Open research data management with the STOCKS LabID platform

Charles Girardot EMBL, Heidelberg DeiC 2023, Kolding



Open Science accelerates scientific progress and innovation



UNESCO Recommendations on Open Science (2021)

- Facilitates Knowledge Dissemination
- Encourages Reproducible Science
- Allows Fairer Science by sharing tools and data (lowers \$ barrier)
- Helps building Public Trust and Engagement
- Compliancy with Funding Agency Policies

"AlphaFold was trained on all known 200,000 protein structures in the Protein Data Bank - an archive that is the result of decades of work of thousands of molecular biologists around the globe."

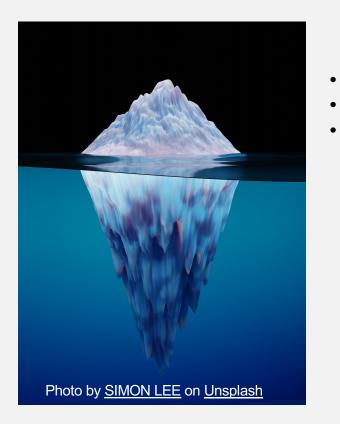
> Prof. Dr. Patrick Cramer, Max Planck Society President (German AI Award Ceremony, Berlin, 28/9/2023)



Open Science == Open Data + Open Source + Open Access



Data Management as a prerequisite of Open Data

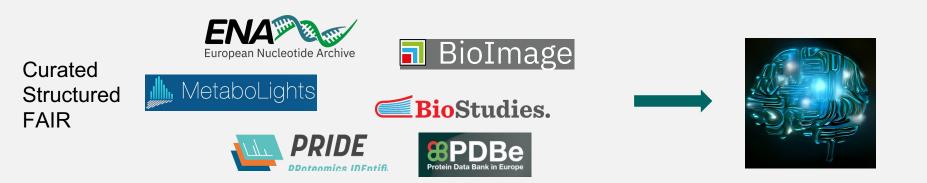






Data Management as a prerequisite of Open Data





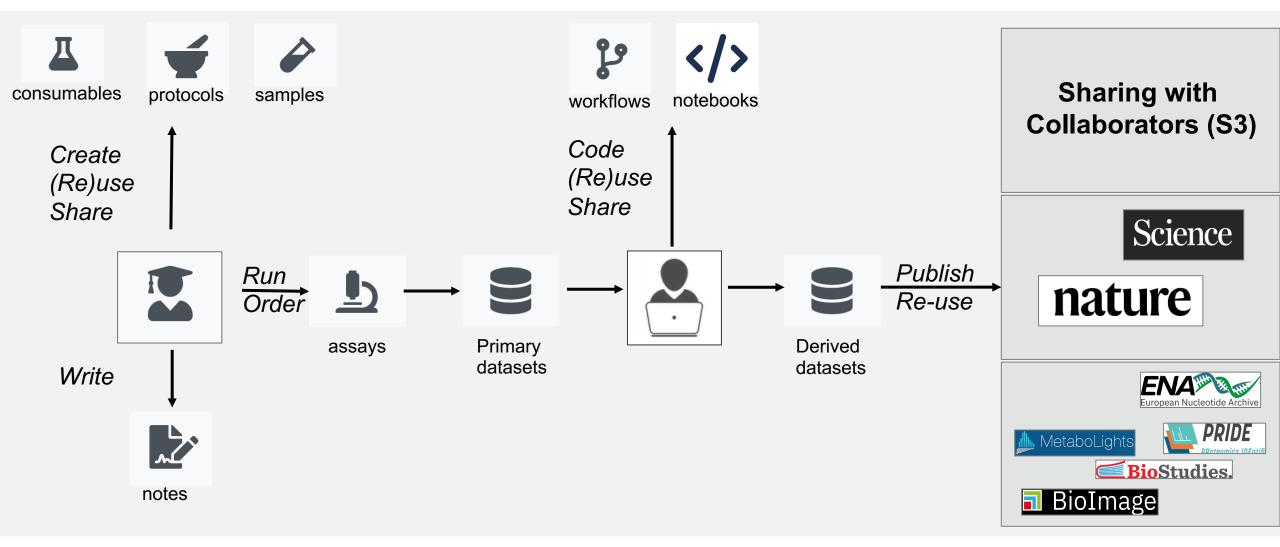
- Unpublished
- Actively Analyzed
- Waiting ... (lost?)
- Data stored ...somewhere

