



Benchling Life Sciences R&D Cloud

Accelerating the Pace
of Life Sciences R&D

Advances in biotechnology are transforming almost every aspect of our lives — from the medicines we take, to the food we eat, the crops we grow, and the materials we use every day.

Not surprisingly, the scientific techniques and R&D operations needed to bring these innovations to market are constantly evolving and growing in complexity. As a result, the scale and speed at which R&D data is generated are growing exponentially.

To continue making these innovations a reality, life science organizations need to fully embrace a digital transformation that will enable them to integrate their R&D data systems, develop more robust scientific platforms, and achieve more productive collaboration.

Unfortunately, the legacy software that R&D teams have historically used holds them back, siloing data and creating bottlenecks that stall their progress.

It's time for R&D software to catch up to the science it's intended to support.

Enter Benchling.



The Benchling Life Sciences R&D Cloud

Benchling connects the entire R&D lifecycle — from project documentation and data acquisition to sequence design, sample management, process management, and reporting.

By standardizing and centralizing R&D workflows on a single platform, Benchling helps forward-thinking companies accelerate their digital lab transformation to enable better, faster decision-making.



The Benchling Difference

If you're currently relying on paper lab notebooks, word processing docs, and spreadsheets that aren't purpose-built for your science, legacy ELNs and LIMS that silo your data, or custom-built systems that require constant IT upkeep, your entire organization is operating at significantly lower efficiency than it could be otherwise. So why Benchling?

Built for Complex Science

Purpose-built to support the development of anything from biologics and biomaterials to strains and small molecules, Benchling interlinks your sequences, samples, and experimental results to ensure full traceability.

Adapts to Your Process

Built on top of a secure, high-performance cloud infrastructure, Benchling supports evolving scientific workflows and integrates with lab instruments and other software systems to help unify your R&D data ecosystem.

Intuitive and Easy to Use

Benchling's modern user interface — with natively interconnected notebook, sample registration, inventory management, and workflow design applications — means your team can work better and faster, together.

Enables Data-Driven Decisions

Centralized, standardized data capture and storage help ensure the integrity of your data, while integrated analytics tools help you derive the insights you need to make better scientific and operational decisions.



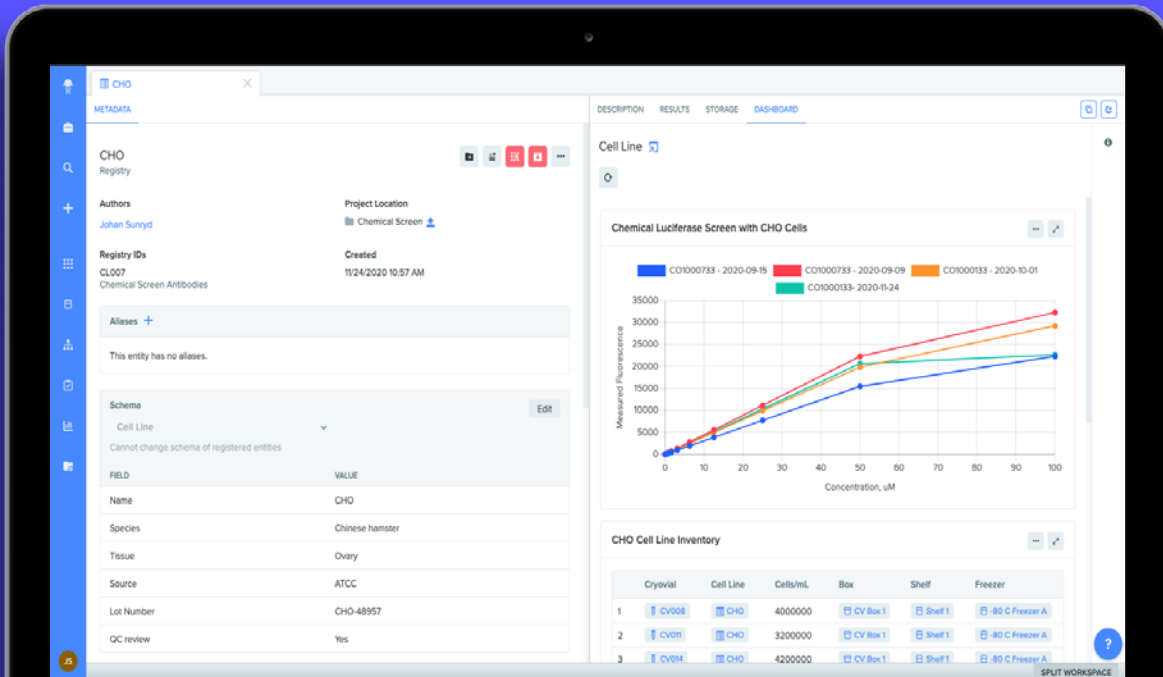
Brenda K. Minesinger, PhD
Principal Scientist



