spread out over the next 3-5 years, not the $150MM that's been promoted***
> *"If they hit all of their technical milestones over the next couple of years,* ***we could buy anywhere from 6 to 10 additional machines. That would be over the next 3 to 5 years****. If they hit all of their targets for us, the lifetime of our collaboration agreement is 7 years total, and we just passed the two-year mark."*

Source: Scorpion Capital consultation calls with experts

PART 2 – Findings from interviews with former BLI employees and executives

Part 2) Former BLI employees/executives: Total addressable market is negligible

Virtually every former employee we interviewed indicated BLI's total addressable market is negligible. An ex-executive stated that the TAM numbers BLI promotes are "ridiculous"; that "they know better"; and that they didn't want to hear "more accurate numbers." A former scientist sized the entire market no more than 300 machines over the next 5 years and thought it could soon drop to 30-40 machines annually - $60-80MM at $2MM/machine, although ex-employees indicted BLI would have to slash pricing 50-80% to have a shot. A second ex-executive sized the market as even smaller, at "a couple of hundred" machines worldwide.

> ***TAM numbers BLI promotes are "ridiculous"; didn't want to hear accurate figures from employees internally***
> *"These **ridiculous TAM numbers that are being thrown around and they know better**. I showed them more accurate numbers when I was there but it **wasn't a message that they liked very much."*** ***–Former BLI executive***

> ***Can't sell more than 300 machines over the next 5 years in total, equivalent to $600MM in total or about $125MM/year at $2MM per machine; could be as low as 30-40 machines per year***
> *Q: "What is the maximum units they can be sell per year right now - an honest, near-term, total addressable market?"*
> *A: **"In the next five years, maybe 300-ish or so total machines**. If you take it through 2030, let's say 500 or so, I'm thinking probably not more than that. I think **somewhere around that would be the maximum**. I think they can go at this pace, maybe 30 to 40 instruments a year."* ***–Former BLI senior scientist***

> ***TAM is no more than "a couple of hundred" machines worldwide – roughly $400MM at $2MM price point; most pharma companies can easily outsource to a CRO and don't need a machine themselves***
> *Q: "How big is the market – the actual TAM, not the blue sky numbers every company uses at their IPO?"*
> *A: "**Maybe a couple of hundred worldwide**. Are there really big market segments that are immediately available or opening down-market for this technology? I think that's the question. I'm obviously familiar with the pharmaceutical space and in the pharmaceutical space. It's in the **low hundreds of instruments**, if that. Because **you can buy the capacity from a CRO as you need it, and not every company has to have this instrument on-premise**. There's no need for that. You can freeze the cells; you can transport the cells; there's a whole logistics industry that is very specialized and comparatively inexpensive. Instead of buying the instrument, you just ask someone to do experiments for you and ship those cells to you."* ***–Former BLI executive***

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Total addressable market is negligible

Former employees sized individual use cases as miniscule markets, such as cell line development. A former executive called it "really small" and walked us through a methodology that worked backward from how many lead drug candidates annually need to go through a cell line development workflow. Assuming ~1,000 candidates per year with average CDMO pricing for cell line development at $150-200K yields a market size of $150-200MM.

> ***Cell line development is a "really small" market; others have done the math and come to same conclusion***
> ***"If you do the math on cell line development, you can figure out how big the market is****, how much you should charge, all those things. Other people have talked to me about this said, well, this is how I do the math. And I say, that's how I do it as well. It's* ***not that big of a market. In fact, it's really small. I probably had some friction there around this."*** ***–Former BLO executive***

> ***Easy to calculate TAM by working backward from pharma drug pipelines; 1,000 cell development candidates per year times $150-200K per candidate, using CDMO pricing, yields $150-200MM, perhaps $300MM maximum***
> ***"One could calculate it by estimating how many drugs are on the market or in development****, which is available publicly, and then work backward on development success rates and build a funnel and backward tabulate how many enter the clinical funnel. The last step for entering the clinical funnel is taking your lead candidate and doing scale up for preclinical studies. You can easily calculate this number. Other people I have talked to estimate that number is in low single-digit thousands, at most per year, and it could even be less like 1,000. I've heard different numbers from different people. If you say it's 1,000 and if you were to outsource this to a CMO or CDMO, they are going to charge you $200 grand for it, and they're not going to make a lot of margin on it. But that's an outsourced number to do the work, maybe like $150,000 to $200,000.* ***That tells me the market is like $150 to $300 million maximum."*** ***—Former BLI executive***

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Sales are close to saturated

Given the insignificant TAM, ex-employees indicated BLI is already saturated within the ~30 large biotech/pharma customers who can afford to pay $2MM: already "in most of them" who gave it a try; BLI fully penetrated the trivial cell line development opportunity years ago; company realized there "aren't enough pharma companies" for the machine; already hit a "ceiling to the growth."

