◀ title of world's strongest beer from a German brewer, Watt and Dickie made Sink the Bismarck, a "quadruple IPA" with an alcohol-by-volume level of 41 percent. And they projected 60-foot-high naked images of themselves onto the Houses of Parliament to trumpet their plan to "take the craft beer revolution to the next level" (a BrewDog sign covered their private parts). Sometimes their antics flopped: In 2018 they released a beer called Pink IPA in a rose-colored can that was supposed to show support for gender equality but struck many as condescending. "People in the industry can't stand these stunts," says Will Bucknall, co-founder of Kicking Horse, a U.K. craft beer distributor. "But they hit the mark for their equity punks, and they increase the adoration of the brand."

Rather than trying to just sell craft beer, the company also works hard to market a roguish lifestyle. The online BrewDog Network features beer-themed content such as the quiz show *Are You Smarter Than a Drunk Person?* Last year the company opened a hotel next to its Ohio brewery called the DogHouse that features taps in its 32 rooms, beer-infused soaps, and even well-stocked brew fridges in the bathrooms. "They've created this elusive brand equity that's based on more than enjoying their beer," says Spiros Malandrakis, a beverage industry analyst with market researcher Euromonitor International. "With BrewDog, you can drink a beer in the shower at their hotel."

BrewDog's strong branding was a big reason why TSG Consumer Partners, a San Francisco-based private equity firm that's pumped money into consumer-focused brands including Famous Amos, Vitaminwater, and Planet Fitness, invested $128 million in the company in December 2017. Despite his ubercool public image, Watt is steeped in the details of his business. His office suite features a replica of the beer shelf at a nearby Tesco supermarket so he can evaluate how the labels on his products stand out next to those of rivals. Still, he says, BrewDog remains true to its artisanal roots and will never sell out to a big brewer. "For us, the bigger companies are responsible for the bastardization and commoditization of beer, which is everything we're against," he says. Asked how he squares that with the TSG deal, Watt points out that iconic U.S. players such as Southern California's Stone Brewing Co. have also tapped buyout funds. "That just helps us compete without having to sell our souls." —*Edward Robinson and Thomas Buckley*

THE BOTTOM LINE BrewDog, the U.K.'s largest craft brewer, sells more than a third of its beer volume in mainland Europe. Tariffs and added time for border crossings could hurt business.

Big Pharma's Efficiency Drive

● A third of drug-development costs comes from patient studies. Novartis wants to make them cheaper

Discoveries of new cancer-fighting and antiviral medicines grab headlines and sometimes win Nobel Prizes. But after the breakthroughs and backslapping are over, Big Pharma's grunt work is just beginning.

Companies carry out years of costly studies to prove treatments are safe and effective: finding hospitals and clinics to participate, hunting down patients who fit precise descriptions, tracking their health in minute detail for years while ensuring they take their medications, and then combing through heaps of data that will determine whether doctors can prescribe them. It's the unsexy side of the industry, and it's a big reason it can take more than $2 billion and 12 years to launch a new treatment.

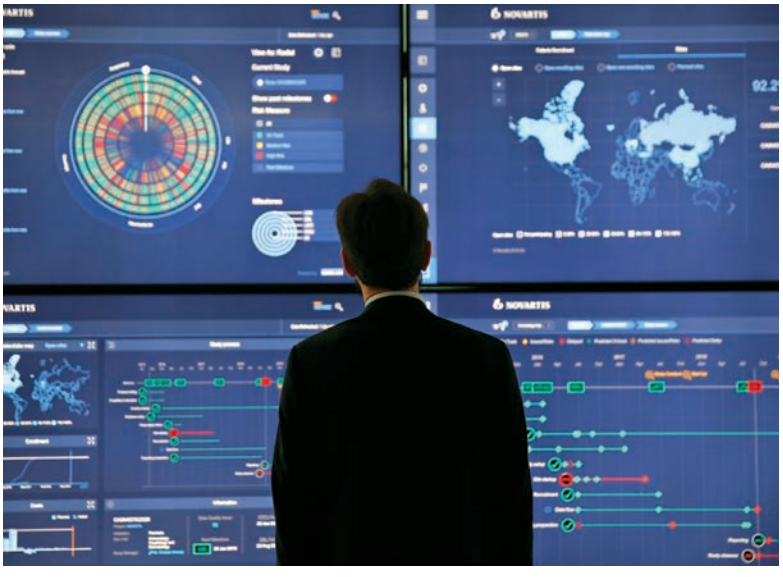
Drugmakers "do an excellent job of drug discovery," says Justin Hoss, a consultant at KPMG who specializes in technology and life sciences. "Then they get to a point of doing clinical trials, and it's a big bottleneck. The faster they get people through clinical trials, the faster they're going to know whether their investment was worth it or not."