"What Benchling has provided us is a single solution for multiple different problems, from sequence design and alignment to a centralized database. Our speed has doubled, communication has improved exponentially, and it's decreased scientist frustration."



Benchling Life Sciences R&D Cloud



Applications



Notebook

Ensure documentation completeness and compliance



Molecular Biology

Accelerate DNA and amino acid design, at scale



Registry

Standardize, connect, and contextualize sample data



Inventory

Track and manage every sample and reagent



Requests

Coordinate work across specialized teams



Workflows

Design, test, and optimize R&D processes



Insights

Translate R&D data into actionable insights

Platform



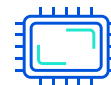
Codeless Configuration

Rapidly configure and deploy without needing to code



Benchling for Lab Automation

Automate instrument orchestration and data acquisition



Integrations & APIs

Unify your entire R&D data ecosystem



Ensure documentation consistency, completeness, and compliance

Notebook streamlines experiment documentation, collaboration, and knowledge transfer — all while ensuring your teams remain in compliance with organizational SOPs and regulatory requirements.

- Customizable entry templates
- In-line entity registration and inventory management
- Configurable, assay-specific data capture tables
- Audit trails and version control
- 21 CFR Part 11 compliant e-signatures

Standardize experiment documentation

Develop a library of Notebook entry templates with predefined protocols, checklists, and tables to standardize how your team performs and documents any number of experiments.

Avoid data recording errors

With pre-configured, structured data capture tables, you can ensure that experiment results are recorded the same way for each respective assay, by every team member.

Eliminate knowledge silos

Register and update the usage of samples and reagents in real-time directly within your Notebook entry, so each sample or entity is always accompanied by its complete history.

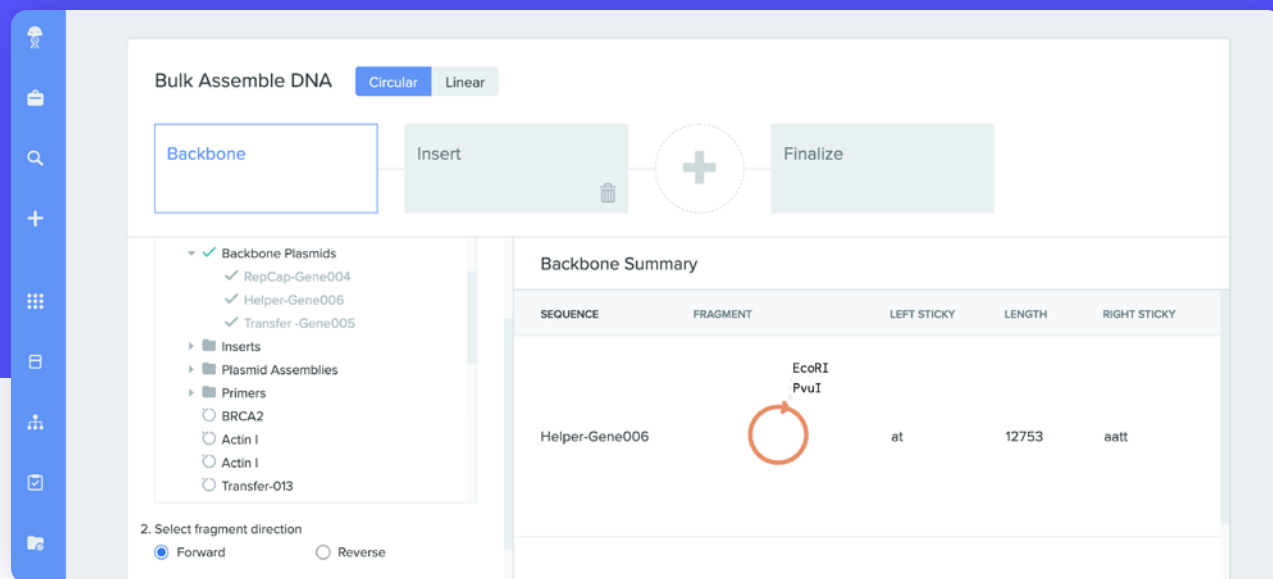
The screenshot displays the Benchling Notebook interface. The main window shows a notebook entry titled "Production and QC of IgM Lots" with ID "EXP20001958". Below the title is a table with the following data:

Inputs					
	samples	Request ID	Task	Mark for redo	Date Requested By
1	AbDemo	bioprocessing1	Transfection	<input type="checkbox"/>	2020-05-05
2	AbDemo	bioprocessing1	2L Bioreactor Run	<input type="checkbox"/>	2020-05-05
3	AbDemo	bioprocessing1	Affinity Chromatography	<input type="checkbox"/>	2020-05-05
4	AbDemo	bioprocessing1	EC50 Antigen Inhibition Assay	<input type="checkbox"/>	2020-05-05

An information panel is open on the right, showing details for the selected entry, including "Name: Production and QC of IgM Lots", "Folder: IGM PRODUCTION", and action buttons like "Update information", "Comment", "Retract", "Archive", and "Export entry".



Accelerate sequence design and analysis, at scale



Molecular Biology combines over a dozen DNA and amino acid design tools to help improve the speed, accuracy, and fidelity of your discovery programs.

- Golden Gate and Gibson assembly
- Primer design with secondary structure prediction
- DNA and amino acid alignment
- Amino acid translation, codon optimization, and back translation
- Antibody sequence annotation with CDRs, framework regions, etc.
- CRISPR guide RNA design

Streamline sequence design across teams

High-throughput in silico tools increase research efficiency — every sequence can be referenced in any Notebook entry, while retaining their full experimental context and history.

Ensure proper sequence utilization

Benchling automatically captures and maintains a history of every modification to every sequence. At the same time, read-only permissioning allows you to control who can modify sequences.

Trace sequence relationships end-to-end

Define relationships between every primer, insert, construct your team uses, and interconnect sequences with strains, cell lines, and other downstream products to ensure full traceability.



Standardize, connect, and contextualize every sequence and sample

Registry is an agile sample intelligence management system that harmonizes the way you collect, structure, and analyze all the sequence, sample, and experiment data in your lab.

- Code-free interface for defining scientific entities and metadata
- Configurable assay- and process-specific data capture tables
- Configurable auto-linking of entities and data
- Parent-child sample lineages
- Configurable media and formulation component schema

Standardize registration for diverse entities

Record pertinent information about the composition and properties of every sequence, sample, and entity in your lab, and define enforceable constraints to ensure every registered entity is unique.

Ensure end-to-end sample traceability

Define relationships between specific sample types — sequence to cell line to mouse model — to ensure the full lineage of any registered entity can be traced.

View sample & experiment data in context

Embeddable results tables enable you to record and automatically connect every piece of experiment data to the samples from which those data were produced.

The screenshot displays the Benchling Registry interface for a sample named 'CPA 47 + Prolif'. The interface is split into two main panels: METADATA and RESULTS.

METADATA Panel:

- Schema:** Cell Culture (Cannot change schema of registered entities)
- Table:**

FIELD	VALUE
Cell Concentration (cells/mL)	10000
Temperature Grown	37.5
Cell Line	CPA 47
Media Used	Proliferation Media Batch
Volume of Media Used (mL)	1000

- Custom Field:** This entity has no custom fields.