> ***Only ~30 pharma companies that can afford $2MM BLI machine; almost all have already bought one to try it out***
> *"One machine per $50B of market cap sounds like about a good bellwether. Typically, the customers that you'll see coming through first, big pharma that have $2 billion-plus research budgets a year,* ***they buy one of everything, and they validate it. I'm pretty sure Berkeley Lights is in almost all of the big pharma's now****. Big pharma's with a budget that size, there are* ***30-odd of them globally****. Of course, the MAB space is a lot bigger than that, But that said, 30 of them have the budget to be buying pieces of equipment like that in that price range."* ***–Former BLI executive***

> ***Already in most of the large pharma customers; "still a stretch" for companies with smaller research budgets***
> *"While I believe the company has announced deals with smaller biopharma's now, it's* ***still a stretch for the people with smaller research budgets****. It's just a matter of what sort of assumption can you make on the penetration into medium biopharma's and CROs. If I had to rank the segments, I'd say* ***large biopharma—yes—and they're in most of them."*** *–* ***Former BLI executive***

> ***Cell line development market is so negligible that BLI quickly penetrated the opportunity years ago; company realized there "aren't enough pharma companies" for it; already hit a "ceiling to the growth" which is not much***
> *"In 2016 we found a pretty good fit with cell line development.* ***Over a year or so, through the process, I realized that there aren't enough pharma companies to keep doing this forever.*** *You start off with cell line development, you have in the high tens of companies, maybe 60, 70. And then, you do about 10-20 campaigns a year and then have a 50 to 100 installed base…* ***They've seen enough penetration, and it's kind of obvious that there's a certain ceiling to the growth****. You can have some flow through, but the growth turns out to be not much"* ***–Former BLI senior scientist***

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Sales are close to saturated

Ex-employees elaborated on the lack of further opportunity in cell line development: already ran out of customers; already killed off the segment despite what they promote to investors; was always "a hard sell" as couldn't show their tool is any better than current methods; no incentive or ROI for customers to use BLI for cell line development.

> ***BLI knew they would quickly run out of cell line development customers***
> ***"It was always on the radar that they were going to run out of customers for cell line development*** *specifically. So, the general idea was let's try to expand the range of applications to capture more customers that are not necessarily doing cell line development that are doing immuno-oncology or antibody discovery."* **-Former BLI scientist**

> ***BLI has already killed off the cell line development segment***
> *"They've kind of* ***gotten rid of cell line development and they've stopped touting it****…"* **–Former BLI employee**

> ***Cell line development is "a hard sell" as BLI can't show its method is any better than status quo***
> *"I think* ***cell line development is a hard sell*** *because everybody's got their version of what they think is the best path, a little bit of witchcraft which biology has sometimes,* ***In CLD, it is very difficult to make an unambiguous statement****. And that's because you're trying to say the counterfactual; if I would have run it on this other system, it would have been better. The only way to do that is to literally learn 300 independent campaigns on both types of systems and then measure the variability and the distributions of the cells."* **–Former BLI executive**

> ***Current methods of cell line development are reliable and well-known; no incentive to use BLI's machine***
> *"The status quo is to transfect the CHO cells…****They have data, know it works, know the cost, have already bought the systems; it's sunk cost. And here comes this really expensive machine****, and it's like, we can do things better. You go, that looks really cool, and I think that is true, but how can you prove it to me? Maybe that was a fluke. How much money am I prepared to spend to figure out whether that's true?"* **–Former BLI executive**

> ***No ROI for the machine in cell line development***
> *"Sometimes pharma's are just rich and they just buy them. And it's just done. Sometimes they're very skeptical and have a hard time figuring out if they can spend $2 million. It's a lot of money. It's very difficult to prove how you are better without running something that looks like a $200-million study, and* ***who the hell is going to run a $200-million study with the risk of it not looking good if your total market is $300 million and your pricing actually takes that market down to $80 million. The return's not there."*** **– Former BLI executive**

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Machine's throughput limitations dooms its TAM and commercial relevance

The machine's market size is further limited by its "massive throughput limitation," which makes it painfully slow versus typical flow cytometers and cell sorters and renders it impractical for widespread application. An ex-executive and ex-scientist noted the limited number of chambers on the chip and the difficulty in exporting cells: can take minutes to process one cell, "several hours to export a few hundred," and a whole day for one chip. They further indicated that "there's not much more optimization" BLI can do on the "main bottlenecks to "speed up the process."

> ***Throughput is constrained by the limited number of chambers on BLI's microfluidics chips***
> *"Berkeley Lights uses a microfluidic device that has some chambers that are etched literally into the device.* ***The limiting factor is how many of these chambers you have on the chip****, and over time, they've developed chips with up to 13,000 or 14,000 chambers. The maximum number of cells that you can screen is actually right now, I think, only up to 13,000."* – ***Former BLI scientist***

> ***Throughput is also limited by slow rate of cell export; "takes several hours to export a few hundred cells"; pales in comparison to standard tools like flow cytometers or cell sorters***
> ***"Another issue that limits throughput is export of the cells*** *from the microfluidic device to a plate, like on a culture plate. That process is also relatively time-consuming.* ***It takes several hours to export a few hundred cells****. Ultimately, those are the points where there's not much more optimization of the system that can be done to speed up the process.* ***There are one or two main bottlenecks that we never really brought the throughput on par with a flow cytometer or sorter*** *or some kind of droplet-based technology."* ***–Former BLI scientist***

> ***Machine is painfully slow; "massive throughput limitation"; couple of minutes for one cell, whole day for a chip***
> *"Understanding the way technology actually works, which is by moving cells individually, that takes a certain amount of time.* ***It can take up to a couple of minutes to process one cell. So, that gives you a massive throughput limitation. Just to screen one chip and to take a couple hundred cells off of that, that's an all-day process****. And the cells only stay alive for a day or two maximum, depending on which immune cell type you're working with."* ***–Former BLI executive***

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Machine's throughput limitations dooms its TAM and commercial relevance

By limiting screening to a handful of cells at a time – compared to an immune system that has billions – ex-employees indicated that BLI's tool is too slow to ever be viable for manufacturing cell therapies, making it at best an esoteric tool for occasional R&D use: "it's not compatible with manufacturing"; "why I think the market is limited"; BLI will soon get disrupted by tools with same capabilities but "at throughputs of millions of cells with a couple of hours."

