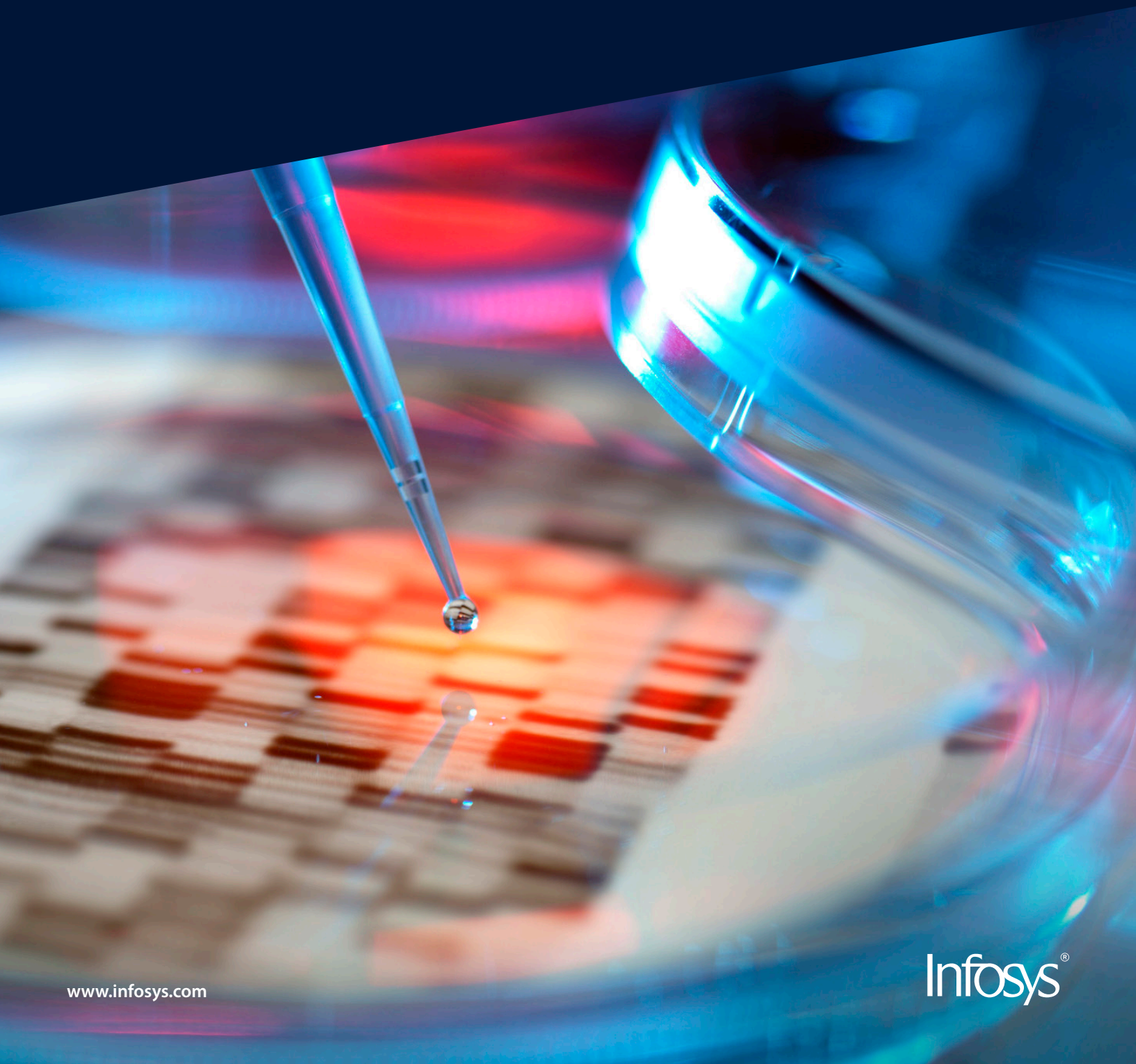
DIGITAL OUTLOOK

LIFE SCIENCES INDUSTRY



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INTRODUCTION

The life sciences business is facing several challenges as it enters the digital age.

