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sciences

A Science-Aware™ Approach to Lab Informatics

The problem with most LIMS and ELN solutions and 5 markers of a science-aware™ approach.

Introduction

A good experiment starts with the right questions.
So too does a good solution search.

Science begins by asking the right questions and doesn't stop until they are answered. Why then is the search for an informatics platform marked by incumbent solution categories, few questions, and no real answers? The reality is, many of the market's leading lab informatics solutions leave scientists wanting—reluctant to adopt, unable to innovate, and hamstrung when it comes to unlocking the true benefits of a platform-based approach.

In this guide, we'll answer five essential questions at the heart of the solution search and clearly define a science-aware standard for lab informatics that you can use to identify the right platform for your lab.

Whether you're a scientist, lead a team of scientists, or are enabling scientific progress through your supporting work, this guide is for you. Read on, and discover the power of a science-aware approach.

Why science-aware?
A science-aware platform unifies data, works the way scientists do, and makes life in the lab simple.

1 What do scientists need in a lab informatics platform?

2 Why do so many solutions leave them wanting?

3 What is a science-aware platform and why does it matter?

4 How does the platform you choose shape the lab you will become?

5 What criteria define a platform that is truly science-aware from the rest?

What do scientists need in a lab informatics platform?

Complex science and the need for highly simple LIMS and ELN solutions.

The complexity of science has never been greater—with more complex small and large molecules, more sophisticated instruments, intensified pressure to discover, more stringent reporting requirements, and a greater velocity and volume of data than ever before. The onus is on the lab informatics platform to simplify all of this complexity and get drugs to market faster. But to achieve this level of simplicity is easier said than done. It requires an approach that is rooted in a sound understanding of science and its requisites in a platform.

Did you know?

Sapio clients cite the simplicity of our interface and the sophistication of our LIMS and ELN capabilities as a key reason for selection.

Talk to a Sapio Expert
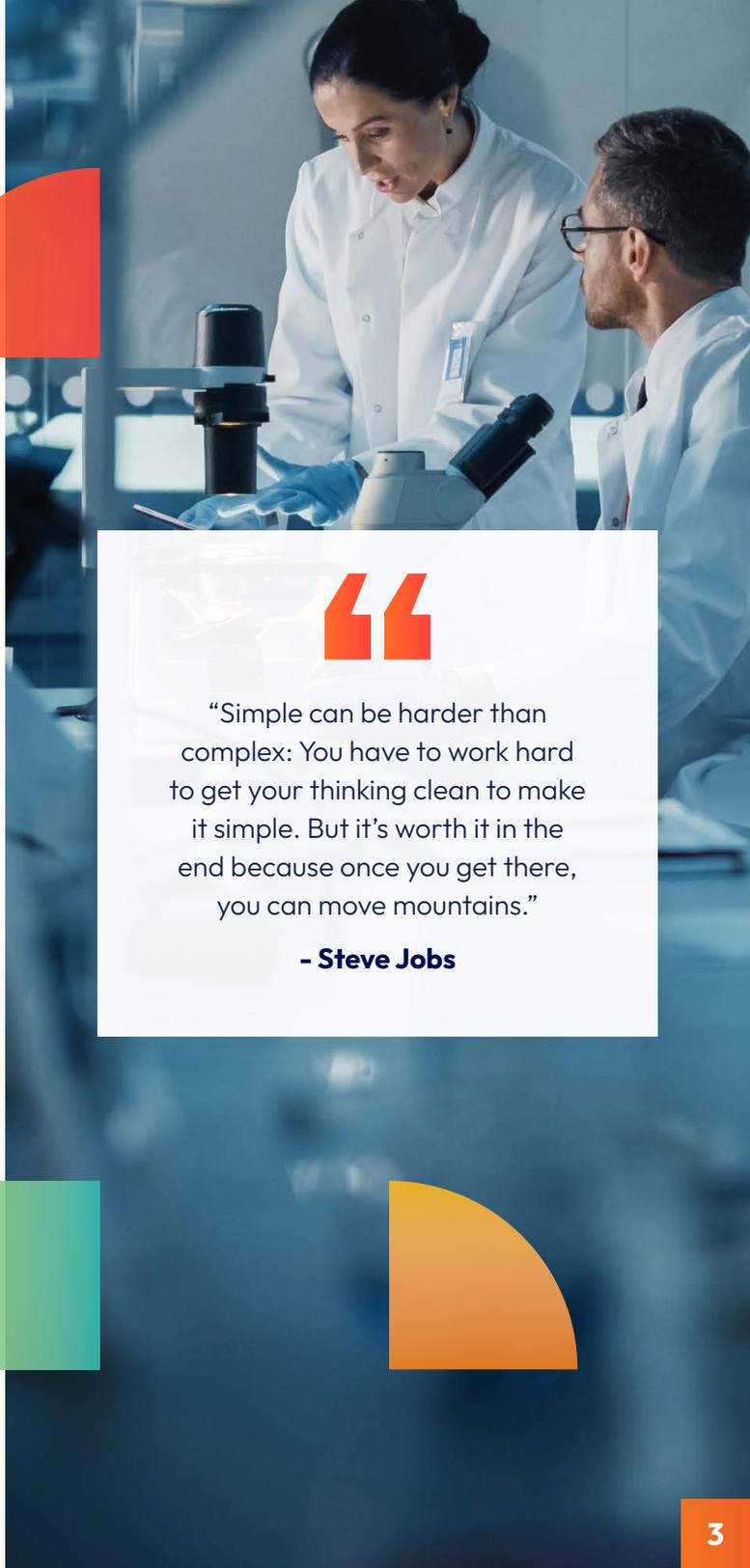
"Simple can be harder than complex: You have to work hard to get your thinking clean to make it simple. But it's worth it in the end because once you get there, you can move mountains."

