

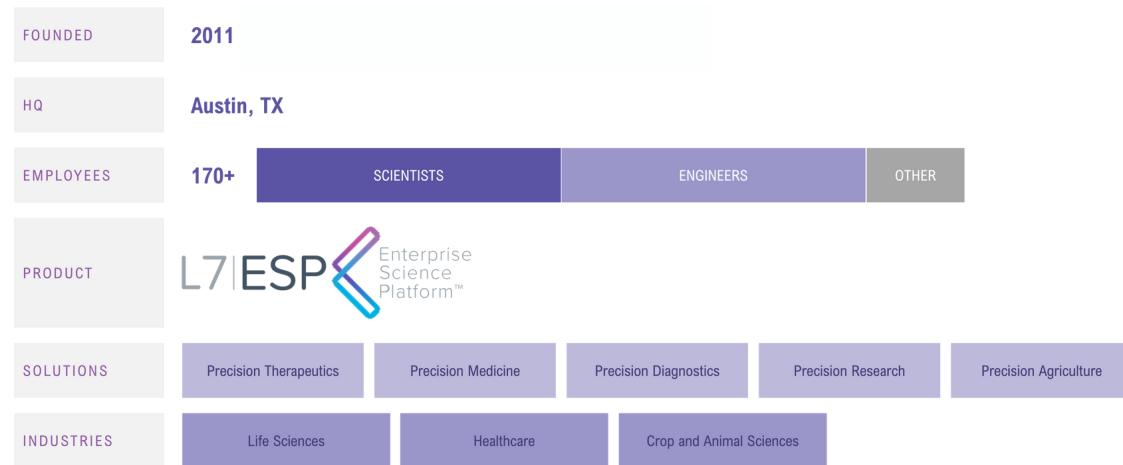
EBOOK

L7 | PRECISION DIAGNOSTICS

deliver superior service with faster turn-around by
digitalizing order-to-report

About L7

L7 Informatics, Inc. is a leading provider of integrated scientific data and analytics solutions. The company offers a comprehensive platform that enables seamless data integration, advanced analytics, and collaborative workflows, empowering scientists and researchers to accelerate discoveries, improve operational efficiencies, and drive innovation. L7's mission is to revolutionize how scientific data is managed, analyzed, and utilized, facilitating breakthroughs in research, drug discovery, development, and manufacturing.



Gartner 'Cool Vendor' 2020

In 2020, L7 was one of only five companies recognized in the Gartner Cool Vendors in Life Sciences report that technology leaders should watch to help accelerate life science business results.

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Deloitte Technology 'FAST 500' 2021

With a 3-year growth of 8,288%, L7 Informatics is ranked #26 and #1 Life Sciences Software.



Deloitte Technology 'FAST 500' 2022

Honored that L7 Informatics made the list again with another impressive 3-year growth of 1,543%.

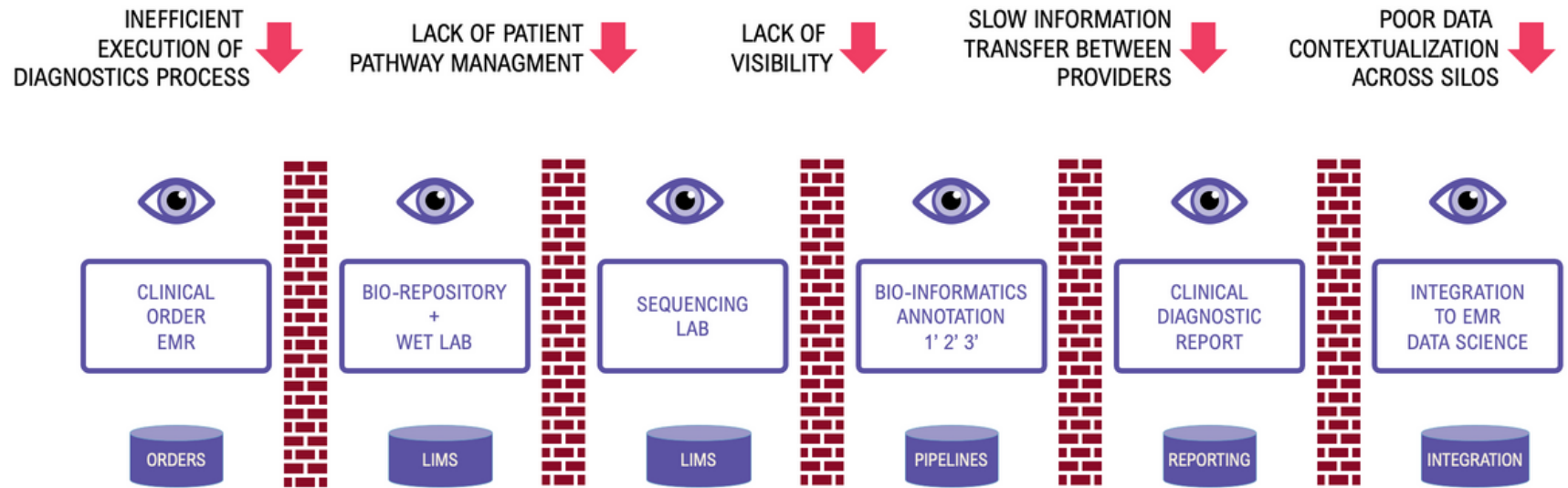


Deloitte Technology 'FAST 500' 2023

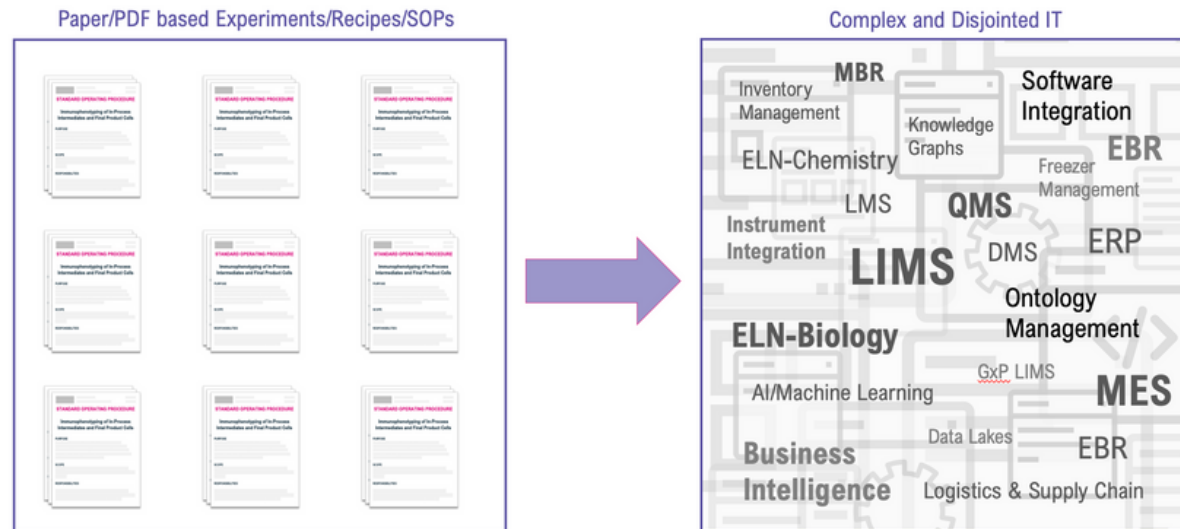
For a third consecutive year, we made the list again, and celebrate a significant 3-year revenue growth of 2047%.