> ***Lack of throughput limits the TAM; BLI will get disrupted by competitors with same capabilities at radically higher throughputs***
>
> ***"That's basically the nutshell of the reason why I think the market is limited for Berkeley Lights*** *specifically because I believe that there will be technologies that come through the pipe that are able to have the same functionality as their system but at a much, much higher throughput. And once you start talking about screening tens, hundreds of thousands of cells, even millions of cells, that's where researchers and drug developers really want to be. They want to be able to screen as much of the immune repertoire as possible. I'd say, give it three/four years,* ***technologies will start to come through which are doing the same thing but at throughputs of millions of cells within a couple of hours, and that, I believe, will take their market."*** ***–Former BLI executive***

> ***Handles too few cells at a time to be ever be viable for manufacturing; just an R&D tool***
>
> ***"it's not something that you can apply to a manufacturing process*** *because you can get out in the order of thousands of cells, but obviously, you cannot get enough of those out for a therapy product. Even the application of growing the cells and expanding them will always be something but then used for an R&D need;* ***it's not compatible with manufacturing."*** ***–Former BLI scientist***

> ***BLI screening is limited to hundreds to a few thousand cells, while an immune system may have many billions***
>
> *"The aim of these technologies that are going after this immune cell screening space is to find out what are the interesting molecules in our immune system that we could subvert to become drugs? I'm really bullish on the single-cell space generally. I think there's a huge amount of growth there, but* ***the problem is that with the work that Berkeley Lights is doing, I mean, an immune system has billions and billions of unique cells****, and so you want to screen as many of them as possible to figure out what they do and what their genotype is, but* ***the technology is limiting to screening a few hundred to a few thousand cells, and to capturing out maybe a couple of hundred of those."*** ***–Former BLI executive***

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Instrument is wildly overpriced

Ex-employees indicated the instrument is wildly overpriced at $2MM and that BLI needs to slash pricing by 50-80%. An ex-executive called the pricing "ridiculous," "stupid," "nuts," "so ludicrous," and a reason it's "having a tough go." Others described it as "always a pain point" and a reason the installed base is negligible, adding that pricing is particularly problematic when cheaper alternatives exist. We quote 4 ex-employees below – two former executives and two former scientists.

> ***Former executive calls the pricing "ridiculous," "stupid," "nuts", "so ludicrous" and a reason it's "having a tough go"***
> *"**The $2 million pricing per machine is ridiculous. I think it's stupid**…Their pricing is almost like shooting themselves in the foot.. pricing seems **so ludicrous** to me for what that market needs and wants. $2 million…**I think that's nuts…It's having a tough go given its pricing point** and its complexity." –Former BLI executive*

> ***The price tag is a "pain point" and preventing customer adoption***
> *""The rice is a big problem for customer adoption. Price was a big one for the Beacon and for the Lightning. The price point was **always a pain point."** –Former BLI scientist*

> ***Installed base is negligible because the cost is $2MM; price vs. value doesn't work when alternative exist***
> ***"They only have 50 instruments or so in their installed base - that's because it's $2-million**. You need to make a huge case for someone, especially with a science background, to spend $2-million; those are like atomic force microscopes or something, which are extremely expensive ones, where the information that you get through them cannot just be done any other way. **Here, there are alternatives. The price, along with the value, is not exactly where customers go bonkers."** –Former BLI senior scientist*

> ***Price needs to drop 50-80% to have a shot***
> *Q: "So, you're saying they **need to cut the price of this by 50% to 75%?"***
> *A: **"Yes**. Realistically, they won't do it," –Former BLI senior scientist*

> ***Price needs to drop 75-80%***
> *"My belief is that a palatable price point is **somewhere around $400 to $500,000."** –Another former BLI executive*

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Instrument is wildly overpriced and operating costs are too high

An ex-executive indicated that BLI is an extreme price outlier among lab instruments, perhaps 99th percentile, and that competitors like 10X Genomics are 95-97% cheaper. He described it as an illogical reverse of the razor blade model, where BLI sells a prohibitive $2MM razor and then adds $2,000 chips. He added that the pricing alienates potential customers who view discussions with BLI as a waste of time, and a former scientist commented that the pricing creates expectations that can't be met. Assuming a cost per run of $15K in consumable chips/reagents, operating cost for daily use could be millions per year.

> ***BLI price is an extreme outlier among lab instruments, perhaps 99th percentile; leading competitors like 10X Genomics are at 95-97% cheaper than BLI; illogical reverse of the razor blade model***
> *"If you lined up all these biological instruments, like every instrument you can imagine for life sciences, I don't know the exact number;* ***it's gotta be in the 99th or 98th percentile on price. It is up there****. And look at 10X, I mean, flip this thing on its head.* ***10X offers a dirt-cheap system. It's $60k, $100k, something like that, easily covered under a grant****, and then they sell these consumables. That are kind of expensive, but the margins are great.* ***It's a razor blade model. BLI model is the reverse - a $2,000,000 device, and a $2000 chip****"* ***-Former BLI executive***

> ***Pricing alienates potential customers who view it as a waste of time***
> *"I can tell you that if you go and talk to a lot of academicians about this device, when you tell them it's $2 million, and* ***they just go, oh great, I just wasted time. I'm not buying nothing. There's no way.*** *$2 million is very expensive."* ***– Former BLI executive***

> ***Pricing creates expectations that can't be met***
> *"Obviously, the expectation is high…I think* ***the biggest miss they had is probably some of the pricing and expectations****. Once you have the price, the expectation goes through the roof."* ***–Former senior scientist***

> ***Cost per run potentially >$15K in consumable chips ($12K) plus reagents we believe to be $4-5K***
> *Q: "So, if you have four runs on a machine that has four of these chips and you need to swap them out every day, that could be* ***$12,000 a day just in consumables? That's millions of dollars a year per machine."***
> *A: "Right, yes.* ***That's the operating cost."*** ***– Former BLI employee***

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Launch of a lower-priced instrument has been a total dud

Given the Beacon's prohibitive $2MM price, BLI launched an entry-level version in 2019 called Lightning, which we believe to be ~$750K. Ex-employees indicate it has been an unmitigated flop with a mere 6 to 8 units placed in the first 18 months: still too expensive; no target market; failed product at every level, with BLI getting the features, applications, potential customers, and pricing all wrong.