– Steve Jobs

More complex molecules, with a higher average molecular weight.

In recent years, the molecular weight of top selling drug candidates has seen a sharp increase. This upsurge in molecule size is primarily driven by **the growth of large molecule biologics, which are anticipated to surpass small molecule sales to the tune of $120 billion by the year 2027.**[1] A look at recently approved drugs substantiates this trend—40% of new drug approvals in 2022 were biologics, compared to just 28% in 2021 and 24% in 2020.[2]

What it means: Rising molecule size and complexity necessitate lab informatics platforms that are **designed to model and analyze complex scientific objects,** including but not limited to molecular structures.

More complex operational processes, stemming from the pressure to innovate.

The number of molecules in the pipeline has been steadily and rapidly increasing over the past 20 years. **In 2001, there were just under 6,000 drugs in the global R&D pipeline. In 2022, that number was just over 20,000.**[3] The size of the drug development pipeline is reflective of the ongoing pressure to put forth more drug candidates, which is driven in part by the extended patent cliff that began in 2010 and continues today. According to a recent report by McKinsey, the pressure to innovate is a leading source of increased operational complexity for pharmaceutical organizations.[4]

What it means: More complex operational processes require lab informatics platforms that can handle complex scientific workflows with exceptional ease and flexibility, at the pace of innovation.

More complex reporting requirements, from regulators and customers.

A global pharmaceutical supply chain coupled with localized regulatory requirements in developing countries have added new complexity to pharmaceutical regulatory reporting and compliance.[5] At the same time, biotechs and pharmaceutical organizations are also exerting increased pressure for timely reporting from both their internal divisions and their outsourced service providers.

What it means: Satisfying stringent reporting demands, regulatory and customer-driven, relies on laboratory management platforms that enable built-in searchability and reporting, without the need to stitch together information from multiple systems.

More complex data sets, leading to an intensified focus on AI.

Together, the growing volume of complex pharmaceutical data and the pressure to innovate have resulted in a widespread interest in data-driven techniques. AI in particular has the potential to transform drug discovery, clinical research, operational efficiency, and more.[6] **According to a recent report from Astute Analytica, AI in drug discovery is expected to grow at a CAGR of 25% from 2023 to 2030.**[7]

What it means: In order to enable organizations to take advantage of breakthroughs in AI, machine learning, and predictive modeling, lab informatics platforms must solve the standardization problem, to make scientific data usable and unified.

Did you know?

Sapio's science-aware™ informatics cloud brings together evolving scientific data in a centralized, standardized, analyzable, visualizable, and searchable solution.

Speak to an Expert

Why do so many solutions leave scientists wanting?

Inflexible workflows, painful implementation, cumbersome maintenance, and the groan factor.