The Problem

Legacy data silos and processes hinder velocity, efficiency, and science, increasing the risk for business and patients.

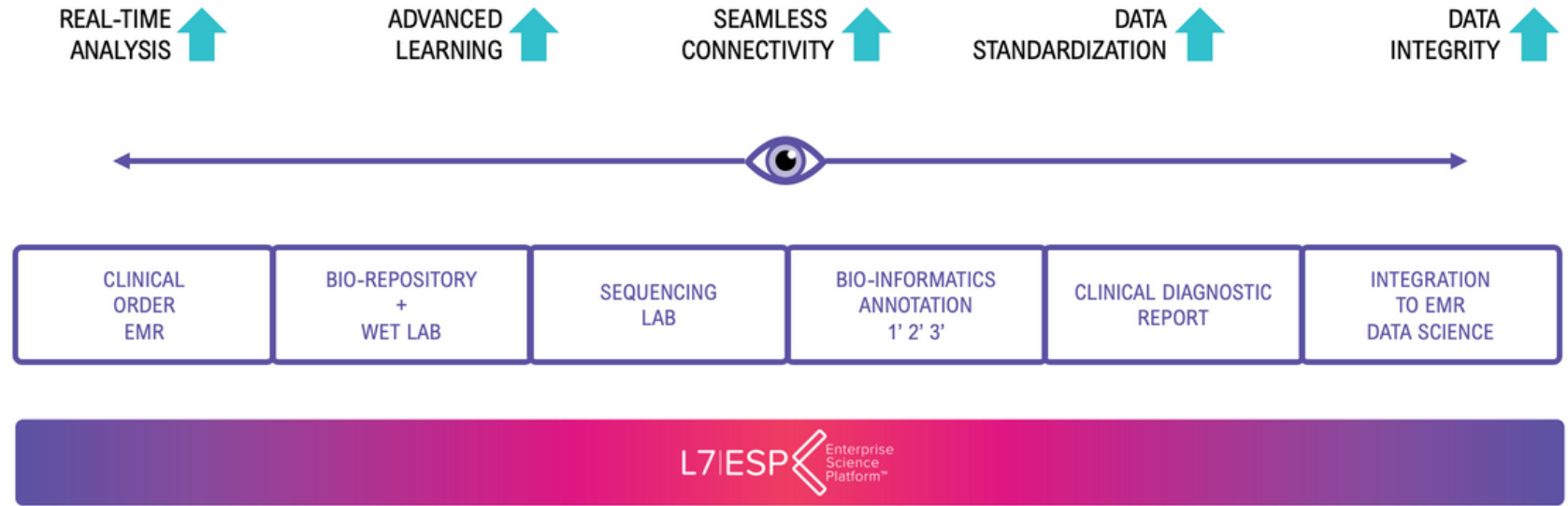


Paper-based “Standard Operating Procedures” implemented across siloed IT systems make digitalization and validation of systems difficult and reduce the velocity of the business and create data integrity problems

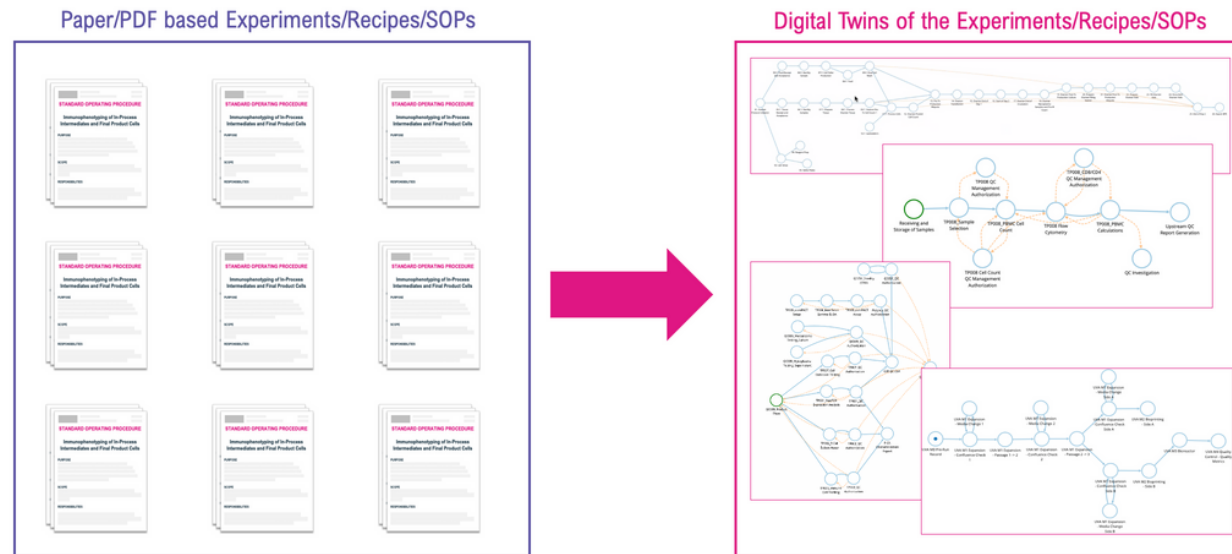


The Solution

L7|ESP accelerates Precision Diagnostics requirements for integrated data + intelligence, improving efficiency, velocity, and science, and reducing risk for business and patients



L7|ESP creates digitalized twins of Experiments, Recipes and SOPs, making the validation of systems easier, increasing the velocity of the business, and reducing data integrity problems.



