LIFE SCIENCES

Technology-Driven Opportunities & Risks in Life Sciences

A survey of senior digital and data leaders, by NTT DATA UK

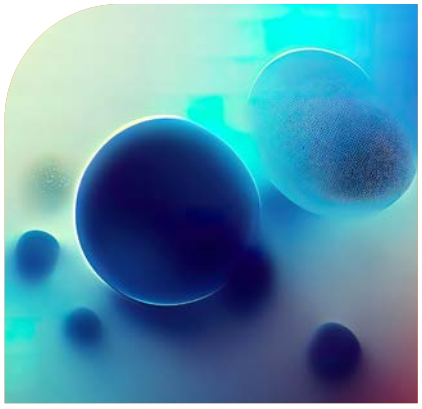
Introduction

An NTT DATA UK survey of senior digital and data leaders working in the life sciences sector has found serious concerns about the threat posed by cyber-criminals, with cyber attacks – both those designed to steal research data and intellectual property, and those motivated by financial theft – seen by respondents as their greatest technology-related risks.

Respondents also worry about the danger of accidental data loss or release, and are keenly aware of the risks involved in deploying Cloud and AI technologies. These fears are, however, balanced by widespread optimism about the potential to rapidly generate revenue and cost savings through applying digital and data technologies.

In particular, there is great excitement about the potential to rapidly introduce AI technologies – both traditional 'predictive' AI, and 'generative' large language models. In adopting AI, life sciences companies are prioritising data analysis applications – particularly to spot unidentified conditions and develop new treatments – and the use of AI to improve logistics, business processes and clinical trial methodologies.

Alongside AI, respondents see 5G, telemedicine and cloud migration as offering excellent opportunities. These technologies attract broader but less enthusiastic interest from our survey group.



Our survey

As a technology provider with extensive operations in the life sciences sector, NTT DATA UK is keen both to understand the needs, interests and concerns of digital and data leaders working in the field, and to contribute to the debate about how best to harness digital technologies in the service of patient care, operational efficiency and medical innovation.

In March 2024, we surveyed 100 of the most senior IT leaders working in large- and medium-sized pharmaceutical, biotech, digital health, medical research, diagnostics and drugs manufacturing businesses in the UK. Seniorities ranged from c-suite (such as CIOs and CDOs, who together comprised 38% of respondents) and vice-presidents down through departmental heads to director level, and company sizes ranged from 1,000 employees to more than 10,000.

We wanted to understand where this group see both the greatest current opportunities, and the greatest risks, around the application of contemporary and emerging digital technologies; and within the field of AI, we were interested in how they are prioritising the application of these fast-evolving technologies. We hope the results will be of interest to all those working in the field.

Key findings and analysis

Risks

To understand how respondents view the risks involved in adopting digital and data technologies, we asked them how much work, investment and reform is required to keep various risks at an acceptable level. Both of the threats most frequently put in the top category focused on cyber: 35% say that combating cyber-attacks launched for the purposes of espionage or data theft requires 'very substantial effort', and 31% say the same of attacks in pursuit of extortion or financial theft. In total, those saying that meeting these threats demands either 'very substantial' or 'substantial' effort total 79% and 76% respectively.

These findings reflect the heightened risk of espionage and data theft within life sciences compared to other industries, where most cyber crime is focused on financial theft and extortion. In part, this reflects the high value of research and trials data: in a sector where R&D costs represent a high proportion of investment and the first organisation to register a new treatment or vaccine takes the whole market for the duration of the patent, this information often comprises an organisation's greatest asset.

Such data is also very attractive to state-backed cyber actors – who are often better organised and resourced than other cyber criminals, and thus present a greater threat.

To address these dangers, life sciences organisations must ensure that their governance, risk and compliance procedures are robust and up to date, pay careful attention to good data governance, and design Cloud systems that maintain sovereignty and security. For more information on cyber security, visit our website.