Worldwide, sales are slowing down from the heady days of 2014-15 when new drugs for hepatitis and cancer drove strong growth. As the revenue from these drugs tapers off in markets like the United States, and the slowdown in emerging market economies impacts drug sales, the pharmaceuticals industry is faced with the prospect of tepid growth in prescription drug sales through 2020 (CAGR 5.1 percent during 2013-20). Patients are demanding a greater say in treatment and care. In response, pharmaceutical companies are engaging with customers more deeply, even treating them as strategic partners. Last but not least, the industry is facing financial pressure, as payers call for pricing reform, and value-based payments take hold.

Life sciences organizations, like those from every other industry, are turning to digital technology to help them overcome these challenges. They are using a range of technologies, from analytics to artificial intelligence (AI), to discover new drugs and treatments to spur growth, cut operational costs, and engage better with patients. With digital technologies progressing at speed, what developments are life sciences companies watching most closely? And what impact do they think these technologies will make on their business in the next three years?

As the technology partner of some of the biggest life sciences organizations globally, Infosys also has the same questions. Hence late last year, we commissioned a survey of 1,000 senior decision makers from business and IT, from large organizations (with 1,000 employees or more and annual revenue of at least US$500 million) in nine industries, including 112 respondents from the life sciences industry to hear their views on the digital technology trends that would make the greatest impact on their business within the next three years.

While identifying the key digital technology trends was the most important objective of the study, it was not the only one. The survey also sought to understand which digital technologies were in use within life sciences companies and the broad purpose for which they had been deployed – improve existing operations, solve new problems, or create new opportunities. Another objective of the research was to ascertain what measures these organizations needed to take to benefit from the favorable digital technology trends of 2018 and beyond.

Finally, the study reviewed these findings against current and immediate investments in digital technologies to understand where the life sciences sector was deploying its resources.

The research findings were supplemented with our own perspective and anecdotes about the happenings in the industry to produce this short but incisive report.

EXECUTIVE SUMMARY

- According to the life sciences companies surveyed, improving cyber security (64 percent), using cloud-based technologies (54 percent), and fostering industry collaboration (47 percent) are the top trends, which will make a positive impact on their organization within the next three years.
- Big data analytics (71 percent), cyber security (64 percent), and AI (62 percent) are the most common digital technologies being utilized by life sciences companies today.
- Life sciences organizations plan to invest in digital technologies in the coming 12 months, but not all investments are in the top trends: 76 percent of those who consider it a trend over the next three years were investing in technologies to improve cyber security for protection of patient and trial data.
- While funds were not a problem, a big majority of respondents said that their organization could improve both existing skills (86 percent) and technologies (87 percent) in preparation for implementing the top trends within the next three years.

TOP LIFE SCIENCES TRENDS FOR THE NEXT THREE YEARS

1 CYBER SECURITY

2 CLOUD

3 INDUSTRY COLLABORATION

From our conversations with respondents from organizations in the life sciences industry, it is obvious that they are aware of the latest digital trends, which stretched from 3D printing of customized drug doses to using new patient-centric platforms in clinical trials. When asked to name the trends with the greatest positive impact on the organization in the next three years, the respondents mentioned the following (only those named by 30 percent or more are listed below, not showing the three most commonly chosen):

a. Automating pre-work in clinical research by using optical character recognition (OCR), search engines, and AI, complete with a chatbot user interface, for knowledge management.

b. Online interactions (for example, one-to-one personalization on the channels that healthcare providers prefer, increased use of mobile, and virtual meetings). Since healthcare providers (HCPs) rarely have the time or willingness to meet sales representatives, marketers of pharmaceuticals and other solutions are trying out digital alternatives to engage and educate them. These B2B marketing tactics range from communicating on preferred channels, such as mobile, to using virtual meetings, which are becoming an increasingly important method of engagement. Here, the use of integrated applications will make it easier for life sciences companies to engage HCPs on digital channels as well as expand reach.

c. Experiments in 3D printing to customize drug doses. In a detailed conversation, one respondent said 3D printing could make a huge impact, both from an operational and quality perspective, and could revolutionize how products are brought to market.