L7|ESP - A Unified Platform Built on Industry 4.0 Principles

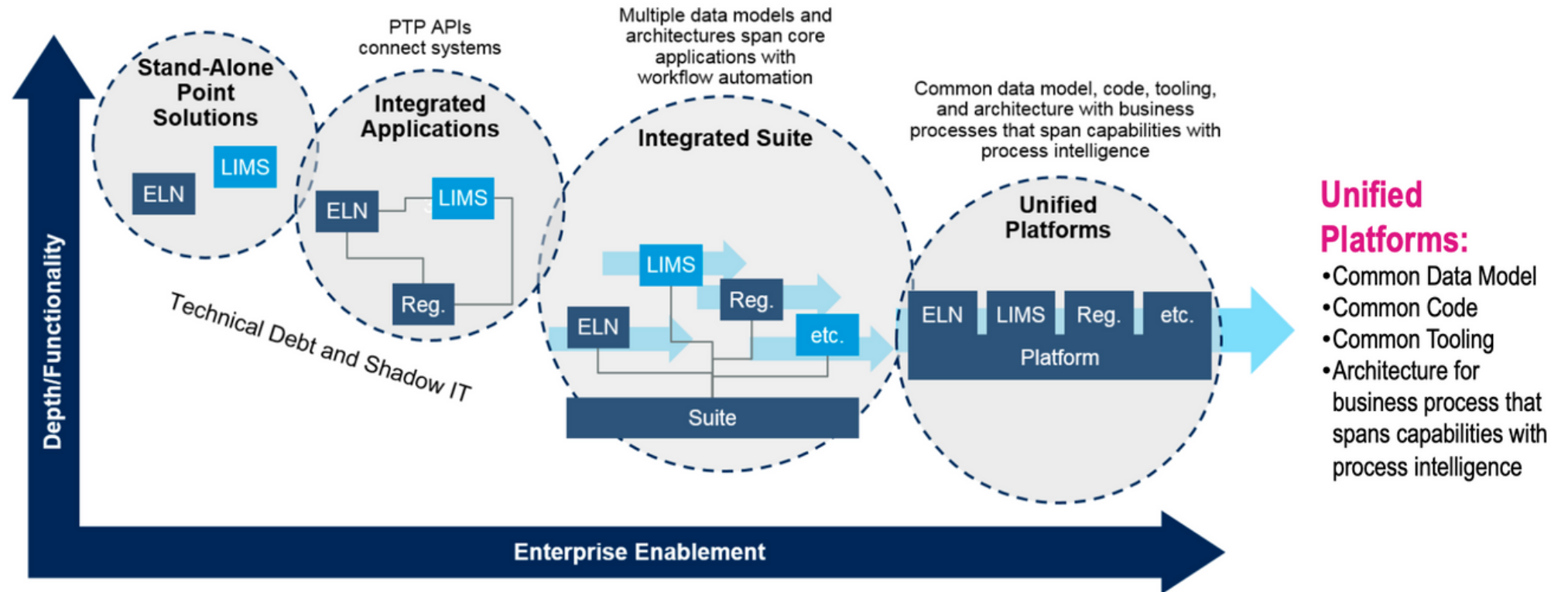
Industry 4.0 Principles



L7|ESP - A Unified Platform for Life Sciences



"Life Science Lab Informatics Digital Criteria"
Published 20 December 2018
- Source: © Gartner, Inc 2018



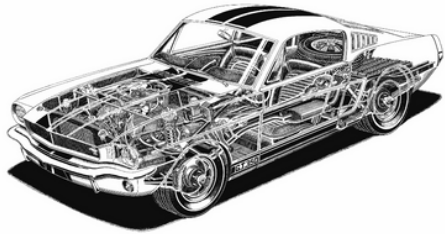
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© 2018 Gartner, Inc.

Composable Platforms Built of 'Primitives'

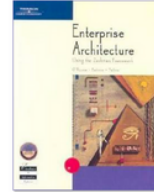
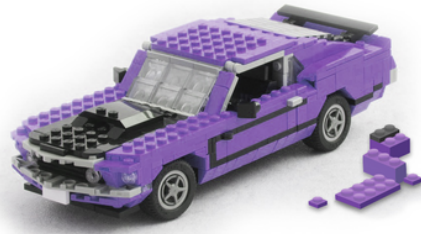
COMPOSITE MODELS vs PRIMITIVE MODELS

Composite models are fixed functionality and difficult to modify



Reference: Enterprise Architecture - using the Zachman Framework, ©Riisanka, Fishman, L7

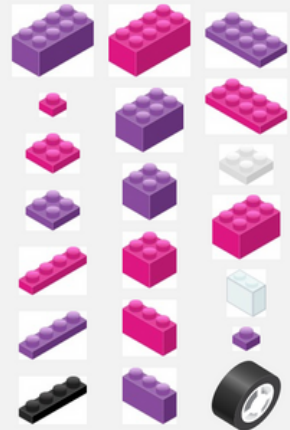
Primitive models provide quick assembly, modification, and reusability



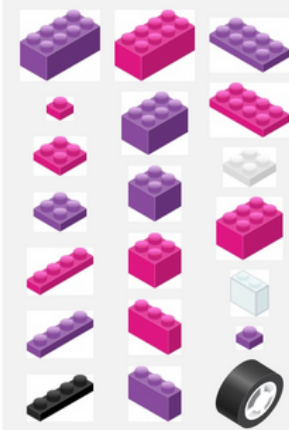
Enterprise Architecture using the Zachman Framework

PRIMITIVE MODELS PROVIDE QUICK ASSEMBLY, MODIFICATION, CUSTOMIZATION, AND REUSABILITY

L7 HUB "STORE"

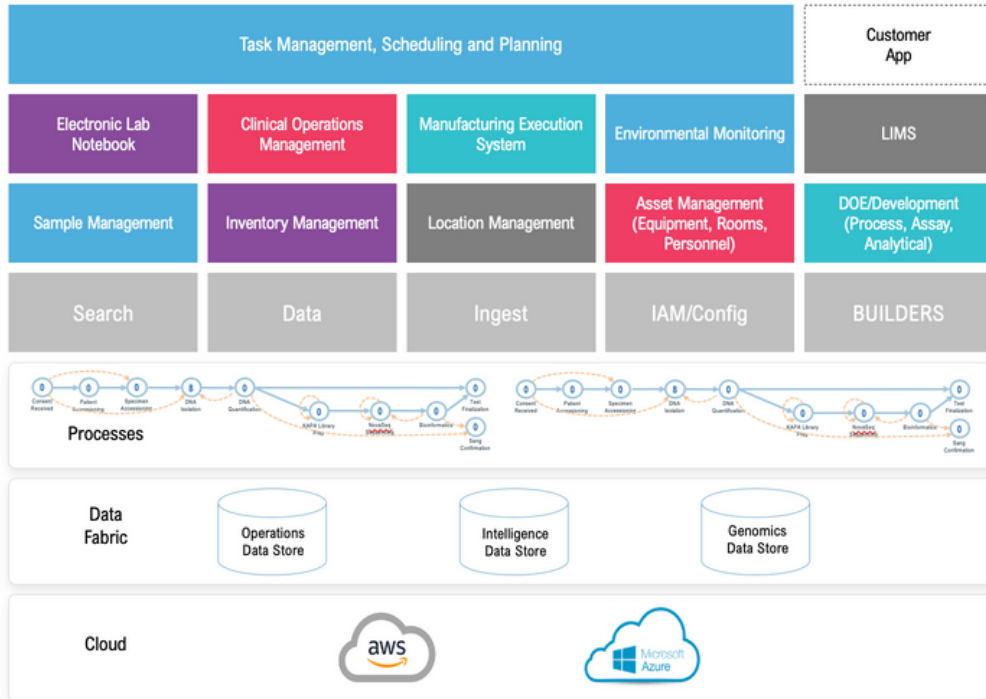


L7 HUB "STORE"



Unified Platforms

Meet all of your data and process needs with a single solution, L7's unified platform, L7|ESP, equipping your business with a comprehensive operating environment and software stack that adapts to your unique requirements while preserving data provenance and integrity.