RESULTS Panel:

- Cell Line Characterization Table:**

	Sample ID	Western Blot	FISH stain image	DNA Gels	NGS
1	CPA 47 + Prolif				
2	CPA 47 + Prolif				

- Culture Yield Table:**

	Sample ID	Yield (g)	Primary Productivity	Creator
1	CPA 47 + Prolif	20		SynBio



Track the location and utilization of every sample and reagent

The screenshot displays the 'Cell Lines' inventory page. On the left, a grid shows storage positions from A1 to H10. Positions 2, 3, 4, 5, 6, 7, 8, 9, 10 in row A, and 11, 12, 13 in row B are highlighted in green. On the right, a table lists container details:

Position	Container	Volume	Cell Culture	Cell Line
2 A2	CR017	700 uL	CPA 47 + FBS	
3 A3	CR018	700 uL	CPA 47 + FBS	
4 A4	CR019	800 uL	CPA 47 + Seru...	
5 A5	CR020	800 uL	CPA 47 + Seru...	
6 A6	CPA 47	1000 uL		CPA +
7 A7	CR021	800 uL	CPA 47 + Seru...	

With **Inventory**, you can keep track of the amounts, concentrations, and physical locations of any samples and reagents stored in your lab.

- Custom storage types (e.g. cryovials, boxes, freezers)
- Media and formulation mixture component and lot tracking
- Aliquot lineage tracking and linking with experiment results
- Customizable worklists for organizing samples and reagents
- Barcode generation, scanning, and label printing

View sample & experiment data in context

Easily locate items with Inventory's visual interface, and organize containers into worklists to transfer samples and reagents between collaborators.

Connect physical samples to experiments

View all the samples that were used and produced in a particular experiment, and view all of the data — and associated experiments — that were ever generated from that particular sample.

Simplify location tracking

Support for label printing means you can integrate Benchling with your lab's barcode scanner and pull up any sample's full experimental history with a single click.



Coordinate handoffs within and across cross-functional teams

Seamlessly submit, manage, and track work and inventory transfer requests between teams with **Requests**.

- Customizable request tickets for defining tasks and assigning team members
- Sample and inventory linking to ensure the right materials are used
- Centralized dashboard for scheduling, assignment, and triaging requests
- Automatic request status update notifications for requesters and work fulfillers

Standardize request submissions

Require requesters to specify protocols, registered entities, and inventoried samples and reagents so the fulfilling teams have everything they need to fulfill a request.

Streamline task fulfillment

Triage requests, assign requests to individual team members, and view request status and progress in real-time through a centralized dashboard.

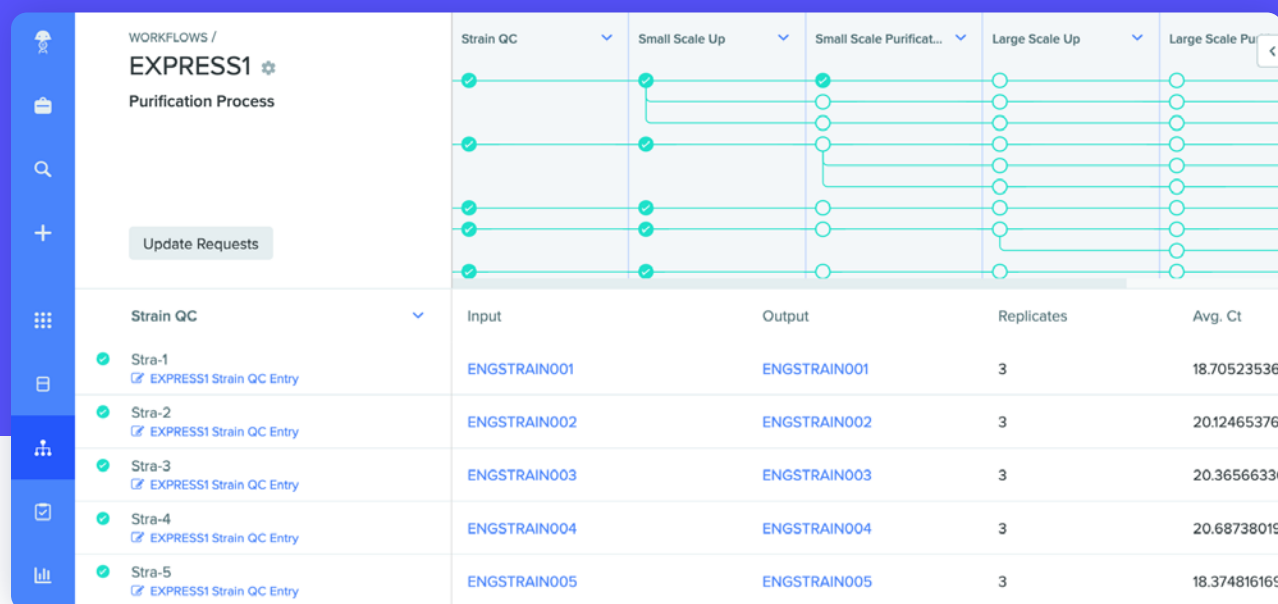
Ensure full visibility into request status

