CRO Sector
M&A drivers and market trends

March 2019
I am pleased to introduce you to our review of M&A drivers and trends within the Contract Research Organisation (CRO) sector. In this paper we reflect and discuss some of the important trends observed in recent years and look to the future of deal making within the industry. The CRO sector has enjoyed robust corporate activity in the last few years and this momentum looks likely to continue going forward. Results Healthcare have been very busy working on a range of advisory transactions, helping both buyers and sellers achieve their strategic goals. We have expanded and broadened our healthcare team in response to growing client demand.

The last few years have been a very interesting period for deal watchers in the CRO space. Multiple mega-mergers took place between key players leaving the CRO landscape looking very different to when the period began. Results Healthcare were pleased to be a part of this transformation by advising on the INC inVentiv Heath merger (now rebranded as Syneos Health). This deal was valued at US$7.4 billion and brought over 22,000 employees together across 60 countries. The transaction exemplifies the theme of clinical commercial convergence; inVentiv commercial expertise being a natural pairing for INC’s clinical capabilities.

CRO M&A activity over the last year has become more focused with players seeking to acquire companies with specific areas of expertise as a way to bolster niche capabilities, whether this be getting access to patient centric data, addressing unmet therapeutic areas in rare diseases and through personalised medicine, utilising artificial intelligence in data analysis or dealing with changes in the pricing and regulatory environment. As an example, earlier this year, Results Healthcare advised on the sale of Xendo to ProPharma Group. This deal gave ProPharma a substantially bigger European presence and added key regulatory consulting capabilities to the group.

Looking towards the future, we believe that the fundamental drivers of the sector remain strong. Although the types of deals occurring are set to evolve, larger CROs will continue to use M&A as a way to achieve their strategic aims. We believe this will create many opportunities for deals at the smaller end of the spectrum and for providers of niche, specialist capabilities.

Kevin Bottomley
Healthcare Partner
Introduction

Supporting the life science R&D process

Contract Research Organisations (CROs) typically provide discovery and development services to the pharmaceutical, biotechnology and medical devices industries (frequently referred to as sponsors), but can also support foundations, research institutions and universities.

CROs co-ordinate and execute activities throughout the R&D pathway, by organising and conducting clinical trials to test the new molecule in humans. As independent companies, they offer an objective assessment of a new drug in the clinical setting and, because they partner with many companies, typically offer broader experience than if the sponsors organised the trials themselves. CROs obtain most of their revenues from sponsor R&D budgets, with work conducted in the form of short- or long-term contractual outsourced services.

Foundation and evolution of the industry

The initial foundation of the industry emerged in the 1970s, where pharma were expected to do all of their R&D in-house, however were often faced with capacity problems and it was this occasional need for excess capacity, where resources were limited, that led to the formation of the first CROs. Since then sponsors have chosen to outsource R&D activities for several other reasons, including accessing capabilities not found in-house, achieving a reduction in fixed costs, and benefiting from greater global reach.

In the late 1980s and early 1990s, the industry witnessed the arrival of a stream of blockbuster drugs and the growth of the smaller biotech sector. These two factors coupled with the increasing cost of developing drugs, helped change the relationship dynamic between pharma and CROs and this provided the stimulus for CROs to expand both their services and market.

The CRO industry has been growing steadily in recent years. In 2018, the value of the global CRO services market was estimated to be valued at US$37 billion1. Between the forecast period of 2018 to 2024, the market is estimated to grow at a 8.2% CAGR as the demand for robust clinical services grows and sponsors continue to invest in R&D2. In 2013, outsourcing represented over 47% of clinical development spend and this is set to increase to over 60% by 2020. This is a seismic shift over a relatively short period of time for an industry of this size.

Why do pharma use CROs?

- Access to capabilities and expertise not found in-house
- Shift from fixed to variable cost model to reduce use of internal resources
- Improved global reach and access to patients
- Higher quality and more efficient execution
- Reduction in oversight required
- Lower capital requirements
- Accelerated development timelines, quicker route to market
- Access to innovation not found internally

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1. 2017 CRO Market Size Projections 2016-2021, ISR Reports, 2017
2. Contract Research Organisation (CRO) Services Market Forecasts to 2024, Researchandmarkets.com, 2024
Industry overview

Continued growth in R&D spend and outsourcing

The R&D landscape has drastically changed over the past decade. In a time where the biopharmaceutical industry has faced growing regulatory scrutiny, escalating commercialisation costs and patent expirations on key blockbuster drugs, the business models of the larger market players have evolved, promoting extensive growth of the clinical outsourcing industry.

The growth of the global CRO market has been largely driven by increased big pharma outsourced development spend. It has also been influenced by a shift in the industry, with more companies focusing on rare diseases with unmet medical needs, areas where research is lacking historically and therefore a large R&D investment is required. Additionally, with constant scientific discoveries deepening our understanding of disease pathology, biopharmaceutical companies are continuing to discover, develop and commercialise novel and increasingly complex treatments.

Whilst the CRO market is expected to reach US$41 billion by 2020, growing at a 5.4% CAGR between 2017-20, development outsourcing penetration is expected to increase to 60% in 2020 (Figure 1), driving overall growth of the CRO market. The global CRO market is expected to continue growing, largely due to the increase in complexity of clinical development requirements and therefore the need for more specialised expertise. Furthermore, biopharmaceutical companies, which often lack the internal infrastructure to run their own studies are progressively seeking CROs with full services capabilities so that they are able to operate under a full-service model. With fully loaded costs per successful molecule reaching highs of US$2 billion, sponsors are now acknowledging the increasing importance of therapeutic expertise and scalability required to lower costs and expedite time-to-market for new drugs. Sponsors understandably seek CROs as expert partners to allow for the optimisation of internal cost structures, compress timelines and navigate regulatory hurdles to ultimately produce a quality end-result from a positive clinical trial.

Figure 1


www.resultshealthcare.com
Market size by function

The average timeline from discovery, through development to launch of a new therapeutic, is between 10-15 years. However, only 5-8 compounds of every 10,000-15,000 compounds evaluated reach clinical testing, and of those ultimately only one is advanced into commercialisation (Figure 3). We have summarised the phases below:

- **Drug discovery** – assessing the underlying disease mechanism to discover and identify compounds that can alter a disease process
- **Pre-clinical research** – understanding and evaluating how a compound works in a biological system, addressing drug efficacy and toxicity

![Drug development process](image)

- **Investigational New Drug (IND) application** – obtaining permission from regulatory authorities (such as the FDA) to start human clinical trials
- **Clinical trials**
  - **Phase I** – discovering the safety and dosage ranges; dosages are gradually increased for each patient cohort and the pharmacokinetics of the drug is monitored
  - **Phase II** – studying the drug on several hundred participants with the disease, evaluating drug efficacy in patients
  - **Phase III** – the largest and longest conducted study, they are more rigorous extensions of previous clinical stages: confirming efficacy on various levels and safety in a more heterogeneous patient population
- **New Drug Application (NDA) review** – submission of an NDA or BLA (Biologics License Application) to respective government regulators. Failure to abide by the strict government protocols can be grounds for rejection
- **Post approval studies** – requirements to collect and report additional safety and efficacy data to government regulators once the drug has been approved. This can occur throughout the lifespan of the product

The complexity and intensity of the different stages of the drug development process is reflected in the CRO market sizes per function (Figure 4). As the clinical and post-approval stages are the most complex and regulatory intense stages of development, these are the stages at which sponsors require the most input from specialist outsourced providers and hence is reflected in the market size.
CRO market size by function

<table>
<thead>
<tr>
<th>Function</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-clinical</td>
<td>9%</td>
</tr>
<tr>
<td>Central lab</td>
<td>4%</td>
</tr>
<tr>
<td>Clinical</td>
<td>42%</td>
</tr>
<tr>
<td>Post-approval</td>
<td>45%</td>
</tr>
<tr>
<td>Pre-clinical</td>
<td>9%</td>
</tr>
<tr>
<td>Central lab</td>
<td>4%</td>
</tr>
<tr>
<td>Clinical</td>
<td>42%</td>
</tr>
<tr>
<td>Post-approval</td>
<td>45%</td>
</tr>
</tbody>
</table>

Figure 4

Source: CRO Industry Primer, Credit Suisse, 2016

Competitive landscape

Outside the top 10 CROs, which hold approximately 60% of the market share, the industry landscape is vastly fragmented, comprising of a handful of large, global, full-service CROs and several hundred small and medium sized, defined-service providers.