Business Apps

- Clinical Operations
- Electronic Batch Records
- Electronic Lab Notebook
- Environmental Monitoring
- Inventory
- LIMS
- Locations
- Manufacturing Scheduling
- Stability Testing
- See roadmap

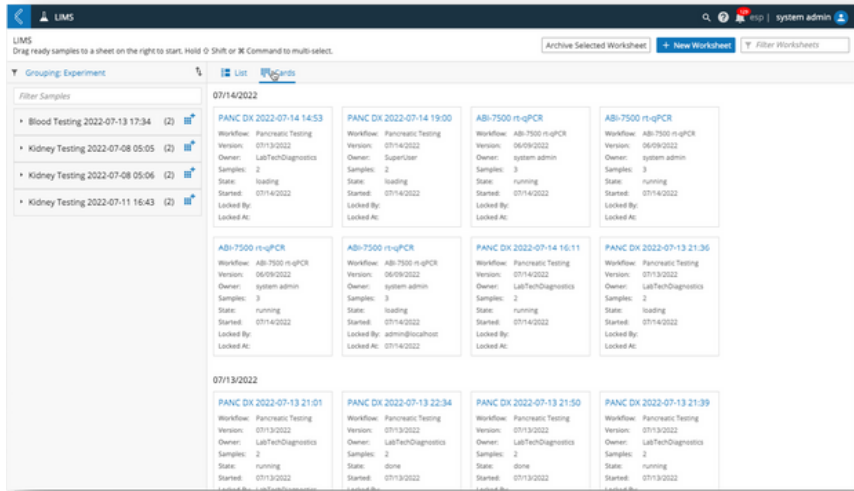
Standard Apps

- Assets
- Dashboards
- Reports
- Data
- Entities
- Ingest
- Projects
- Samples
- Search

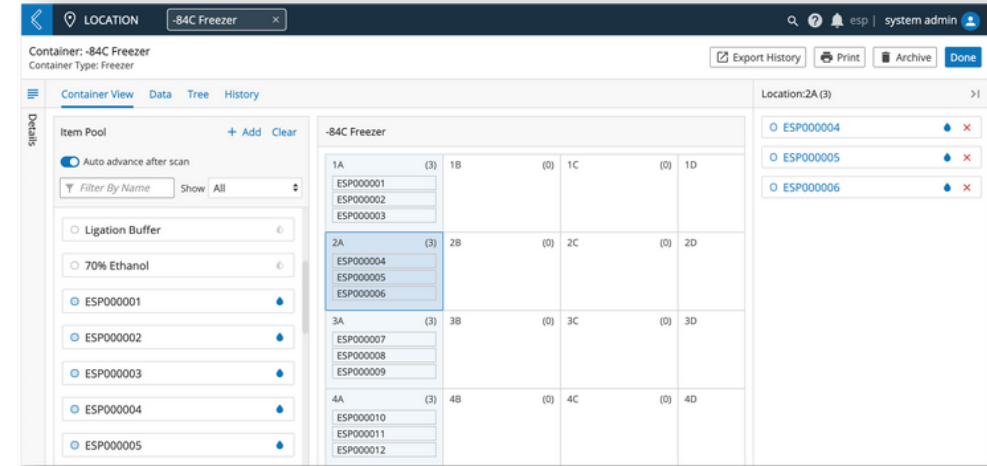
Configuration Apps

- Applets
- Master (Builders)
- IAM

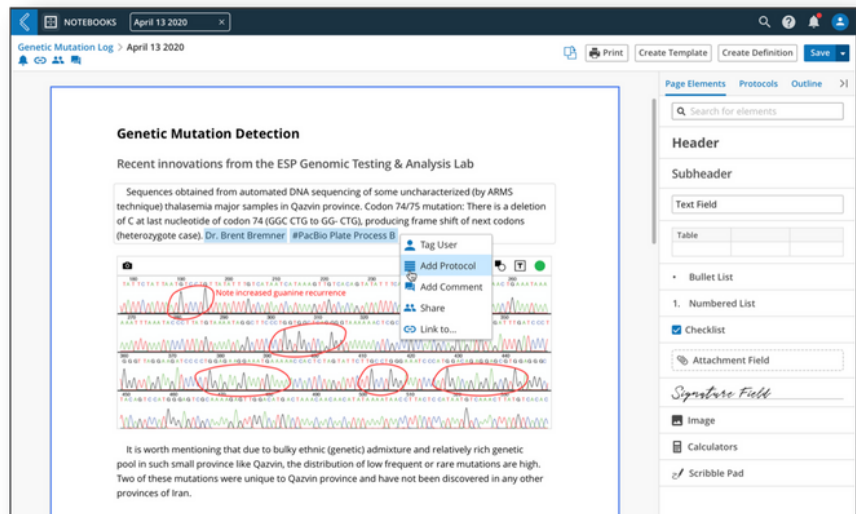
L7 Business Apps - Every Application Needed for the Scientific Enterprise



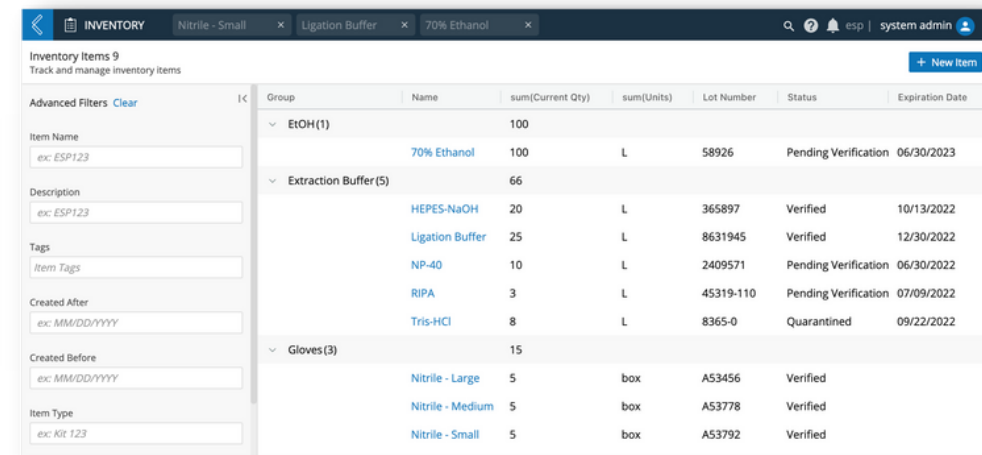
Integrated LIMS + LES



Location



Electronic Lab Notebook



Inventory

L7 Business Apps (continued)

CLINOPS Studies Indications Organizations Facilities Patients Select tab

System Admin

Studies Add New Study

Fill out the form below to add a new study.