> ***Lighting has been a total disaster with virtually no placements to date; has no target market; aimed at academic institutions who can't afford it; can take years to get a grant for it.***
> *"Consider that the Lightning was launched in 2019, a couple of years after the Beacon.* ***By end of 2020, we probably had placed six to eight platforms.*** *I think one of the reasons why was that* ***we were still trying to find the optimal target*** *for that one. Lightning is cheaper than the Beacon, but it's* ***still an expensive machine*** *by academic standards. So, most of the institutions that were interested in purchasing the platform somehow needed to actually apply for a grant to purchase the platform. So, the lead time to place the platform was longer because it usually couldn't really be scheduled or factored into that same year's budget. Usually, we're supposed to write a grant, write the project, apply for a grant, write a project, and then the next year, they would basically have the money to purchase it, and that was something that was taken into consideration at the beginning at Lightning launch, but I think it had been underestimated."* ***–Former BLI scientist***

> ***Lightning is a failed product at every level; BLI got the features, applications, target market, and pricing all wrong***
> ***"The choices that were made at the launch of the platform turned out to be not the best*** *because the potential market that was targeted and the applications that were launched with the platform initially were probably not the ones they should have focused on. The platform was supposed to be the best of the Beacon with less automation, but also a more inviting price point. I think that's not what happened ultimately. The machine was still too expensive in comparison with others."* ***– Former BLI employee***

> ***Lightning is still too expensive for universities who can't buy it without grant funding***
> *"It's still a sizable amount of money and a fairly expensive piece of equipment for a facility, for a university. For academic purchases, it* ***always had to be tied to some kind of grant application."*** ***–Former BLI scientist***

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Launch of a lower-priced instrument has been a total dud

Ex-employees indicated that BLI gave the Lightning to several institutions for free and even operated it and ran assays for them – they still sent it back. Small to mid companies tested it as well and simply passed. The lack of published data validating both the Lightning and Beacon lead to a "vicious circle" with a lack of customers, which led to a further lack of published data and so on.

> ***BLI gave the Lightning to customers for testing and even operated it for free; lack of published data from the device and pricing were issues***
> *"Several institutions* ***received the Lightning initially to test it. For free****, or we were organizing demos internally, so we were actually helping some of the potential customers to run their samples on the machine and develop their assays to see if the Lightning could generate the data that they were interested in. However, the price was steep, so budgeting it in was always an issue.* ***They would have like to have seen more published data on the machine, generally, a bigger body of data that had been generated internally before committing to the purchase."*** ***– Former BLI employee***

> ***"Was always difficult" to sell; small to mid companies tested the Lightning and simply passed***
> *"Most of the time, it was startup or medium-sized companies that looked at the Lightning to develop exploratory assays to perform QC of CAR-T products. The general idea was to try to figure out if they could develop a set of assays to help support the release of therapy products with the FDA when INDs were filed and things like that. In that case,* ***they tested the system. We were involved in demo'ing the system for these potential customers****. The assays were run, and they weren't released assays, even generally, so that's why they needed more support of the execution of these assays together with the potential customer. It was always a matter of* ***the platform was still quite expensive. It was always difficult to ensure a sale rapidly."*** ***–Former BLI employee***

> ***"Vicious circle" of lack of publications led to lack of customers led to more lack of publications***
> ***"The lack of papers hurt mostly the sales of the Lightning in particular because it's kind of a vicious circle****. We were relying on our customers to generate more publications. The timing of academic publications is not a fast process either. We prioritized product and assay development to have applications to sell together with the platform over generating that body of data that could be published. Ultimately, they decided to focus on assay development and application development which was also one of the reasons why at a certain point, the R&D team internally felt like our work was mostly done at a certain point."* ***-Former BLI scientist***

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Machine is "not robust enough" for commercial use

Former employees repeatedly confirmed one of the most devastating findings from customer interviews – that the machine is not robust enough for commercial use: "not the most robust" tool; customers would get "furious" as high-value cell samples would get stuck or destroyed inside the machine; breaks down frequently, sometimes a week at a time, requiring BLI to fly out scientists to try and fix; machine couldn't go 6-7 days without breaking down in the middle of a long run.

> ***"Not the most robust" machine; sticky cells and other issues***
> *"There are also issues because it's microfluidic, and that also means the cells could be sticky and have other issues. That happens. There are a few factors. It's* ***definitely not the most robust****, and that's not because of the instrument itself; that's because of the kind of things customers can put on it, and then that may push it to break it."* ***–Former BLI product manager***

> ***Breaks down a lot, sometimes a week at a time; were flying out scientists to fix; "huge support team" needed***
> *"It was breaking a lot. Initially, it was* ***breaking maybe once a month or so****, but that changed. They would send someone immediately, so probably a week that it was out of commission. Flying somebody out was manageable at that number. By the time I was leaving, they were* ***building a huge support team****. Initially, it was scientists who were flying and helping, but they realized the need, and I think they have a decent-sized team now to actually work on that."* ***–Former BLI scientist***

