ESP
Enterprise Science Platform™

SYNCHRONIZED
solutions for science + health

L7INFORMATICS

a foundational platform for integrating science + health operations

Through collaboration, L7 Informatics builds comprehensive solutions to uniquely address your complete workflow needs. By incorporating your functioning IP solutions, ESP can alleviate your operational pain points and increase efficiency. Because operational excellence stems from better use of resources and faster, higher quality results.

Available either as a pre-built or customized solution, ESP is ideal for a variety of industries:

GENOMIC RESEARCH CENTERS

Foster collaboration and expedite genomic research in academic, industry, clinical, and agricultural environments. Our integrated, agnostic platform manages scientific processes and data in one place, yielding better data access and faster discoveries.

DIAGNOSTICS COMPANIES

Get total visibility over your operations while integrating and automating workflows. ESP can help increase your sample throughput and quality assurance in your diagnostic results. Plus, our platform provides reliable documentation for regulatory review.

PHARMACEUTICAL COMPANIES

Bring therapeutics to market faster. By automating processes and managing data from various stages of development and manufacturing, you can easily access data and get necessary documentation for regulatory submission, operational efficiency, and audits.
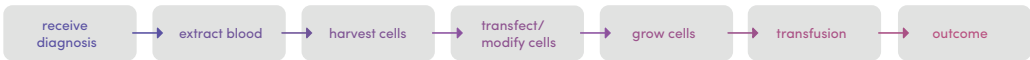
the heart of ESP: a software foundation for scientific process + data management

ESP organizes your scientific and healthcare operations around different data-rich workflows. ESP encompasses not only wet lab operations but also supports full integration of analysis and reporting, drastically reducing the amount of IT "machinery" required to manage, process, and analyze samples all while maintaining end-to-end data provenance throughout.
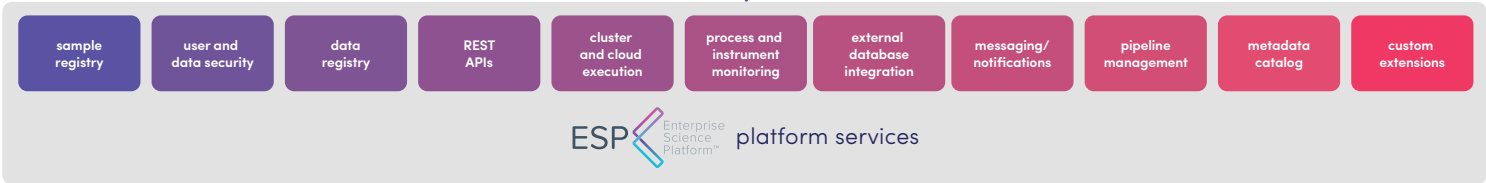
sequencing workflow

receive samples → store/accession samples → prepare/process samples → sequencers → 2°analysis → 3°analysis → reports → publication

therapeutics workflow

receive diagnosis → extract blood → harvest cells → transfect/ modify cells → grow cells → transfusion → outcome

pharmaceutical workflow

receive samples → store/accession samples → send samples to CRO → prepare/process samples → sequencers → receive data from CROs → 2°analysis → 3°analysis → reports → analyze and revise

diagnostics workflow

order submission → receive samples → store/accession samples → prepare/process samples → sequencers → 2°analysis → 3°analysis → decision support → clinical report

ESP: Apps
ESP runs discrete software modules with specific functions.

ESP: Connectors
ESP interfaces with common lab instruments and software systems.

sample registry	user and data security	data registry	REST APIs	cluster and cloud execution	process and instrument monitoring	external database integration	messaging/ notifications	pipeline management	metadata catalog	custom extensions

ESP Enterprise Science Platform™ platform services

operational efficiency

ESP's tools are designed to provide full transparency into your operations. Whether you are using our complete solution or complementing your existing LIMS or analysis tools with a handful of our apps, ESP enables streamlined sample, process, instrument, and inventory tracking to facilitate better communication between lab technicians, managers, bioinformaticians, and scientists.

PROTOCOL MANAGEMENT

In both laboratory and clinical operations, efficient protocol management and data entry are key for maintaining quality and throughput goals. As you move into regulated environments, accurate record keeping—including tracking sample or treatment progression—becomes a stringent requirement. ESP has the tools you need to maintain critical records, and forms the basis for the provenance that will be required for downstream reports.

SAMPLE TRACKING

ESP gives stakeholders a detailed view of where a sample is in its workflow, or where a patient is in their treatment protocol. As each discrete item moves from one functional environment to another, users can view results in real time as they become available directly from ESP; no more hunting around for spreadsheets or emailing technicians for status reports.