Market share by organisation (2016)

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quintiles</td>
<td>43%</td>
</tr>
<tr>
<td>Covance</td>
<td>15%</td>
</tr>
<tr>
<td>PAREXEL</td>
<td>9%</td>
</tr>
<tr>
<td>PRA Health</td>
<td>8%</td>
</tr>
<tr>
<td>PPD</td>
<td>6%</td>
</tr>
<tr>
<td>ICON</td>
<td>4%</td>
</tr>
<tr>
<td>Charles River</td>
<td>3%</td>
</tr>
<tr>
<td>INC</td>
<td>2%</td>
</tr>
<tr>
<td>Inventiv</td>
<td>2%</td>
</tr>
<tr>
<td>WuXi Pharma</td>
<td>2%</td>
</tr>
<tr>
<td>Others</td>
<td>4%</td>
</tr>
</tbody>
</table>

Figure 5

Source: KPMG Research

Differentiating between the large players is becoming significantly more challenging as many of them now have parallel service capabilities, resulting from a significant amount of M&A activity over the past few years, where these large players have acquired smaller companies which offer distinguished services to themselves or operate in different countries, with the aim of becoming a full service package for clients.

These larger CROs are providing services to large pharma companies and generally do not provide tailored services for small-to-medium sized pharma. This has left the market open for smaller CROs, where we have seen strong growth as these companies address smaller and mid-pharma clients.

Increasing complexity of trials

The complexity of the drug development process has increased the duration and costs of clinical trials over the past 15 years. Some studies suggest that the average number of study endpoints required for a later phase study has surged by 86% between 2002-2012 and the number of countries the trial must take place in more than tripling. One fundamental driver behind this complexity is that biopharmaceutical companies need to address larger worldwide disease threats, for instance in orphan diseases and oncology. Brand new classes of drug require different ways of running trials.

In a report published by E&Y in 2016, it was found that over 64% of the total pipelines of biopharmaceutical companies worldwide comprised of critical therapeutic areas such as oncology, CNS, cardiovascular, diabetes and internal medicine. CROs are also aligning their capabilities with these therapeutic areas of interest which has been reflected in the M&A activity of the larger CROs. Over the past few years, these players have acquired bolt-on companies in order to expand into these rapidly-growing therapeutic areas. For example, Precision Medicine Group acquired ApoCell in October 2018, a specialist next-generation lab specialising in high complexity biomarker and immunofluorescence detection to address complexities for immuno-oncology applications.

According to IQVIA, international spending on cancer treatments increased in 2017, with therapeutic and supportive case use reaching US$133 billion, an increase from US$96 billion reported in 2013. Immuno-oncology is one of the major growth drivers for the sector, with a particularly active pipeline by close of 2017, including approximately 300 molecules with 60 separate mechanisms being evaluated in clinical trials in Phase I or II. The proliferation of immuno-oncology therapies has been previously linked to greater R&D spending and more alliances between sponsors and CROs. Sponsors recognise that the critical challenges faced when developing an immuno-oncology asset, including trial recruitment difficulties and identification of effective biomarkers, could be best addressed by specialist CROs to ultimately upsurge returns on associated R&D investments.

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3 Global Oncology Trends 2018, IQVIA, 2018
Access to patients

Patient Recruitment and patient retention is having a large impact on clinical trial timings and have delayed launch dates for new drugs. Both recruitment and retention of patients are a major challenge for those running trials, with a high percentage not meeting targets and drop-out rates increasing. One respondent blamed the increased burden for patients through study participation without adequate "return of investment" in form of personal benefits. Such concerns explain the prevalence of patient centric approaches in today's research.

Engagement model evolution

- The way in which pharma companies work with CROs is changing
- CROs are taking on more of the strategic planning in trials in addition to execution
- This trend is set to continue with CROs becoming end-to-end development partners

Sponsors have not only been changing the frequency with which they work with CROs and their services utilised; they have also changed their engagement models.

In the past CROs were responsible for executing the pharma's clinical requirements on a study by study basis (Table 1). This relationship was transactional, executed tactically and was led by the pharma client. There would typically be many interfaces between both sides with accountability diffused throughout the CRO organisation.

Today's CROs work much more in partnership with their pharma clients. This model of engagement involves more strategic interaction, with the CRO typically proposing solutions and managing outcomes. There may be a single peer-to-peer point of contact with an empowered CRO authority whose incentives are aligned with the pharma client. There is also likely to be governance frameworks and structures in place to be able to manage the relationship which will involve teams of stakeholders working across multiple trials.

The trend towards CROs taking greater responsibility for strategic thinking and planning on behalf of the sponsor is set to continue with CROs increasingly taking on the role of development partner offering an end-to-end integrated service. Here the edges of development responsibility are becoming even more 'blurred' with the CRO taking the lead in the generation of the relevant clinical data. Key Performance Indicators (KPIs) and other metrics are used to assess the success of the program allowing the client to assess the overall performance of the CRO. This set-up promises a more efficient delivery, to more predictable targets, by allowing greater expertise driven governance from the CRO.

Furthermore, under the evolving engagement model we see that CROs often have scope beyond the clinical development stages into the commercialisation of the drug, whether this be providing services such as market access, HEOR or sales force organisations.

<table>
<thead>
<tr>
<th>Tactical vs Strategic Partnership model</th>
<th>Strategic Partnership model</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tactical model</strong></td>
<td><strong>Strategic Partnership model</strong></td>
</tr>
<tr>
<td>Short-term mindset</td>
<td>Long-term approach based on risk sharing</td>
</tr>
<tr>
<td>Project-by-project focus</td>
<td>Several projects awarded at the same time</td>
</tr>
<tr>
<td>Competitive bidding with multiple CROs</td>
<td>Large percentage of work with a few strategic partners</td>
</tr>
<tr>
<td>Inconsistent monitoring</td>
<td>Performance tracked with pre-agreed benchmarks</td>
</tr>
<tr>
<td>Limited flexibility for restructuring workforce</td>
<td>Ability to tear down workforce and outsourcing functional teams</td>
</tr>
<tr>
<td>Superior subordinate relationship</td>
<td>Defined governance structure and involvement of senior stakeholders from both sides</td>
</tr>
<tr>
<td>Limited to core activities</td>
<td>Extends to non-core activities across the life cycle</td>
</tr>
<tr>
<td>Work typically awarded on the basis of most competitive pricing</td>
<td>Value add comes in the form of better productivity, efficiency and NPV enhancement</td>
</tr>
</tbody>
</table>

Table 1
Quintiles + Merck Serono Partnership

There are several examples of pharma-CRO strategic partnerships and one of the most notable formed was between Merck Serono and Quintiles in 2013.

Under the partnership both parties formed a five-year cooperative alliance under which they would create a comprehensive process to integrate the expertise and experience from both organisations. Quintiles became the sole primary provider of Merck’s outsourced clinical development services, which spanned the full spectrum from phase 1 trials through to post-marketing activities. Under the governance structure, Merck would lead the strategy for its clinical development programmes, whilst Quintiles would direct clinical-trial planning and execution, and notably also become a key contributor to Merck’s clinical-trial design activities.

The benefit from Merck’s perspective was that it would enable them access to Quintiles’ cross functional and therapeutic expertise and also benefit from a better pricing structure; for Quintiles it was the ability to secure long term and stable contractual revenue.
Sector M&A trends

Slow down of mega mergers to focus on building niche specialties

- Fewer major acquisitions, smaller deals likely to become more frequent
- Increased competition for a smaller pool of assets
- Providers of specialist services likely to be an area of interest

Over the past few years there has been an increasing amount of consolidation in the CRO market. In 2016 alone, £24 billion was spent on CRO M&A. There are several reasons for this activity, but the underlying driver has been the need for CROs to differentiate and change the scope of their business model to meet the demands of sponsors, so that they are able to capture the strategic partnership type models addressed in the previous section.

