Diagnostics Industry 2025 and Beyond in Asia

Digital transformation of the laboratory

January 2023

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Process inefficiencies are a key bottleneck for labs today; it is believed that up to 70% of lab workers' time is wasted performing administrative tasks, doing preparation work, cleaning data and reporting

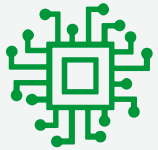
Key challenges in labs today

Lack of automation

- The majority of lab processes, including sample preparation, processing and analysis, are currently run manually with minimal automation, especially at the sample prep step

Fragmented data capture

- Data is often captured at multiple instrument locations, often in different parts of the lab ecosystem, complicating data capture and retrieval



Lack of data standardization/inter-compatibility

- Data storage, analysis and reporting are highly fragmented due to varied file formats, coding challenges and a lack of unified reporting tools

Administrative inefficiencies

- Test ordering and reporting, procurement, inventory tracking, and day-to-day management are largely done manually with significant room for optimization

Source: L.E.K. research and analysis

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The lab of the future is envisioned to be a highly automated data-enabled service organization supplying consumers/patients, healthcare providers or other stakeholders directly

The future of the lab is …

… a data-driven business

Labs have to become data providers for their clients, whether internal (e.g., other departments) or external e.g., Pharma/Life Science companies, regulatory bodies or other stakeholders)

… a specialized advisor

A more holistic quality paradigm and broader access to (analytical) data enable labs to act as specialized advisors giving decision support (e.g., through application of artificial intelligence technologies)

… interconnected in a broader ecosystem

Labs will integrate into a wider ecosystem of laboratories to more efficiently utilize existing capacity and exchange sample data

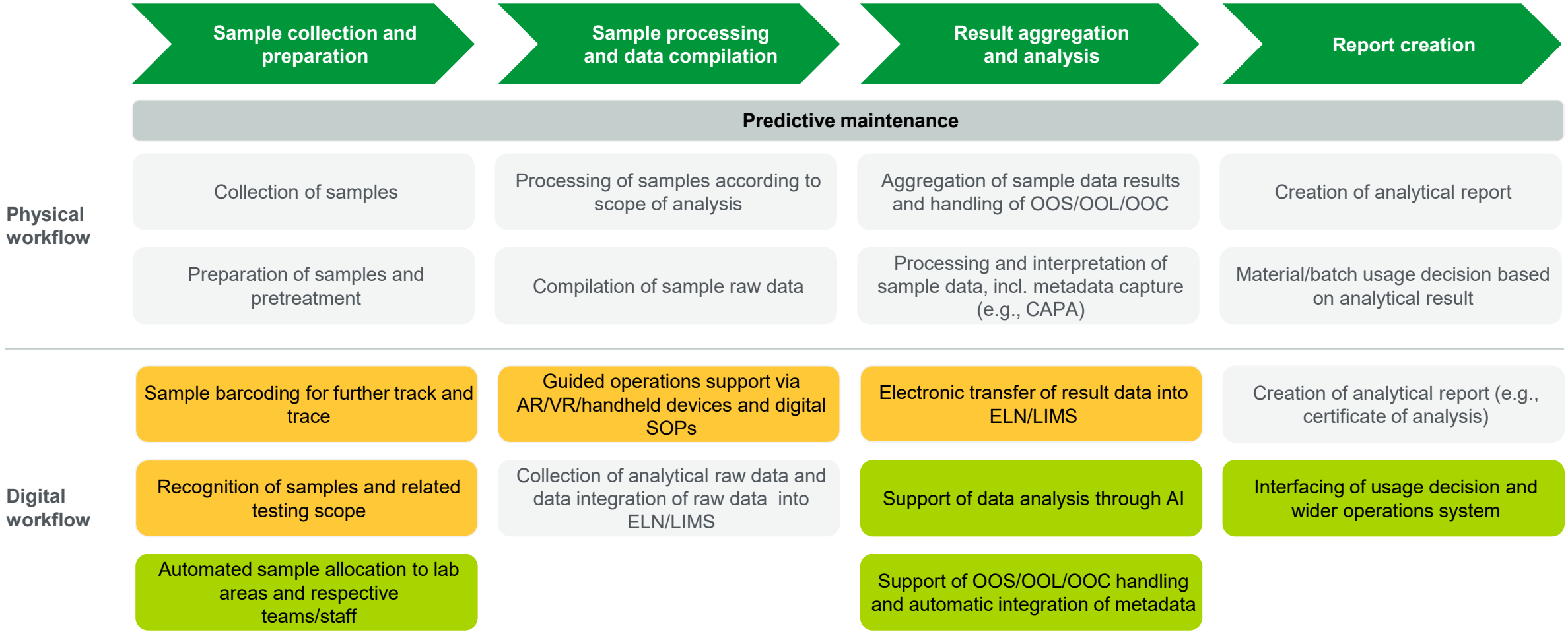
… operational 24/7 with low turnaround times