When we combine those rating risks as requiring either 'substantial' or 'very substantial' effort, 'accidental loss or release' overtakes financially-motivated cyber-attacks to move up into second place, named by 78% of respondents. This finding speaks to the hard reality that, no matter how carefully an organisation armours its data management systems, simple human error can cause catastrophe: staff awareness and training in the issues around data security is just as important as system design.

Respondents also express acute concerns about the risks of both Cloud migration, and AI decision-making. On Cloud, a total of 74% say 'substantial' or 'very substantial' effort is required to avert security breaches during Cloud migrations; 64% say the same of the effort required to avoid breaking data handling rules during such transitions. Indeed, Cloud migrations must be carefully planned to ensure that data remains protected and that its management complies with legal and regulatory requirements; for more information on this, see the dedicated section of our website.

AI systems present a different and unique set of challenges: 63% say that 'substantial' or 'very substantial' efforts are required to ensure that opaque 'black box' AIs don't undermine compliance with regulatory requirements, while 61% are as concerned that AIs might generate discriminatory outcomes or false information.

Both Cloud and AI are seen as high-potential technologies (see below), but respondents are clearly aware of the significant risks attached to their deployment.

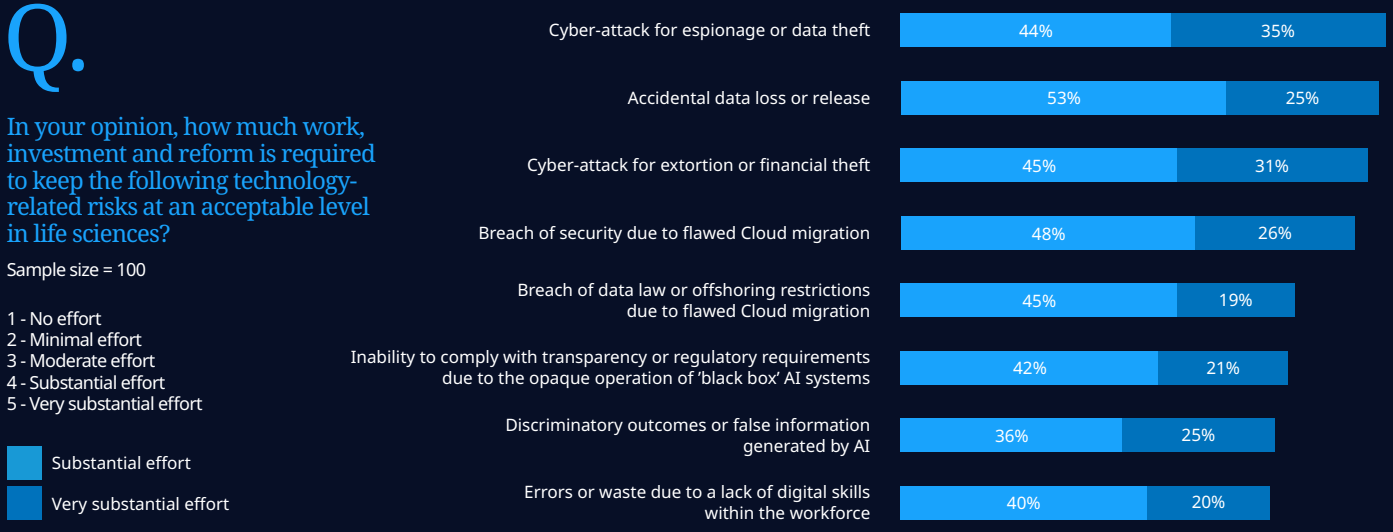
"35% say that 'very substantial effort' is required to address the threat of cyber attacks designed to steal data"

Q.

In your opinion, how much work, investment and reform is required to keep the following technology-related risks at an acceptable level in life sciences?