PROVENANCE

We track the full provenance of data, from instruments to QC and mapping pipelines, as well as experiment-specific analyses. Users have full access to the provenance chain and all the data associated with each step, enabling complex queries that allow scientists to fully explore their results.

MONITORING

ESP's monitoring tools provide multiple real-time views into ongoing analyses and workflows, giving scientists complete transparency to the status of their projects.

REGULATORY COMPLIANCE

ESP's deep data provenance is critical for healthcare, diagnostic, and therapeutic environments that require all available records to be audited by various regulatory agencies including the FDA, CAP, and CLIA.

CAPACITY + INVENTORY MANAGEMENT

With ESP's holistic operational management and data registries, you can keep track of your manufacturing and processing capacities and your inventory stocks. This enables faster access to operational metrics and can help your organization realize a greater ROI.

ESP applications

Applications in ESP are discrete software modules with specific functions. Rather than having to manage a full platform solution with some functions that you might not need, L7 has modularized ESP deployment to match your workflow's requirements. Only use the tools you need, while knowing that additional functionality is only an app or two away. Because all apps are built on top of ESP, you can be confident that the provenance of your processes and data will remain intact regardless of the apps you use now or add in the future.

ESP connectors

ESP provides connectors to many common laboratory instruments and software systems. In addition, using ESP's powerful REST Application Programming Interface (API) and Command Line Interface (CLI) tools, we are able to integrate directly with most major laboratory instrumentation and software platforms, including Electronic Medical Records (EMR) using HL7. The result is a streamlined and efficient laboratory or clinical operation that reduces wasted time and effort. Eliminating manual transfer of process details and data from these systems lowers operating costs and improves the turnaround time of your workflows.

ESP content

As a comprehensive process and data management platform, ESP has the capability to manage complete workflows, analysis pipelines, and treatment protocols. Out of the box, ESP has a menu of common workflows and analysis tools, including BioBuilds™, L7's versioned and curated library of the most commonly used open-source bioinformatics tools for NGS informatics, enabling new users to hit the ground running while more complex workflows can be developed using ESP's user-friendly builder tools.

deployment + administration

Our team is experienced in developing and deploying scientific software in complex, high-performance environments. As a result, ESP has been designed from the ground up to work in various deployment scenarios ranging from single workstations to cloud environments.

DEPLOYMENT

ESP is built to not only be platform-agnostic but also to be self-contained and easy to deploy. Installation is as simple as extracting a tarball (or unzipping a zip file, if that's how you roll) and adjusting a few configuration settings. The client side is even simpler. As a Web-based application, ESP requires nothing more than a recent HTML5-compliant Web browser.

HPC INTEGRATION

We leverage your existing job scheduler, file systems, and user models to integrate seamlessly into existing compute environments. ESP supports all major job schedulers. Our core pipeline system is built on a task graph engine that uses shell scripts as the main unit of execution: any executable or file visible from the job scheduler's execution environment can be used.

ESP works with job schedulers and user databases via a secure user model that allows ESP users to be mapped to users on the compute nodes. All pipelines execute as the user who submitted them and root access is never required while running the software.

DEVELOPER TOOLS

ESP provides administrative access from the Web, command-line tools, and REST APIs. Our command-line tools can be used to launch and monitor pipelines, allowing ESP to integrate with existing job management systems.

SECURITY

With our security model, scientists can control access to all aspects of their experimental environment. Fine-grained access control lists enable read, write, and execute permissions for all data and pipelines.

benefits + specifications:

- **Analysis agnosticism** – Run any NGS analysis (DNA, RNA) ... or, frankly, any analysis pipeline. Remember, it's customizable to your requirements.

- **Auditing capabilities** – Built-in tools to provide compliance with any regulatory requirements (e.g. CLIA GxP, 21 CFR Part 11)

- **Browser support** – Any HTML5-compliant browser, including mobile (e.g. Safari, Chrome, Internet Explorer)

- **Compute infrastructure** – Scales from single workstations to large clusters or clouds

- **Environment** – Self-contained runtime environment (no external dependencies)

- **Integrated genome browsing** – Support for all common sequencing file formats including FASTA, BAM, BED, GFF, VCF, Wig/bigWig

- **Job schedulers** – Compatible with all major job schedulers (SLURM, SGE/OGE, PBS, LSF)

- **Operating systems** – Linux, OS X

- **Pipeline engine accessibility** – Via Web interface, command line, or REST API calls

- **Pipelines** – Pipeline tasks can be any shell script and run as the submitting user

- **Security** – Built on existing OS security with additional access controls, root access not required

- **Versioning** – Annual licenses include all updates and upgrades