> ***Machine couldn't do 6-7 day without breaking down in the middle of a long run***
> *"Some customers had* ***issues in running a full workflow for six to seven days straight****, so that was obviously impacting their results and their runs."* ***–Former BLI scientist***

> ***Customers would get "furious" as high-value cell samples would get destroyed by getting stuck inside the machine***
> *Q: "You said some customers were furious because they had some high-value sample that got ruined?"*
> *A: "They would run the tool, and then for some reason, during the process, there was a breakdown, or when they're* ***trying to export the final cells and the cells don't come out*** *because they're sticky." -f*

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Machine is "not robust enough" for commercial use

A former BLI scientist provided extensive color on the Beacon's instability and reliability issues: "not robust enough to ensure good results"; troubleshooting was difficult; instrument requires an overwhelming amount of training, support, and documentation and customer still couldn't get it to work; product has too many steps to get it to run properly, requiring handholding by members of BLI's R&D staff.

> ***"Not robust enough to ensure good results"; troubleshooting was difficult***
> *"One of the issues that we used to encounter was if the quality of the material coming into the platform was not optimal, like if cells were not super viable. The composition of the initial material that was going into the platform was very, very important. Sometimes,* ***the workflows were not robust enough to ensure good results if the quality of the sample was not optimal to begin with. Biological samples that biologists work with cannot always be optimal****. There has to be some kind of flexibility in terms of what you can run on a machine and still get a reliable result. Sometimes, I think a lot of the issues that the customers had in terms of viability, in terms of expansion of the cells a lot of times it was due to the quality of the samples that were going in. The system* ***should have been a little bit more resilient and a little bit more flexible to accommodate for a suboptimal sample. At that point, troubleshooting was also fairly difficult****." –Former BLI scientist*

> ***Overwhelming need for training/documentation; customers still couldn't get it to work; needed handholding***
> *"It always required a lot of support materials in terms of documentation. We spent a lot of time writing documents and protocols to cover all the bases.* ***It was a lot. It was a lot to teach, a lot to train****, and even when we tried to simplify workflows, they still required quite a lot of training onsite.* ***It happens a lot that a customer tried a new workflow once or twice on their side, and it didn't work****, and we had a call with the customer to go through the protocol. In those types of calls, it was not only the field scientists or the field service engineering involved but actually members of the R&D team that had developed the assay. There was a lot of information for customers to process and a lot of steps to take.* ***You couldn't really run everything perfectly because there were just too many steps."*** ***–Former BLI scientist***

> ***Customer complained about reliability; 1 out of every 6 or 7 runs may not work***
> *Q:* ***"Did customers complain about the reliability?"***
> *A: "****They did, yes****, they did occasionally because consider that in a workflow that can last up to five to six days or more, 500 hours of a target for consistent and reliable usage, that basically means five or six runs. That is something that can be reached. That limit can be reached fairly quickly. If 1 out of 6 or 7 runs doesn't work, then it starts to be an issue for the customer." –Former BLI scientist*

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Instrument is prone to contamination

Ex-employees stated that the instrument is prone to contamination: "a contamination nightmare"; "was always a big concern" and company still struggles with it; "definite weak points from a biological standpoint that would potentially encourage contamination."

> ***Instrument is prone to contamination ; company struggles with it***
> *"The instrument itself, any sort of cell culture, is open to contamination. If you do 96 well plates and hood, you can certainly get contamination. But it was something, I mean,* ***we struggled with that, and it's certainly something I struggled with*** *when I was working on assay development with them at their headquarters, that there's a lot of microfluidic tubing that can retain bacteria and things like that.* ***There are open areas on the media, which they tried some solutions to try to keep covered. There are definite weak points from a biological standpoint that would potentially encourage contamination****. You have to be really, really careful when you're working with certain cell lines."* ***– Former BLI scientist***

> ***Machine is a "contamination nightmare"; "was always a big concern"***
> *"They tried to mitigate that by altering a lot of characteristics similar to a biological safety cabinet that they tried to merge with the Beacon device. I think it knocked down the contamination by doing a lot of that, but you look at it as a biologist, and as a biologist, well,* ***this is a contamination nightmare, like there are lots of places for things to get in****. You do have the ability to switch out the tubing and things like that. So, it's good in that respect. But* ***it was something that was always a big concern, at least for us when we were taking cells off the instrument. Are they going to grow and end up contaminated?"*** ***– Former BLI scientist***

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Software problems compound issues with the tool's hardware

Former employees detailed various hardware and software problems: software was "constantly updated," confusing and throwing off users; blindsided customers had to grapple with bugs, delayed experiments, and re-learning how the equipment functions; some users just stopped updating the software – "wasn't worth it."

> ***Numerous hardware and software issues; software was "constantly updated", confusing and throwing off customers***
> ***"Sometimes it was hardware issues—an issue with the fluidics of the system. There are a lot of pumps and syringes. Other issues were related to the fact that the software was constantly updated internally****, so we kept releasing new versions of the software. And so, in the field, you could have up to* ***two or three updates of the software per year****. First of all, that required quite a lot of training of the users in the field, but also` of our field application scientists. The people that needed to train the customers were also under* ***constant pressure of learning*** *every new aspect and function of the software, and then they had to teach the customer. Usually, that is something that, even for big and complex machines like microscopes or fluorometers, that rarely happens. You rarely have two or three major software updates per year. I think that was one of the things that were* ***slowing down the process of making super-users*** *or achieving the level of proficiency in the use of the machines because there was a lot of change constantly."* ***–Former BLI scientist***

> ***Customers frequently blindsided with software and hardware changes - bugs, things go wrong, delayed experiments; need to re-learn the system***
> *"The other problem that we have is that there's* ***constant change in both the software version that's being deployed or supported, there are hardware changes****, and so we feel like—we get to where everything's been updated, we're ready to start running the experiment, something goes wrong, they come out to maintain the instrument, and it's like, "Oh, by the way, we've changed the software again. We're going to update the version." And then it's something different, and so, we have to go back and kind of start over and say, now how does this version of software function? What sorts of bugs are we going to find?"* ***–Former BLI scientist***

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Software problems compound issues with the tool's hardware

Ex-employees indicated the instrument was instable and even super-users internally couldn't keep up, and that both the software and hardware behave unpredictably with "no transparency into why things go wrong; instrument behaves in way that are "completely unexpected."