Use of centralized and remote monitoring, and predictive maintenance

Automated sample transportation and system integration with other stakeholders

Source: L.E.K. research and analysis

Digital workflows in the lab, relying on process automation, support of data analysis through AI and predictive maintenance, are key drivers of efficiency and the reduction of diagnostic errors



Source: L.E.K. research and analysis

Solution providers are developing enablers to streamline and accelerate the lab workflow

Examples of enablers along the lab workflow

	Sample collection and preparation	Sample processing and data compilation	Result aggregation and analysis	Reporting and record management
Examples of enablers	• **Barcode system** • **Lab Information Management Systems** (LIMS) • Cloud-based **Electronic Lab Notebook** (ELN)	• **Automation** and **robotization equipment** for sample handling	• AI-assisted **pathological diagnosis platform** to automatically identify the regions containing tumor cells • **AI-assisted NGS data analysis** to detect low levels of cancer DNA in the blood sample	• Digital platform providing visual display and **trending of lab results, health records,** summary of **health risks** and **personalized recommendation** for patients
Examples of solution providers	Labguru, ZOHO, SHIMADZU Excellence in Science	Roche, BIO-RAD, Abbott, BECKMAN COULTER	透彻影像 THOROUGH IMAGES, DEEP INFORMATICS++, C2i Genomics, NovogeneAIT	BioMark, DOMO, skyflow, Nabla

Source: Company website, L.E.K. prior experience

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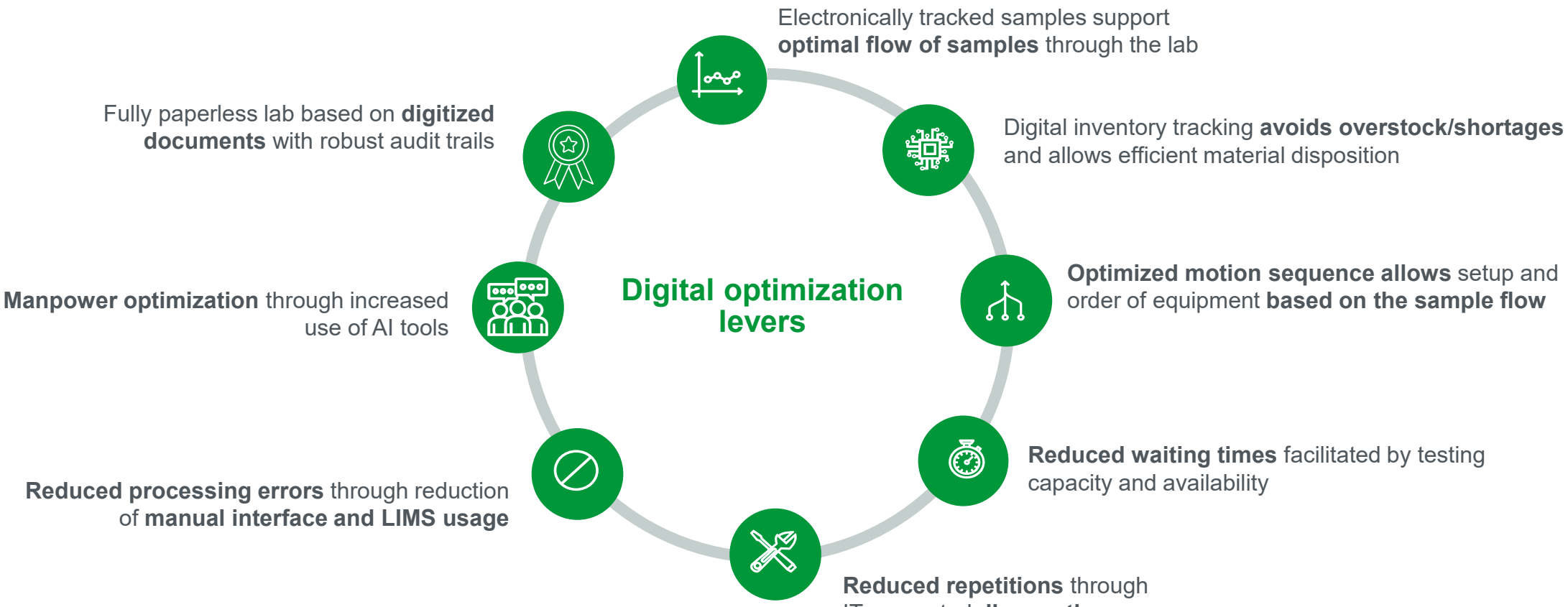
Automation, digitalization and applying AI concepts will help address significant optimization opportunities across the lab