Science is complex, so lab solutions need to be simple. A quick look at the lab informatics space reveals a significant gap between the LIMS and ELN solutions scientists have and the ones they require. **In most cases, these solution gaps stem from a fundamental disconnect between solution capabilities and scientific realities; in other words, a lack of science-awareness.**

Let's take a closer look at a few of the ways current LIMS and ELN solutions fail to satisfy the needs of today's science and the scientists that make it happen.
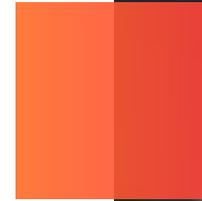
> On the biology side, you have complicated assays, fluorescence markers, etc. That's why we went with Sapio. The process of getting the raw data into the system was much easier than other solutions.
>
> **- Director, Small Biotech**
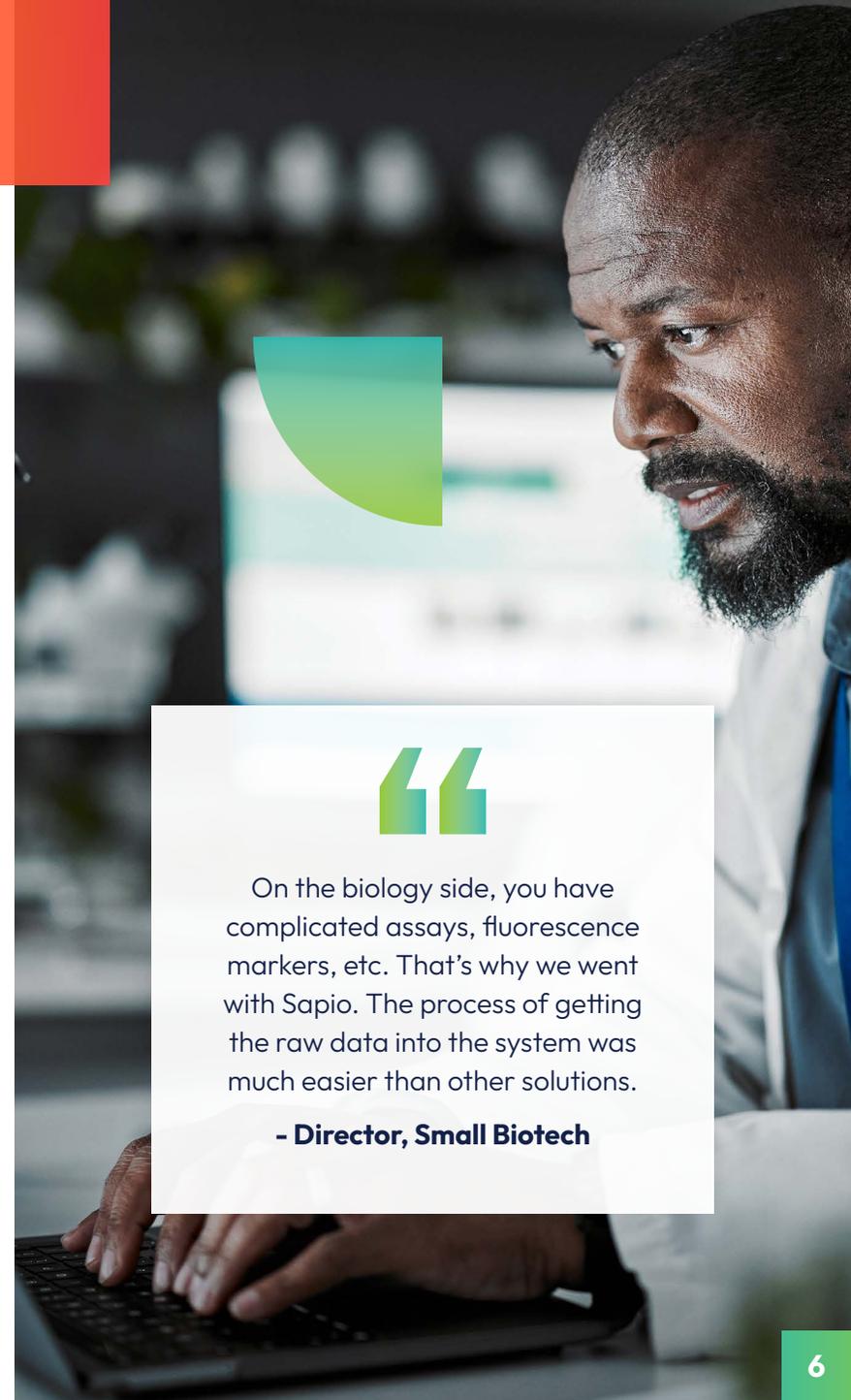
They can't flex to the science.

