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MarkLogic

Defragmenting Data for the Future of Pharma R&D

Contents

Executive Summary

Innovation in pharma today means faster 'time to insight'. However, trying to innovate with disconnected, fragmented data is slow, costly and frustrating—for both pharma companies and patients. Today's data resides within disparate sources scattered across the organization and beyond. This data can only provide value when it's integrated—meaningfully and securely linked, accessible, and resilient to new sources and unintended use cases.

The business challenges that data fragmentation presents in the industry are compounded by organizational approaches that make moving and manipulating data arduous. Data inefficiencies not only present a barrier to sharing, collaborating and the development of new knowledge, they also slow commercialization, delay new ventures, and hamper operational improvements.

Worse, the costs associated with organizing data are becoming ever more prohibitive for pharma, in both money and time.

It is a problem worth solving. Defragmenting data will enable pharma to ask the right questions, using all of their data, whether internal or external, to efficiently bring about innovation and accelerate time-to-insight. When combined, the massive volumes of data flowing in from clinical research and real-world environments can offer critical insights into disease, trials, and treatments.

In a climate of growing collaboration in which pharma, governments, health providers, non-profits and even patients are working together at scale, prohibitive data silos and fragmentation must be overcome in order to even participate in the future of healthcare.

Pharma must become data agile. But new technologies offer only part of the answer. The need to take a more cultural, strategic and enterprise-wide approach to data is becoming critical, especially where different internal functions have adopted inefficient, siloed, and proprietary approaches to data and application development. This also applies between organizations, where novel approaches to secure data sharing and collaboration must be developed.

In this paper, we explore the potential of a world where data is freed from silos. We shall examine in more detail the factors that are preventing this and what it will take to collapse prohibitive structures with appropriate technologies, processes and approaches.

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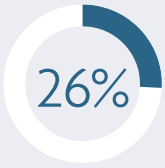
of pharma industry executives consider their levels of data sharing effective today.



believe that effective data-sharing capabilities are lacking.

consider cultural factors as the biggest hurdle to overcoming data silos.

Source: online survey by eyeforpharma in July 2019

A World Without Silos

Great rewards await those who develop the skills, technologies and capabilities to mobilize data across and beyond the organization to where it can be analyzed and interpreted in ways that offer value.

New insights from research data can lead to more rapid identification of promising molecules and less time wasted on frustrating efforts that go nowhere, dramatically reducing the time from research to commercialization.

And insights from health records, genomic research, population-level studies and patient device data are already leading to exciting developments in ever more niche new treatments.

Faster, cheaper, safer

Synthesizing real-world and clinical data to develop and conduct faster, less-costly trials presents a significant opportunity. More responsive and efficient pharmacovigilance, thanks to new abilities to detect real-time trends about drug effectiveness in the market, is another benefit that comes with data agility.

In a world of ever more niche and personalized therapies, such agility is even more important, says Ignacio Quiles Lara, Executive Director, Global Marketing and Commercial Operations at AbbVie. "In oncology, for many years we were only thinking about 'one solution fits all' therapies, such as chemotherapy. But starting in the 2000s, several scientific revolutions clearly marked the beginning of a new era for biomedical research, for new molecules tailored to the individual. The early uses of real-world data are changing the way we look at the business we are in. Data from the human genome project is changing the way we are seeing disease. We are thinking about new antibodies, bioespecifics, antisense therapies, prime editing, or CAR-T, taking cells from patients, genetically engineering those cells and reintroducing them."

Better products, better care

Integrating silos could enable useful exchanges of data between different parts of pharma.

For example, insights gained via Medical Science Liaison (MSLs) from the healthcare providers in terms of their thoughts and understandings about particular products could contribute to future iterations of a product, improving outcomes, safety and efficacy.

Such insights are currently gathered manually and are trapped in most pharma organizations, says Mohammed Ali, Global Head Digital Trials at Boehringer Ingelheim. "Right now there is no centralized structure or system to capture this data."

Significant efficiencies are another benefit if data can be freed from internal silos. A good example is the lack of collaboration when it comes to clinical trials documentation. Clinical teams tend to develop trials in discrete groups and do not share data from trial to trial, which means repeating work unnecessarily.

For many non-novel indications, much relevant information could be accessed in existing documentation, saving a great deal of legwork and data sourcing. Too often it tends to be in non-searchable Word or PDF formats, making such access and sharing impractical.

