MARKET INSIGHT
Biopharmaceutical CDMOs Analysis

February 2019
INTRODUCTION – MARKET UPDATE AND M&A FOCUS

At the outset of this report the primary objective was a year end review of the entire pharmaceutical Contract Development and Manufacturing (“CDMO”) industry in 2018. The scope of the report soon changed to focus specifically on outsourcing within the biopharmaceutical industry. The broader CDMO industry, which includes the development and manufacturing of both small and large molecule drugs, has followed a similar narrative the past few years: growth driven by pharma companies’ increased willingness to outsource, consolidation through M&A, the importance of adding capabilities across the entire development and manufacturing chain, and demand for companies to offer niche capabilities and services. Within the larger industry, biopharmaceutical CDMOs have become increasingly relevant as the development of biologics has become more important to the pharmaceutical industry. With an overall rise in the rates of diseases and chronic conditions, as well as increased access to pharmaceuticals and biotechnology worldwide, the market for biopharmaceuticals will continue to expand globally.

In a highly competitive industry, the biopharmaceutical CDMOs that are most likely to succeed are those that are willing to adopt cutting edge technology and invest the necessary time and capital to build out differentiated capabilities. The best CDMOs will move quickly to increase capacity while remaining flexible and agile.

Some of these topics are highlighted in additional detail throughout this Market Insight report. Based on market research and conversations with pharma executives, industry experts, and investors in the space, we touch upon a handful of trends we see driving the industry as well as developments we expect will meaningfully impact the future of pharma services.

Exclusively focused in healthcare, Bourne Partners has a deep track record of transaction success in pharmaceuticals, pharmaceutical services, and consumer health M&A and financial advisory. We hope this market snapshot is a helpful reference and please feel free to reach out with any questions or to discuss ways we may be able to add value to your company.
### Changing Relationships Between CDMOs and Big Pharma (Page 7)

Big Pharma continues to turn towards outsourcing as it looks to free up investment in manufacturing to help fund pipelines and commercial priorities.

Source: Contract Pharma: Parenteral Outsourcing Trends

“[Pharma companies] outsource the manufacture of other products to companies with a specific area of expertise. The other major tendency is to establish long term relationships with CDMOs that last for many years.” - Marga Viñes, BD Manager, CMO, Grifols International

### Growth of the Biosimilars Market (Page 7)

With impending patent expiration for some of the world’s largest biologics, biosimilars are set to break out in the US, Europe, and Asia. Expect downward pricing pressure as biopharma companies aggressively enter the biosimilars market.

“The biosimilar industry has developed rapidly and regulation has advanced significantly... there may be an opportunity to further streamline the regulatory process and accelerate path to market.” - Mckinsey & Company: Five things to know about biosimilars right now

### New Outsourcing Opportunities in China (Page 7)

While still a very underdeveloped market, CDMOs are investing capital to construct large biopharmaceutical manufacturing plants with unique capabilities in China.

Source: Frost & Sullivan, 2016

### The One-Stop-Shop Model (Page 8)

The trend didn’t change much in 2018 and will likely continue into 2019. The past few years have been characterized by rapid consolidation across the industry as CDMOs seek to gain capabilities across the supply chain.

Source: Pharma’s Almanac: Building a One-Stop-Shop CDMO for Biopharmaceuticals

### The Biopharmaceutical CDMO Oligopoly (Page 8)

Biopharmaceutical outsourcing is dominated by a few global players that are large enough to handle the biggest development and manufacturing projects while flexible enough to respond to changing market dynamics.

Source: Frost and Sullivan, 2016
**Increased Demand for Parenterals (Page 9)**
The biologics market is driving innovation in parenteral drug delivery and dosage forms. To compete in this growing market and expand dosage forms offerings, know-how in parenterals is essential.

Source: Contract Pharma: Parenteral Outsourcing Trends

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**Regulatory Expertise (Page 9)**
Pharmaceutical companies are looking for CDMOs with a strong track record of quality, compliance, and regulatory expertise. It is essential to track any industry trends and developments related to the regulatory landscape.