Science is ever-evolving. And yet, today's lab informatics solutions simply aren't made to adapt. Those solutions that can adapt can only do so with an army of computer-scientists, leaving science-scientists unable to meet their core requirements.

Questions to ask in your search
- If I need to change the system's workflow, can I do so myself or will I need a programmer?

They're not easy or enjoyable to use.

Scientists know how they want things to be done. Unfortunately, few ELNs and even fewer LIMS solutions work the way scientists think they should. Cumbersome interfaces and poor usability are a primary hurdle to scientific adoption, and poor scientific adoption yields poor ROI.

Questions to ask in your search
- Can I speak one-on-one with a scientist who currently uses your LIMS or ELN?

They are painful to roll-out and maintain.

Science is inherently fast-moving, but lab informatics solutions are infamous for their long and heavy roll-outs. In fact, the average LIMS roll-out can take up to 18 months, delaying laboratories from embracing new services and capabilities.

Questions to ask in your search
- How long is your average implementation?
- Will the system break or become buggy when updated?

They offer a fragmented experience.

Scientists need specific capabilities that are designed for scientific functions, and they want them integrated right into the ELN experience instead of hopping between apps and dealing with data transfer issues. What's more, multiple log-ins and log-outs take away from the time scientists can spend on their daily work, causing both inefficiency and frustration.

Questions to ask in your search
- Can I access the tools I need with a single login?
- Do lab scientists, technicians, and informaticists use separate systems?

They ignore the data problem.

Data is science's most prized asset. At the same time, there is a growing information problem at the heart of modern science—a problem of scale, silos, search, and passive data with no context. Today's LIMS and ELN solutions rarely make it easy to find, visualize, and analyze data in a scientific context.

Questions to ask in your search

- If I need to change the system's workflow, can I do so myself or will I need a programmer?

They don't take their own discovery seriously.

The next decade of discovery is poised to unearth more breakthroughs than the entire history of modern science to this point. Enabling this kind of breakthrough not only requires innovation on the part of the scientist; it requires innovation on the part of the platform. Unfortunately, many lab informatics incumbents have a slow, if not stagnant, rate of innovation that is simply outpaced by the speed of life sciences discovery that we are seeing now and expect to continue.

Questions to ask in your search

- How long is your average implementation?
- Will the system break or become buggy when updated?

Scientists know they need lab informatics solutions, but they're still not finding what they need in many of the market's leading alternatives.

What does it take to flip the script, and deliver solutions that put science first? Keep reading… that's precisely the topic of our next section.

What is a science-aware™ platform and why does it matter?

5 markers of a science-aware™
lab informatics platform.

The difference between a platform that sells to scientists and one that truly supports scientists comes down to whether or not it is science-aware. At its most basic level, to be science-aware is to not only believe in the importance of scientific realities, but to understand those realities intimately so that **awareness** can translate into **action**.

In this section, we will define five markers of a science-aware™ lab informatics platform. If you're in the market for a LIMS, an ELN, an SDMS, or a platform to unify them all, this is a key section for you. As we progress through each of the markers, we'll define valuable decision criteria for you to use in your search.

Access

Workflow

Analytics

Reusability

Experience

ACCESS to all of the scientific data, all in one place.

Picture this: you walk into the lab and sit down at the lab bench. But your bottom cabinet is locked, you're out of counter space, and that reagent you're looking for… well, it's on the highest shelf just out of reach. You certainly don't have everything you need. In other words, you don't have ACCESS.

Like a well-equipped lab bench, a well-equipped lab informatics platform will provide access to all of the information and tools in one central location, where the data and the scientists are. **More importantly, a platform that provides scientific ACCESS will deliver powerful searchability alongside a logical data structure that enables scientists to navigate scientific information seamlessly with a full understanding of lineage.** The platform should have no limits when it comes to the volume and velocity of data, and it should enable scientists to understand all data genera, including meta data.