View

Advanced

Protocol N

Study Status

Select option

Indications

Select option

NCT Num

Study Phase

Study Status

Select option

Tags

Current St

Current St

Actual St

Number of Sites Anticipated

Enter number of sites an

Indications Breast Cancer

Protocol Number Enter protocol number

Study Status - Internal In Development

Current Study Status Date 02Sep2022 (eg. 02Sep2022)

NCT Number Enter nct number

NCT Clintrials.gov Link Enter nct.clintrials.gov.l

Study Agent(s) Select option

Study Phase Select option

Study Status - clinicaltrials.gov Open - Available

Project Manager Select option

ICRA

DMCR Required? Select option

Registration Trial? Select option

CTR Type Select option

Number of Participants Anticipated Enter number of partici

Anticipated Study Activation Date Enter actual (eg. 02Sep2022)

Anticipated Study Finish Date Enter actual (eg. 02Sep2022)

Anticipated Date for Data Outread Enter actual (eg. 02Sep2022)

Anticipated Date for Interim Analysis Enter actual (eg. 02Sep2022)

Actual Study Activation Date Enter actual (eg. 02Sep2022)

Actual Subject Actual Enter actual subject actu

Actual Study Finish Date Enter actual (eg. 02Sep2022)

Actual Date Outread Date Enter actual (eg. 02Sep2022)

Actual Date for Interim Analysis Enter actual (eg. 02Sep2022)

Location Select option

Notes Enter notes

Subject Population Enter subject population

IND Number Enter ind number

Randomized Study? Select option

Placebo Controlled? Select option

Hazard Ratio Enter hazard ratio

Power Enter power

Minimum Product Vials for Participation Enter minimum product

Event Endpoint Enter event endpoint

Subject Endpoint Enter subject endpoint

Blinded? Select option

Central IRB? Select option

IRB Name Enter irb ex. (eg. 02Sep2022)

IRB Status Select option

IRB Expiration Date Enter irb ex. (eg. 02Sep2022)

Tags exc: blood

Primary Options Save & Add Another Cancel Save

Clinical Operations

MANUFACTURING Dashboard Schedule Rooms Personnel Clients Requests

Requests See All

Events See All

Open Slots See All

Event Status See All

Clients See All

Another Client See All

Unassigned: 12 Scheduled: 75 Finishing Today: 11

Starting Today: 12 Starting This Week: 39 Currently Working: 6

Today: 0 This Week: 0 Capacity: 110%

On Schedule: 3 Ahead of Schedule: 4 Behind Schedule: 3

Client ABC123 22 Events Client BCD223 18 Events Client CDE000 11 Events

Another Client Status: In Progress Status: In Progress

New Requests

Client #	Subject ID	Type	Date Received
191	ABC0000881	Clinical Run	1 day ago
980	ABC0005560	HD Split Run	1 day ago
121	ABC0006670	Media Change	2 day ago
331	ABC0009000	Clinical Run	2 days ago
001	ABC0009990	Run D4	3 days ago

Ending Today

Event Name	Room	Client	Lot #	Day
Isolation	B2	191	713	3 of 3
Media Change	B9	191	456	1 of 1
Clinical Run	B5.2	001	783	7 of 7
Expansion	B13.2	331	213	10 of 10
Isolation	B16	980	445	1 of 1

Map View List View

Room B2 191 Today

- 08:00 Clinical Run Day 3
- 09:00 Isolation Day 2
- 10:00 Expansion Day 5
- 12:00 Media Change Day 6
- 01:00 Expansion Day 1
- 03:00 Media Change Day 6
- 04:00 Cleaning

Schedule: Aug 21, 2021 Sort by Start Time

- +191-PS2 Isolation Day 10 of 14 Greer, J | Haskins, M | Hastings, B 9 - 11am
- +191-87 Expansion Day 1 of 1 Huges, M | Hastings, B 9 - 9:30am
- +001-PS3 Clinical Run Day 1 of 3 Kepler, J | Beeble, A 9:30 - 11am
- +331-B9 Media Change Day 2 of 2 10 - 11am
- +001-PS5 Isolation Day 4 of 7 Burton, J | Morales, M | Hastings, B 10 - 11:30am
- +121-PS2 Clinical Run Day 1 of 1 Getty, L | Anderson, M 11:30 - 1pm
- +001-B2/B6 Clinical Run Day 2 of 2 Neel, J | Haskins, M | Hill, B 11:30 - 2pm
- +191-B16 Isolation Day 1 of 1 Greer, J | Haskins, M | Hastings, B 12 - 1pm
- +121-PS4 Expansion Day 6 of 7 Hastings, K 12 - 1pm
- +001-PS2 Isolation Day 1 of 4 Harger, M | Lee, B 12 - 2pm
- +331-B16 Clinical Run Day 4 of 10 Greer, J 1 - 3pm

Legend: 191 980 121 331 781 001

Scheduling

SAMPLES ESP000060

Sample: ESP000060 metadata about samples here

Export History Delete Done

Details For Sample A

Sample ID Sample A

Summary This sample is from Kathy Johnson.

Details Lorem ipsum dolor sit amet, mas sed.

Notes Alimut labore et dolore magna aliqua.

Attachments Add Attachment Document.pdf

Tags Tag 1 X Tag 2 X

Work Groups Group A X Group B X

Barcode RXAV113112AC12 QR Code Print

Shopping Cart Remove from Cart

Owner System Admin Submitted 06/03/18 10:08:32 AM Custom Icon Change Display Icon

View Parents & Children Process Data Linked Items Attachments History

All Sample Types + Link Sample Filter Samples

Parent Child

Samples	Type	Tags	Last Modified
Sample ABC123	Subject	Tag 1 X Tag 2 X	04/22/18 11:34:03 AM
Sample ABC456	Subject		06/03/18 10:08:32 AM
ESP000061	Sample	Tag 1 X	06/03/18 10:08:32 AM
ESP000062	Sample	Tag 1 X Tag 2 X	04/22/18 11:34:03 AM
ESP000063	Sample	Tag 1 X	04/22/18 11:34:03 AM
ESP000064	Sample		05/04/18 04:28:32 PM
ESP000065	Sample	Tag 1 X Tag 2 X	06/03/18 10:08:32 AM
ESP000066	Sample	Tag 1 X	06/03/18 10:08:32 AM
ESP000067	Sample		04/22/18 11:34:03 AM
ESP000068	Sample		05/04/18 04:28:32 PM
Sample B8C112	Specimen	Tag 1 X Tag 2 X	05/04/18 04:28:32 PM
ESP000080	Sample		04/22/18 11:34:03 AM
ESP000081	Sample		06/03/18 10:08:32 AM
ESP000082	Sample		06/03/18 10:08:32 AM
ESP000083	Sample		04/22/18 11:34:03 AM
Sample 00010011011	Specimen	Tag 1 X Tag 2 X	05/04/18 04:28:32 PM
Sample 00192212211	Specimen		05/04/18 04:28:32 PM
Sample 88192881920	Specimen		04/22/18 11:34:03 AM
Sample 00000110029	Specimen	Tag 1 X	06/03/18 10:08:32 AM
Sample 0000199919	Specimen		06/03/18 10:08:32 AM
ESP000090	Sample		05/04/18 04:28:32 PM