Source: Contract Pharma: Parenteral Outsourcing Trends

"Pharma and CMOs operate in a complex and dynamic environment that requires strict attention to meeting new regulatory standards. And CMOs must constantly monitor industry trends and market developments to ensure they are ready to meet the needs of their clients."

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**Key Questions (Page 10)**
The opportunity in biopharmaceuticals is big and growing too rapidly to ignore. It’s by far the fastest-growing part of the industry and is drastically changing. How will the world of biopharmaceutical outsourcing evolve in 2019?

Source: Mckinsey: Rapid growth in Biopharma: Challenges and opportunities

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**Investment Activity (Pages 11-13)**
Whether pure M&A, capital investments, or funding by financial buyers, Bourne Partners breaks down investment activity in the biopharmaceutical CDMO sector.
### Biologics Snapshot – Breakdown of drug sources

#### Cell Culture (Active Substance)
- **Microbial Cells**
- **Mammalian Cell Culture**
- **Other (Insect Cell, Plant Cell, Viral Culture, Yeast)**

#### Therapeutic Classes
- Recombinant Proteins
- Vaccines
- Cell Therapy
- Viral Gene Therapy
- Tissue Engineering
- Monoclonal Antibodies
- Peptides

#### Indication
- Genetic
- Metabolic Disorders
- Neurological
- Immunosuppressants
- Hematological
- Infectious diseases
- Oncology
- Cardiovascular diseases

### Biologics Drug Innovation

#### 2017-Feb 2019 Biologics Novel Drug Approvals

<table>
<thead>
<tr>
<th>Therapeutic Class</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oncology</td>
<td>7</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Hematology</td>
<td>6</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Dermatology</td>
<td>5</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Endocrinology</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Neurology</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Immunology</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Biologics vs Small Molecule New Drug Approvals

<table>
<thead>
<tr>
<th>Year</th>
<th>Biologics</th>
<th>Small Molecules</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>12</td>
<td>34</td>
</tr>
<tr>
<td>2018</td>
<td>17</td>
<td>42</td>
</tr>
<tr>
<td>2019 YTD</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

1) FDA Novel Drug Approvals
2) As of February 15, 2019
Biopharmaceutical CDMOs – What to Expect in 2019 and Beyond

Small molecules, the long-time basis for drug development, have been eclipsed by the rise in popularity and importance of the development of large molecule drugs. While small molecules make up 90% of drugs on the market and will continue to be the primary active-substance in the pharmaceutical industry, companies are starting to shift their focus to manufacturing and developing the highly profitable, highly complex large molecules, also known as biologics.

Biologics are medicines made from living cells through challenging manufacturing processes and must be handled and administered under carefully monitored conditions. Biologics are used to prevent, treat, diagnose, or cure a variety of diseases including cancer, infectious diseases, chronic kidney disease, and autoimmune disorders. With rising prevalence of infectious diseases and increased demand for novel therapies, pharma and biotech companies are investing in new innovative technologies. CDMOs are following suit.

The global biologics market is expected to account for ~30% of the entire pharma market by 2025 compared to 18.5% in 2015. In the ten year span from 2015 to 2025, the global biologics CDMO market is projected to grow at an average annual growth rate of 15.1% from $7.4bn to $30.3bn. ¹

Industry Growth Factors
1) Rising prevalence of chronic infectious diseases as well as growing incidence of cancer.
2) Continued development of blockbuster biologics (antibody, immunosuppressants, anticancer, atopic dermatitis, etc.).
3) Entrance of small, virtual pharma startups in the market with no manufacturing capacity and/or limited development expertise.
4) Specialized CDMOs offer greater speed-to-market, efficient processes, and lower costs.
5) The number of biosimilars (identical copies of biologics) being approved is on the rise as patents continue to expire.