Collating such information takes weeks and can run to well over €100,000 in hours worked per trial. "In a medium to large pharma company that may run up to 200 trials a year, that amounts to potentially millions of euros saved a year. That's a reproducible saving for one process that can be reinvested in R&D and which also hastens a product's speed to market," says Ali.

"Collating such information takes weeks and can run to well over €100,000 in hours worked per trial. In a medium to large pharma company that may run up to 200 trials a year, that amounts to millions of euros saved a year. "

Mohammed Ali, Global Head Digital Trials at Boehringer Ingelheim

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New dynamics
Sharing data beyond the organization is becoming business as usual. New collaborative rather than competitive dynamics are emerging as data is shared more often between an array of healthcare entities, all of them gaining from the exchange.

Hundreds of niche and non-niche therapies mean there are many overlapping areas of research where many actors, profit and nonprofit, might fruitfully work together, says Quiles Lara. "There is more incentive to share because everyone is developing different therapies.

"There are 10 large biotech or pharma compaines pursuing oncology but another 700 biotech companies that have one or two products – or one indication. There is a lot of room and space for the development of new ideas, therapies and innovative approaches in oncology. Patients still needs new effectives therapies to treat devastating diseases.

"To take real advantage means a change to our approach to information in R&D. It's not only about the drugs and medication, it is also about the diagnostics, looking at specific mutations."

When a pharma company's data is set up to be shared, secured and governed from the start, it makes it easier to participate in the large, multi-agency, cross-industry consortia and collaborations involving governments and non-profits that are being set up to tackle specific diseases and working from national or multinational disease registries.

Democratizing data
Freeing data from silos should also "bring a new generation of analytics, artificial intelligence and machine learning tools that could help radically democratize the process of innovation within pharma"

New analytics tools will enable business leaders to use software to generate insights from data without having to write code in the manner that a data scientist would do today, further speeding progress.

Collaborating directly with patients
Patient-generated data is a further opportunity to innovate if the traditional, and understandable, separations that have existed between all stakeholders in the patient journey can be rethought and the barriers to sharing this data overcome.

Working directly with patients on drug development entails a dramatic shift for the industry, but the opportunities will only grow as patient-generated data explodes in the coming years, says Ali. "We need to be able to talk to patients, have an open exchange about how they are feeling and truly engage in a dialogue where we can use their insights for drug development."

"Hundreds of niche and non-niche therapies mean there are many overlapping areas of research where many actors, profit and nonprofit, might fruitfully work together. There is more incentive to share because everyone is developing different therapies."

Ignacio Quiles Lara, Executive Director, Marketing and Commercial Operations, AbbVie

What's Preventing Pharma From Escaping Data Silos?

The piecemeal legacy data architectures that have evolved in the past decades mean pharma companies, like most big enterprises, are playing a game of catch up to take advantage of these opportunities.

The data limitations within pharma mean even relatively simple interrogations are still a challenge, says Anish Shindore, VP and Head of Digital Acceleration (and formerly Global Head of Commercial Data Solutions) – DTx at Sanofi. "For example, from a salesforce effectiveness point of view, I cannot even answer a few simple questions, such as: Who is the doctor that I am visiting? What am I showing the doctor today? Who is the sales rep visiting them? And, what is the plan of action for that doctor?"

Similarly, in pharmacovigilance, despite the profusion of information being shared on social media or forums about product use and side effects, the industry is still held back from mining that data for indications due to the inability to master and integrate it.

Despite hopes for innovation and insight being pinned on AI and machine learning, and the capabilities of such technology to unlock new insights from data, the fact is, these tools are still barely being used in the way they might, and a great deal of potential is going unrealized, says Shindore, including in his own organization. "I can guarantee you the best data scientists in my organization are the most underutilized."

Different departments develop solutions in isolation

Different departments work to solve specific problems on their own terms and seldom work with other departments to solve a common issue.

In many cases, silos arise because different departments within the same organization create their own data infrastructure based on a particular domain such as immunology, Alzheimer's or cardiovascular disease.

This approach has led to use of multiple data warehouses each purposely built to deal with specific capabilities such as adverse event data, for example. Typically, this involved building places for physical servers to house this information, and then writing the software scripts so that the datasets inside it could be used and queried.

It is a slow and arduous process for any organization, says Bill Fox, VP Vertical Strategy and Global CSO Healthcare and Life Sciences at MarkLogic. "That all had to be done before you did anything with the data. Data-wrangling took 80% of the time and 50% of the budget on projects like these. It could take a couple of years and millions of dollars upfront to build these warehouses before you could even start using them. By then, the questions and the requirements could have changed."