Benefits to sponsors of CRO M&A

Scalability and geographic presence
As a consequence of CROs global expansion through acquisition, their customers gain access to on-demand scalability for their trials and benefit from access to a wider patient population pool

Access to new therapeutic expertise and capabilities
Many CRO mergers are driven by the desire to add additional therapeutic expertise and service capabilities to their offerings. As CROs expand their offerings, sponsors gain the ability to access more services from a single partner

Cost savings
Operating under a “one-stop shop” model, there will be cost and operational savings for CROs which are able to benefit from a greater workload from sponsors through a strategic partnership model and thereby generate savings from economies of scale. These benefits can then be shared with sponsors

Technology improvements
Technologies can have a big impact in shortening clinical timelines and improving clinical trial success through, for example, enabling between site identification, selection, and startup activities. Often, it’s only when CROs are operating at a critical mass are they able to justify the high investment in technologies which are able to accrue such benefits and returns

Below are examples of the ‘mega-mergers’ which have taken place since 2015.

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5 CRO Industry Update: Big Data Drives Drug Development Efforts, Contract Pharma, 2018
Quintiles + IMS = IQVIA

In May 2016, Quintiles and IMS Health announced an all-stock transaction to merge the two entities (combined equity value of US$17.6 billion) which would later become IQVIA. This deal created the second largest CRO in the world with over 50,000 employees operating in more than 100 countries.

The driving force behind this mega-merger was a desire to create a global Real World Evidence (RWE) solutions platform. By combining IMS’s data gathering and analysis, plus its access to patient, prescription and other key healthcare data, together with Quintiles’ real world clinical applications, the combined group aims to transform the clinical development of innovative medicines and drive commercial success.

Inventiv + INC = Syneos Health

In May 2017, inVentiv Health and INC Research announced their US$7 billion merger and in doing so created one of the world’s largest biopharma outsourcing providers, now re-branded as Syneos Health. As well as achieving critical scale and becoming the third largest CRO, the deal promised several strategic advantages and potential synergies to the combined entity.

The merger gives Syneos the ability to deliver services in several different models: full service, hybrid and Functional Service Provision (FSP) as well as a new, greater reach that allows them to do this in any country, with any sized customer.

Syneos plans to leverage the commercial insights gained from inVentiv’s commercial outsourcing operations. inVentiv has a significant breadth and depth of commercial expertise offering services such as selling solutions, communications, and consulting. inVentiv also has an extensive network of Key Opinion Leaders (KOLs) including Medical Science Liaisons (MSL), nurse educators, patient advocates, as well as significant amounts of pharmacy data through its Adheris pharmacy network.

Syneos now also has a much broader customer base; INC had many small and mid-sized biopharma clients; inVentiv counted all of the top 20 biopharmas as customers.

Covance + LabCorp

In February 2015, Covance, the US-based drug development services company, was acquired by LabCorp, the worldwide leading provider of clinical laboratory services. This merger was valued at US$6.1 billion and was the result of LabCorp’s acquisition of Covance’s Genomics Laboratory one year prior. The deal was driven by LabCorp’s need to improve patient recruitment and trial efficiency in addition to leveraging synergies to increase data delivery efficiency.

Shortly after their acquisition of Covance, LabCorp acquired Chiltern, a UK-based CRO in a deal valued at US$1.2 billion, closing in July 2017. By acquiring Chiltern, LabCorp strengthened its position in becoming the global leader in clinical outsourced services, further expanding its workforce to over 20,000 employees and providing LabCorp access to Chiltern’s extensive expertise in oncology. Following both acquisitions, LabCorp’s global reach has been solidified and it remains the CRO with the largest market share across the industry.

David King, LabCorp, CEO

On their acquisition of Covance: “We are excited to bring two industry leaders together to provide a unique and complete set of services that will benefit all healthcare stakeholders. Our complementary services and capabilities will enable us to pursue multiple strategic opportunities in both the clinical laboratory and drug development businesses. Combined with the enormously talented people of LabCorp, we will employ our capabilities to enhance drug development, diagnostic services and the delivery of healthcare to better address the system’s demand for improved outcomes at lower costs.”

On their acquisition of Chiltern: “The addition of Chiltern advances a key element of LabCorp’s strategy – to bring innovative medicines to patients faster which ultimately will improve patient outcomes.”

We believe that the mega-mergers that previously characterised CRO M&A are unlikely to occur at the same rate going forward, purely on the basis that the group of large scale CROs has become smaller. However, there is likely to be increased competition from the large CROs for specialised players who can offer key capabilities otherwise lacking from the acquirer’s portfolio. Traditionally, small and specialised CROs have found a strong customer base in the small and mid-size biopharma sector as these customers value a more personal service and access to specific, specialist capabilities. As large CROs are adding these capabilities through M&A, they are better able to compete with smaller CROs for these customers.
# Top 10 global CROs by revenue

<table>
<thead>
<tr>
<th>Company</th>
<th>Intelligence</th>
<th>2017 revenue (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LabCorp</td>
<td>Ranked #1 owing to its revenue, wide portfolio of clinical research and post-clinical research services. Labcorp acquired Covance in 2015 for US$5.5 billion. Recent acquisitions include Orig3n (bio-medical research), Sciformix (life sciences consulting), Chiltern International (clinical development CRO).</td>
<td>10.4bn</td>
</tr>
<tr>
<td>IQVIA</td>
<td>IQVIA was formed in 2016 through the merger of Quintiles and IMS Health, the healthcare information company, in a deal worth US$12.9 billion. Recent acquisitions have focused on integrated regulatory solutions (Acuta), HCP engagement services (Advanced Health Medical) and bio-statistical analysis (StatFinn Oy, 159 Solutions).</td>
<td>9.7bn</td>
</tr>
<tr>
<td>Syneos Health</td>
<td>Syneos Health was formed in 2018 after the merger of INC Research and inVentiv Health in a deal totalling US$7.4 billion. Most recent acquisition since its merger is of Kinapse Limited (life science consulting).</td>
<td>2.7bn</td>
</tr>
<tr>
<td>PAREXEL</td>
<td>2nd largest service portfolio and operates from 85 locations. Acquired by Pamplona Capital Management in June 2017 for US$4.9 billion. Recent acquisitions include The Medical Affairs Company (outsourced medical affairs services), Health Advances (life science consultancy), Quantum Solutions India (India-based CRO).</td>
<td>2.4bn</td>
</tr>
<tr>
<td>PRA HEALTH SCIENCES</td>
<td>5th largest CRO with more than 15,000 members of staff. Recent acquisitions include Parallel 6 (enrollment &amp; engagement solutions), Symphony Health Solutions (data and analytics life science consulting).</td>
<td>2.6bn</td>
</tr>
<tr>
<td>PPD</td>
<td>Privately held with a broad portfolio of drug development, laboratory and lifecycle management services. Most recent acquisitions include Evidera (health information and research services) and Syneus (patient recruitment and trial management).</td>
<td>1.9bn</td>
</tr>
<tr>
<td>Charles River</td>
<td>Reports in three segments: Research Models and Services, Discovery and Safety Assessment, and Manufacturing Support. Recent acquisitions include MPI Research (drug discovery and safety CRO), KWS BioTest (vitro and in vivo discovery testing services), Brains On-Line (pre-clinical specialist CRO focusing on CNS targeted drugs).</td>
<td>1.9bn</td>
</tr>
<tr>
<td>ICON</td>
<td>Based in Ireland, ranked 8th largest CRO by revenue and operates from 38 countries. Recent acquisitions include Mapi Group (research and commercialisation services), Clinical Research Management (research and regulatory services).</td>
<td>1.8bn</td>
</tr>
<tr>
<td>WuXi AppTec</td>
<td>Headquartered in China and offering services to big pharma, biotech and medical device companies. Recent acquisitions include ResearchPoint Global (CRO), HD Biosciences (preclinical drug discovery CRO).</td>
<td>1.0bn</td>
</tr>
<tr>
<td>Medpace</td>
<td>10th largest CRO by revenue, offering full-service clinical research and development services. Acquired by Cinven Partners in 2014 for US$0.9 billion. Recent acquisition of NephroGenex (pharmaceutical company focusing on kidney diseases).</td>
<td>0.4bn</td>
</tr>
</tbody>
</table>

Table 2

Source: Top 10 CROs 2018, Igeahub, 2018
The larger players have now covered many of the possible clinical capabilities and geographic reach. Given the time required to integrate these large acquisitions there is likely to be a pause in activity with many of these players not looking to make major acquisitions in the near future. Many of the remaining mid-size CROs are private equity backed, pursuing their own buy-and-build strategy and may be less willing to be acquired in the medium term. By process of elimination the focus for deals is likely to now be on smaller, specialised acquisition targets. Small firms with specialised capabilities can help fill niche capability gaps within larger groups. They are also significantly easier to integrate and so bring less operational challenges.