> ***System was instable; even super-users internally couldn't keep up with the constant changes***
> ***"Internally, it was also difficult for us to keep up, and we were super-users****, and we were the ones that were actually requesting features for the software. I think we never reached a good balance between implementing new features because they were needed to improve the capability of the software and the machine but also keeping the system stable enough that a simple update doesn't affect the major functionality."* ***–Former BLI employee***

> ***Hardware and software in particular behave unpredictably; "no transparency into why things go wrong"***
> *"And then there's software issues. It's not transparent. So, as they need their process to be more and more workflow-based,* ***there's no transparency into why things go wrong. So, it's not uncommon that something just happens that's completely unexpected*** *based on what you've told the instrument to do; something unexpected has happened, and it's some sort of a software issue."* ***–Former BLI scientist***

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Equipment is plagued by data integrity issues

Former employees stated the equipment is plagued by data integrity issues that make it difficult to trust the output, and that internal BLI users were aware of "way more problems" than the average customer: "data integrity was compromised"; device conflicts; "had to really, really analyze the data deeply and be very, very careful about the output."

> ***Data integrity is compromised and can't trust the output; have to triple-check everything; buggy software; device conflicts affect data quality; internal users were aware of "way more problems" than the average customer***
>
> *A: "Sometimes **data integrity was compromised**—it was difficult to figure it out immediately. It was only when you were looking at the data after the experiment had been run that you would realize something maybe had not been acquired correctly or something like that. **The software was occasionally buggy**, but mostly maybe there was **some kind of conflict in the way that the data was acquired that might have affected the quality of the data** that was coming out."*
>
> *Q: "So, there were data integrity issues, so you couldn't necessarily trust the data coming out of it?*
>
> *A: "Yes, or let's say **you had to really, really analyze the data deeply and be very, very careful about the output**."*
>
> *Q: "Is the data coming out of the machine today trustable by the average customer?"*
>
> *A: "I would see more of the disadvantages because we were developing new assays, so obviously, we needed to change some key aspects of the system and of the software to achieve certain capabilities. **We were encountering in an R&D setting way more problems or issues that we needed to solve."** –Former BLI employee*

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Data integrity issues create obstacles for FDA use

The data integrity problems flagged by ex-employees are not only devastating enough to prevent adoption, but they make the machine a non-starter for any FDA-related submission, according to a former BLI executive, who indicated that customers therefore won't take the risk of using it. A former BLI scientist elaborated further, stating that the company still needs to validate that data from the instrument can be used in an FDA new drug filing. We struggle to understand how BLI's product is viable if it creates FDA issues for large pharma/biotech customers, for whom the entire point is getting new drugs through approval.

> ***Former executive suggests the machine is a non-starter for any FDA-related submission; customers won't take the risk of using it***
> ***"They've got these ideas around cell therapy - I laughed when I took a peek at their S-1. That's so far out. Not only do you have to get a pharma to buy this thing and use it, you have to get somebody to take it through the FDA****, a novel device. Is Berkeley Lights going to pay for that? Are they going to do their own first to get it approved in some application? A pharma company who's building the therapeutic has to take the risk of using something new at the FDA.* ***The FDA could be like, "Nah, no. We don't know about that. That sounds complicated."*** *It's just a risk. In cell therapy to introduce new modes of testing or production are likely going to take a very long time and I think it's going to be hard to get the incentives appropriately. Who are the companies who are going to build knowing that's a risk? That's a platform risk.* ***They will crawl up the rear end as a class 1 device. It's a heavy lift."*** ***–Former executive***

> ***Former BLI scientist indicates they still need to validate that data from the instrument can be used in an FDA new drug filing***
> *"A lot of work was focused on generating datasets that could confirm that the Beacon platform could generate data that would support an IND filing with the FDA, comparable to traditional methods that are employed right now. They got to a point where* ***they really needed to prove that you could replace completely the standard cell line development workflows with the Beacon workflow and have the same likelihood of success with the FDA*** *or, in general, with a pharma company. That was mostly the focus."* ***–Former employee/scientist***

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Instrument is too difficult and time-consuming to be usable

A recurring theme of interviews with ex-employees – corroborating identical color from customers – is that the instrument is too difficult and time-consuming to be use: the complexity level is over the top; "peculiarities" of an unfamiliar platform where nothing is available off the shelf; and the resulting challenges in developing new assays. One ex-employee pointed to the lack of a vendor ecosystem around the Beacon, which meant that customers "almost always" had to do custom work versus using off the shelf products as with conventional flow cytometers. We quote two former BLI executives and a former scientist below.