d. Improving safety of drugs by improving data ingestion, data quality, and including data mined from practitioners' mining literature and social media to augment structured data. Currently there exists a number of challenges – process gaps, lack of visibility, etc. – which the life sciences industry can fix by digitizing the flow of intake. Companies can use a benefit risk assessment tool, which uses algorithms. They can also use visualization and reporting tools to analyze structured and unstructured data and compare the risk benefit profile of a drug with competitive offerings using metrics like Angioedema-Quality of Life (AE-QoL) and adherence, and make informed decisions on how to take the drug forward.

e. Investments in new patient-centric platforms to support clinical trials throughout the life cycle, from patient identification, screening, and recruitment, to eConsent, adherence, and engagement. To facilitate the last two, the platforms leverage clinical, claims, electronic medical records (EMR), electronic patient-reported outcome (ePRO), and behavioral and sensor data along with various algorithms.

f. Using analytics and pattern recognition to support clinical trial participants by detecting disease early and driving value-based care.

g. Improving business process efficiencies of pharmaceutical companies by investing in risk based monitoring to predict key events, collaborative automated authoring, automated publishing of clinical trial outcomes to regulators, track and trace systems throughout the distribution process, e-labels, and IoT-led predictive maintenance in pharmaceutical factories.

h. Using technology to achieve greater patient-centricity during clinical trials. This includes a number of measures such as employing wearable devices to remotely track clinical trial patients and digitally integrating electronic medical records to have a single source of truth for health data.

i. Using mobile technology to educate patients about drug safety and effectiveness, gather data, or send reminders about medication.

On average, each life sciences respondent put five trends in the list of what would make a significant positive impact on their organization in the next three years. Overall, the digital technology trends that were mentioned the most revealed that life sciences organizations were mainly placing their bets on mature technologies that could help them improve existing operations rather than emerging or disruptive technologies. These trends were improving cyber security to protect patient and clinical trial data (mentioned by 64 percent of the respondents), using the cloud to improve data and data analytics (54 percent), and collaborating within the industry to share information and thereby improve patient outcomes (47 percent).

Here is a closer look at each.

1 Improve cyber security to protect patient and clinical trial data

Digital technologies are fueling innovation and business performance in life sciences. However, they come at a cost – a higher risk of cyber attack. With highly confidential data on patient health, clinical trial outcomes, drug development, and intellectual property flowing across a vast healthcare ecosystem of clinical research partners, contract manufacturers, marketing agents, business process outsourcers, and other vendors, the need to secure defenses has never been higher. As one respondent said, patients are seeking more information and life sciences companies are responding by offering richer data. Since the information will only be given to those who opt in, companies must ensure they have a robust system to protect patient identities.

Unfortunately, a number of life sciences organizations are still behind the curve when it comes to security provisioning. In a 2017 survey of life sciences executives commissioned by a premier consulting and advisory firm, 43 percent of the respondents said they had not ramped up cyber security investments despite being aware of serious breaches. Workplace attitude and practices are also to blame. In pursuing a culture of openness and collaboration to facilitate access to information, life sciences personnel have been known to flout cyber security guidelines by, for example, leaving open workstations unattended and hence vulnerable to data theft. The industry has also historically thought of cyber security as an "IT problem".

But now it looks like things are changing. The C-suite is taking a keen interest in cyber security, and personally grappling with challenges such as understanding what their most valuable (and vulnerable) assets are, figuring out the best protection tools, and securing the commitment of internal staff and external partners to the security mission. This is a massive task that will take years to complete. Hopefully, the beginning shall be made in 2018 itself.

2 Use of cloud-based technologies to improve data and data analytics flexibility and efficiency

A recent research study predicts the global life sciences analytics market to touch US$24.73 billion by 2021, significantly higher than the US$13.26 billion figure for 2016. Cloud-based analytics is an important factor in this growth.

A leading technology advisory firm expects that by 2019, 75 percent of life science R&D IT organizations will deploy applications on a cloud-first basis. To pharmaceutical companies laden with data gathered during drug development, the cloud offers a highly scalable and flexible environment to host and share that information. During expansion phases – new trials, products, geographies – companies can build their core IT infrastructure on the cloud, and easily ramp it down later.