Although pharma has been addressing the issue, change has been piecemeal while the commercial urgency to respond at scale has become acute. Silos in R&D in particular are holding pharma organizations back, says Fox. "They know that if taking a drug to market takes as long tomorrow as it does today, they will soon be out of business."

Differing external data

Dealing with internal data is one challenge, but when it comes to external sources—data sitting in multiple silos in multiple hospitals with differing standards and no harmonization—"it's one big mess out there," says Vannieuwenhuyse. "There is an important step to be taken to integrate that data before it can be used for research purposes."

Databases were not designed for the questions of today

Legacy databases typically answer specific queries. They were not created for the kinds of possibilities being explored today. "The fact that pharmacovigilance might want to link chemistry data to incidents, for example, is not something anyone will have thought of when that database was originally created," says Philip Hajduk, Vice President of R&D Information Research at AbbVie.

As they are currently designed, these databases are inflexible, says Hajduk. "The way they're architected prohibits asking more questions about the data. In many cases, it is not clear how those inquiries would be made at all."

This is one of the great impediments to some far-reaching breakthroughs, says Nigel Hughes, Scientific Director at Janssen Clinical Innovation. "We have data and samples now that can answer questions we did not know we would be asking when it was all gathered, but it is difficult to use the way it is currently configured."

Data lakes have become data swamps

The data lake approach, moving data in different formats from all over the organization into one place, has not solved the issue of silos. Data lakes do not automatically enable an organization to curate and master data in ways that enable it to ask new questions of it or to share with ease.

"We sometimes call data lakes 'swamps' because they become a dumping ground, and you have to then be intelligent after the fact to make use of the data," explains Fox.

There may well be an emotional tendency among those who have invested in existing solutions, including data lakes, to attach great value to them, which can be an impediment to creating agile data platforms that can securely ingest, harmonize and share data wherever it comes from, says Fox.

"We sometimes call data lakes 'swamps' because they become a dumping ground, and you have to then be intelligent after the fact to make use of the data"

Bill Fox, VP Vertical Strategy and Global CSO Healthcare and Life Sciences, MarkLogic

Semantic search is tricky
Semantic, Google-style searches of our data is already possible. However, pharma's very particular and varying drug, disease and tissue biology vocabularies, further compounded by complex gene and protein expressions, present an extra challenge. Tagging internal data with such vocabularies tends not to be done well as yet.

Multiple synonyms for drugs in similar classes, for example, compound the challenges of being able to search meaningfully. Ensuring data can be shared by standardizing the terms used is vital. For example, a toxicology department might have its own specific internal adverse event definitions that will need to be harmonized before they can be more widely shared and analyzed.

"If you are not looking at a document in the right way, it is hard to do," says Imran Chaudhri, MarkLogic's Chief Architect for Healthcare and Life Sciences. "Searchability, recall, specificity and precision are low in most organizations. We are trying to help them improve recall above 90 percent and improve precision and relevancy at the same time. SharePoint or a file repository just doesn't cut it."

Without the right ontologies, searching for data across the organization can be difficult and wastes time, says Fox. "Where data is integrated, harmonized and enriched with appropriate taxonomies, the noise in database searches can be greatly reduced."

Culture eats strategy
The limitations of legacy technology are not the only factors keeping data in its silos. Cultural constraints are a significant barrier, too.

Data security concerns have understandably weighed heavily. Many pharma companies are still getting comfortable sharing data because of genuine security or governance reasons, yet over-caution or simply a territorial attitude to data are still rife, says Hughes.

"We have to have greater openness and receptivity to collaborating between and within pharma companies. There are lots of reasons why we don't share data internally, but none of them stand up to real scrutiny. There is a lot of data that is easily shareable and does not cause any problems from a privacy, security or compliance point of view."

Patient privacy and GDPR are also often raised as spurious reasons not to share data between healthcare and pharma, says Vannieuwenhuyse. "These are often used as an excuse not to share. There can be a feeling of entitlement to own data from research groups who want the privilege of using their own data first, in many cases, because their metrics are the number of publications they get, and they don't want others to publish."

This is going to have to change. Collaborative networks between pharma, academia and healthcare, such as those set up by the likes of the Mayo Clinic, the Karolinska Institute or Oxford & Cambridge Universities, are increasingly the future model of research, says Hughes.

The old model of building walled gardens—buying data and keeping it in the organization—will not offer the best way to capture value from data in the future.