A closer look at the ACCESS marker:

- ✔ All of the data in one place
- ✔ Powerful searchability
- ✔ Logical, hierarchical knowledge graph data structure
- ✔ Unlimited volume, velocity, and visibility

Access

Configurable **WORKFLOW** that adapts to novel science.

Imagine a scientific workflow you recently executed in your lab. Perhaps it's one you are still testing out, or maybe you have spent years perfecting it. The only problem is that your new LIMS system can't support 3 of its 12 steps. You're left with a difficult choice: take on a custom programming project or conform your approach to the system you chose.

Your workflows are an integral aspect of your scientific approach, and they should be supported exactly as they are. **A platform that possesses the WORKFLOW marker will provide scientists a frictionless workflow builder right inside the platform that requires little to no technical intervention.** In addition to its low code / no code approach, the platform should make changes as easy as possible, including but not limited to implementing business rules in natural language. Last, but not least, the platform should enable workflows to coordinate seamlessly across departments, sites, and instruments—with no gaps in visibility or control.

A closer look at the WORKFLOW marker:

- ✔ Frictionless workflow builder
- ✔ Low code / no code platform
- ✔ Configurable English language rules engine
- ✔ Integration across departments, sites, and instruments

Workflow

Rich ANALYTICS made for scientific information.

Where do you analyze your scientific data? If you're like most scientists, the answer is likely a separate system for BI and data visualization. Perhaps this solution was not even made for biopharma. Or maybe, you have no data analysis solution at all. But the ability to interpret and analyze scientific data should never be outsourced to an outside system.

A platform that delivers rich scientific ANALYTICS will start by structuring scientific data as a unified, navigable data object—presented in a living knowledge graph that is dynamic, standardized, and ready for analysis. **Without ever leaving the platform, users will be able to visualize and interpret any data point in a proper scientific way.** The platform will also employ more advanced data-driven techniques that are focused on accelerating discovery, including AI, ML, and predictive modeling. Most importantly, it will enable data analysis that is truly scientist-led, with zero reliance on BI specialists and SQL coders to access and analyze scientific information.

A closer look at the ANALYTICS marker:

- ✔ Living knowledge graph
- ✔ Scientific visualization and interpretation
- ✔ Built-in AI, ML and predictive modeling
- ✔ Scientist-led data analysis

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Analytics

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REUSABLE objects to power productivity and scale.

The speed of discovery matters now, more than ever before. Why then do you find yourself recreating workflows, experiments, and design entities that have already been created by another colleague? Or spending hours searching for key data points? This approach to science risks the loss of previous learnings, siloes organizational best practices, and most critically, wastes valuable scientific time.

By contrast, a platform with REUSABLE objects and data will build upon prior experiences and accelerate the scientific process. This commitment begins at configuration, as templated use cases bypass the need for custom development. **After rollout, the platform's reusability continues, with the ability to save workflows and experiments for future use and seamlessly share them across teams.** Furthermore, it enables the user to easily reuse historical scientific data and processes across samples, workflows, experiments, and projects. For individual scientists, reusability means scientific design entities can be created once and reused anywhere—from compounds to plasmids, reagents, proteins, molecules, viral vectors, and more.

A closer look at the REUSABLE marker:

- ✔ Templated use cases for rapid configuration
- ✔ Saved workflows and experiments
- ✔ Reusable design entities
- ✔ Built-in sharing and utilization
- ✔ Centralized access to reusable historical data

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Reusability
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Unified **EXPERIENCE** from data access to interpretation.

Log in. Move data. Log out. Move data. Log in. Move data. Log out. This cross-system ritual has become an accepted norm for today's scientists. But with the ELN in one place, the LIMS in another, team collaboration in another, and the data analytics and design tools in another still, lab informatics will never accelerate a drug's path to market—at least not in the way it should.

With one, singular login and learning curve, a proper lab informatics platform will provide a unified experience from the data to the end user. An integral part of the EXPERIENCE marker is delivering all of the tools and applications in one place from science-aware capabilities for CRISPR editing, plasmid / small molecule design, flow cytometry analytics, and 3D plating, to live ideation sessions in support of strong scientific collaboration.

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Experience

A closer look at the EXPERIENCE marker:

✔ A single login, a single learning curve
✔ Unified platform from the data to the end user
✔ One consistent substance, one common experience
✔ Built-in science-aware tools
✔ Integrated collaboration

Did you know?