Investment in data technology

Over the past few years one of the major themes and drivers in the CRO market has been greater investment in technology and data. The Quintiles and IMS merger in 2016 is one of the best examples of this. CROs which have invested in this area have improved their value proposition to sponsors as the collection and analysis of data has become a key differentiator in the quality and efficiency of clinical trials.

The use of big data has become more prevalent in trials, which has vastly improved the quality of data collected. These big data sets are analysed computationally allowing for high-quality analysis as trends and associations are easily detected. One area in which the high-quality data outputs and analysis is extremely valuable is in Real World Evidence (RWE) studies, where a sponsor is required to prove the economic value of their new therapy. RWE has become increasingly important to sponsors, driven by both regulatory changes and pressure from payers. Both the European Medicines Agency (EMA) and the US Food and Drug Administration (FDA) are mandated to increase the use of RWE Data in the process of regulatory decision making through the introduction of the 2018 EMA Guideline and the 21st Century Cures Act. Regulatory agencies are increasingly looking to RWE to support new drug approvals, new indication approvals, and to satisfy post-approval study requirements. Additionally, payers are requiring more RWE data to support product value propositions and to justify reimbursement decisions. This issue is becoming more pertinent as the price for new drugs rises. As a result, RWE is becoming more valuable to pharma in order to provide key data for market access and Health Economics and Outcomes Research (HEOR) models.

However, data collection is not currently standardised which makes gathering homogeneous, structured data sets, a challenge. This ultimately impacts stakeholder and payer trust. As a result, pharma companies and CROs are investing in their RWE capabilities. A recent survey by the Tufts University found that pharma, biotech and CROs are planning to increase their staff headcounts for RWE data collection by 25% by 2020.

RWE capabilities are also being built through M&A. PPD’s acquisition of Evidera in 2016 added significant RWE capabilities to the group and was the driving force behind the deal. CTI Clinical Trial and Consulting Services acquisition of Eurotrials was similarly motivated. The acquisition significantly strengthened CTI’s RWE business and increased the firm’s global footprint in Europe and Latin America.

Icon + Mapi Group

Another deal along the themes of RWE and commercialisation was the acquisition of the Mapi Group by ICON. The majority of the 700 employees at Mapi are involved in RWE and analytics and their transfer to ICON doubled the size of the late phase team. In addition to RWE and analytics, other commercialisation capabilities gained included: regulatory expertise; post approval research; language services; consultancy services supporting clinical outcomes assessments; pricing and market access; and scientific communications services.

The Mapi acquisition was also a data play. The Mapi Research Trust is a non-profit organisation that collects patient-centered outcome information. The deal gave ICON access to this data which represents the industry’s most subscribed library of Clinical Outcomes Assessments (COAs).

Dr. Steve Cutler, ICON, CEO

“The late phase CRO market continues to grow as our customers face greater scrutiny from regulators and reimbursement bodies around real-world evidence of product value and safety. The acquisition of Mapi extends the breadth and depth of ICON’s late phase capabilities, creating an industry leading provider of post-approval research, spanning evidence generation, strategic regulatory services, scientific communications and commercial strategy. Our customers will also benefit from ICON’s access to the industry’s broadest set of tools and instruments as well as new and enhanced real-world data sets.”

James Karis, CEO of Mapi Group

“By combining with ICON, our customers will have access to a broader global footprint, additional depth of experience, new scientific communication services and access to innovative solutions to capture real world data from patients. In addition, our customers will have access to a wide range of global clinical services, spanning all phases of development.”
In 2017, PRA acquired Symphony Health Solutions for US$530 million. Symphony provides data, analytics, consulting and technology solutions to the biopharma industry. In addition to these cloud-base solutions, Symphony brought a 400-strong customer base, revenues in excess of US$200 million and their ‘Integrated Dataverse’, which is one of the largest commercial health databases in the US and contains information on over 280 million lives.

PRA is now able to use these RWE insights to customise clinical studies more effectively. This deal was intended to be complementary rather than synergistic. CEO Colin Shannon explained how the deal secured a strong dedicated data supply to support their ongoing growth.

“...We look forward to helping Symphony Health continue to grow their existing business and working with them to expand geographically using PRA’s global footprint. Symphony Health will also provide us with rich data insights that will allow us to customize our clinical studies to be as unique as the patients who they are designed around. By creatively harnessing the power of our technology and data assets, we are redefining the clinical development process for a more patient-centric future.”

Blockchain applications for CROs

Blockchain technology is software that records transactions in blocks, which link together in chronological order to form a secure, verifiable, transparent digital ledger system. The database is spread across a network of distributed nodes, each with their own copy of the entire blockchain.

By continuously synching their own copies with other users, these nodes ensure the information exists simultaneously in multiple places – creating a strong, secure, public record of transacted items between parties that is almost impenetrable to hackers.

The technology can allow two institutions to access and add to information kept on a blockchain for a single patient without compromising the patient’s privacy. This can allow CROs to collaborate with healthcare providers and academic institutions more easily.

Blockchain has the potential to increase trust in the way data is produced. An audit trail is built into every transaction, allowing verification of the original source and the ability to detect attempts to tamper with it. This has implications for tracking patient consent through multiple protocol revisions in a secure, verifiable, unfalsifiable way. Consent data can be tracked in real time and as such regulators can be confident that informed consent has been thorough, accurate and complete.

Patient recruitment is another area where blockchain has the potential to help CROs. The anonymous storing of detailed patient records could be made visible to trial recruiters who can actively reach out to patients if they qualify. This would increase the pool of potential participants and the quality of the data associated with them.
Clinical trial material supply chain is another area where CROs could benefit from blockchain. Investigational products can be tracked from inception to patient with a secure, accessible record of every step in the journey. We would expect to see innovative players within the CRO space making bolt-on acquisition to obtain blockchain technology much like they have done for AI and machine learning in the last 12 months.

**Complex regulatory environment driving need for services**

Pharma companies are forced to look at more advanced techniques to tackle unmet medical needs as the types of therapies being developed are becoming increasingly complex. These advanced drug modalities bring with them a need for more complex clinical trials. More endpoints must be measured, there are greater regulatory hurdles and more unconventional trial designs may be required. As the execution of clinical trials becomes harder and more complex the need for specialist expertise increases.

The industry is seeing more and more deals that have been driven by regulatory forces, highlighting the need for greater focus on safety together with greater penalties for failure to collect and report safety information in an appropriate manner. These changes have motivated CROs to increase pharmacovigilance capabilities to adapt to this more stringent regulatory environment which are often specific to the geography. Moreover, as governments across the globe increase standards on controlling the safety and efficacy of pharmaceutical products, regulatory affairs consulting has also been an area where sponsors have aimed to optimise efficiencies to accelerate overall timelines. CROs with extensive expertise in regulatory affairs ensure that new products comply with legislative requirements through preparing internal audits and materials for submission to respective regulatory agencies. Demand for these capabilities have been major drivers behind recent M&A activity including ProPharma Group’s acquisition of Xendo in June 2018 and Paraxel’s acquisition of Quantum Solutions India in April 2015.