Approaches and attitudes to working with and sharing data will need to evolve, says Hughes. "As a sector, we don't have a culture for doing this. Everyone talks about being data-driven, but no one is very good at it right now. Pharma and academia both still tend towards the parochial when it comes to holding and governing their own data."

As this trend grows, participants will also need new ways of thinking about useful exchanges of value when it comes to data, says Hughes. "Breaking out of silos will require new types of non-financial relationships and collaboration—such as one party sharing data and another sharing analytical capabilities."

A lack of trust
Cultural problems exist outside too. Trust between parties is an impediment to deeper collaboration, adds Vannieuwenhuyse. "Do external partners trust others, specifically pharma, well enough to allow some types of access and reutilization? Trust is intangible, but it's also really important. It takes a long time to build, and you can quickly lose it."

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Nigel Hughes, Scientific Director, Janssen Clinical Innovation

Solutions: A New Data Architecture

A significant part of the solution to freeing data from silos will lie in establishing a new data architecture that enables users to conduct intelligently written, natural-language searches that return meaningful answers.

These searches should return highly relevant information from across a range of data sources by inferring what is being asked based on who is searching and what the data system knows about their specific interests.

From Google to Netflix

"From the conversations I have with people in R&D, they want to go from the 'Google' experience to the 'Netflix' experience," says Fox. "Netflix is a system capable of learning your preferences. It knows that if you are this type of person, generally you are looking for this kind of information, and it can make recommendations accordingly."

Data architectures capable of this will build an understanding of user intent and create a network of relevant objects and vocabularies that enable content to be ranked in terms of its relevancy to that user.

They will use operational data to build a deeper picture of user needs and interests, adds Chaudhri. "As more and more users click on data, for example in searches for diabetes, if we know their preference already, we can find similar users based on their usage patterns.

"Machine learning models are also starting to improve the relevance of what gets returned to users by automatically looking for patterns in the data and creating operational codes to alert data scientists to potentially valuable correlations."

Trying to create capabilities like this within existing data infrastructure typically entails prohibitive costs in both money and time, says Fox. "A project like this would take three to four years and cost $10-20 million. Those things don't happen. You just give up in the end."

Creating a new data foundation and architecture is therefore necessary to be able to reduce time spent with data-wrangling and blending. "This entails integrating and making accessible structured and unstructured data source."

Using a data hub framework, cloud computing and a software subscription model, such capabilities can be made operationally faster and at far lower cost than trying to adapt legacy infrastructure, says Fox. "What would have been a two-year project can become just three or six months."

A new future of collaborations

Collaborations, public or private, offer important paths to innovation in pharma, but without a flexible data architecture, interacting with other organizations will be difficult.

A data hub approach should also ensure that handling external data in formats that are not standard inside the organization is possible. "A data hub framework with the ability to ingest data as it is, and that is able to harmonize it, will enable and accelerate that process," says Fox.

"A hub approach means it's also easier to create a more granular security infrastructure, ensuring that access to information can be closely controlled and governed to satisfy the requirements of those partner organizations providing the data."

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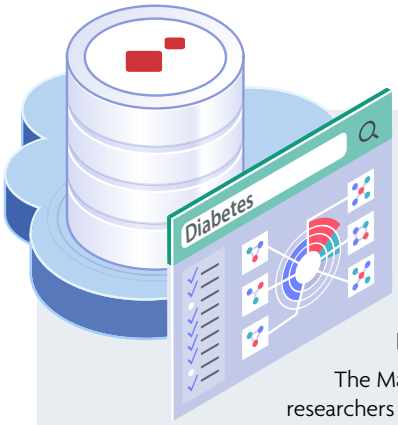

MarkLogic Data Hub Service for Pharma R&D

A 'single pane of glass' for R&D data

Pharmaceutical researchers are often unable to find the information they need within massive data assets that include decades of research and clinical trial data. Meanwhile, IT departments struggle to help as they're stuck focusing on the IT plumbing rather than building end-user solutions.

The MarkLogic Data Hub Service for pharma R&D enables researchers to quickly and easily find, synthesize, and share information, speeding progress through the R&D pipeline.

Implementation: Build Trust and Knock Down Walled Gardens

While pharma organizations are already working to break data out of their silos, none have yet reached the desired end state, says Bill Fox of MarkLogic. "Life sciences companies are moving to the cloud, are exploring databases capable of handling unstructured data and are trying to change the way they interact with customers. Some have invested heavily, but nobody is all the way there. No one is running a next-generation, cloud-centric, data-first system now."