> ***Difficult and time-consuming to use; not off-the-shelf; "peculiarities" unconventional and inconvenient; everything is custom due to lack of an ecosystem***
> *"The important thing is that they are little peculiarities in the Berkeley Lights platform that make it very different to develop assays, to run the tests that people are very familiar with utilizing convenient legacy technology. For a lot of those flow cytometers and cell sorters, it's a huge market where the same vendors offer off-the-shelf a lot of products that you can utilize right away, or there are small companies that can do custom work for you, and you basically order things overnight, or they arrive to you, not unsimilar to how people use Amazon.* ***With Berkeley Lights, there's no such an ecosystem. Almost always, you work on something custom."*** ***–Former BLI executive***

> ***"Complex" and difficult to develop new assays on***
> *"Instead of moving toward a simpler, more flexible platform, it seemed like the platform was remaining* ***quite complex and more difficult to develop new assays on****." –Former BLI scientist*

> ***Complexity is over the top; not dummy proof; fully train users may be unrealistic***
> *"These are* ***very complicated devices; they're not dummy-proof. The thing is so complicated****, and this is the thing—you can have the perfect user, but how long do you have to train somebody, so they know every in and out, every problem, every issue?" –Another former BLI executive*

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Complexity requires dedicated FTE"s and compounds operating costs

Ex-employees indicated that the machine's complexity level necessitates specially trained and dedicated operators – perhaps even several FTE's, adding substantially to the machine's operating cost: "need one to two FTE's working on it"; "lot of headache"; "not that straightforward"; "…you need a special operator. It's not like anyone can just jump in and do it."

> ***Machine requires 1-2 dedicated full time employees; "lot of headache" to use; hard to get cells out; steps required are "not that straightforward"***
> *"Typically, someone can get up to speed in a quarter, and you probably* ***need one to two FTEs working on it****. It's not like a PCR machine that you can set it up and go. So, you need one expert or two, and there is* ***a lot of headache*** *on the downstream. By that, I mean, even if you can get the cell out, it's not that easy once you have the cell to do something. You need to do some large steps to actually do the sequencing. That is* ***not that straightforward****." –Former BLI product manager*

> ***May even need 3-5 FTE's to standardize on a BLI machine; skills are difficult to find; "ongoing cost" per experiment is half an FTE***
> ***"The need for FTEs is much higher typically because you probably need three to five FTEs to do the same job****, maybe something like that, and also some of them may need some skill that is specific, not just easily transferable. The ongoing cost to do the same experiment probably is—depending on how you do it—maybe half of a person." –Former BLI product manager*

> ***So complex it needs specially trained operators; creates customer pushback; hard to do assays***
> *"When it comes to the limitations, it's a tool that's not like a PCR machine; it's a little more like a FACS machine, which means* ***you need a special operator. It's not like anyone can just jump in and do it. And that also maybe creates some pushback from the regular customers****. Also, you need to plan a lot before getting something on the machine because you need to do a bunch of assays.* ***These are not easy assays****. Even though you're doing bulk format, so when you're trying to do a single-cell level, it gets* ***pretty complicated."*** *–Former BLI senior scientist*

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Competition from cheaper, better alternatives has already rendered BLI irrelevant

Former employees state that competing products at 5% of the cost - $100K vs. $2MM - have already rendered BLI obsolete: competitors are not only far cheaper but have higher throughput; another wave of even cheaper disruptors are on the horizon; a former scientist at BLI states he would rather use cheaper alternatives if he was at a biotech customer.

> ***Former engineer indicates a lot of new entrants and emerging competitors; "already other alternatives"***
> *"One of the challenges that Berkeley Lights are facing in the coming years will* ***be a lot of other companies will be entering into the same area and creating a lot of competition for the company. There are already other alternatives*** *in the market,"* ***–Former BLI engineer***

> ***Former scientist states that single cell screening has been "expanding so much" that BLI can easily be replaced by cheaper platforms with higher throughput***
> *"Nowadays especially, the field of single-cell analysis is expanding so much and making so much progress that I think we're getting to the point where* ***most of the applications that are being developed on the platform can actually be replaced by applications with higher throughput on cheaper platforms like 10X Genomics and a couple of others."*** ***–Former BLI scientist***

> ***Former scientist continues that he would rather mix and match with a few cheaper $100K machines than spending $2MM on BLI***
> *Q: "If you were at a biotech company, would you spend $2 million on the Beacon, or would you just replicate the capability by buying a few different machines for $100k each or whatever for different use cases?"*
> *A:* ***"I would probably go with a cheaper machine and maybe a different set of assays from multiple platforms."***
> ***–Former BLI scientist***

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Competition from cheaper, better alternatives has already rendered BLI irrelevant

Three former employees pointed to Abcellera (ticker: ABCL) as BLI's key competitor. With $5B in market cap, a former scientist stated it has already eclipsed BLI in size and offers "exactly the same workflow." A former scientist and an ex-executive each described Abcellera's service-based business model, which avoids BLI's upfront $2MM price tag.

> ***Abcellera is a key competitor; productizing single cell screening as BLI tries to do is "so damn hard" that customers outsource to Abcellera and others like HiFi who sells it as a service***
> ***"AbCellera is a big one. In terms of a technology competitor****, like think of who else can do that single-cell secretion assay and then identify that cell. AbCellera can do that, but it's so damn hard that they could not productize it, so they did a very good job in making it as a service…****Customers who want to just outsource everything; they go to AbCellera****. For customers who want to do it by themselves, have the flexibility, they go for Berkeley Lights. Sphere, HiFi. HiFi is a decent company that can actually do single cell in a droplet, but I think that's also pretty hard that they could not productize, so they're just running it as a service."* ***–Former senior scientist***

> ***Abcellera's system has similar capabilities, delivered via a less expensive service model that avoids a $2MM capital purchase and the maintenance requirements of a complex platform***
> ***"For antibody discovery, there is obviously AbCellera that has a similar system for – it's a comparable system for evaluation of single cells. AbCellera also is based on a microfluidic device****. But again, AbCellera's business model is different because they don't sell platforms. They basically develop everything internally, so they have customers that give them mice, rabbits, or anything like cells to identify antibody clones, and they do it internally, so they don't have to support the maintenance of the platform in a field."* ***–Former scientist***