¹ Frost and Sullivan, 2016
2) McKinsey: Rapid growth in Biopharma: Challenges and opportunities
Biopharmaceutical CDMOs – Opportunities for Growth

Potential for additional CDMO & Big Pharma alliances
Big Pharma may become increasingly interested in building alliances with large biopharmaceutical CDMOs whether that be through partnerships, joint ventures, or acquisitions. As seen by Thermo Fisher’s acquisition of Patheon, owning a large CDMO can provide a variety of options for combining products and services while maintaining wider control of the value-chain. Another example is Lonza and Takeda’s recent collaboration to bring the new cancer treatment ALUNBRIG to patients. CDMOs in particular can serve as platforms for testing new, innovative products and technologies and can quickly acquire the capacity and means to manage and cultivate complex, niche technologies.

Growth of the biosimilars market
A biosimilar is a drug that is an identical copy of an existing biologic. With many patents for original biologics expiring soon, the market of biosimilars that can be sold for lower prices is expected to continue expanding. The market size of biosimilars was $2.7bn in 2015 and is projected to increase to $66.3bn by 2025 with an average growth rate of 38% per year. The growth of the biosimilar industry is attributed largely to the upcoming expiration of patents for blockbuster biomedicines, the increased demand for low-cost, high-efficiency drugs due to market depression and persistent slow growth, and the biosimilar-favored policies of governments around the world.

New outsourcing opportunities in China
The number of investments in China has been increasing due to more biosimilars and innovative drugs entering the market, a need for extra capacity, and a shift in regulatory policy. With both global and domestic demand on the rise, Chinese regulatory authorities made the move to permit contract biomanufacturing in China in 2016. China’s CDMO business is nascent, but international companies such as Lonza and Boehringer Ingelheim have already invested in the market. GE Biopharma, which was recently acquired by Danaher, also built its first biologics plant in China in 2015 when it built a facility for JHL Biotech. The dominant player in China is widely considered to be Wuxi Biologics, which went through a very successful IPO on the Hong Kong stock exchange in 2018.

“As the China market grows from its limited position in comparison to the US market, the value of that growth will significantly increase. …If you are a global biopharma – or expect to be a supplier to global markets – of course the objective is to find growth opportunities. If you are not looking at China, then that should be a concern.”


Source: Contract Pharma: Contract Biomanufacturing in China

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1) Frost and Sullivan, 2016
2) Contract Pharma: Contract Biomanufacturing in China
The Biopharmaceutical CDMO Oligopoly

Asahi Glass first entered the market by acquiring CMC Biologics (now AGC Biologics), a fast-growing biopharmaceutical supplier. AGC Biologics is expanding rapidly across three continents with facilities in the US, Denmark, Germany, and Japan.

Boehringer Ingelheim BioXcellence has one of Europe's largest production plants for biopharmaceuticals (260,000 liters). What's more, the company is a leading contract manufacturer of biologics for 15 out of the top 20 global pharma players.

Catalent's $950mm acquisition of Cook Pharmica immediately made them one of the top large molecule manufacturers. Its Commercial Mammalian and Microbial Manufacturing business continue to benefit from a robust customer base and strong demand.

Lonza is a dominate player in the market. Lonza recently expanded in China, partnering with GE Healthcare to bring a biologics facility to Guangzhou by 2020. One of the first to market, Lonza partners with some of the top pharma companies, including a joint venture with Sanofi.

Patheon was acquired in 2017 by Thermo Fisher, one of the largest sellers of bioprocessing supplies. Owning a sizable CDMO provides Thermo Fisher with a variety of options for bundling diverse products and services.

Wuxi Biologics is the dominant leader in China with 63.5% market share and accounts for 35.1% of total revenue. Wuxi has made rapid business progress across the US, Europe, and Asia, and its customers include some of the largest global pharma companies.

