

State of the Discovery Nation 2019

Key Insights

Joint report by Medicines
Discovery Catapult and the
BioIndustry Association

Introduction

Medicines Discovery Catapult (MDC), in association with the BioIndustry Association (BIA), has conducted its second review of the State of the Discovery Nation, summarised in this key insights report.

This year, the report reviews the size and shape of the sector, and then focusses on two technology areas that are set to influence the future of medicines discovery:

- **Artificial Intelligence (AI)**
- **Complex cell models (CCMs)**

Key insights

80% of small or medium-sized enterprises (SMEs) in the medicines discovery community are Service and Supply companies, accounting for 90% of employment

60% of the SMEs have fewer than 5 staff; 80% have fewer than 20 staff

70% of drug assets are in cancer, anti-infectives, or central nervous system (CNS)

Cancer is the strongest therapeutic area for UK companies

Companies working in anti-infectives face a challenging market

AI and cell and gene therapies were the hottest areas of 2018

Companies are calling for government support around funding and tax incentives

90% of companies need AI; currently 75% of AI spend is on data access and curation

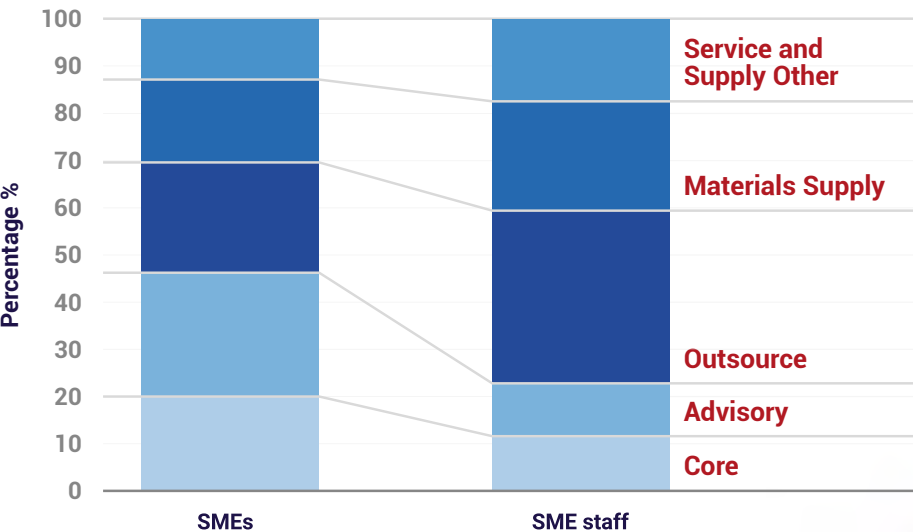
CCMs show much promise to reduce animal usage, with a need for validation before large-scale use

Market Analysis

Market analysis has been produced through a review of public and private data.

- Approximately 21,000 people work in 1,500 medicines discovery SMEs in the UK¹
- 2,500 people work in 300 companies that are developing their own drug assets ('Core' companies)
- 1,200 service companies employ 18,500 people
- The most common type of service company is 'Advisory', which is also the company type with the fewest average number of employees
- The largest employer company type is 'Outsourcing', supporting 8,000 jobs, approximately 40% of the total workforce

20% of companies are actively focussed on therapeutic product development



90% of staff are in service and supply

- Companies are focussed in hubs around the country
- 55% of companies are in the triangle of London, Oxford and Cambridge
- Further clusters around the North-West and Lowland Scotland



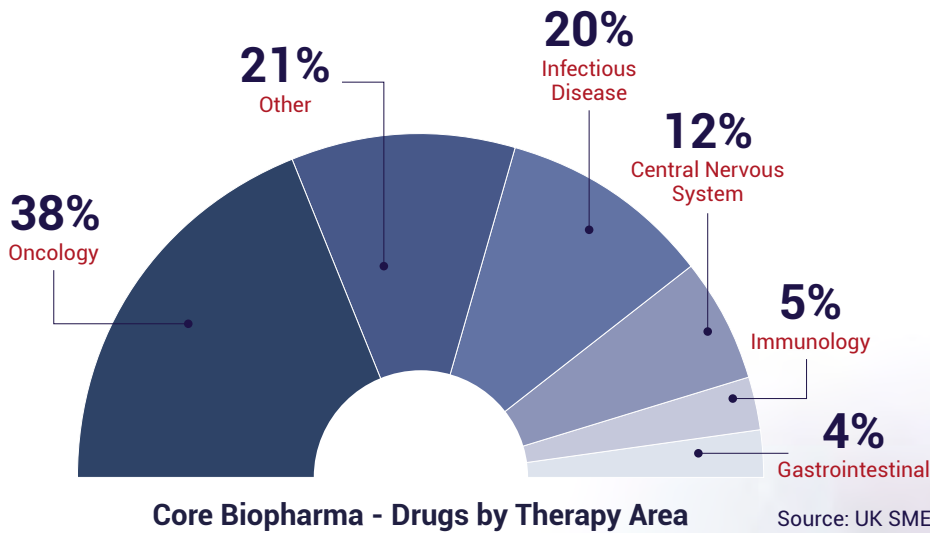
¹ Estimates have been rounded to reflect the volatility in company numbers