Overview of key digital optimization levers



Source: L.E.K. research and analysis

Workflow digitalization and automation cut across all diagnostic areas, with a substantial reduction in processing time (up to 50%)

	Lab best practice		Sample arrival at lab	Sample processing and preparation	Diagnostic tests	Data analysis and interpretation	Report creation and sharing of guidance	Industry standard	Time saving of best practice
Phenotyping	Cytomor-phology	Autom.	+	+	++		+	12 hours	25%
		AI			+	+			
	Immuno-phenotyping	Autom.	+	+	++	+	+	10 hours	50%
		AI			++	+	+		
Genotyping	Chromosome analysis	Autom.	+	+	++	+	+	34-82 hours	20%
		AI			++	+			
	FISH	Autom.	+	+	+	+	+	34-82 hours	10%
		AI							
	PCR	Autom.	+	++	++	++	+	6 hours	30%
		AI							
	NGS	Autom.	+	++	++	++	+	14 hours	30%
		AI			++	++			

Low impact or n/a | Medium impact | High impact

Note: Benchmarks referring to current standard lab with average level of digital maturity
Source: L.E.K. research and analysis

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Looking into the future, a fully digitalized lab workflow could enable usage of disruptive technologies, with additional efficiency gains anticipated

Key elements of a digital lab in the future

Digitized samples

Description

- Most tissue samples will be digitised in the form of **2D and 3D images**
- These digital samples can be **analyzed using AI** technology (e.g., image recognition)

Example

- **Quantum computing** for the storage of digital samples is in development for wide adoption of digital specimen

Digital lab assistants

Description

- Hands-free access and visualization of data from various sources
- **Voice-enabled data capture** at the point of testing

Example

- The start-up LabTwin developed an assistant that uses **voice recognition** for data capture during experiments

Augmented reality for data capture and QC

Description

- Seamless capture and sharing of samples and data
- **Real-time guidance** of process steps for lab staff and recording of procedures

Example

- Magic Leap developed **augmented reality solutions** that can capture and share 3D models, with further applications under development

Connected equipment using IoT

Description

- **Central (remote) control** of equipment
- **Automated process and information flows** between instruments and devices, including pipettes, dispensers and scales

Example

- OEMs such as Eppendorf and Roche focus **on integration of instruments** in development; Siemens provides **connectivity solutions** for medical devices

Source: Company websites; Omnia Health; MLO; Graves et al.; L.E.K. research and analysis