Other Important Players

Abbvie Contract Manufacturing, Avid Bioservices, Brammer Bio, Emergent BioSolutions, Eurofins, Fujifilm Diosynth, JHL Biotech, KBI Biopharma, Millipore Sigma, Novasep, Rentschler

Biopharmaceutical CDMOs – Key Differentiators

The one-stop-shop model is especially attractive for the commercial success of large molecule CDMOs that often win business in earlier stages of the value-chain. Pharma companies generally prefer to stick with the CDMO that has early-stage development capabilities, as switching costs are significantly higher once cell lines and processes are established. Due to the complexities inherent to large molecule drug development, there needs to be a balance between having scalable service offerings as well as specialized technologies. Large industry players generally find this balance through M&A, looking to add the initial niche capabilities from acquiring small biopharmaceutical CDMOs followed by additional investments to expand capacity.

The biopharmaceutical CDMO oligopoly is comprised of CDMOs that have large-scale manufacturing facilities. The largest CDMOs are particularly attractive to sizable clients because they offer broader, large-scale infrastructure, and more specialized bioprocessing and regulatory expertise. These CDMOs generally handle all services, from cell line development through fill-finish and packaging.

Industry Case Study: Samsung Biologics

Samsung Biologics is the fastest growing bio-CDMO globally. The Company has 362,000 liters of capacity after recently opening the world’s largest biologics product plant with capacity of approximately 180,000 liters.

As of 2016, Samsung Biologics had the third largest production capacity in the world behind Boehringer Ingelheim and Lonza, and are contemplating the addition of 3 more plants in pursuit of having the largest production capacity and meeting growing customer demand.

Keys to Success

1) Willingness to adapt its operation to the needs of clients and dedication to get the critical, early tech transfer step right
2) Attaining capacity in early stages of development
3) Internally investing to build out technological support and regulatory expertise
4) Increasing investment in developing biosimilars (recently announced joint collaboration with Takeda)
5) Reaching a critical mass, attracting large clients that may be in need of large, multi-year contracts

1) Samsung Biologics Co., Ltd. 2018 Mid Year Investor Report
2) Biopharma Reporter: Samsung Biologics opens third plant, contemplates a fourth
Biopharmaceutical CDMOs – Additional Value-added Capabilities

Increased demand for parenterals
The movement toward outsourcing biopharmaceuticals is changing the supply chain in more ways than one. Biologics are mostly delivered intravenously or by injection and therefore the rise of the biologics market has lead to an increased demand for parenteral dosage forms. ¹ It is increasingly important for CDMOs to offer these capabilities. Innovation in the delivery devices and packaging will also continue to expand the biologics market. According to a Zion Market Research report, the global parenteral packaging market was valued at approximately $8.7 billion in 2017 and is expected to generate revenue of around $18.2 billion by the end of 2024, growing at a CAGR of around 11.1% between 2018 and 2024. ² In order to meet market demand, companies will need to add the necessary technology including lyophilization, containment for highly potent drugs, and aseptic manufacturing, among others.

Regulatory expertise
Long gone are the days when pharma companies chose CDMOs purely for their manufacturing expertise. To develop long-term relationships with pharma companies, CDMOs must provide a spectrum of service offerings that add value beyond the ‘legacy CDMO’. While it’s imperative that CDMOs have a strong quality record and positive regulatory history, they must also be able to provide significant regulatory leadership and expertise in all stages from early stage discovery to commercialization. Because the biopharmaceutical industry is complex and rapidly changing, it is more important than ever that CDMOs can help clients understand and navigate the processes and expectations of both international and US regulatory authorities. The ability to navigate regulations in different regions, maintain relationships and deal with local authorities, preserve intellectual property, monitor quality systems and processes, and track trends and developments are all critical in ensuring regulatory compliance.