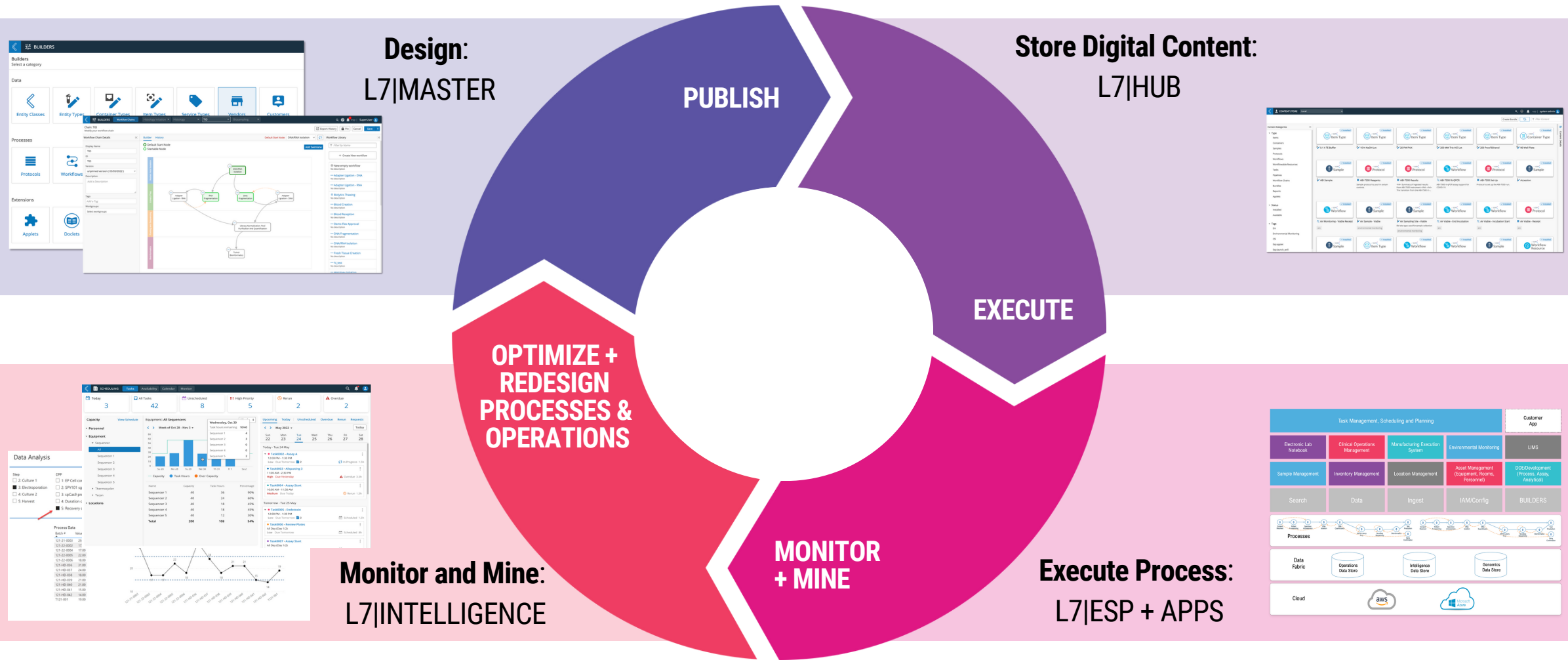
Sample Management

L7|ESP Connectors

Agilent	Bioanalyzer 2100	Illumina	MiSeq	Scotsman	Ice Maker/AFE424A-1A	
	Tapestation 2200,4200		HiSeq	Siemens	HDMI	
	Microplate Labeler		NextSeq 500, 550	Solair	5100 Particle Counter	
Akoya Bioscience	Vector Polaris		NovaSeq 6000	StepOne	Plus	
APC	UPS/SMX3000RMHV2U	PacBio	iSeq	SynergyLx	Microplate reader	
Applied Technology	7900 HT		PacBio RSII, Sequel	TBD	Gel Imager	
Beckman Coulter	Ampure	Julabo	Water Bath	Thermo Fisher Scientific	Veriti Thermal Cycler	
	BioMek i7	Lascar	Electronics		3500, 3500 XL	
Bio-Rad	Gel Doc XR + Imager	Lonza	FlashGel		Fragment Analyzer	
Biolog	Plate Reader	Media Jet	Printer MJ 9410		Genetic Analyzer	
Biomerieux	BACT/Alert 3D	MilliQ	Integral Water Purification System		Qubit - 1.0, 2.0, 3.0, 4.0	
BioStore	III Cryo -190C	Molecular Devices	SpectraMax (GA3500)		QuantStudio 12k Flex	
Biotek	Synergy LX (fluorimeter)	Olympus	IX83		StepOne Realtime PCR	
Bulldog	BioShake XP	Oxford	Nanopore Sequence		Nanodrop spectrophotometer	
Caliper	Twister II (liquid handler)	Perkin Elmer	LabChipGX		Trinean	DropSense
Cardinal Health	Timer/ C6510-7	Promega	Maxwell CSC		Unico	Rock-IT! Tube Mixer
	Thermometer CH240056, CH2971-6, CH2212-2		Maxwell RSC	USA Scientific	Vortex Mixer	
Cellomter	Vision	Protein Simple	ELLA	ViaFreeze	Duo CRY	
Clean AirSystems	24" ISO 5 Combination	QIAGEN	EZ1 Advanced XL	VWR	Total Range Thermometer	
Cole-Parmer	Techometer	Quant Studio	12k Flex/Dx		Traceable Stopwatch	
Covaris	LE220 Ultrasonicator	RAININ	RFID reader and pipettes		Mini Centrifuge	
Datamax-O'Neil	M-420 Mark II printer	Rees	EMS		Vortex Mixer	
Dynmo	Label Printer 1750283	Roche	LightCycler 480	Zebra	Zebra Printer 410/420	
Eppendorf	Centrifuge 5424, 5430R, 5804R	SATO	Plastic Tag Printer TXPSX5			
	SmartBlock 1.5mL	Sage	Pippin			
	Thermomixer	Savant	DNA 120			
ESCO	Class II, BSC/AC2-4S9-NS	Scientific Industries	Vortex Mixer			
			Digital Vortex-Genie 2			

Digitalization Lifecycle

Design > Publish > Execute > Monitor + Mine > Optimize



L7 Informatics Customers



CASE STUDIES

The image shows two people in a professional setting. On the left, a person is wearing a blue polo shirt and has their hands clasped. On the right, a person in a white shirt is holding a pen and pointing at a tablet. The tablet screen displays a network diagram with nodes and connecting lines. The entire scene is overlaid with a semi-transparent blue filter.