The regulatory outsourcing services market is expected to grow at a CAGR of 12% between 2018 and 2024 to reach a global value of US$4.5 billion. As a whole, the market remains extremely fragmented, with many smaller, niche CROs dominating the field, especially in Europe.

**Syneos Health + Kinapse**

A recent notable acquisition in the post-approval and regulatory market was Syneos Health’s acquisition of Kinapse in August 2018. Syneos acquired Kinapse from the private equity firm, Hg Capital in a deal valued at US$160 million. Kinapse is a UK-based leading advisory and operational solutions provider to the life sciences industry, delivering services across the clinical and commercial lifecycle. Through this acquisition, Syneos expects to leverage synergies between the two businesses, capitalising on their safety, pharmacovigilance and regulatory operations in the post-approval market. Furthermore, the acquisition expands Syneos’ Asia Pacific operations and doubles their consulting footprint in Europe.

**Alistair Macdonald, Syneos, CEO**

“As customers increasingly face risk, competition and rising development costs, the innovative, technology-enabled solutions provided by Kinapse are seeing increasing demand. Through this combination we continue to inject new and enriched high-value solutions into the industry’s only end-to-end offering, unlocking value for all of our biopharmaceutical customers. Additionally, with Kinapse’s growth, recurring revenue streams and new cross-selling opportunities, we’re poised to further strengthen our Commercial business by integrating their services into more comprehensive offerings.”

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*Zion Market Research, 2018*
Private equity’s desire for pharma services

In 2017, global private equity funds raised US$453 billion, comfortably eclipsing 2016’s fundraising of US$345 billion. This was the highest level raised since before the financial crisis of 2008. The amount of capital that is being deployed on healthcare assets has increased and investors have improved their appetite for investment in the sector which has in the past been overlooked by some for being too complex and difficult to penetrate. The amount of healthcare deals as a proportion of total private equity deals has increased from 11% to 18% between 2015 and 2017.

In the past, M&A transactions largely consisted of trade purchasers as the key buyers. However, since private equity have increased their appetite for investment in this space, processes are seeing more and more private equity firms either investing for the first time in the CRO sector or acquiring bolt-ons for their pre-existing portfolio companies. Private equity firms have both the aptitude and attitude to source acquisitions, creating a competitive environment in which multiples are driven higher. Since 2013, the average EBITDA multiple paid by PE in the CRO sector was 11.9x. This environment has resulted in PE firms both acquiring but also selling their portfolio companies at a faster pace, yielding them an optimal return on their investment.

There has been a significant drop in the length of hold periods by private equity in the outsourced clinical services sector. Whereas the traditional model saw PE companies holding their portfolio companies for approximately five years, recently the industry has experienced PE houses reducing the amount of time between acquisition and sale.

We can point to seven outsourced pharmaceutical deals (eResearch Technology, BioClinica, Phlexglobal, Synexus, Xendo, Kinapse and InVentiv) which were all exited in less than four years (Figure 6).

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**Figure 6**

Source: Results Healthcare data

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7 Private Equity Fundraising in 2017: A Global Story, Value Walk, 2018
**Xendo + ProPharma Group**

In June 2018, Xendo, a leading provider of regulatory affairs and pharmacovigilance consulting services, was sold by Sovereign Capital Partners to ProPharma Group, who are backed by Linden Capital Partners. This deal not only represents the high level of private equity interest in this market, but also highlights Sovereign’s short hold period of Xendo.

During Sovereign’s 26-month investment period, they successfully supported the development of the business through a strategy of organic and acquisitive growth. Sovereign invested in operational efficiencies, enhanced the management team and supported the acquisition of Sofus, a Swedish-based company engaged in regulatory and quality solutions. In our opinion this transaction exemplifies the level of competition that exists, particularly in the private equity community, for good quality assets of mid-size scale.

Private equity recognise that there is still value to be achieved from secondary buyouts as acquisition companies require continual investment to expand their geographic footprint and add other service lines and capabilities.

**Role of Artificial Intelligence and Machine Learning**

Artificial Intelligence (AI) and machine learning, when combined with big data, has the potential to greatly improve the clinical trial process. Hidden signals within vast pools of Real World Data may only be found when processed by advanced AI algorithms. There are many areas within clinical trials where these insights may drive change.

With the ability to process and analyse large pools of data, AI has the potential to identify potential risks in the clinical development process and highlight them early. This could allow researchers to mitigate and adjust plans accordingly. Ultimately, this will speed up the path from protocol submission to drug approval.

AI algorithms can also be used to mine various data sources such as electronic health records, prescribing data and insurance claims. The resulting federated database can then be compared with patients who are currently enrolled in clinical trials to identify certain subgroups of patients that may be more susceptible to adverse events. The same method can be used for patient enrichment strategies whereby certain population subgroups are selected as most likely to progress to a particular disease state or to respond well to treatment. This can lead to higher powering and reduced N numbers, driving down costs and shortening development timelines.

AI also has applications within the increasingly important area of ‘wearables’ by processing and analysing multiple real-time sources of data. Effective use of wearable sensors can reduce the need for patients to travel for site visits during clinical trials. This is a significant barrier to patient recruitment and patient retention.

Operational improvements may also be found through the application of AI algorithms. PRA were able to predict the chance of a successful bid for new business with greater than 75% accuracy. Once projects were won, AI technology was able to correctly identify those studies that would run over budget with an accuracy of over 80%. These ‘back office’ applications allow CROs to deploy resources more intelligently and improve the overall efficiency of their business.

AI also has applications for recruiting clinical trial patients. This processing can be difficult and time-consuming for both the CRO and the patient. According to a White House briefing only 3% of cancer patients in the US are enrolled in clinical trials. A Cognizant report on recruitment forecasts estimated that 80% of clinical trials fail to meet enrolment timelines and one third of Phase III study terminations are due to recruitment issues.

**AI assistance in the drug development process**

<table>
<thead>
<tr>
<th>Research</th>
<th>Drug discovery</th>
<th>Pre-clinical</th>
<th>Phase I clinical trials</th>
<th>Phase II clinical trials</th>
<th>Phase III clinical trials</th>
<th>Regulatory review</th>
<th>Manufacture</th>
<th>Post marketing surveillance</th>
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<td>Target ID/selection</td>
<td>Pharmacovigilance</td>
<td>Protocol design</td>
<td>Site selection</td>
<td>Enrolment and retention</td>
<td>Regulatory submission</td>
<td>YCQR</td>
<td>Pharmacovigilance</td>
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<td>Mutation/ expression analysis</td>
<td>Biomarker discovery</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 7**

Source: Results Healthcare data

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8 White House, 2018

9 Patients Recruitment Forecasts in Clinical Trials, Cognizant, 2015
Traditionally patients may get trial recommendations from their doctor, providing their doctor is aware of an ongoing trial. Alternatively, patients must do their own research which will often involve searching registries such as ClinicalTrials.gov or patient forums.

AI could solve this problem by extracting relevant information from a patient’s medical records and comparing it with ongoing trials currently recruiting and suggesting appropriate matching trials. However, extracting the relevant information from unstructured data sources presents challenges to any AI system.

**Linguamatics acquired by a Tier-1 CRO**

In January 2019, Linguamatics was acquired by a Tier-1 CRO. Linguamatics is a leading provider of natural language processing (NLP) SaaS solutions to the life sciences and healthcare industries. In completing the acquisition, the tier-1 CRO will improve their current capabilities of uncovering insights to patient outcomes and enhancing their value-based care offerings. Linguamatics’ intelligent solution generates insights from a wide range of unstructured and semi-structured data, empowering customers to efficiently integrate AI into their operations. In 2018, Linguamatics was recognised by Frost and Sullivan as an Artificial Intelligence Life Sciences Leader. Results International acted as financial advisor to Linguamatics.