The sector is primarily composed of small SMEs

80% of companies employ fewer than 20 staff



60% of companies employ fewer than 5 staff



70% of SME assets are in cancer, anti-infectives or CNS

Source: UK SME data provided by Global Data

Focus on core asset developers





MDC conducted an in-depth review of asset-owning companies in the areas of oncology, infectious diseases, CNS disease, musculoskeletal disorders and respiratory.

Over 50 SMEs operate across preclinical and clinical phases in oncology, supported both by investor and commercial pull, and world leading science. These companies also benefit from active funding and co-ordination from Research and Development charities

The anti-infective company group remains active, but lower commercial interest means product development is challenging

CNS is a mid-size segment covering a range of diseases, with strong commercial pull

Drug discovery nation trends

-  80% of SMEs have significant concerns about Brexit's impact on recruitment
-  AI in drug discovery and cell and gene therapy are deemed hot areas, which is reflected in private sector capital investments
-  Companies require data science across all areas of drug discovery, and in particular improved data availability for AI and machine learning
-  CCMs were felt to be particularly promising in oncology and CNS, with a need for additional funding to independently validate new models

Sector view on MDC and broader government support



The SME community increasingly recommends working with MDC, increasing its 2018 rating among the government support structures



Respondents asked MDC for collaboration building and enabling access to industrial validation of new services and technologies

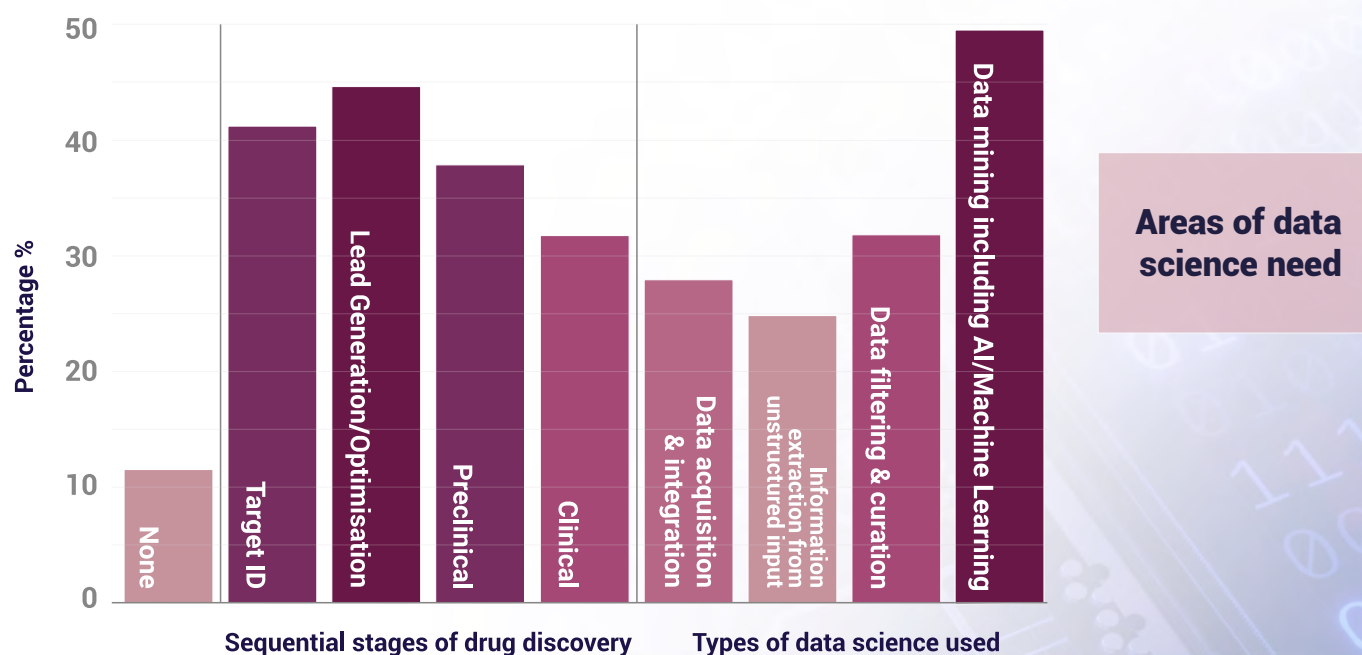


75% recommended the government should prioritise direct grant funding over in-kind or infrastructure support

Focus on Artificial Intelligence

AI is now seen as a core part of improving drug discovery decision-making and is needed by 90% of respondents across SMEs and larger companies.