“The demand for sterile manufacturing is directly linked to several industry-wide factors. These include the number of drugs in the collective drug pipeline of the global biopharma industry, the proportion of those drugs that will be administered by injection and the proportion that lie in those therapeutic areas where medicines are traditionally injected for good medical reasons”
- Colin MacKay, CEO, Symbiosis Pharmaceutical Services

¹) Contract Pharma: Parenteral Outsourcing Trends
²) Globalnewswire: Global Parenteral Packaging Market
³) BioProcess International: Managing Customer and Regulatory Expectations
Biopharmaceutical CDMOs – Questions to be answered in 2019

- Will more CDMOs make end-to-end moves in 2019, especially to acquire additional large molecule capabilities? What gaps are still left in the biologics portfolio that need to be filled?

- Competitors such as Lonza, Patheon, Samsung, and WuXi are making a concerted push into the market. How will they differentiate their offerings?

- What new entrants will come into the market?

- What role will small- to mid-sized CDMOs have within the biopharmaceutical industry? Will they need to focus increasingly on filling niche segments to compete with larger CDMOs?

- Where are the next large molecule ‘mega-plants’ going to be built?

- With increased demand for complex products and larger capacity, what will the supplier(customer)-customer relationship look like, especially between the large CDMO consolidators and Big Pharma? What will be the important measures of supplier performance?

- Through what medium will pharma companies pursue strategic partnerships with suppliers (joint ventures, M&A, etc.)?

- What will be the impact of increased biosimilars competition both domestically and internationally?

- How will policy changes affect business sentiment and investment plans, especially in Europe and China?
Investment Activity – M&A Landscape

- In the past few years, leading global providers as well as smaller, specialty service providers were the target of acquisitions efforts to dominate market share.
- The CDMO market saw a series of larger M&A transactions in an attempt to expand capacity, enhance capabilities in more complex areas including biologics, and to differentiate the business in a highly competitive industry.
- The transactions above highlight some of the most relevant acquisitions where the buyers were looking to build or expand upon a biopharmaceutical platform.

### Biopharmaceutical CDMO Transaction Comps

<table>
<thead>
<tr>
<th>Announced Date</th>
<th>Target</th>
<th>Target Description</th>
<th>Buyer</th>
<th>Geographic Location</th>
<th>Enterprise Value</th>
<th>LTM Revenue</th>
<th>LTM EBITDA</th>
<th>EV / LTM Revenue</th>
<th>EV / LTM EBITDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>May-18</td>
<td>PHAST Gesellschaft</td>
<td>Focuses on QC testing of small and large molecules, and analytical development</td>
<td>Eurofins Scientific</td>
<td>Germany</td>
<td>NA</td>
<td>$28.5</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Sep-17</td>
<td>Cook Pharmica</td>
<td>Provides CDMO services to pharma and biopharma companies</td>
<td>Catalent Pharma Solutions</td>
<td>USA</td>
<td>$950.0</td>
<td>177.8</td>
<td>NA</td>
<td>5.3x</td>
<td>NA</td>
</tr>
<tr>
<td>Jul-17</td>
<td>Amatsigroup</td>
<td>CDMO offering bioservices for biotech and pharma companies internationally</td>
<td>Eurofins Scientific</td>
<td>France</td>
<td>193.6</td>
<td>68.3</td>
<td>$13.8</td>
<td>2.8x</td>
<td>14.0x</td>
</tr>
<tr>
<td>May-17</td>
<td>Patheon</td>
<td>CDMO to both small molecule and large molecule biological drugs sectors</td>
<td>Thermo Fisher</td>
<td>USA</td>
<td>7,205.3</td>
<td>1,933.0</td>
<td>351.2</td>
<td>3.7x</td>
<td>20.5x</td>
</tr>
<tr>
<td>May-17</td>
<td>PharmaCell</td>
<td>CMO for cellular therapies and regenerative medicine in Europe</td>
<td>Lonza</td>
<td>Netherlands</td>
<td>NA</td>
<td>12.3</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Dec-16</td>
<td>CMC Biologics</td>
<td>CDMO offering cell line development and mammalian cell culture, among others</td>
<td>Asahi Glass Co.</td>
<td>Denmark</td>
<td>514.3</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Sep-15</td>
<td>PacificGMP</td>
<td>CDMO of biologics including monoclonal antibodies, vaccines, insect cell, etc.</td>
<td>Abzena</td>
<td>USA</td>
<td>8.4</td>
<td>3.0</td>
<td>NA</td>
<td>2.8x</td>
<td>NA</td>
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<tr>
<td>Apr-15</td>
<td>BioOutsource Ltd.</td>
<td>Contract lab for the virus testing and characterization of biologics and vaccines</td>
<td>Sartorious Stedim Biotech</td>
<td>United Kingdom</td>
<td>33.0</td>
<td>9.7</td>
<td>NA</td>
<td>3.4x</td>
<td>NA</td>
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<tr>
<td>Feb-15</td>
<td>KBI Biopharma</td>
<td>CDMO specializing in analytical testing, and cell line development, among others</td>
<td>JSR Corporation</td>
<td>USA</td>
<td>100.0</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
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</table>