Requesting team members are automatically updated with output data and new sample locations. Run reports to measure request throughput and improve resource allocation.

Request ID	Status	Samples	Tasks	Requestor	Created	Assigned To
scale_up_expression1	In Progress	0 20 0		Junn Criz...	6/2/2020	Junn Crizaldo
bioprocessing3	Requested	3 0 0	2L Bioreactor Run	Megan	4/28/2020	Danee
genomics_core4	Requested	34 0 0	Library Prep QC	Junn Criz...	4/2/2020	Abigail Toh
bioprocessing4	In Progress	0 1 0	2L Bioreactor Run, Affinity Chr...	Megan	4/28/2020	Megan
bioprocessing2	In Progress	1 3 0	EC50 Antigen Inhibition Assay	Megan	4/28/2020	Danee
bioprocessing1	Completed	0 0 1	2L Bioreactor Run, Affinity Chr...	Megan	4/28/2020	Danee
genomics_core2	Cancelled	31 0 0	Library Prep QC	Junn Criz...	11/12/2019	Abigail Toh
genomics_core3	Completed	0 0 34	Library Prep QC	Junn Criz...	3/2/2020	Abigail Toh
genomics_core1	In Progress	0 3 0	Library Prep QC	Junn Criz...	11/12/2019	Abigail Toh



Design, test, and optimize R&D processes



Design and test multi-stage R&D processes to optimize efficiency, identify bottlenecks, and maximize outputs with **Workflows**.

- Visual process design with templating and versioning
- Centralized dashboard for tracking the status of in-progress workflows
- Lineage tracking of registered samples used and created across Workflow stages
- Data aggregation for comparing results across multiple runs of the same workflow

Ensure consistent execution for every process

Link each Workflows stage to preconfigured Notebook entry templates to ensure your team performs and records every step of each process the same way, every time.

Evolve R&D processes with full traceability

Workflows templates are fully versioned, and can be modified to include process variations that enable the comparison of study results.

Coordinate work and resource utilization

The Workflows dashboard view gives you insight into every active process, including the project they're a part of, the current status, and who's working on it.



Translate R&D data into actionable insights

Drawing conclusions from R&D data is a snap with **Insights**. Analyze, visualize, and report on data from every sequence, sample, experiment, and process with easy-to-build dashboards.

- Dataset viewer with previewing, filtering, and sorting capabilities
- Query builder for quickly identifying and running analytics
- Data visualization with charts (e.g. table, bar, line, and scatter plots)
- Configurable dashboards with real-time updating

