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Driving Research Continuity in Indian R&D through Remote Lab Operations

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India's research landscape is undergoing rapid transformation as institutions look toward hybrid and remote working models to enhance flexibility and collaboration. By turning to cloud-based lab systems and AI-powered analytics, R&D organisations can build agile, future-ready environments to help power India's academic and industrial sectors.



The COVID-19 pandemic marked a turning point for research and development practices throughout the world. With restricted access to physical laboratories due to nationwide lockdowns, traditional on-site research models were disrupted overnight. In response, R&D organisations were compelled to adopt hybrid and remote research models, combining in-person lab work with digital off-site data analysis.

Ignited by the short-term necessity of COVID-19, digital R&D solutions have now evolved to redefine remote research frameworks and transform how research continuity is maintained. Moving from manual processes largely confined within the four walls of the lab to data-driven research that is independent of location, institutions have learned that the data itself represents the greatest store of value. As a result, reliable, flexible, secure access to lab-generated data is at a premium, and remote and cloud solutions have surged to fill a market gap. For example, in a survey conducted soon after the start of the pandemic, Deloitte showed that drug companies rated cloud computing as one of the highest priorities of the following 5 years.

In the work-from-anywhere hybrid environment, it is no longer practical for data to be encased within physical lab notebooks or local data systems. Researchers working from different locations require safe, real-time access, analysis and sharing of protocols and experimental results to maintain momentum in their projects and promote collaboration across departments and institutions.

In this new environment, cloud-based Electronic Lab Notebooks (ELNs) with AI-powered data analytic platforms play a key role. These solutions enable remote data accessibility, enhanced data integrity, and compliance with regulatory standards – crucial factors in both academic research and industrial R&D.

Specifically for India, digital platforms have the power to support the sector's desire to collaborate with globally dispersed partners, helping to position the country as a science and technology hub.

Why On-Premises Lab Infrastructure Falls Short

On-premises-only laboratory systems, once central to managing research operations, are less suited to meet the demands of modern, collaborative R&D environments. Designed for a different era, on-premises systems typically offer limited data-sharing capabilities, and rarely will they include secured remote access. Research data held on internal systems will often only be accessible by researchers while in the lab, or through complex, IT-managed remote connections. For scientists

working from different locations, on-premises data accessibility can become a significant challenge, adding to cost, complexity and delay.

In addition, each organisation may rely on several different research solutions, with data scattered in proprietary formats, residing on separate storage systems – and accompanied by unstructured data in the form of spreadsheets and miscellaneous documents. Fragmented data stores and the lack of synchronisation between file versions can result in inconsistencies in project documentation, duplicated effort, and misinformed decisions, all of which will impact timelines and increase costs.

Labs from Anywhere: Secure, Synchronised and Collaborative

To resolve the issues around data fragmentation, labs are turning to modern ELN solutions that enable secure, flexible and real-time access to scientific data from multiple locations, based on cloud technologies.

By switching away from on-premises to cloud-based solutions, users are no longer tethered to a specific device or internal network. Cloud operations provide the ability and the freedom to access data from anywhere, and to share data in standardised, controlled formats between research groups and between systems.

In addition, the access-from-anywhere capabilities of cloud solutions strike a balance between convenience and safeguarding, through comprehensive security and access management. Secure authentication protocols including single sign on (SSO), two-factor authentication (2FA) and role-based access controls ensure that data is protected and accessible only by authorised users, upholding stringent data protection standards without sacrificing usability.

Equally, cloud-based solutions solve the challenges around fragmented data and lack of synchronisation. Changes – whether amending or updating existing experimental protocols, uploading results or creating new documents – committed from any location are reflected across the platform for the entire team. Synchronised real-time updates eliminate the risks of version conflicts and encourage collaborative workflows, helping projects move forward without delays.

R&D thrives on teamwork and a strong sense of scientific community, and the elimination of data silos provides significant collaboration advantages. Researchers, analysts, regulatory reviewers and quality assurance personnel can work within a shared data environment that supports parallel workflows and real-time feedback – particularly beneficial in fast-paced R&D projects where swift decision-making is necessary.

Digital-First Labs: Powering Resilience, Continuity and Global Collaboration

Organisational resilience and business continuity are no longer optional in today's R&D landscape – they are mission-critical objectives. The COVID-19 pandemic underscored how quickly disruptions can derail even the best-planned R&D programmes. To mitigate these risks, it is essential for research organisations to enhance infrastructure that can adapt to a range of possible scenarios. Central to this effort is a digital-led lab system offering the tools and flexibility to maintain programme progression regardless of physical limitations.

By moving data management to secure, cloud-based platforms, organisations gain the ability to operate across multiple locations, enabling teams to remain productive even when access to physical labs is limited. In addition, even if one site is impacted by disruption, research can continue without delay.

Beyond continuity, a digital-first cloud-based approach positions organisations to attract and retain global collaborators. In an increasingly connected research environment, the newest cloud solutions provide security, reliability and always-on availability that international partners expect.

Future-Ready Research Starts with Cloud-powered Labs

In India, where the scientific community is becoming globally integrated, the desire to move to a scalable and digitally connected research environment is particularly urgent. Institutions hoping to engage in cross-border collaboration now depend on continuity and accessibility regardless of location.

Cloud-based solutions – especially cloud-based ELNs – with browser-based data access, real-time data synchronisation, remote experimental logging, and digital approvals, enable research teams to work seamlessly across geographies and support the speed and efficiency of competitive research domains.

Adopting a digital-first strategy anchored in cloud ELNs offers Indian research organisations a significant competitive advantage, shielding operations from disruption and enhancing high-integrity workflows that are essential for cutting-edge discovery. By building agile, future-ready research environments with cloud ELNs, India's R&D sector can accelerate both growth and global impact, leading the way in shaping the future of science and innovation.

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