**Notes:**
- NA - Not Available

**Median:**
- $193.6
- $28.5
- $182.5
- 3.4x
- 17.3x

**Mean:**
- $1,286.4
- $318.9
- $182.5
- 3.6x
- 17.3x
## Investment Activity – Capital Investments

### Investments by Leading Biopharmaceutical CDMOs

<table>
<thead>
<tr>
<th>Announced Date</th>
<th>Investor</th>
<th>Geographic Location</th>
<th>Investment Size</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-19</td>
<td>Thousand Oaks Biopharmaceuticals</td>
<td>China</td>
<td>$45.0</td>
<td>$45mm in Series A financing to advance its phase II CDMO operations while beginning construction of one of the largest cell culture facilities in China</td>
</tr>
<tr>
<td>Jan-19</td>
<td>Fujifilm Corporation</td>
<td>USA</td>
<td>90.0</td>
<td>Expanding existing facilities in NC to support growing customer portfolio including additional suites and single use cell culture manufacturing trains</td>
</tr>
<tr>
<td>Jan-19</td>
<td>PCI Pharma Services</td>
<td>USA</td>
<td>20.0</td>
<td>Expanding biotech clinical and commercial packaging to support advanced injectable delivery forms and biologic medicines</td>
</tr>
<tr>
<td>Dec-18</td>
<td>Lonza</td>
<td>China</td>
<td>NA</td>
<td>Agreement with GE Healthcare under which GE Healthcare will deliver a biologics facility to Lonza in Guangzhou, operational in 2020</td>
</tr>
<tr>
<td>Dec-18</td>
<td>Rentschler Biopharma</td>
<td>USA</td>
<td>NA</td>
<td>Agreement to buy the former Baxalta biologics manufacturing site in Milford, MA</td>
</tr>
<tr>
<td>Dec-18</td>
<td>Catalent</td>
<td>USA</td>
<td>14.0</td>
<td>Expanding biologics packaging capabilities and capacity at the Bloomington, IN, biologics manufacturing facility</td>
</tr>
<tr>
<td>Dec-18</td>
<td>Changzhou Qianhong Biopharma</td>
<td>China</td>
<td>145.0</td>
<td>Site focus will be on R&amp;D of innovative and first-of-its-class biologics for China, targeting cancers, cardiovascular and cerebrovascular diseases</td>
</tr>
<tr>
<td>Nov-18</td>
<td>Abzena</td>
<td>USA</td>
<td>20.0</td>
<td>Investment into two new manufacturing suites at 500 L and 2000 L scale in a new GMP facility in San Diego</td>
</tr>
<tr>
<td>Sep-18</td>
<td>Lonza</td>
<td>Switzerland</td>
<td>418.0</td>
<td>Expansion to the original Ibex facility allows Lonza to offer antibody biomanufacturing services, from the pre-clinical stage to commercialization</td>
</tr>
<tr>
<td>May-18</td>
<td>Samsung Biologics</td>
<td>South Korea</td>
<td>740.0</td>
<td>Investment to nearly double its capacity by opening the world’s largest biologics production plant</td>
</tr>
<tr>
<td>May-18</td>
<td>WuXi Biologics</td>
<td>Singapore</td>
<td>80.0</td>
<td>Establishes a state-of-the-art biologics manufacturing facility in Singapore. It will be the 10th global drug substance manufacturing facility of WuXi Biologics</td>
</tr>
<tr>
<td>Jun-18</td>
<td>Boehringer Ingelheim</td>
<td>Germany</td>
<td>265.0</td>
<td>New Biologicals Development Center (BDC) bundles biologics development, increases capacity for CMO business and expands supply network</td>
</tr>
<tr>
<td>Oct-17</td>
<td>Lonza</td>
<td>USA</td>
<td>NA</td>
<td>Clinical-stage mammalian manufacturing site in the United States acquired from Shire plc</td>
</tr>
<tr>
<td>Feb-17</td>
<td>Lonza, Sanofi</td>
<td>Switzerland</td>
<td>270.0</td>
<td>Strategic partnership to design, construct, start-up and operate a state-of-the-art large-scale mammalian cell culture facility</td>
</tr>
<tr>
<td>May-17</td>
<td>Boehringer Ingelheim</td>
<td>China</td>
<td>80.6</td>
<td>Multinational, active biopharmaceutical manufacturing facility in China utilizing mammalian cell culture technology</td>
</tr>
</tbody>
</table>