Extract scientific intelligence in real-time

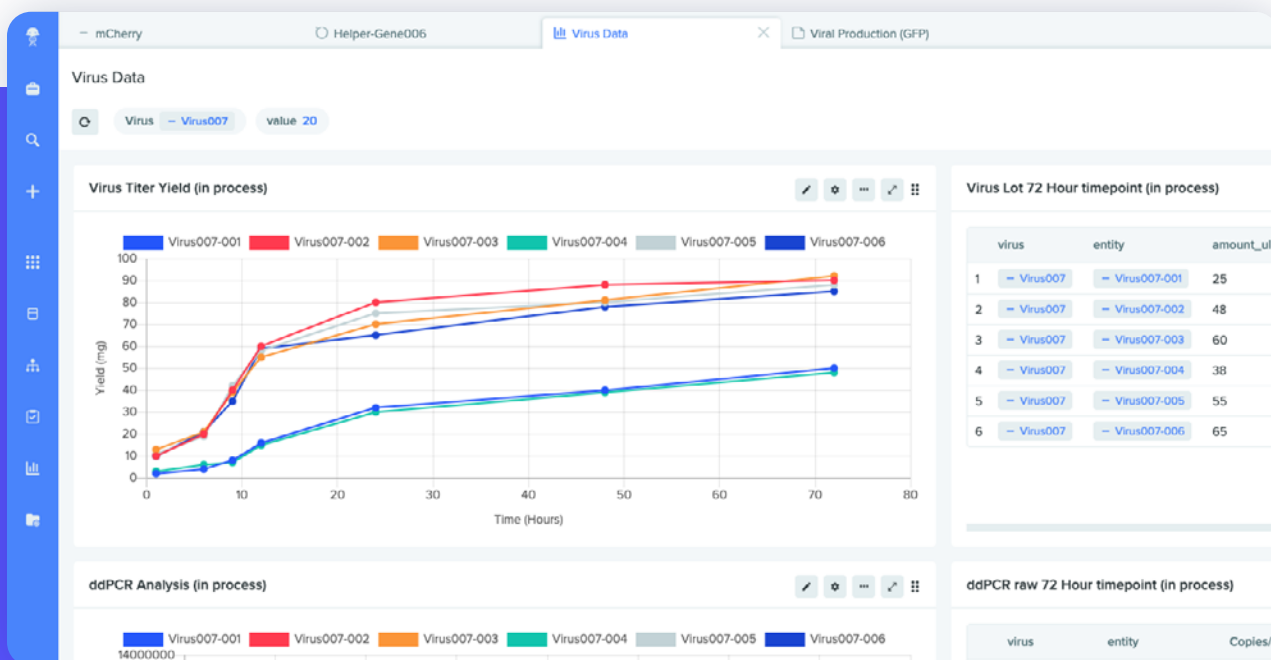
Build scientific dashboards to analyze experiment results and trace the lineage of each data point back as far as the sequence that was used to create a cell line or other entity.

Leverage data to optimize operational efficiency

Dive deeper into resource utilization and compare process variations to identify opportunities to improve program throughput, yield, and quality.

Track and manage organizational performance

Gain visibility into progress at the individual and group levels. Ensure team compliance with process review standards, and monitor teams' output velocity and quality.