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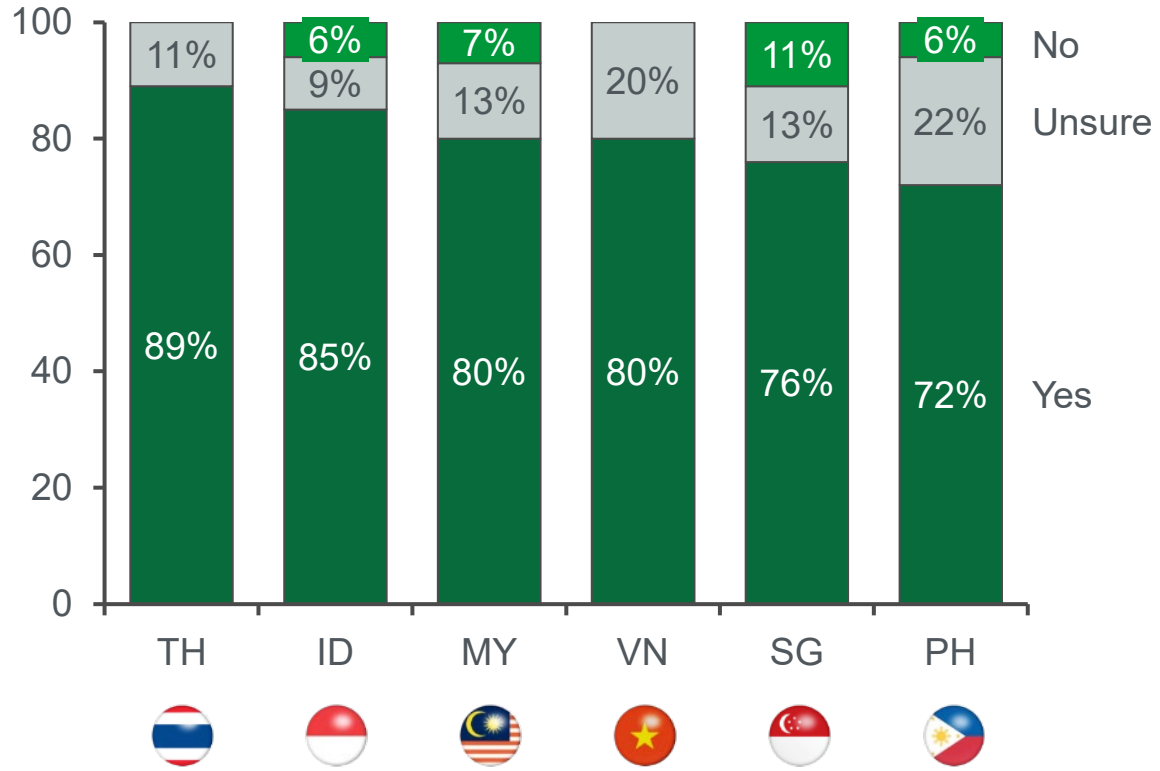
Challenges in healthcare talent retention and the rising cost of medical resources in APAC are expected to be key contributors to the acceleration of the lab digitalization process