Pharmaceutical products have a limited time under exclusive patents, and the majority of drugs

● Typical development cost for a major new drug

$2b

▼ Novartis's high-tech command center in Basel, Switzerland, tracks its global drug trials



STEFAN WERMUTH/BLOOMBERG. DATA: COMPILED BY BLOOMBERG

undergo delays during human testing. French drugmaker Sanofi estimates that as many as 7 out of 10 trials are hit by enrollment snags. Every extra week getting to market subtracts about $300,000 from sales before cheaper copies emerge, according to TriNetX Inc., a Cambridge, Mass.-based company that helps drugmakers speed up trials. Stung by such setbacks and feeling pricing heat from insurers and health systems, companies from Novartis AG to Sanofi to AstraZeneca Plc are turning a microscope on the efficiency of their drug trials. The area is "completely ripe for disruption," Hoss says.

Trying to streamline an operation that spends more than $5 billion a year on developing new drugs, Novartis dispatched teams to jetmaker Boeing Co. and Swissgrid AG, a power company, to observe how they use technology-laden crisis centers to prevent failures and blackouts. That led to the design of something that looks like the pharma version of NASA's Mission Control: a global surveillance hub where supercomputers map and chart Novartis's network of 500 drug studies in 70 countries, trying to predict potential problems on a minute-by-minute basis.

If a trial shows up in red on the wall of flatscreen displays—signaling a risk to the schedule—the company can swing into action and make sure it stays on course. A key concern is whether trials are attracting enough patients to get a complete reading of a drug's safety and efficacy or other trial objectives. It's among the most frustrating parts of the process, often taking 18 months or more for late-stage studies. Novartis plans to reduce the time it takes to fill a trial's patient ranks by as much as 15 percent.

The traditional approach was taking "way too long for our patients, and way too long for the economics of the business," says Bertrand Bodson, a veteran of Amazon.com Inc. and other retailers who came to Novartis last year to head technology. "We wanted to modernize that."

Many companies are betting that tech advances will pay off in quicker patient studies, which typically account for a third of the time and cost it takes to bring a treatment to market. Keeping trials that span the globe on schedule can be a struggle. A delay at just one clinic can disrupt the entire operation, says Heather Bell, head of digital and analytics for Sanofi.

"You are only as fast as your slowest site," she says. "We're looking at literally every stage of that development funnel in order to figure out how we can do it better and faster and, ideally, in a less costly way."

Researchers sometimes unwittingly build delays into their study designs, setting requirements for enrollment—age, other health conditions, previous treatments—that can shrink the potential pool of volunteers. Also, study sites may simply be located too far from entrants, or patients may not even hear about the opportunity to join an investigation. Those problems can force drug companies to make expensive changes to the experiment's original blueprints. "Historically, trials have been designed in a very manual way, based on hunches, and not data-driven," says Gadi Lachman, chief executive officer of TriNetX, which taps information from hospitals, clinics, and other sources to predict how fast a pharmaceutical study will enlist patients.

Companies across the industry are turning to TriNetX for help prospecting for patients before their studies begin. That can circumvent costly, time-wasting alterations, Lachman says. The goal is to shave one to three years off the time it takes to get a drug to market.

Increasingly, mobile devices are allowing people to participate from their own homes, making studies more convenient—and reducing the likelihood that candidates will drop out because they don't want to travel to study centers for data collection. Sanofi is planning to use smartwatches to track movement throughout the day in subjects with Parkinson's disease. Remote blood pressure cuffs, glucose meters, breath-analyzing devices, and other monitoring gadgets allow researchers to assess patients from their own kitchens, says Cristina Duran, who leads efforts to revamp drug development at U.K.-based AstraZeneca.

Better management of studies becomes particularly necessary as some investigations try to follow very large patient groups. Novo Nordisk AS, for example, is tapping 17,500 patients to evaluate the heart benefits of an experimental medicine to treat obesity. That's the biggest trial in the Danish company's history.

One way or another, pharmaceutical product testing has to be transformed from a cumbersome process with thousands of Excel spreadsheets and disparate databases into something more integrated and advanced, says Badhri Srinivasan, Novartis's head of global development operations. "You are putting out fires," he says. "It's not a sustainable way to run clinical trials. We just can't keep doing things the way we have."
—James Paton

THE BOTTOM LINE Big drugmakers can spend about $2 billion and take as long as 12 years to develop a medicine. Now some are trying new technology to make the process more efficient.

● Research and development expenditure as a share of revenue in 2017