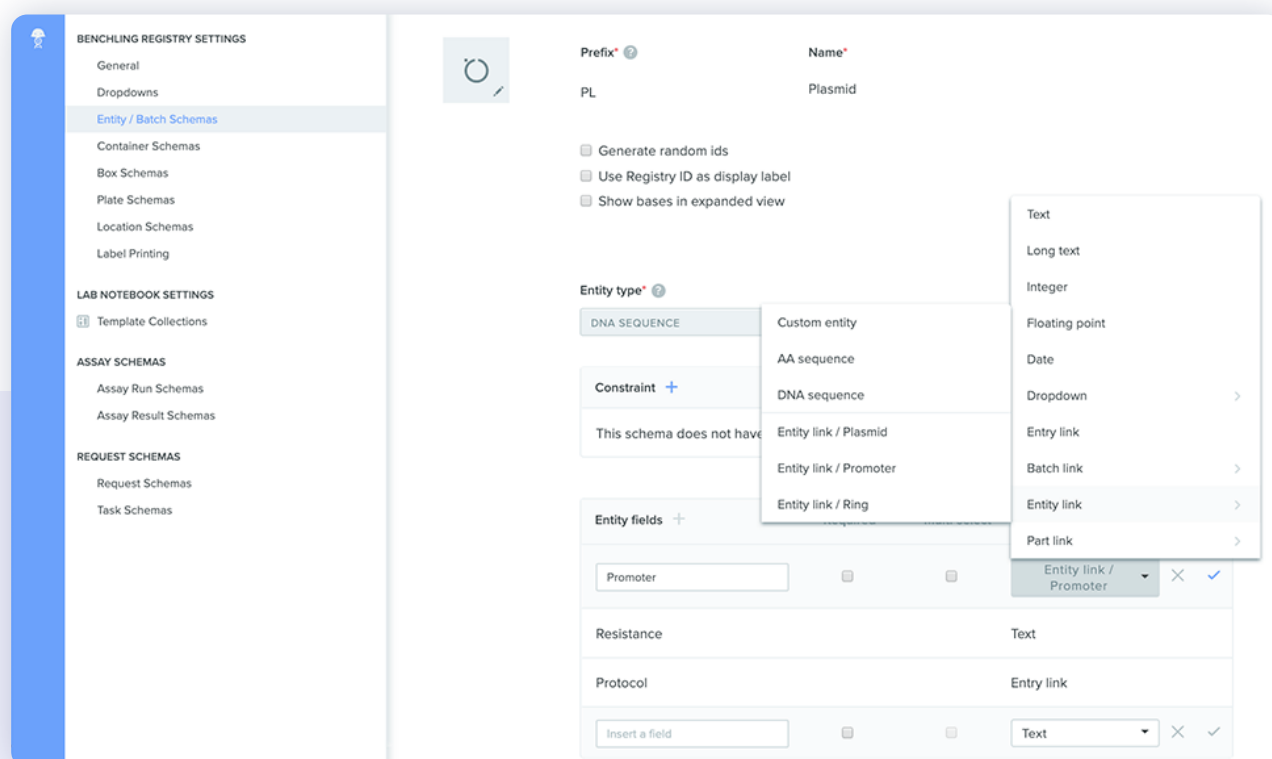


Rapidly configure and deploy without needing to code

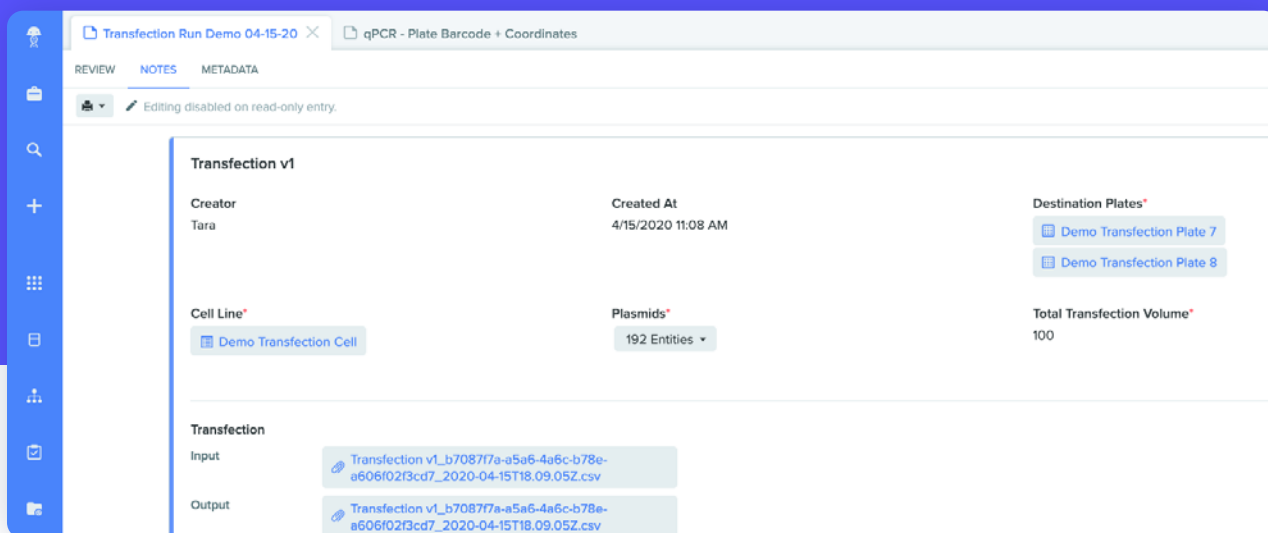
With no-code, UI-based configuration, Benchling allows you to quickly and easily adapt the system to fit your team and processes — no matter how quickly they grow and evolve.