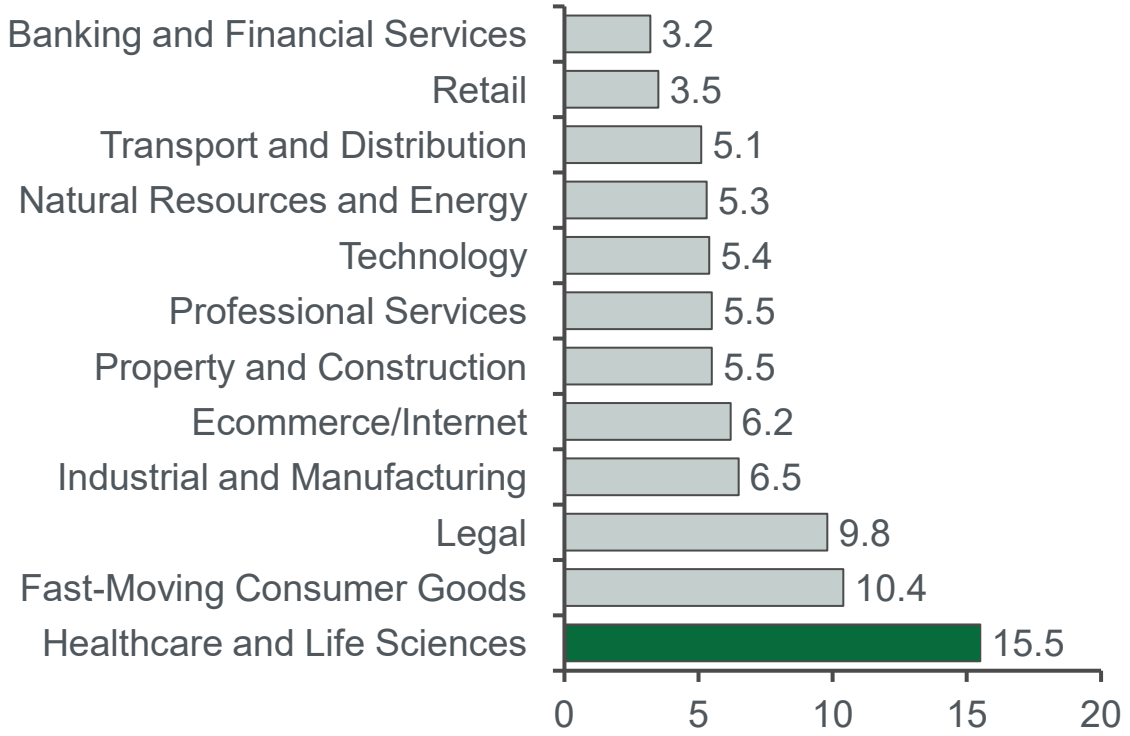
SE Asia healthcare and life sciences employees intend to resign (2022)

Percentage of respondents*



Example: Indonesia salary annual increase (2021)

Percentage of respondents



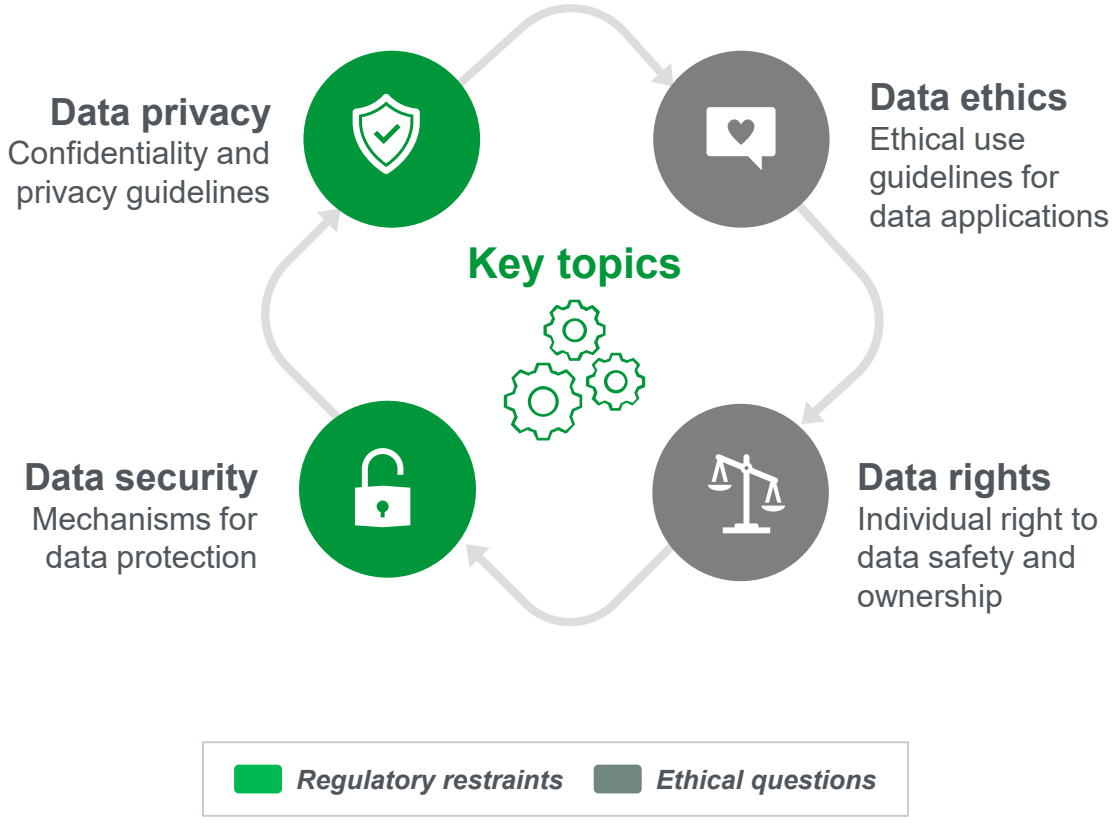
Note: *Survey question: As a healthcare professionals, do you plan to resign in 2022?
Source: Michael Page Talent Trends 2022 The great X report, LinkedIn 2022 Global Talent Trends, L.E.K. research and analysis