Also, migrating data and data analytics to the cloud will help life sciences companies derive deeper insights and thereby intensify engagement with various stakeholders – regulators, payers, healthcare providers, and caregivers. It will also empower sales and marketing teams with valuable customer insight (easily accessed from a single location on the cloud, from any device, and on demand) that they can use to take better decisions while executing strategy and engaging customers.

3 Encouraging industry collaboration by adopting industry-standard processes for shared HCPs to give them the right information faster, leading to better outcomes for patients

The emergence of specialty medicine calls for sharing vast amounts of data with HCPs. But this process is full of friction: each life sciences company typically has a dozen or more digital channels that onboard and identify HCPs in different ways. Given that each HCP works with several life sciences companies, it soon ends up inconvenienced and frustrated by the engagement experience, and turns to other sources for information.

Collaboration is the answer to this problem. By working together as an industry to adopt standardized processes, life sciences organizations can enable HCPs to get information faster. Ideally, these collaborations should take place in online meetings. Unfortunately, regulatory restrictions on information sharing have limited this option and driven companies to resort to awkward alternatives.

This is likely to change in the future, as integrated applications built to suit industry requirements, including compliance, make online meetings a good choice for digitally engaging HCPs. That is probably the reason why 54 percent of the respondents included this in their list of influential trends for the next few years.

Which of the following trends will have the most positive impact on your organization within the next three years?

Cyber security for protection of patient and trial data	**64%**
Use of cloud-based technologies to improve data and data analytics flexibility and efficiency	**54%**
Industry collaboration for its shared HCPs so they get the right information faster, leading to better outcomes for patients	**47%**
Automation of pre-work in clinical research	**44%**
Online interactions (for example, one-to-one personalization on the channels that HCPs prefer, increased use of mobile, and virtual meetings)	**43%**
Experiments in 3D printing of drugs for customized drug dosing	**42%**
Improving safety of drugs by improving data ingestion, data quality, and including data from mining literature and social media	**40%**
Investment in new patient-centric platforms to support clinical trials	**40%**
Providing patients support during clinical trials using analytics and pattern recognition for early disease detection	**39%**
Investment to improve business process efficiencies of pharma companies	**34%**
Use of technology to achieve greater patient-centricity during clinical trials	**34%**
Use of mobile technology to educate/inform/engage patients through clinical trials	**33%**
Use of technology to derive data driven contextual insights for sales action	**29%**
Average number of trends that will have a positive impact on respondents' organizations within the next three years	**5**

DIGITAL TECHNOLOGIES THAT LIFE SCIENCES ORGANIZATIONS USE – BIG DATA, CYBER SECURITY, AND AI

Life sciences companies use about six digital technologies on average. The most deployed technologies in the industry are big data analytics, cyber security, and AI, in use at 71, 64, and 62 percent of the organizations, respectively. A surprising 58 percent of the respondents said their organization used 3D printing.

Which of the following digital technologies does your organization currently utilize?

Big data analytics	71%
Cyber security	64%
AI (machine learning, deep learning, natural language processing, natural language generation, and visual recognition)	62%
3D printing	58%
Internet of Things	55%
Enterprise cloud	54%
ERP and enterprise application implementation/modernization	48%
Dev-ops and agile	47%
Business process management solutions	46%
Enterprise service management solutions	33%
APIs	33%
Blockchain	29%
Mainframe modernization	12%

For the respondents within life sciences organizations participating in the survey, the most important purpose of implementing the mature technologies in this list, namely, cyber security and big data analytics, was to improve existing business operations. In the case of AI, however, it was clearly to create new opportunities (62 percent) just as it was for other emerging technologies like 3D printing and blockchain.

When the following areas of digital technologies and solutions were implemented within your organization, was it to improve existing business operations, solve new kinds of business problems, or create new opportunities?