It is no small undertaking. For organizations that have in some cases dozens of multi-million-dollar data projects already in progress, trying to transform every part of the data infrastructure everyone relies on day to day can feel much like attempting to change the engine while the plane is flying.

Evolving the data technology need not entail a rupture from existing operations, however. Transforming your data architecture does not have to be done in one grand project. For companies starting the voyage, it may make sense to start in one therapeutic area so that they can learn and evolve.

But adopting technology that works is only one part of the puzzle. As important as the technological solutions is the approach and attitude of pharma and the wider healthcare sector, says Hughes. "Technology is not a barrier. There are lots of providers with their secret sauce. Much of the work companies need to do is cultural and governance related."

A. Implement rules and governance

Pharma organizations must consider data from an enterprise-wide perspective, empowering a governing body to start defining rules to data throughout its lifecycle. This is not a straightforward task.

This body needs to set universal rules around sourcing. The quality of data required, who has access to it and what kind of insights should be gathered must all be defined.

A top-down data strategy that clearly lays out how data is captured and stored and that specifies who should have access to what data and for what reasons is necessary to creating a data system that creates the right connections for the future, says Boehringer Ingelheim's Ali.

B. Identify the right pilot projects

The right pilots, delivered rapidly and then communicated widely are essential for building enthusiasm for deeper and broader data transformations. In short, find the right business problem, implement a solution and demonstrate ROI quickly. This drives crucial cultural support for this and the next project.

ROI measured in time and effort saved can be a powerful persuader. By contrast, spending two years on a technology transformation project will try patience beyond the breaking point.

Being able to show rapid improvements in search capability for a particular task so that it becomes as close to instant as possible will create enthusiasm and an enduring commitment to the process, says Fox. "If someone previously had to use five different databases and build their own Excel spreadsheet over a weekend but can now achieve the same thing in 15 minutes, that is a significant acceleration of the business. This gives people the will to keep going."

"Technology is not a barrier. There are lots of providers with their secret sauce. Much of the work companies need to do is cultural and governance related."

Nigel Hughes, Scientific Director, Janssen Clinical Innovation

C. Lead and educate

As with any change management process, sponsorship of data transformation projects from the top is important, but the middle and bottom tiers of the organization must also be persuaded of the need for new attitudes and approaches. According to Fox, "It is incumbent on business leaders in R&D and pharmacovigilance or safety to go to the next level in understanding the capabilities of technology. They don't need to be able to write code. It is possible to transform the business within a year and not believe those who tell them it is impossible." How to educate, train and keep people aware of the technologies you are using is a challenge and it is easy to underestimate this aspect of the task. The work involved in making the benefits of new data tools apparent to colleagues throughout the organization goes beyond running some seminars, says Hajduk.

"People are not behaving badly if they don't seem to be responding. It doesn't matter how good your idea is, if you don't articulate it and show how it applies to others' problems, it will fail. I've run so many seminars on new tools and shown off how cool they are. Then months later I walk into their office and ask if they have used the tool and they say they didn't see how it applied to them."

D. Assimilate IT management

It is also incumbent on IT leaders to get out into the business to understand the challenges and the use cases of colleagues, adds Fox. "Are the decision-leaders improving conditions on the ground? Are researchers finding information readily and easily? Is pharmacovigilance able to pick up events and separate signal from noise better? Are we dealing with GDPR?

"It is really about leaders taking on that responsibility to break out of those silos and to enable their people to begin operating in a different way. Email is not sufficient, and large-scale presentations are not enough to drive data culture. You have to go scientist by scientist, sit down with them and show them how your tools can help them."

It's also an ongoing process, adds Hajduk. "The problems are always changing. When you sit in front of a small group and show off the technology, they ask about something else. The feedback is tremendous. You can't get it from surveys, it's a high-touch process. It is eventually catalytic, but there is a long way to go before it becomes self-sustaining, so that aspect of the work has to be part of our job too."

Being receptive to the needs of colleagues and showing interest in how they go about interrogating data is an important part of the role of those developing data tools for the organization, says Hajduk. "Curiosity is now the number-one trait I look for in the managers leading my teams."

E. Build new data capabilities and roles

Data-related roles in pharma will also become more important inside the organization particularly when it comes to issues around data governance, quality management and stewardship, says Hughes. "Those now need to become official roles, not part-time jobs. Data needs to be thought of as an asset for the company, and you need to have the right caretakers looking after it.

"If you are using cloud infrastructure and data science, you need people from a software engineering background and data scientists who know how to use AI and how to develop self-service tools. These new curators and stewards of data need to create the right use cases and identify the right users of the data."