Sapio is the first science-aware lab informatics platform of its kind. It delivers unified **access** to scientific data, low code / no code **workflow** configurability, robust science-first **analytics**, reusable workflows and objects, and more in a single, scientist-centered **experience**.

Learn More

How does the platform you choose shape the lab you will become?

Looking ahead and setting yourself up for success.

Too often, the choice for a lab informatics platform becomes about who has share of market, or which platform is the 'safe' choice. To take this route is to neglect the science-centered purpose of lab informatics. Your LIMS and ELN selection should support your science, now and in the future.

What kind of lab do you want to become, and how will the platform you choose support or hinder that journey?

> We chose Sapio because of the ELN and LIMS functionality in one platform; we didn't have to purchase separate applications and integrate them. The more we can do multiple things on one software, the better.
>
> **- Director of Lab Systems, Small Biotech**

When discerning whether a lab informatics platform is truly science-aware, play out your partnership with that platform over time. Your choice will inevitably impact how you answer these critical questions—not just today, but one, three, or five years down the road.

How rapidly will you be able to embrace new science?

Consider your platform's ability to support the evolution of your science, the progression of your molecule, and the addition of new capabilities and instruments over time.

How empowered and satisfied will your scientists be?

Gauge your platform's capacity to make life easier for your team, and to help you remain competitive in the scarce and highly competitive scientific labor market.

How readily will you meet regulatory and customer requirements?

Evaluate your platform's ability to provide integrated reporting while adjusting to the ever-changing regulatory and compliance landscape.

How competitive will you be when data-driven discovery becomes the norm?

Discern whether your platform will equip you with the standardized data foundation needed to rapidly embrace new breakthroughs that accelerate and improve discovery.

What criteria define a platform that is truly science-aware from the rest?

Use our decision support tool to ask the right questions.

Questions fuel the scientific process and the solution search. Through good questioning, scientific decision makers can differentiate a science-aware℠ platform from one that will leave them wanting for more. **On the following page, you will find a helpful guide to help you rank the five markers, identify them through the right questions, and take a more scientific approach to a new lab informatics platform for your organization.**

> The reason we had Sapio as the leader by far was their flexibility. They were able to fit the system to meet site-specific needs, or even implement something across the company that can change on a site-specific basis.
>
> **- Senior Director, CRO**

Access	Workflow	Analytics	Reusability	Experience

Importance
(Rank 1 to 5)

Importance
(Rank 1 to 5)

Importance
(Rank 1 to 5)

Importance
(Rank 1 to 5)

Importance
(Rank 1 to 5)

Defining Questions

Will my data reside with the rest of my capabilities, or will it reside in a different system?

How robust are the integrated searchability capabilities; can I find what I need?

Are data structures siloed, or can they be navigated as one, unified knowledge graph?

Will I run into volume or velocity obstacles when handling high-throughput data?

Defining Questions

Can I build sophisticated workflows in a highly intuitive way?

How much programmer intervention is needed to make workflow modifications?

Is the platform equipped with English language rules engines to allow me to create rules on the fly?

Do my workflows bring together multiple departments, sites, and instruments?

Defining Questions

Is my data presented contextually in a living knowledge graph with geneology?

Are scientific data presented and visualized scientifically, or do I need another tool for visualization?

Does this platform ready me for the future of discovery through AI, ML, and predictive modeling?

Are my scientists able to lead data analysis, or do they need a BI or SQL expert?

Defining Questions

Do you have pre-built templates to speed up configuration for specialized applications like bioprocessing, for example?

Can I save, reuse and share my workflows and experiments?

Are scientific design entities created once and used anywhere?

How much control do I have over sharing and permissions?

Defining Questions

Do users of the LIMS and ELN utilize separate interfaces with separate logins?

Is my data platform the same as the one I use for my LIMS and ELN?

How many interfaces will my scientists need to learn?

How capable are you of supporting sophisticated functions like NGS, in vivo, CRISPR editing, and more?

Does your platform eliminate the need for a separate solution for live collaboration and screen sharing?

Notes

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Notes

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Did you find this guide valuable? Wait until you see the platform.

Schedule your live preview and see Sapio's science-aware platform in action.

Schedule Your Preview

1. https://www.europeanpharmaceuticalreview.com/news/171206/rise-of-biologics-set-to-continue-says-report/
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