Sample size = 100

1 - No effort
2 - Minimal effort
3 - Moderate effort
4 - Substantial effort
5 - Very substantial effort



Opportunities

Asked to identify the technologies with the greatest potential to generate revenue and savings, respondents first name two forms of Artificial Intelligence: 35% say predictive AI currently presents 'very substantial opportunities', and 34% say the same of generative AI. The use of 5G (30%) and robotic process automation (RPA) (27%), come in third and fourth places on this metric, with other technologies scoring 20-23%. It's clear that, by some margin, AI systems are seen as the technologies with the greatest potential to truly revolutionise life sciences organisations and operations (see below).

If we broaden the definition to include 'substantial' as well as 'very substantial' opportunities, 5G comes in on top (82%) followed by telemedicine (79%), predictive AI (75%), Cloud migration (73%) then generative AI (72%).
So there is very widespread interest in the more mature technologies of 5G, telemedicine and Cloud migration, while AI technologies have slightly smaller but more enthusiastic fan bases.

The interest in 5G reflects its range of uses in life sciences. Private networks can, for example, be deployed to support communication within a laboratory, hospital or production facility – offering reliability, security and resilience, with high bandwidth and low latency. 5G is also well-suited to the remote operation of scientific and medical equipment, and has great value in telemedicine and wearable or implantable technologies.

We are also in accord with our respondents in seeing RPA – and its machine learning sister, Intelligent Process Automation – as high-potential technologies, with a range of applications throughout life science organisations' business processes.

Note that director-level staff (who form a quarter of the sample group) appear less enthusiastic about most of these technologies than more senior leaders. While the proportion saying that predictive AI presents 'very substantial' opportunities matches the whole-group figure of 35%, just 19% say the same of generative AI (against 34%), 12% of 5G (30%) and 19% of RPA (27%). In each case, a higher than average proportion say these technologies have 'substantial' opportunities – but they do seem less convinced about their potential to thoroughly transform processes and systems.

> "AI systems are seen as the technologies with the greatest potential to truly revolutionise life sciences"

This may reflect a tendency at the middle-management level to focus on some of the challenges and disruptions involved in adopting new technologies – such as the need for new skills and the potential for staff redundancies – rather than the opportunities to realise efficiencies or increase profits for the business. These technologies can help compensate for today's shortages of skilled staff; but when adopting any new technology or introducing organisational reforms, careful attention must be paid to change management issues – including staff engagement and consultation, regular clear communication, and workforce training. For further information on change management, visit our business consulting pages.

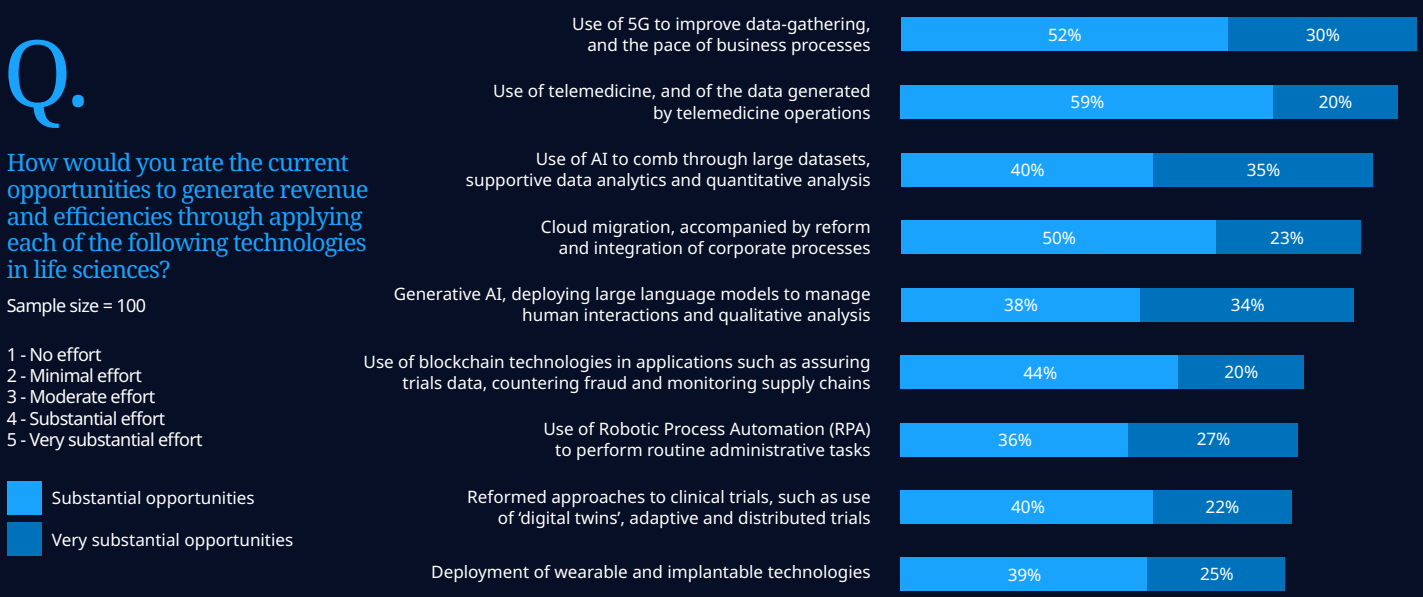
In general, though, positive scores are high for all technologies, with even the lowest-rated (wearable and implantable technology) seen by 61% of respondents as offering 'substantial' or 'very substantial' opportunities to generate revenue and efficiencies.
Only tiny proportions of respondents see 'no opportunities' in any of the technologies: the greatest scepticism appears within department heads' views of generative AI (20% see no or 'minimal' opportunities; see below) and directors' perceptions of blockchain (19%).