- The largest contract biologics manufacturers have been investing heavily in manufacturing capabilities to address unique product areas, including vaccines, anticancer drugs, and immunosuppressants
- As shown above, the largest players are looking to significantly expand facilities to meet customer demand. Expect additional investments both domestically and internationally in 2019

NA – Not Available

Source: CapitalIQ as of 2/15/2019
While strategic buyers stole the M&A headlines in 2018, financial sponsors were also very active in the space. The biopharma services sub sectors saw increased funding compared to the prior year. Within the industry, biopharmaceutical CDMOs lead the way in dollar amounts funded by financial buyers in the past two years. The industry is still highly fragmented partly due to a large portion of CDMOs being owned by private equity. Despite high valuations, investors are betting on continued growth of the CDMO industry. Expect to see continued investment in CDMOs as financial buyers look to build a platform and/or grow current portfolio companies through bolt-on acquisitions.

### Top Markets of Investment Activity (2017-2018)

<table>
<thead>
<tr>
<th>Category</th>
<th>$ Invested (USD mm)</th>
<th># of Rounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDMO Biologics, Mammalian Cell Line</td>
<td>$201.0</td>
<td>5</td>
</tr>
<tr>
<td>CDMO Small Molecules &amp; Peptides, Formulation</td>
<td>$118.0</td>
<td>9</td>
</tr>
<tr>
<td>CRO Drug Discovery, In Silico Assays</td>
<td>$100.0</td>
<td>5</td>
</tr>
<tr>
<td>CDMO Biologics</td>
<td>$62.3</td>
<td>7</td>
</tr>
<tr>
<td>CDMO Small Molecules &amp; Peptides, API Production</td>
<td>$58.4</td>
<td>6</td>
</tr>
<tr>
<td>CRO Clinical Development, Research Site &amp; Patient Recruitment</td>
<td>$45.5</td>
<td>6</td>
</tr>
<tr>
<td>CRO Bioanalytical Services</td>
<td>$38.9</td>
<td>6</td>
</tr>
<tr>
<td>CRO Clinical Development, Full Service</td>
<td>$27.1</td>
<td>11</td>
</tr>
</tbody>
</table>