- Data explosion (size & technology)
- Bioinformaticians don't grow on trees
- How to share (meta)data with collaborators (e.g. AI)?
- Need of powerful Data Management tools

Open Data == Managed and FAIR Data from Day 1

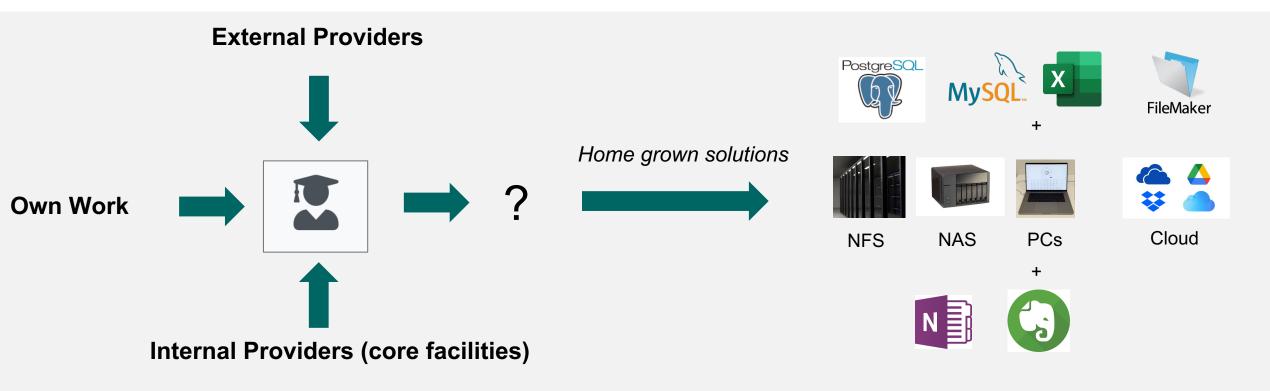


Capturing high-quality (meta)data from creation to dissemination





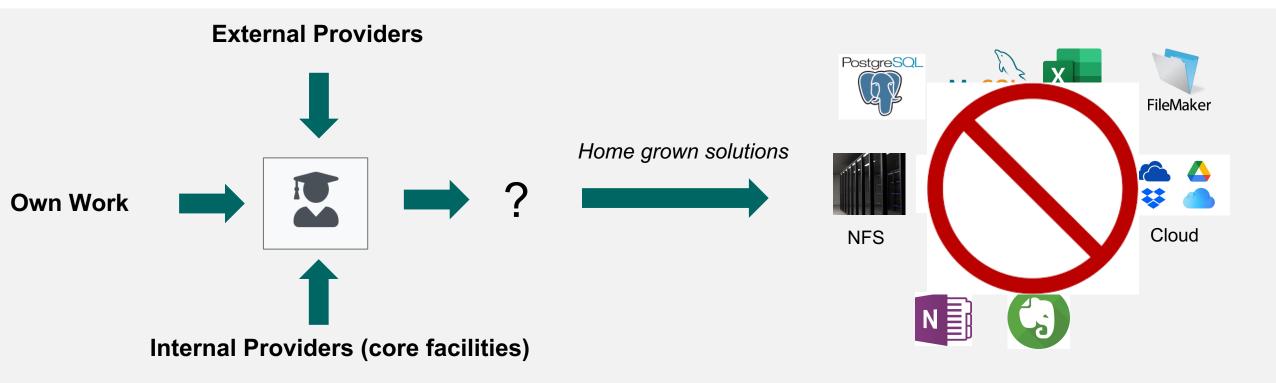
Data is often scattered in many places and solutions



- Users/Groups often left alone: home grown solutions
- Labs use more and more technologies (multi-omics, imaging assays)
- Data scattered in different places, registered in different systems
- X Difficult to collate all data together and keep information up to date



One place to manage all your data!



- X DM is often perceived as a burden
- X Exposing users to multiple systems is not the right answer
- ✓ Offer a system with **low entry level** that users **use frequently**



Lab Integrated Data: One-stop shop for managing all your data

- FAIR scientific Data Management solution
- > Aims at covering your everyday DM needs
- > Open Source
 - https://gitlab.com/lab-integrated-data
- Documentation & Online Training
 - https://grp-gbcs.embl-community.io/labid-user-docs/
- Demo Server
 - https://labid-demo.embl.de/