- Big pharma is spending more on AI, and increasingly bringing this work in-house to build internal capabilities. However, the clinical and commercial value of AI projects and assets are hard to value, meaning risk-sharing and partnership deals are likely to continue
- 75% of company AI spend is on the upstream (often unseen) activities of data access, curation and data labelling, and not algorithm development and improvement. This leads to company requests to improve the availability of cost-effective datasets, as well as to improve the automation of chemical synthesis for faster feedback on AI-designed compounds
- The highest value datasets currently reside within pharma companies. This means that deals and platforms that enable SMEs to access pharma-held data are potentially valuable, though these are challenging to design in a way that protects pharma's assets



Community recommendations



Given the pace of change in the sector, MDC was asked to make datasets available, particularly in ADME² and toxicity, and to increase its advisory capacity for very early stage companies



There is a need to bring together AI buyers and sellers through events and networks, and to improve mutual understanding of the services offered and required

²Absorption, Distribution, Metabolism and Excretion

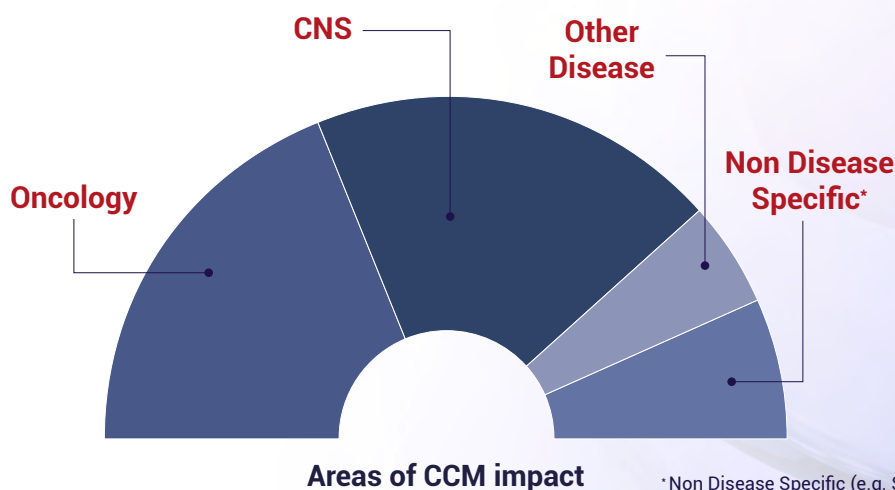
Focus on Complex Cell Models

CCMs are viewed as a valuable enhancement to current drug-discovery assays, when used correctly

After a period of academic breakthroughs and technological innovation, the market is focussed on improving reproducibility and developing validation data. This means that adoption is currently small-scale and experimental, but growing, with requirement from regulators a key enabler for future growth

The key areas where CCMs are expected to be impactful are cancer due to the successes so far and the commercial opportunity, and CNS due to the issues with current models

UK SMEs are seen to have a good reputation, potential for growth, and the ability to enter the CCM market from adjacent scientific fields such as induced pluripotent stem cells



Highest impact disease areas for CCMs are oncology and CNS

Community recommendations



UK SMEs are asking MDC to support the validation of CCMs and their pre-sales process by demonstrating and de-risking CCMs



SMEs recommend that MDC brings together the community and shares expertise through events and direct collaborations



MDC should focus on selected areas of commercial potential interest, where the risk remains too high for private funding

Acknowledgements

Thank you for reading the State of the Discovery Nation 2019 Key Insights Report. Thanks also to the experts across the UK SME community for their contributions to it.

The state of the drug discovery nation is improving and can benefit from continued support from the MDC, BIA, and broader government. We will continue to conduct research to ensure that we continue listening to the sector and shape MDC's strategy in response to evidence.

Please contact MDC if there is additional evidence that we should be considering. Our ambition is to go beyond incremental change, to transform the industry, and we look forward to working with you to achieve it.



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