	Improve existing business operations	Solve new business problems	Create new opportunities	None of these
3D printing	45%	34%	52%	-
AI (machine learning, deep learning, natural language processing, natural language generation, and visual recognition)	43%	42%	62%	-
APIs	65%	43%	24%	-
Big data analytics	51%	45%	40%	-
Blockchain	36%	42%	52%	-
Business process management solutions	67%	41%	29%	-
Cyber security	65%	46%	21%	1%
Dev-ops and agile	60%	45%	25%	-
Enterprise cloud	54%	44%	39%	-
Enterprise service management solutions	78%	38%	24%	-
ERP and enterprise application implementation/modernization	70%	41%	28%	-
Internet of Things	42%	44%	45%	-
Mainframe modernization	62%	46%	54%	-

WHERE THE LIFE SCIENCES SECTOR IS INVESTING – NOT NECESSARILY IN THE TECHNOLOGIES DRIVING THE TRENDS

Life sciences organizations plan to invest in digital technologies in the coming 12 months. How much of that money is going towards new applications? Most importantly, are these investments aligned with the technologies underlying the most important trends in the business?

To understand this, the survey asked the respondents whether they were investigating or investing in the top trends they had named as having the most impact on their organization in the next three years. Here are the findings.

The trend being invested in by the largest number of organizations was not among the top three by importance or influence: 86 percent of the respondents said they were investing in technology to make clinical trials more patient-centric – a trend that has been "active" for some years now. The finding likely means life sciences companies are going to use information such as wearable data and electronic medical records in addition to their existing sources to improve clinical trials.

Cyber security came next, with 76 percent of the respondents claiming they were investing in it, followed by investments in improving business process efficiencies (67 percent).

Sixty-one percent of the organizations said they were investing in automation of pre-work in clinical research.

Is your organization investing in or investigating any of the top trends?

	Investing in this trend	Planning on investing in this trend	Investigating this trend	Not investing in, planning on investing in or investigating this trend
Use of technology to achieve greater patient-centricity during clinical trials	86%	7%	7%	-
Cyber security for protection of patient and trial data	76%	21%	2%	-
Investment to improve business process efficiencies of pharma companies	67%	26%	7%	-
Automation of prework in clinical research	61%	21%	18%	-
Improving safety of drugs by improving data ingestion, data quality, and including data from mining literature and social media	59%	34%	6%	-
Online interactions (for example, one-to-one personalization on the channels that HCPs prefer, increased use of mobile, and virtual meetings)	57%	29%	10%	5%
Investment in new patient-centric platforms to support clinical trials	54%	38%	8%	-
Industry collaboration for its shared HCPs so they get the right information faster, leading to better outcomes for patients	52%	35%	13%	-
Providing patients support during clinical trials using analytics and pattern recognition for early disease detection	52%	29%	14%	5%
Use of cloud-based technologies to improve data and data analytics, flexibility, and efficiency	51%	37%	12%	-
Use of technology to derive data driven contextual insights for sales action	50%	44%	6%	-
Experiments in 3D printing of drugs for customized drug dosing	48%	44%	7%	-
Use of mobile technology to educate/ inform/engage patients through clinical trials	40%	55%	5%	-

When asked "Which of the following technologies or solutions will your organization use in order to realize the promise of all of these trends?" the life sciences respondents were once again somewhat inconsistent in their response.

Although cyber security, cloud, and collaboration technologies were central to the top three trends, they did not feature at the top of the list here. Rather, the respondents said big data analytics (67 percent), AI (61 percent), and 3D printing (61 percent) were the technologies that would help them to capitalize on the trends within the next three years.

Last but not least, how confident was the life sciences industry about implementing these trends? When the survey asked the respondents if they had what it took to implement their top trends, a big proportion agreed that they need to improve their technologies (87 percent) and their skills further (86 percent). Only 36 percent cited lack of funds as a barrier to implementation, which is expected, given the healthy investment level in the industry.

IN CONCLUSION

The life sciences industry is relying on digital technology to solve its greatest business challenges. Using cyber security solutions to protect confidential patient and clinical data is a big priority, and the most impactful trend. Many of the key trends in the industry are about making clinical trials more patient-centric.

As the sector making the biggest investments in digital technology, life sciences clearly has the budgetary resources to implement key trends. However, organizations feel they need to improve their technologies and skills further to implement the trends to the fullest.

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