Welcome, Charles Girardot	≡ +	Q	¢	ž	= ` H	:	@girardo
LabID	STOCKS is becoming «Lab Integrated Data» (Lab ID)						
v23.10.0 (= v23.10.0)	STOCKS has outgrown its name with the addition of features which made it much more then a la We are chosing the name «Lab Integrated Data» (shortened Lab ID) to highlight the data manage application. It will continue to be available at EMBL at its new url: <u>labid.embl.org</u> (please update It is also now fully open-source and freely available on 🌳 <u>gitlab.com/lab-integrated-data</u> .	ment c	ore fea	ature		-	m.
Import datasets 🗸							
CONSUMABLES			You	have	e ongoii	ng exp	eriments!
₩ EQUIPMENTImage Equipment	Welcome To				Visit das	shboard	
STORAGE EQUIPMENT			H		1	1	110
BIOMATERIALS	Lab ID 🚯						
Y PROTOCOLS							
🕑 LAB NOTEBOOK	Search Q						
O Assays							
DATASET MANAGEMENT							
	GET SUPPORT			A	ר		
	READ THE DOCUMENTATION	AT	CG				
		₽·C	•S•1		·		
GBCS · 2018-present · 🗐 🎭 💌	Email us						



LabID articulates around 4 interconnected modules

Lab Collection Management

(Consumables, Equipment, Storage)

Dataset Management

(Assays, Datasets & Studies)

Biomaterial Management

(Sample & Specimen, Biobanking)

Electronic Lab Notebook (ELN)

(Project, Experiment & Protocols)



Searchable, customizable and extendable lab collections

	LabID	+	New Freezers 🗸	Search		Q Personal Compu	ıtational Sup 🗸 🛛 All
	Integrated Data	~	1 2 →	1 - 10) ∨ of 13	▼ ² · ∡ · ∑ · ·)≡ ⊠ ≪	
	v23.10.0 (= v23.10.0)	0	Name 🐙 🔻 🔻	Code	Stock locations	Origin/Vendor	Catalogue #
	Import datasets 💙	×	trec	free text search	free text search	Select option 👻	free text searc
Δ	CONSUMABLES		TREC -80C Freezer	trec-80-freezer-1	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
¥	EQUIPMENT			trec-80-freezer-10		Eppendorf	U535 Innova
(ÎI)	STORAGE EQUIPMENT •	0		1 trec-80-freezer-11	0	Eppendorf	U535 Innova
	Tower	0	TREC -80C Freezer	2 trec-80-freezer-12	0	Eppendorf	U535 Innova
	Cabinet	0	TREC -80C Freezer	3 trec-80-freezer-13	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
	Cryogenic	0	TREC -80C Freezer 2	trec-80-freezer-2	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
•	Freezers	0	TREC -80C Freezer	3 trec-80-freezer-3	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
	Fridges		TREC -80C Freezer	trec-80-freezer-4	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
	Drawer		TREC -80C Freezer	trec-80-freezer-5	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
	Shelf		TREC -80C Freezer	trec-80-freezer-6	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
	Rack						
	Compartment						
	Вох						

- Shelf
 Rack
 Compartment
 Box
 GBCS · 2018-p
 - Consumables, Equipment & Storage Equipment
 - Extensive search and filtering options
 - Customizable table views
 - > New types can be added without coding (Admin UI)



Searchable, customizable and extendable lab collections

LabID	+	- New Freezers 🗸 🌣 S			Q Personal Computa	itional Sup 🗸 🛛 All
Integrated Data	~	1 2 →	1 - 10 -	✓ of 13	▼ ⁰ · ⊻ · 2 · · ≣ ⊠ < i	
v23.10.0 (= v23.10.0)		Name 🐙 🔹 🔻	Code	Stock locations	Origin/Vendor	Catalogue #
Import datasets 🖌	~	trec	free text search	free text search	Select option 👻	free text sea
CONSUMABLES						
₩ EQUIPMENT	0	TREC -80C Freezer 1	trec-80-freezer-1	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
		TREC -80C Freezer 10	trec-80-freezer-10	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
🋍 STORAGE EQUIPMENT 🔹	0	TREC -80C Freezer 11	trec-80-freezer-11	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
• Tower	0	TREC -80C Freezer 12	trec-80-freezer-12	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
- Cabinet	D	TREC -80C Freezer 13	trec-80-freezer-13	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
Cryogenic		TREC -80C Freezer 2	trec-80-freezer-2	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
Freezers	D	TREC -80C Freezer 3	trec-80-freezer-3	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
- Fridges		TREC -80C Freezer 4	trec-80-freezer-4	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
Drawer		TREC -80C Freezer 5	trec-80-freezer-5	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
· Shelf		TREC -80C Freezer 6	trec-80-freezer-6	9A E-1 Bio Hub Storage	Eppendorf	U535 Innova
Rack	-					
Compartment						
· Box						