### Active Private Equity Sponsors

<table>
<thead>
<tr>
<th>Sponsor</th>
<th>Current Sector Investments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampersand</td>
<td>Brammer Bio</td>
</tr>
<tr>
<td>Arlington Capital Partners</td>
<td>Grand River Aseptic Manufacturing</td>
</tr>
<tr>
<td>Avista Capital Partners</td>
<td>BioReliance</td>
</tr>
<tr>
<td>Camden Partners Holdings</td>
<td>Paragon BioServices</td>
</tr>
<tr>
<td>The Carlyle Group</td>
<td>AmbioPharm</td>
</tr>
</tbody>
</table>

### Recent Public Equity Offerings:

1. **Mar 2018**: WuXi Biologics (SEHK:2269) – Follow-on Equity Offering for $508.4mm
2. **Feb 2018**: Avid Bioservices, Inc. (NasdaqCM:CDMO) – Follow-on Equity Offering for $20.3mm
3. **Nov 2016**: Samsung Biologics Co. (KOSE:A207940) – Initial Public Offering for $2.0bn

### 2018 Biopharma Services Investments by Geography

![Biopharma Services Investments by Geography](image-url)

### 2018 Biopharma Services Global Funding Trend

![Biopharma Services Global Funding Trend](image-url)

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1. Source: CapitalIQ
2. Biopharma Services Sub Sectors include CRO, CDMO, Scientific Sourcing, Diversified, Logistics & Supply Chain, Consulting, and Market Research
3. Tracxn Sector Report: Biopharma Contract Services, December 2018
4. Excludes funding information of Chinese companies
Since 2001, Bourne Partners has been a thought leader in the healthcare investment banking space. Our team is a trusted resource for clients and our track record of success includes raising over $2 billion in equity and debt capital and executing more than $5 billion in M&A transactions.

Please contact us to talk about ways we may be able to add value to your company's strategic priorities.

Our Experience

Bourne Partners is an investment banking and strategic capital firm focused exclusively in the healthcare space covering the full spectrum of Pharma Services including a significant focus on CDMOs, CMOs, clinical and non-clinical CROs, SMOs, analytical lab/testing; as well as labeling, packaging, distribution, and supply chain management services. We help companies execute M&A (selling their business or buying another) and raise capital to finance growth or recapitalize their business. Below is a snapshot of our recent industry deal experience:

2019

$252,000,000

Objective: Avista, a CDMO that offers differentiated services ranging from API and drug product development to analytical testing, engaged Bourne Partners to serve as its exclusive advisor in the sale of the company.

Process: Bourne Partners used its long-standing relationships and knowledge of the CDMO, analytical lab testing, CMC services and pharmaceutical sectors to provide counsel to Avista throughout the process.

Result: Avista signed an agreement to be acquired by Cambrex at a value of $252 million.

2017

$1,620,000,000

Objective: Bourne Partners worked in partnership with and invested alongside The Carlyle Group on the 2017 AMRI acquisition.

Process: Bourne Partners utilized its relationships and knowledge of the CDMO and pharmaceutical sectors to provide counsel to and invest alongside The Carlyle Group, contributing to the evaluation and negotiation of the AMRI transaction.

Result: Bourne Partners co-invested alongside The Carlyle Group and GTCR LLC who successfully acquired AMRI at a value of $1.62 billion.

2018

$32,000,000

Objective: Accelovance engaged Bourne Partners to identify an acquirer for the remaining clinical CRO business after the successful carve-out of Accelovance’s SMO segment, Optimal Research, in late 2017.

Process: Bourne Partners used their international network to run a highly targeted process and structure a transaction that was ideal for all parties.

Result: With the advice of Bourne Partners, Accelovance signed a merger agreement with the Japanese CRO Linical to sell all remaining assets. The combined companies will now boast a strong international CRO presence reaching through North America, Europe and Asia Pacific.

“I’ve known the Bourne Partners team for several years and enjoyed working with them on this project. Bourne Partners’ experienced execution team and deep domain knowledge across pharma and pharma services, contributed in maximizing the value of Avista Pharma Solutions. I highly recommend them as a lead advisor to anyone exploring the sale of their company.”

- Patrick Walsh

Chief Executive Officer, Avista Pharma Solutions