A head of digital capabilities for the organization as well as more people in digital roles with digital and analytics skills in health economics will be needed, says Quiles Lara.

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F. Consider vendors for lifetime partnership

It is tempting to choose vendors based on their capability to help with the organization's most pressing data problems, but it is important to consider how likely a vendor may be to help evolve new solutions to future data capabilities you may not even be able to articulate yet.

After conducting a broad technology assessment, AbbVie spent the last few years assembling data technologies from various vendors to create the desired infrastructure with a view to future as well as present needs, says Hajduk. "It's important to ask, is this a vendor that is going to grow with me and is investing in novel technologies and will continue to be cutting edge?"

The process is more art than science, he says. "A lot of it is gut feel when they come in and present. You get a good sense of that when meeting with their engineers, chief architect and technology officers and also from their experience and where they have been."

Counterintuitively perhaps, vendors with deep pharma-only specialisms might not always be the best fit, says Hajduk. "R&D is special—but it is still data. There are advantages to those specializing in R&D, but if you choose them, you will get what every other pharma is looking for.

"You get a rapid solution to your problem today, but what could a vendor who may have solved problems you don't even know about across finance, or the military, offer? I might pay more, and it might take longer, but maybe having more diversity of applicability is better. It is a question of how urgent it is for me to solve that problem today. There's no formula for this."

Choosing vendors with the capability to help evolve solutions to incorporate the latest tools in artificial intelligence and machine learning, which AbbVie is in the process of developing, is important.

The art of building an agile data organization

AbbVie has been transforming its approach to data and is on the cusp of seeing the benefits from a more agile data setup, says Philip Hajduk.

Being able to analyze data on targets, drugs and patients faster means making decisions faster, driving operational efficiencies and cost savings. "We have a firm belief that better use of data will allow us to recruit clinical trials faster, so their costs should go down and we should see decreased R&D costs.

"AbbVie is expecting to see results soon," Hajduk says. "We track new entries to the pipeline on the basis of insights generated from our network. We would expect in the next 12-24 months it will start to impact our pipeline."

The company is also hoping in the near term to actually start applying artificial intelligence tools to help accelerate progress, he adds. "The idea is to convert these data into databases that can be used for AI.

"We want machine learning to learn from the knowledge graph that we have used. A machine can then exhaustively explore all possibilities and look for statistically similar things we would not have been able to look for. Where AI will have its most power is at scale, and we are starting to have enough data to make use of these techniques."

The Way Forward

Pharma organizations may feel they are already drowning in data and struggling to co-ordinate multiple data projects. It would be understandable if they did not relish the prospects of taking on the 'meta' problem of data silos.

But, as this paper has hopefully made clear, creating the means to analyze and synthesize disparate data sets from within and beyond the organization is becoming a key means of innovating in the healthcare industry.

An organization-wide approach to data, and an IT architecture that enables this, is therefore becoming an imperative.

Happily, the new technical tools at pharma's disposal allow this to be done in a way that need not be disruptive. Rather than entailing a high-risk 'big-bang' IT overhaul, dissolving data silos can be iterative. The most straightforward projects can be used to demonstrate tangible benefits and then rolled out steadily across the organization.

But the full advantages will not emerge instantly. Individuals throughout the organization will take time to learn about and exploit the new found possibilities. Realizing the potential of newly freed data will to a great extent depend on data leaders working with colleagues throughout the organization to help them see and realise the possibilities in their work.

Over time these partnerships will lead the way to a future of limitless insights and ever better outcomes for patients, healthcare providers and pharma companies alike.

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About Marklogic

Data integration is one of the most complex IT challenges, and our mission is to simplify it. The MarkLogic Data Hub is a highly differentiated data platform that eliminates friction at every step of the data integration process, enabling organizations to achieve a 360o view faster than ever. By simplifying data integration, MarkLogic helps organizations gain agility, lower IT costs, and safely share their data. Headquartered in Silicon Valley, MarkLogic has offices throughout the U.S., Europe, Asia, and Australia.

Visit www.marklogic.com to learn more.

About eyeforpharma

Our mission is to make pharma more open and valued. More open so that the strongest ideas and insights are brought to the fore in a transparent, trustworthy manner. More valued by having an authentic approach to building products and services that matter to patients.

To do this, eyeforpharma provides a hub for senior-level pharma executives, patient groups and other health stakeholders to exchange ideas and observe shifting trends and practices. We actively respond to the aims and interests of our audience, so please get in touch if you think we can do more. Visit www.eyeforpharma.com.