RT-qPCR + NGS for COVID-19

CAP/CLIA testing of COVID-19 using NGS and RT-qPCR

SITUATION

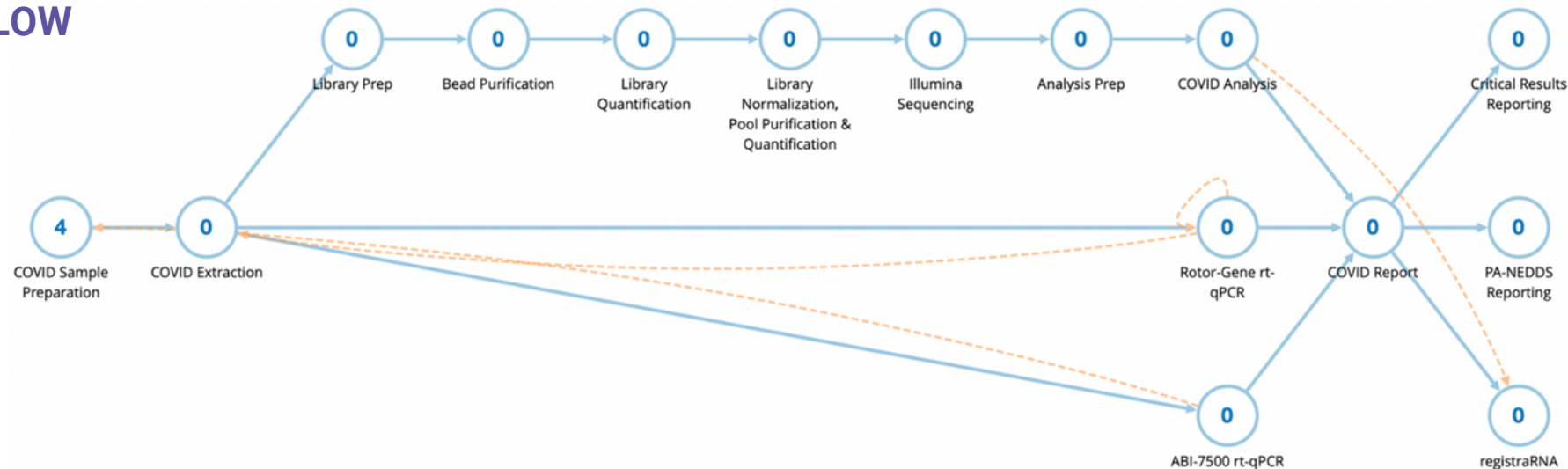
Manual paper-based processes were slowing down the overall lab throughput – this reached a critical stage during the 2020 pandemic when the lab pivoted to COVID-19 testing.

SOLUTION

L7|ESP was selected to automate the entire COVID-19 testing process, from sample accessioning and preparation through testing, and clinical report generation.

- The process begins when L7|ESP ingests a Sample Accessioning form received from a clinical institution.
- As the samples move through the Sequencing workflow, L7|ESP is gathering data from a Biomek Liquid Handling Robot, rt-qPCR instruments, fluorimeters, Illumina Sequencers, and various bioinformatic pipelines.
- L7|ESP enables the scientists to determine presence of COVID-19 in the patient's sample, and smoothly inform any physicians of the findings. All of this data is kept inside L7|ESP in a secure and query-able fashion.

WORKFLOW



miRNA CDx Workflow



IVD diagnostic testing platform for a QIAGEN developed miRNA test with Cloud-based and appliance-based global deployment

SITUATION

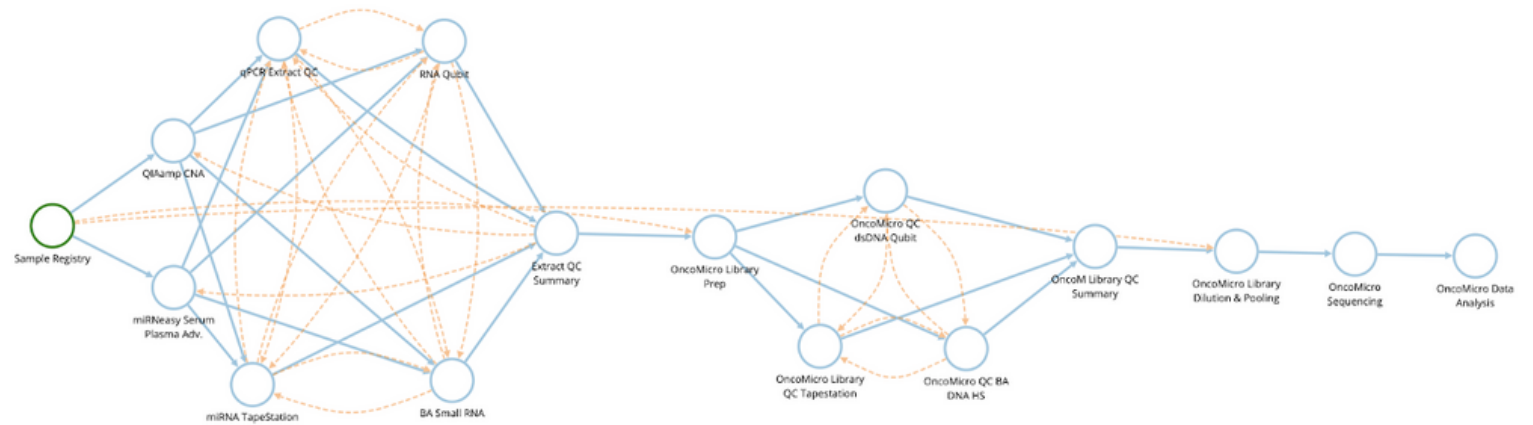
Paper-Based capture of diagnostic data, including the complete workflow from extraction to data analysis. There was no automated integration with instruments and CLC bioinformatics.

SOLUTION

QIAGEN selected L7|ESP to automate the miRNA NGS workflow (Sample to Insight) for a companion diagnostics including all the instrument and bioinformatics integrations. The miRNA CDx workflow chain begins with the reception of plasma samples in Sample Registry. Once the Nucleic Acid is extracted using the QIAamp miRNeasy Serum Plasma Advanced Kit , L7|ESP walks the user through a set of QC methods (TapeStation, BioAnalyzer, Qubit, and qPCR) to determine the quality of the extracted miRNAs. These findings are summarized in the Extract QC Summary workflow.

At Library Preparation, L7|ESP handles the sample genealogy as libraries are prepared and indexes are assigned. After performing the necessary QC steps, the libraries are diluted and pooled to prepare for NGS. Prior to sequencing, L7|ESP generates the sample sheet to be used with the NextSeq 550 Dx. L7|ESP automatically registers the generated FastQ files for each library, as well as pull important sequencing run metrics to assess the health of the run. Once complete, the user may submit an analysis job to CLC Workbench at the click of a button. L7|ESP receives the results and displays the output of the secondary analysis back to the user.