Lab digitalization, and in particular the accumulation of data, also opens up the creation of new monetization opportunities, although regulatory and ethical challenges remain

Innovative models for lab data monetization

Lab and HQ	Customer	Service
Quest Diagnostics (U.S.)	Pharma, medtech, etc.	• **Cooperates** with health data analysis firm Prognos Health to provide data and insight reports to healthcare institutions for patient journey analysis, marketing campaign optimization, etc.
labcorp (U.S.)	Pharma, medtech, etc.	• **Directly sells** de-identified information to diverse organizations, including information derived from diagnostic results, prescribing information, and claims and payment data
Genomic Lab Research & Diagnostics *Genomic* (Germany)	Pharma, medtech, AI players, etc.	• **Cooperates** with diverse organizations including labs and hospitals; provides large data set of biomarker data, lab data and clinical data for diverse purposes such as AI training and patient journey analysis

Regulation of and ethical questions about lab data



Source: L.E.K. analysis

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In terms of engagement, laboratories' needs and preferences continue to evolve; principals and distributors need to adapt their engagement model to create a distinct purpose for interactions

What do laboratories seek?

Laboratories' preferences for engagement	
On-demand information (accessible anytime and anywhere)	**Empower lab to self-access information** from their desired channels (e.g., mobile app, website or other platforms)
Personalized content, less spam	**Coordinated, relevant and fit-for-purpose content** across various interaction points (e.g., F2F, email, phone calls, customer portal)
Agile and real-time support	**Consistent and timely issue resolution** for customers to drive brand affinity and loyalty
Greater connectivity to peers/KOLs	**Facilitate interactions and access to peers and KOLs** through professional communities/network
Access to unbiased information	**Engage in objective conversations** and provide **greater access to independently reviewed information** to earn trust and advocacy

Source: L.E.K. research and analysis

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COVID-19 has catalyzed digital engagement and increased adoption and acceptance for remote and digital tools

NON-EXHAUSTIVE

Digital initiatives along the laboratory purchase journey

	Prepurchase	Purchase	Usage/Training	After-sales support
Examples of enablers	• Launch **online portal** to showcase company products and demos • Leverage AR to provide **interactive 3D model** of IVD instrument for demonstration	• Actively promote **online flagship store**	• Offer **VR-based training** with guided instructions	• Launch device management platform for remote monitoring after deployment • Leverage **merged video stream with annotation** to provide instant hands-on support remotely
Principals resorting to digital solutions	B BRAUN BIT BUILD INNOVATION TOGETHER	3M	GE Healthcare CGS	Roche Medtronic BIOMÉRIEUX

Source: L.E.K. research and analysis

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