**Precision Therapeutics + Helomics**

In June 2018, Precision Therapeutics and Helomics agreed to merge. In doing so Precision gained access to Helomics artificial intelligence platform which, when combined with Helomics vast tumour database of over 149,000 patient cancer tumours, can produce actionable insights to help Precision’s TumorGenesis subsidiary develop patient-derived tumour models much more efficiently. TumorGenesis, once integrated and operating under Helomics, will work with the parent company to test tumours and enhance the company’s precision oncology offering.

**Genae + Hilbert Paradox**

Medical device CRO Genae bought Hilbert Paradox (HPX), a digital health data management platform in March 2018. HPX’s platform enables isolated digital health data silos to be captured and integrated using data analytics and AI. It can be used to help clients improve data equity – the value of their health data pools. This platform is expected to improve Genae’s Digital Health division and enable the processing of large volumes of data generated from genomics, diagnostic devices, biosensors and wearables to accelerate research.

### Acquisition into nascent therapeutics areas

Pharmaceuticals often outsource work where they are accessing new therapeutics areas and to this extent may not have the capabilities and expertise in-house. For CROs it has therefore been important that they have experience in a diverse range of therapeutic areas. Doing this inorganically can be faster and significantly easier, rather than spending years cultivating your team, hiring in new individuals. An acquisition could mean that the newer, larger business has a wider product offering or more in-depth expertise in an existing area. There are several therapeutics areas which have been highly sought after by CROs. Immuno-oncology is one of them and was the reason for Quintiles acquisition of Novella Clinical, Concept Life Science and Aquila Biomedical, Charles River and KWS Biotext.

Treating rare diseases is one of the most rapidly expanding areas in clinical research and pharma is consistently looking to partner with CROs that exhibit deep sector knowledge in the rare disease clinical trials space. Within the EU, a disease is defined as rare when it has an effect on less than 1 in 2,000 people. In total, approximately 7,000 rare diseases worldwide affect over 300 million people. Yet, despite this high prevalence, only 5% of rare diseases and disorders are approved by regulatory bodies. In spite of a small patient pool, rare diseases are becoming vital to pharma companies, who are able to charge high premiums for drugs that will have little impact on government health budgets.

The process in conducting a rare disease trial is substantially different than the typical traditional drug development, and many pharma companies look for a CRO that demonstrates innovative strategies to manage a rare disease program. ArQule, a personalized medicine company working in the oncology space, only identified two CROs in its search for an outsourcing partner that met its criteria to develop a drug in the ultra-rare disease space. Mid-sized CROs are often considered to be the sweet spot, where they are just big enough to have the relevant expertise needed in rare diseases, while CROs that can take rare disease treatment from Phase 1 all the way through to approval are often the most sought after. CROs specialising in rare diseases tend not only to have a clear understanding of the complexities of the trial process and all accompanying procedures, but are also considered very patient-centric. They quite frequently have close links with patient advocacy groups, who’s support is often seen as critical in creating registries and assisting with recruitment. These factors all played a key role in ArQule’s decision-making process.

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10 Rare Diseases, Moderna, https://www.modernatx.com/pipeline/therapeutic-areas/rare-diseases
11 Overcome the Challenges of An Ultra-Rare Disease Trial, Ed Misera, Clinical Leader, 2018
While CROs remain vital to bringing a new drug to market in the rare disease development process, conducting a rare disease clinical trial still comes with inherent challenges, namely from a small patient population and a wide geographical spread. Many rare diseases face various regulatory requirements in different countries; with no global consensus on the standard of care, this often leads to difficulties in identifying homogenous populations of these rare disorders. Furthermore, with the limited data available from an incomplete understanding of the disease’s history, it is often difficult to identify meaningful outcomes for clinical trials. It is critically important for pharma that CROs in this sector have expertise in enrolling rare disease patients and maximising site selection to create realistic study feasibility.

Atlantic Research Group + CCA Clinical Research

In December 2018, Atlantic Research Group (ARG) acquired CCA Clinical Research. In doing so, ARG, a rare disease, immunology and oncology-focused CRO, gained access to CCA’s expertise in rare diseases. The acquisition will further increase ARG’s expertise and service offering in the rare disease clinical trials process, allowing them to access more clients across new markets. The union will further permit ARG to expand its workforce and serve a larger and more diverse client base in the USA, Western Europe, the Middle East and Asia, creating a global, clinical trial management solution for small to mid-sized biotech companies.

Clinical Commercial Convergence

Studies have shown that of the drugs that make it to market nearly 50% fail to reach their sales expectations. The pharma industry is becoming more aware of the need for an effective post-approval, commercial strategy to ensure the success of a new product. There is now a greater focus on market access, health economics and patient engagement. Due to a lack of available talent, pharmaceutical companies struggle to keep commercial functions in-house and increasingly rely on outsourcing providers for these services.

Outsourcing in the post-approval/commercial space has seen particularly strong growth and now represents the largest share of pharmaceutical outsourcing to CROs. For CROs, many of the post-approval activities such as market access achieve stronger margins than the traditional clinical business of CROs where profitability has been squeezed by the procurement departments of big pharma. As a result, CROs are investing more in the commercial space through organic growth as well as M&A.

For example, INC Research (now Syneos) plans to leverage the commercial insights gained from the acquisition of inVentiv’s commercial outsourcing operations. inVentiv had a significant breadth and depth of commercial expertise offering services such as selling solutions, communications, and consulting. inVentiv also had an extensive network of Key Opinion Leaders (KOLs) including Medical Science Liaisons (MSL), nurse educators, patient advocates, as well as significant amounts of pharmacy data through its Adheris pharmacy network.

12 Trials and tribulations: Rare disease research and the shifting care paradigm, Melissa Fassbender, 2018

Figure 8

Clinical CRO landscape

Source: Evolution Bioscience, Results Healthcare data
Valuation

Valuations in the CRO sector have traditionally traded at a premium to the wider market and this has been partly a reflection of the overall enthusiasm for the sector, in addition to improved outsourcing trends and the initiation of large consolidation across the sector. Figure 9 illustrates the public valuations on an EV/EBITDA basis for the top eight publicly listed CROs compared to the S&P 500 index. The valuation multiples for these CROs is currently 15.9x which represents a premium of 38% compared to the S&P at 11.0x. Between 2014 and to date this premium has been 25% on average.

Public market valuations on an EV/EBITDA basis – S&P 500 index vs CRO index

Note: CRO Index constituents include: IQVIA; SYENOS; LabCorp; PRA Healthcare Charles River; ICON; Wuxi AppTec; Medpace