> ***Abcellera has already eclipsed BLI in size and offer "exactly the same workflow"***
> *"And, of course, then there's the service providers like AbCellera, which is already doing two or three-fold Berkeley Lights revenue, has a slightly different technical approach, but effectively,* ***it does exactly the same workflow—screens cells for antibodies, picks out the ones that are making the relevant antibody*** *and allows the research and development teams to then go and further characterize those antibodies."* ***–Former executive***

Source: Scorpion Capital consultation calls with experts

Part 2) Former BLI employees/executives: Competition from cheaper, better alternatives has already rendered BLI irrelevant

Former employees indicated that 10X Genomics (ticker: TXG) is also a significant competitive threat, stating that both 10X Genomics and Abcellera deliver the same single cell information as BLI but at 5% of the cost. We note 10X cut its prices again last month. Ex-employees state it's not only cheaper but offers better capabilities and far higher throughput.

10x Genomics Introduces New Chromium X Series for Single Cell Analysis

10x Genomics Sees Bump in Chromium Instrument Sales After Price Drop

Aug 05, 2021 | Andrew P. Han

> ***Abcellera and 10X Genomics platforms deliver the same single cell information for a fraction of the cost of BLI***
> *"The AbCellera system has the same possibility because it's based on a very similar concept to the Berkeley Lights system; it doesn't use optoelectrical positioning to move the cells around, but* ***has a 3D based, gravity-based system to isolate single cells****, but then you can also put them in chambers when you put them together with other cells so that you can do a functional assay. So, that part could be done with the AbCellera system. Some other aspects of the activation of a cell that is producing antibodies can also be monitored to a specific type of assay that is compatible with the 10X Genomics platform based on encapsulating it in droplets, not like single cells but a B cell and potential target cells together in the same droplet and then monitoring the behavior of the B cell and then staining.* ***There are ways to obtain the same information."*** ***–Former BLI scientist***

> ***10X Genomics offers better capabilities and radically higher throughput for 5% of the price of BLI's machine***
> *"10X Genomics does single cell RNA seq and the technology is droplet-based, so cells are basically captured in a droplet and then they're alive and analyzed for their RNA. In the past few years, 10X Genomics has expanded their capabilities quite a bit…****Our throughput was a few thousand cells, while on platforms like 10X Genomics, you can have hundreds of thousands. I think we're talking about $100k, so it is significantly cheaper****…They have some applications to actually combine fluorescent staining for antibody-based detection of markers on the cells and mRNA. So it gives you the possibility of looking not at a single cell but also some functional markers."* ***–Former BLI scientist***

Source: Scorpion Capital consultation calls with experts; https://investors.10xgenomics.com/news-releases/news-release-details/10x-genomics-introduces-new-chromium-x-series-single-cell ; https://www.genomeweb.com/business-news/10x-genomics-sees-bump-chromium-instrument-sales-after-price-drop#.YShgzY5Kg2w

Part 2) Former BLI employees/executives: Competition from cheaper, better alternatives has already rendered BLI irrelevant

A board member at a key competitor painted a grim picture of the competitive dynamic: BLI has peaked; losing ground and "not selling many instruments"; competitors view their volumes as "a bloody disaster." Former employees indicated that another competitor, Isoplexis, enables single cell screening for $100K with similar capabilities to BLI, and mentioned a wave of emerging, disruptive competitors on the horizon with lower cost and higher throughput versions of BLI's tool.

> ***BLI has peaked and will be stagnant within 2-3 years***
> *"Within two, then into three years, BLI will be relegated to a more stagnate position.* ***They're not going to get better, and there's no breakthrough that's coming. We've seen what they've got."*** ***—Board member at a key competitor***

> ***Losing ground and "not selling many instruments"; competitors view BLI volumes as a "bloody disaster"***
> ***"They're not selling many instruments, but their instruments are expensive. On a units placed basis, they're losing ground. The other ones are just placing many, many more units****, not just placing, selling. Volume. If Mission Bio were to sell as many units as Berkeley Lights has placed in total, it'd be a bloody disaster. They're increasingly doing larger placements, headed toward the thousands-level."* ***-Board member at a key competitor***

> ***Emerging, disruptive competitors like Scribe and others are creating lower cost/higher throughput versions***
> *"There is a small company called Scribe Biosciences, in San Francisco. I'm aware of another one, Bioelectronica in Nevada, which is trying to create effectively* ***a low-cost, high-throughput version of the Berkeley Lights platform****. The sophistication of their assay is lower, but for the bulk of the B cell screening, you don't really need a super sophisticated assay. You just say, hey yeah, the antibody that this cell secretes binds to my target. That's the primary screen that most of these customers are using. So, one or more of those all have viable approaches to this market."* ***–Former BLI scientist***

> ***Isoplexis enables single cell analysis for immuno-oncology applications, also around $100K; similar capabilities***
> *"For some of the assays that we developed in terms of T cell analysis, there is* ***IsoPlexis that has a system that performs single-cell analysis*** *of cytokines produced by T cells, and also now I think* ***they've expanded and have a system to do single-cell proteomics. I think it's also $100k.*** *It could be a little bit lower. Again, if you want to look at the functionality of the cells, that is not what they are doing. However, it still allows you to get information at the single-cell level on the response of a T cell population, even if you don't have different types of cells that are physically interacting with each other and* ***you're monitoring their behavior like you would do basically on the Berkeley Lights."*** ***–Former BLI scientist***

Source: Scorpion Capital consultation calls with experts