Codelessly configure:

- Notebook entry templates
- In silico entities
- Assay-specific data tables
- Inventory storage types
- Multi-step processes
- User permissions



Automate lab instrument orchestration and data acquisition



With **Benchling for Lab Automation**, automatically ingest, parse, and append data from liquid handlers, plate readers, and other instruments.

- Out-of-the-box integration with liquid handlers like PAA, Tecan, and Hamilton
- In-app interface for defining liquid handler operation and processing rules
- Liquid handler instruction generation directly within Notebook entries
- Standardized assay- and instrument-specific data capture tables
- Automatic data ingestion, parsing, and appendage of results and entities

Simplify instrument orchestration

Kick off instrument runs with a single click — define instructions that include sample data and preconfigured, instrument-specific input parameters to reduce errors and artefacts.

Reduce errors from manual data transfer

Run outputs can be automatically pulled into Benchling upon completion of your instrument runs, with results data automatically synced to predefined, structured data tables.

Retain full data integrity at high-throughput

Registered and inventoried sequence, sample, and reagent volumes are automatically created and updated in lab automation workflows from start to finish.



Unify your entire R&D data ecosystem

Integrate software, databases, and instruments with the **Benchling Developer Platform** to centralize and synchronize your R&D data and processes.

- Create, run, update, delete (CRUD) access via Benchling's REST API
- Events system for automatically triggering actions in Benchling and connected systems
- Read-only, SQL Data Warehouse for storing Benchling- and instrument-generated data

Centralize data across informatics systems

Use the API to build integrations that automatically pull and push data out of Benchling to ensure all your systems are kept up-to-date with complete, accurate data.

Automate workflows with custom logic

Subscribe to events that allow you to automatically trigger the next step in an informatics workflow, automate instrument interaction, or sync changes to an external database.

Extend platform capabilities with 3rd-party apps

Connect your proprietary software to support specialized workflows, and securely connect to analytics tools like Tableau and Spotfire to create charts and dashboards from Benchling data.

CORE RESOURCES

DNA Sequences >

Oligos >

AA Sequences >

Custom Entities >

REGISTRY

Registry Resource

List registries

BulkGet registered entities

Registration >

Batches >

MOLECULAR BIOLOGY

DNA Alignments >

INVENTORY

Containers >

Plates >

Boxes >

Locations >

Transfers >

Label Templates >

BulkGet registered entities SUGGEST EDITS

`https://benchling.com/api/v2/registries/registry_id/register-ed-entities:bulk-get`

PATH PARAMS

`registry_id*` string

QUERY PARAMS

`entityRegistryIds` string

Comma separated list of entity Registry IDs

Response

Returns an array of entity (Sequence, Protein, CustomEntity) resources.

cURL

```
curl https://benchling.com/api/v2/registries/src_NetYd96a/registered-entities:bulk-get?entityRegistryIds=pBN000,sBN000 \
-u sk_YOUR_SECRET_KEY:
```

● 200 OK ● 400 Bad Request

```
{
  "entities": [
    {
      "aliases": [],
      "annotations": [],
      "archiveRecord": null,
      "bases": "GATTACA",
      "createdAt": "2017-04-18T05:54:56.247545+00:00",
      "creator": {
        "handle": "lpasteur",
        "id": "ent_jDKamp05",
        "name": "Louis Pasteur"
      },
      "customFields": {
        "test": {
          "value": "test"
        }
      },
      "entityRegistryId": "pBN000",
      "fields": {
```



Trusted partner to leading life science R&D organizations

Benchling enables high-impact life science R&D across hundreds of commercial, government, and academic organizations around the globe.

We've developed our platform in close coordination with R&D teams to ensure that no matter your science — from strain engineering and fermentation to cell therapy development, antibody engineering, and everything in between — the Benchling Life Sciences R&D Cloud will support the work you do.

Our professional services teams leverage three pillars of customer success to deliver the right solution for your organization:

- **Deep life sciences domain knowledge** across different R&D modalities
- **Proven implementation methodology** and best practices for R&D data management
- **Rapid prototyping and user testing** to build the right solution for your organization



Learn how Benchling can accelerate the pace of your R&D innovation. Visit benchling.com.





www.benchling.com