Figure 9

Source: CapIQ data
<table>
<thead>
<tr>
<th>Date</th>
<th>Target</th>
<th>Target Description</th>
<th>Target country</th>
<th>Buyer</th>
<th>Seller</th>
<th>Implied EV (£m)</th>
<th>EV/EBITDA</th>
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<tr>
<td>Feb-19</td>
<td>Citoxlab</td>
<td>Non-clinical CRO</td>
<td>France</td>
<td>Charles River</td>
<td>Ardian</td>
<td>392.0</td>
<td>13.8x</td>
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<tr>
<td>Jan-19</td>
<td>LinguaWorx</td>
<td>NLP SaaS solutions</td>
<td>UK</td>
<td>Tier-1 CRO</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Jan-19</td>
<td>Boston Medical Associates</td>
<td>Consulting and clinical trial management services</td>
<td>USA</td>
<td>Factory CRO</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Jan-19</td>
<td>Proteum Clinical Research</td>
<td>Conducts clinical stage pharmaceutical studies in a broad range of therapeutic areas</td>
<td>USA</td>
<td>Eligo Health Research</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Dec-18</td>
<td>CCA Clinical Research</td>
<td>Clinical trials of rare diseases, immunology, and neurodegenerative disorders</td>
<td>UK</td>
<td>Atlantic Research Group</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Nov-18</td>
<td>Cato Research</td>
<td>Full service CRO</td>
<td>USA</td>
<td>JLL Partners/Water Street Healthcare Partners</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Nov-18</td>
<td>BioAgility Labs</td>
<td>Bioanalytical testing lab</td>
<td>USA</td>
<td>Cobepa</td>
<td>Riverside Partners</td>
<td>314.0</td>
<td>20.0x</td>
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<tr>
<td>Oct-18</td>
<td>ApoCell</td>
<td>Next-generation lab specialising in the identification and analysis of biomarkers</td>
<td>USA</td>
<td>Precision Medicine Group</td>
<td>Summite Partners</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Aug-18</td>
<td>Knapspe</td>
<td>Provider of consulting and outsourcing services to life sciences industries</td>
<td>UK</td>
<td>Syneos Health</td>
<td>Hg Capital</td>
<td>n/a</td>
<td>n/a</td>
</tr>
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<td>Jul-18</td>
<td>Xendo</td>
<td>Consultancy and project management in the area of health care product development, manufacturing, compliance, validation, regulatory affairs, and engineering</td>
<td>Netherlands</td>
<td>ProPharma Group/Linden Capital</td>
<td>Sovereign Capital</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Jun-18</td>
<td>CRF Health</td>
<td>eCONA solutions including patient reported outcomes, observe reported outcomes, and clinician or rater reported outcomes</td>
<td>USA</td>
<td>Genstar</td>
<td>Vitruvian Partners</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Mar-18</td>
<td>Accorovance</td>
<td>CRO focused on oncology, vaccine and general medicines Phase I-IV programs</td>
<td>USA</td>
<td>Linical</td>
<td>n/a</td>
<td>24.0</td>
<td>n/a</td>
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<tr>
<td>Mar-18</td>
<td>Optimum Contact</td>
<td>SaaS-based Patient Feedback and Audit Compliance Software</td>
<td>UK</td>
<td>IQVIA</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
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<td>Feb-18</td>
<td>MPI Research</td>
<td>Full-service CRO</td>
<td>USA</td>
<td>Charles River Laboratories</td>
<td>n/a</td>
<td>618.0</td>
<td>11.7</td>
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<td>Jan-18</td>
<td>Concept Life Sciences</td>
<td>Drug discovery, development and analytical testing consultancy</td>
<td>UK</td>
<td>Spectris</td>
<td>Equitstone Partners/Europe</td>
<td>163.0</td>
<td>17.5</td>
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<tr>
<td>Dec-17</td>
<td>Crown Bioscience</td>
<td>Worldwide drug discovery and development solutions company</td>
<td>Taiwan</td>
<td>JSR Corporation</td>
<td>Os怜Med Advisors; Qiming Weichuang Venture Capital Management</td>
<td>267.0</td>
<td>35.4</td>
</tr>
<tr>
<td>Aug-17</td>
<td>intelective</td>
<td>Clinical and commercial CRO, morfed to rebrand as Syneos Health</td>
<td>USA</td>
<td>INC Research</td>
<td>Advent International</td>
<td>3,487.1</td>
<td>11.0</td>
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<tr>
<td>Aug-17</td>
<td>Symphony Health Solutions</td>
<td>Provider of data analytics and consulting solutions</td>
<td>USA</td>
<td>PRA Health</td>
<td>Symphony Technology Group</td>
<td>406.0</td>
<td>n/a</td>
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<tr>
<td>Jul-17</td>
<td>Chiltern</td>
<td>Full-service CRO</td>
<td>USA</td>
<td>LabCorp</td>
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<td>929.0</td>
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<td>Pamplona Capital</td>
<td>n/a</td>
<td>3,868.5</td>
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<td>A full-service medical communications agency, offering clinical and regulatory writing services</td>
<td>UK</td>
<td>LDC</td>
<td>Growth Capital Partners</td>
<td>38.0</td>
<td>8.5</td>
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<td>Dec-16</td>
<td>Philogenex</td>
<td>eTMF and TMF document management solutions and other support services to the clinical research market</td>
<td>UK</td>
<td>Vitruvian</td>
<td>Bridgepoint Development Capital</td>
<td>115.0</td>
<td>12.1</td>
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<td>Nov-16</td>
<td>European PharmInvest Services</td>
<td>Pharmacovigilance and regulatory science consulting services</td>
<td>Czech Republic</td>
<td>Ergomed</td>
<td>n/a</td>
<td>6.9</td>
<td>11.5</td>
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<td>Nov-16</td>
<td>Evaluate Pharma</td>
<td>Market intelligence and analysis for the life science industry worldwide</td>
<td>UK</td>
<td>Hg Capital</td>
<td>n/a</td>
<td>73.0</td>
<td>17.0</td>
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<td>Oct-16</td>
<td>Cyprotex</td>
<td>Provides toxicopharmaceutical (ADMET and PK) information services</td>
<td>UK</td>
<td>Evotec</td>
<td>North Atlantic Value</td>
<td>44.8</td>
<td>10.2</td>
</tr>
<tr>
<td>Oct-16</td>
<td>IMS Health</td>
<td>World’s largest, full-service CRO, covering clinical and commercial services merged to form IQVIA</td>
<td>USA</td>
<td>Quintiles</td>
<td>n/a</td>
<td>10,249.0</td>
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<td>Aug-16</td>
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<td>Integrated clinical research technology solutions</td>
<td>USA</td>
<td>Genven</td>
<td>Ampersand Capital Partners</td>
<td>1,082.0</td>
<td>14.0</td>
</tr>
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<td>Jun-16</td>
<td>Envision Pharma</td>
<td>A scientific communications and technology company that focuses on the life science industry</td>
<td>USA</td>
<td>Ardian &amp; GHD Capital</td>
<td>The Halifax Group</td>
<td>193.1</td>
<td>12.5</td>
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</table>