WORKFLOW



VALUE COMPARISON OF THE L7|ESP UNIFIED PLATFORM VS INTEGRATED POINT SOLUTIONS → TCO

INVESTMENT	L7 ESP	INTEGRATED POINT SOLUTIONS
Licenses	Annual License Model: Core License + Additional Packages (Lab Operations, Research, etc...). Updates to the latest release are included.	Multiple licenses for multiple solutions (ELN, LIMS, Inventory Management, Freezer Management, Instrument Integration, Data Management, Reporting, etc...). Upgrades to the latest release may incur additional license fees.
Maintenance Fees	Maintenance is included in the annual license.	Typically 20% - 22% of the license fee for each solution.
Integration	Because L7 ESP is a unified platform and leverages a single data fabric, no integration is required to enable an end-to-end process other than, for example, an ordering portal or ERP system (as required).	Multiple point solutions require multiple integration points, leading to higher costs and preventing full contextualization of the overall data model, making it extremely difficult or even impossible to obtain meaningful insights.
IT Resources	Only a single set of common skills (Python, HTML, and JavaScript) are required to maintain and extend all aspects of research, development, and lab operations. Fewer IT resources are required to maintain such a unified platform.	Multiple solutions require multiple technical skillsets to maintain the solutions, thus requiring additional IT resources and cost.

VALUE COMPARISON OF THE L7|ESP UNIFIED PLATFORM VS INTEGRATED POINT SOLUTIONS → CAPABILITIES

INVESTMENT	L7 ESP	INTEGRATED POINT SOLUTIONS
Data Model	L7 ESP offers a flexible late binding data model tailored to customer needs with the Builders no-code configuration tool. Ontology Services like SciBite ensure adherence to ontology rules across the organization. With a single data fabric, L7 ESP can collect and execute data for any end-to-end process, leading to comprehensive insights into scientific and operational data.	Some solutions require customers to adjust their data models to fit an existing structure. This can result in changes to customer processes to accommodate inflexible data models, leading to time-consuming and costly analysis of data from multiple integrated systems. This can also result in a loss of contextualization and value of the data collected.
Process Model	L7 ESP's low code/no code configuration tool allows for easy configuration of any process using both predefined and new content without requiring the customer to change any part of their current processes.	Some solutions force customers to adapt their processes to fit a predetermined structure and may not support all protocols and workflows within an end-to-end process.
Predefined and Reusable Content	L7 Informatics continually creates reusable content to enhance implementation efficiency and speed. This content includes data entity definitions, workflow components, instrument connectors, and more, which can be shared easily between departments to improve collaboration and speed to value.	Without the use of a composable architecture and unified platform, implementations tend to be more custom and deployed in silos across different departments.
Business Analytics Enablement	L7 ESP uses a single data fabric including an intelligence data store that can be used by any business intelligence tool such as Microsoft PowerBI, Tableau, etc. to enable scientific and operational insights into all processes and data within L7 ESP. With L7 ESP's single data fabric, all data is contextualized to enable deeper and more meaningful insights.	Data sourced from multiple systems typically is exported to a data lake system for analysis. However, data stored in a data lake will lose context as the different data sources are joined, which restricts the value that can be obtained from the analysis.
Communication and Visibility	Users across all groups (Biospecimen Management, Sample Management, Lab Operations, Pathologists, Bioinformatics, etc.) all work seamlessly in the same platform. All requests, status, results, reconciliations, and more are easily available.	Communication via email, internal messaging services, etc. is required to communicate requests, status, results, issues, etc. when using multiple solutions. Visibility to critical information regarding requests, status, results, reconciliations is much more difficult when using multiple solutions.
Sample Lineage and Provenance Tracking	L7 ESP tracks each sample from storage in the BSSR to use in each lab and includes tracking via couriers and external partners, as applicable. L7 ESP automatically manages and tracks all sample parent-child relationships as well as all sample movement to provide full Chain of Identity and Chain of Custody for all samples.	Using multiple systems to enable any end-to-end process increases the difficulty to not only track but also to maintain sample lineage and provenance when sample related data must be exchanged between systems, sometimes multiple times within a single process.
End-to-End Audit Trail	L7 ESP includes a complete and immutable audit trail of each change in the database including all implemented end-to-end processes.	Multiple solutions not only requires multiple audit trail exports but also mapping and assemblage of different audit trail formats to produce a single audit trail of an end-to-end process.

VALUE COMPARISON OF THE L7|ESP UNIFIED PLATFORM VS INTEGRATED POINT SOLUTIONS → IMPLEMENTATION + MAINTENANCE

INVESTMENT	L7 ESP	INTEGRATED POINT SOLUTIONS
IT Resources	Only a single set of common skills (Python, HTML, and JavaScript) are required to maintain and extend all aspects of research, development, and lab operations. Fewer IT resources are required to maintain such a unified platform.	Multiple solutions require multiple technical skillsets to maintain the solutions, thus requiring additional IT resources and cost.
Ease of Configuration	Because most of the process and data modeling changes can be performed by anyone trained in the L7 Master low code / no code configuration tool, changes can be made much more rapidly since IT resource typically do not need to be involved.	Many point solutions required IT resources to make basic changes such as extending the data model or modifying a protocol step, thus increasing costs and delays while decreasing flexibility and speed to market.
Implementation Approach and Skillsets	Uses Low Code / No Code configuration tool for Data and Process Modeling, Reporting, Data Processing, and Automation leverages commonly used technical skills, including Python, HTML, and JavaScript.	Multiple solutions typically require multiple technical skillsets across all the solutions from database management to configuration to coding and more with each solution potentially requiring a different set of technical skills.
Implementation SDLC	L7 Informatics' well defined customer content SDLC provide a single roadmap for a successful implementation of any end-to-end process in L7 ESP. Each customer implementation is fully documented.	Implementing multiple systems requires multiple implementation approaches and models increasing costs and time to value.
Verification and Validation	Each major release of L7 ESP is verified and validated. In addition, each customer implementation is verified by L7 Informatics' QA resources. Verification and validation documentation including test matrices, trace matrices, Verification Summary Report, Release Notes, and more are provided to each customer to support their own verification and validation efforts.	Verification and Validation is required for each system, leading to higher overall validation costs. Some vendors may provide verification and validation documentation while others may not.
Updates	L7 Informatics is a PaaS solution which means that L7 ESP updates are provided to each customer who can then implement those updates on their own schedule. Any required verification and validation related to L7 ESP updates or additional implementation phases need only be performed in one system.	Verification and validation will be required (as applicable) to each system update as well as each system impacted by additional implementation phases.



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About L7 Informatics

L7 Informatics, Inc. is a leading provider of integrated scientific data and analytics solutions. The company offers a comprehensive platform that enables seamless data integration, advanced analytics, and collaborative workflows, empowering scientists and researchers to accelerate discoveries, improve operational efficiencies, and drive innovation. L7's mission is to revolutionize how scientific data is managed, analyzed, and utilized, facilitating breakthroughs in research, drug discovery, development, and manufacturing. To learn more, visit www.l7informatics.com.

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