Q.

How would you rate the current opportunities to generate revenue and efficiencies through applying each of the following technologies in life sciences?

Sample size = 100

1 - No effort
2 - Minimal effort
3 - Moderate effort
4 - Substantial effort
5 - Very substantial effort



AI applications

Asked how their organisations are allocating time and resources to AI projects, more than half of respondents select as their top priority applications that focus on data analysis: 30% choose 'data analysis to identify new conditions where there is unmet medical need', and 21% 'data analysis to identify new molecules with therapeutic potential'. Both are included by more than 80% of respondents within their top five priorities.

Note that both goals rest on the use of predictive rather than generative AI. Currently, AI pattern recognition technologies are sufficiently mature for a range of predictive uses within life sciences, particularly in a 'closed' environment where the source data is controlled and well understood: obvious examples include the use of imagery for diagnostics, and poring through datasets to target further work in search of conditions or therapeutics. The quality of AI outputs is always dependent on the quality of the data fed into the system, so good data management is an essential foundation stone for the use of AI technologies; see our data and intelligence pages for more information.

After these data analytics applications, the AI deployment named as their top priority by the third largest cohort of respondents is its use to improve supply chains and logistics: 17% put this as their top priority, and 75% include it in their top five. Here – as in other business functions not unique to the life sciences sector, such as HR, legal and customer services – there are more obvious opportunities for the deployment of generative AI systems.

A clear majority of respondents are also prioritising AI-powered reforms to clinical trials: 66% list the processing of trials data for regulator submissions among their top five; 62% include the identification of trial participants; and 62% the creation of 'digital twins' to act as controls in computer-based 'in silico' trials

Asked about the risks of applying AI, respondents working in roles that include a focus on AI (31% of the group) tend to provide similar answers on prioritisation to those given by their colleagues. However, they seem a little more relaxed than others about the risks accompanying AI: 16% say that 'very substantial' effort is required to tackle the problem of discriminatory or false results, against a whole-group average of 25%; 16% also believe this of the opacity of 'black box' systems, against 21%.