Table 3
Source: Mergermarket, Results Healthcare data; CRO Industry Primer, Credit Suisse, 2016; CapIQ data
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<th>Target</th>
<th>Target Description</th>
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<th>Seller</th>
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<th>EV/EBITDA</th>
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<td>Xendo</td>
<td>Consultancy and project management in the area of health care product development, manufacturing, compliance, validation,</td>
<td>Netherlands</td>
<td>Sovereign Capital</td>
<td>n/a</td>
<td>36.1</td>
<td>8.0</td>
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<td>May-16</td>
<td>Synexus</td>
<td>Engages in the identification, recruitment, and retention of patients for clinical trials</td>
<td>UK</td>
<td>PPD</td>
<td>LDC</td>
<td>178.0</td>
<td>16.2</td>
</tr>
<tr>
<td>Mar-16</td>
<td>eResearch Technology</td>
<td>Patient safety and efficacy endpoint data collection solutions for use in clinical drug development and clinical research needs</td>
<td>USA</td>
<td>Nordic Capital</td>
<td>Genstar Capital</td>
<td>1,391.0</td>
<td>13.0</td>
</tr>
<tr>
<td>Jan-16</td>
<td>IntelliV</td>
<td>Clinical and commercial CRO</td>
<td>USA</td>
<td>Advent International</td>
<td>n/a</td>
<td>2,936.0</td>
<td>11.1</td>
</tr>
<tr>
<td>Jan-16</td>
<td>VHL Research</td>
<td>CDMO services to biopharmaceutical and agricultural and industrial companies</td>
<td>Netherlands</td>
<td>Charles River Laboratories</td>
<td>American Capital</td>
<td>452.0</td>
<td>12.9</td>
</tr>
<tr>
<td>Dec-15</td>
<td>Sogo Rinsho</td>
<td>Site management and contract research organisation businesses in Japan</td>
<td>Japan</td>
<td>EPS Holdings</td>
<td>n/a</td>
<td>61.0</td>
<td>10.4</td>
</tr>
<tr>
<td>Dec-15</td>
<td>Whitehouse Laboratories</td>
<td>Analytical laboratory testing services for materials, finished products, containers, and package systems</td>
<td>USA</td>
<td>AMRI</td>
<td>n/a</td>
<td>43.3</td>
<td>10.5</td>
</tr>
<tr>
<td>Dec-15</td>
<td>Quintessent</td>
<td>Drug development services for pharmaceutical and biotechnology customers worldwide</td>
<td>UK</td>
<td>GHO Capital</td>
<td>Bridgepoint</td>
<td>142.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Nov-15</td>
<td>Corporate Translations</td>
<td>Translation services to pharmaceutical, biotech, and medical device industries</td>
<td>USA</td>
<td>RWS Holdings</td>
<td>n/a</td>
<td>54.1</td>
<td>14.6</td>
</tr>
<tr>
<td>Sep-15</td>
<td>Kinesis Pharma</td>
<td>Drug development consultancy offering contract research services</td>
<td>Netherlands</td>
<td>Venn Life Sciences</td>
<td>n/a</td>
<td>5.5</td>
<td>10.7</td>
</tr>
<tr>
<td>Sep-15</td>
<td>UDG Supply Chain Services</td>
<td>UDG's supply chain services</td>
<td>UK</td>
<td>Celeros</td>
<td>UDG Healthcare</td>
<td>350.9</td>
<td>13.4</td>
</tr>
<tr>
<td>Jul-15</td>
<td>Celsius International</td>
<td>Rapid bacterial detection systems/microbial screening systems for quality control testing needs</td>
<td>UK</td>
<td>Charles River Laboratories</td>
<td>North Atlantic Value</td>
<td>163.8</td>
<td>14.0</td>
</tr>
<tr>
<td>Feb-15</td>
<td>Synexus</td>
<td>Engages in the identification, recruitment, and retention of patients for clinical trials</td>
<td>UK</td>
<td>LDC</td>
<td>Horizon Capital</td>
<td>83.0</td>
<td>10.6</td>
</tr>
<tr>
<td>Jan-15</td>
<td>CRF Health</td>
<td>eCOA solutions including patient reported outcomes, observed reported outcomes, and clinician or rater reported outcomes</td>
<td>USA</td>
<td>Vitruvian</td>
<td>Verdan Capital</td>
<td>258.0</td>
<td>17.7</td>
</tr>
<tr>
<td>Nov-14</td>
<td>Covance</td>
<td>Clinical &amp; preclinical CRO, providing drug development and animal testing services</td>
<td>USA</td>
<td>Laboratory Corporation of America Holdings</td>
<td>n/a</td>
<td>3,434.0</td>
<td>13.3</td>
</tr>
<tr>
<td>Jul-14</td>
<td>Penn Pharma Services</td>
<td>Pharmaceutical drug development, clinical trial supply, and pharmaceutical manufacturing services</td>
<td>UK</td>
<td>PCI Pharma Services</td>
<td>LDRD</td>
<td>127.0</td>
<td>14.5</td>
</tr>
<tr>
<td>Jul-14</td>
<td>Phlexglobal</td>
<td>eTMF and TMF document management solutions and other support services to the clinical research market</td>
<td>UK</td>
<td>Bridgepoint</td>
<td>Inflexion</td>
<td>42.0</td>
<td>9.3</td>
</tr>
<tr>
<td>Jul-14</td>
<td>PrimeVigilance</td>
<td>A pharmacovigilance and medical information services company</td>
<td>UK</td>
<td>Ergomed</td>
<td>n/a</td>
<td>9.0</td>
<td>18.0</td>
</tr>
<tr>
<td>May-14</td>
<td>Medieval</td>
<td>Market access/HEOR consultancy</td>
<td>UK</td>
<td>Covance</td>
<td>n/a</td>
<td>9.2</td>
<td>n/a</td>
</tr>
<tr>
<td>Mar-14</td>
<td>Aptiv Solutions</td>
<td>Clinical CRO focused on adaptive &amp; device trials</td>
<td>USA</td>
<td>ICON</td>
<td>The Halifax Group</td>
<td>118.9</td>
<td>12.0</td>
</tr>
<tr>
<td>Feb-14</td>
<td>Knowledge Point 360</td>
<td>Provides multi-channel healthcare communication and advisory services for pharmaceutical and biotech industries, and healthcare professionals</td>
<td>USA</td>
<td>Ashfield</td>
<td>n/a</td>
<td>111.3</td>
<td>7.2</td>
</tr>
<tr>
<td>Feb-14</td>
<td>Medpace</td>
<td>Full-service CRO</td>
<td>UK</td>
<td>Cinven</td>
<td>LCP Capital Advisors</td>
<td>706.89</td>
<td>9.7</td>
</tr>
</tbody>
</table>

Source: Mergermarket; Results Healthcare data; CRO Industry Primer, Credit Suisse, 2016; CapIQ data
Concluding remarks

CROs are now a fundamental part of the drug development process and their importance will continue to increase. As sponsors experience growing regulatory scrutiny, escalating commercialisation costs and patent expirations on key blockbuster drugs, they are increasingly turning to expert outsourced providers to lower costs and expedite the time-to-market. In turn, the growth of CROs has accelerated over the past five years, with drivers like growth in R&D spend, increasing outsourcing penetration and requirement for more complex clinical trials facilitating overall market growth.

We have seen an increasing amount of consolidation in the market over the past five years. The CRO market has been highly fragmented, however the industry has experienced a high level of M&A activity, including multiple mega-mergers, creating companies which dominate the market and offer services spanning the drug development lifecycle.

These mega-mergers that previously characterised CRO M&A in 2016 and 2017 are unlikely to occur in the same quantity going forward as there is a shortage of CROs left of the required scale and many have covered the clinical capabilities and geographic reach possible. This was illustrated in the M&A activity of 2018, where we saw much smaller deals, focused on specialised capabilities acquisition targets. Small firms with specialised capabilities can help fill niche capability gaps within larger groups.

Private equity activity has also increased within the market, with competitive tension between firms driving high multiples and instigating reduced PE hold periods, contributing to the current attractiveness of the CRO M&A market. At this end of the market private equity have needed to become experts at the technicalities of the CRO market and now understand how this market will develop.

With a positive M&A environment and continued growth in the CRO market, we expect the substantial amount of M&A activity seen in previous years to continue. As sponsors are forced to look at more advanced techniques to tackle unmet medical needs and regulatory requirements pre- and post-approval become more rigorous, we believe M&A activity in the CRO market will focus on companies who can add a differentiated and specialist service offering, likely those specialising in AI and machine learning, regulatory and post-approval capabilities. The CRO market is one which is continually advancing as we improve our scientific and technological understanding, making the industry ‘one to watch’ for exciting M&A deals in the near future.
Results Healthcare at a glance

- Based in London and New York, Results Healthcare has an experienced and entrepreneurial team, which has completed over 75 healthcare transactions to date
- Part of the globally renowned advisory firm, Results International, Results Healthcare was established in 2012, in recognition of client need for a specialist team with dedicated skills in the healthcare, pharmaceutical and biotech sectors
- Results Healthcare offers strategic advice, fundraising, licensing, divestment and M&A support for both sellers and buyers worldwide
- The company has a dedicated team centred in London and New York, providing international coverage through Results’ network in Atlanta, Mumbai, Singapore and Tokyo

Our recent deals

- **Linguamatics** has been acquired by a Tier-1 CRO
- **GH Capital** has acquired **Sterling** has been acquired by **MCKESSON**
- **Pfizer** has divested its Tucson research facility and operations to **Hospira**, a Pfizer company, has divested its UK compounding business to **Baxter**
- **cherry** has been acquired by **AVENIRGLOBAL**
- **Xendo Capital Partners investment** has divested its Holmes Chapel manufacturing site to **Recipharm** has been acquired by **Precision for Medicine**
- **SANOFI** has divested the global rights to LEUKINE® and associated manufacturing assets to **PTX**
- **SEP Scottish Equity Partners** have made a significant investment into **dotmatics**
- **SANOFI** has divested its Tucson research facility and operations to **ICAGEN**
- **SK biotek** has acquired the Swords, Dublin manufacturing site from **Bristol-Myers Squibb** has been acquired by **UDG Healthcare plc**
- **Lucid Group** has secured investment from **LDC** has been acquired for £84m by **STEM**
- **inc Research** has signed a definitive merger agreement, valuing inVentiv at $4.6bn with a joint enterprise value of $7.4bn
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