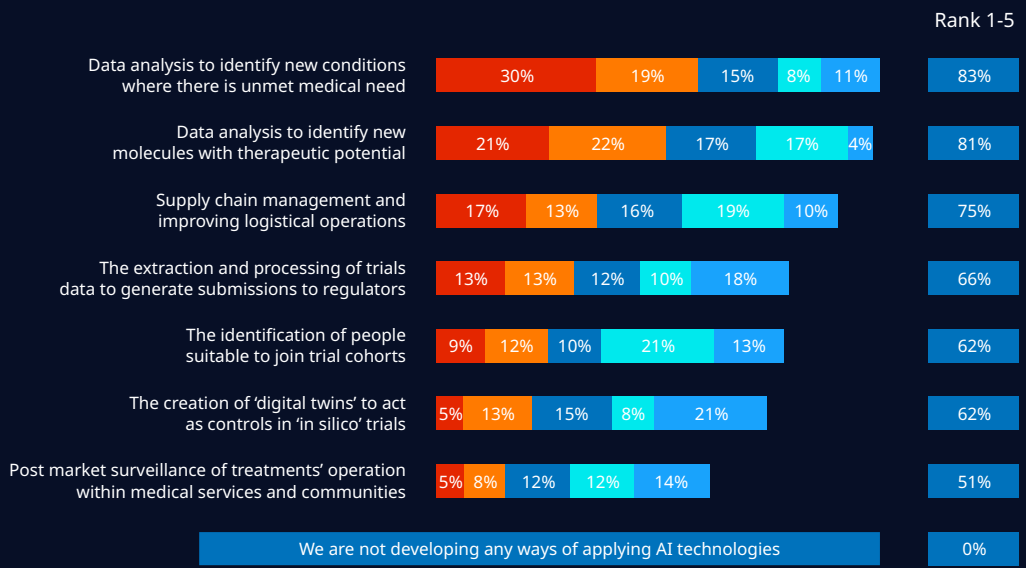
This may reflect the fact that AI specialists have a better understanding of how these threats may be addressed – for risk management techniques are advancing rapidly within the field. One important foundation is the creation of a set of data ethics guidelines, such as those published in 2019 by NTT DATA; these present a set of requirements around the operation of AI systems, providing a starting point for work to ensure that they will always comply with an organisation's ethos and principles.

> "More than 80% of respondents are prioritising the use of AI both to find new conditions where there is unmet need, and to identify new molecules with therapeutic potential"

Q.

How is your organisation prioritising its time and resources in developing ways to apply AI technologies? (Rank up to 5)

Sample size = 100



Net: Data Analysis (for any reason)
Rank No.1 = 51%
Rank Top 5 = 98%

Rank 1
Rank 2
Rank 3
Rank 4
Rank 5

Conclusion

Overall, the picture painted in these survey findings is a very positive one: with a range of technologies currently reaching maturity, senior digital and data leaders see enormous opportunities to generate efficiencies and increase profits in the life sciences sector.

The obvious candidates here are AI technologies. Currently, respondents have high hopes about the potential of generative AI – but they are prioritising the application of predictive AI, a more mature technology and one well suited to analysing the structured and numerical data so common within life sciences. This presents huge opportunities, our cohort believes, to improve the identification of possible new patents, the development of treatments and vaccines, and the operation of clinical trials. Nonetheless, in a closely-regulated sector where errors could have life-threatening consequences, technology leaders are rightly moving cautiously in implementing AI technologies.

Respondents also show keen interest in some lower-profile but more mature technologies – most notably 5G, telemedicine, automation and Cloud. Here, the risks are better understood and the main challenges lie within change management and system design. Still, respondents are clearly aware of the need to manage transitions into the Cloud very carefully, ensuring that data remains secure and compliant with regulatory requirements.

They are still more concerned about staff accidentally losing or releasing data: the security of every data management system depends on the skills and behaviours of its users. And above all, they worry about cyber attacks: beyond defence, few sectors are under greater threat than life sciences – where hard-earned research data has huge value, and well-funded state-backed hackers are highly active. Digital and data leaders in the life sciences sector find themselves presented with huge opportunities by emerging technologies; but before they can safely grow their organisations, they must ensure that they are protected.

"With a range of technologies currently reaching maturity, digital leaders see enormous opportunities to generate efficiencies and increase profits. But few sectors are under greater threat of cyber attacks than life sciences – where hard-earned research has huge value"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