alo-H2B-N-10		🗹 Edit 🥒 Cone 🗸 🖉 Copy URL 🗮 Add to order 📔 Del
ltem details		Annotations
ID	2bb864f2-7fe3-44d2-aacc-6b06ca5cae9f	-
Vector	N-10	🔓 Attachments 🕦 🔷
Vector Size	5226 bp	
Antibiotic Resistance	kanamycin	Drag & Drop your files or Browse
Insert details	H2B-Halo	Powered by POINA
Insert Size	1287 bp	Select all 🗢 name 🗸
Insert 5p RE	_	Select all 🔤 Hame 🗸
Insert 3p RE	-	O addgene-plasmid-123284-sequence-242688_changed_H2B_Halo_constr 279 kB 4 Uploaded by uribe on 22 Nov '21, 17:22 Uribe
Insert sequence	-	
Code	2-33	
Origin/Vendor	Deo Lab (Bego)	Notes 0
Catalogue #	-	Write a note Add
Lot #	-	_
Concentration/Amour	nt 352.15 ng/µl	
Expiration date		📜 Orders 🧕 🔹
Description	* We removed TOMM20 (Nhel and BamHI) and inserted H2B (amplified from plasmid 1-25 with restriction enzymes Nhel and BamHI for ligation with T4 DNA Ligase)	_
Storage Conditions	_	

- > **Customizable** Item Properties (text, number, CVs, item type...)
- Detailed Item Location
- > Annotations, **Attachments** & Notes (Orders)
- Fine grained sharing (per user or group)
- Batch create & edit



Accurately reflect your sample processing workflow

Everything Find Element Q
yw; BEAF-32 330274/CyO; CP190 33903 RNAi
Embryos 0-lh yw 5 x 100ee
RNA 0-1h yw 8 X aliquots lug/10ul
0-1h long PCR Rep2 0-1h long PCR Rep1

- Graphical Lineage of relationships
- Unlimited step number
- Merge & Split supported
- **Specimen** are your living collections (fly lines, cell lines ...)
- Samples may derive from Specimen



A rich sample model fitting most situations

bryos 0-1h yw 5 x	100ee			😰 Edit 📑 Clone 🗸 🕨 Create Child 🗸 🖉 C	opy UR
ID	4acba913-8e17-4d75-934c-231d8b0e9819	3	🖜 Annotations 🧃		
Name	Embryos 0-1h yw 5 x 100ee		InitialTimePoint	egg laying	
Code	XYZ-3345		StrainOrLine	yw	
Project	Wonderful microscope project 📋		Compound Dose	400 mg	
Status	CREATED Sample QC	PASSED	IndividualGeneticChar	0	
Organism	Drosophila Material Type melanogaster (Fly)	whole organism (Whole Organism)	Compound	ibuprofen	
Description	-		Age	0-1h	
Storage Locations	1. Tube A12:-, Furlong Freezer 2 (-20) ir	n V320 Furlong Laboratorv	🔓 Attachments 🌘		
Locations paths	 V320 Furlong Laboratory > Furlong 		Attachments		
Workflow				Drag & Drop your files or Browse	
WORKHOW	Fly Growth Pro	itocol	L		
	Fly embryo colle	action			
	Thy emory con	ection			
Sample Preparatio		• ection	🖉 Notes 💿		
Sample Preparatio Is Control		k no	Notes O Write a note		
	n Is Single Cell	•			
Is Control Use Screen Position	n Is Single Cell	⊁ no			
Is Control	n Is Single Cell	•			
Is Control Use Screen Position	n Is Single Cell	⊁ no	Write a note	ampler (5) 🔍 🗮 Specimen (1) 🖉	
Is Control Use Screen Position Sample Lineage Derives from	x no Is Single Cell X no	¥ no	Write a note	amples (6) 🕲 📕 Specimen (1) 🕲	
Is Control Use Screen Position Sample Lineage Derives from Specimen	x no Is Single Cell x no Specimen	¥ no	Write a note		
Is Control Use Screen Position Sample Lineage	x no Is Single Cell x no Specimen yw; BEAF-32 330274/CyO; CP190 33903 f	¥ no	Write a note		
Is Control Use Screen Position Sample Lineage Derives from Specimen Children	n Is Single Cell X no Is Single Cell X no Specimen Syw; BEAF-32 330274/CyO; CP190 33903 f RNA 0-1h yw 8 X aliquots 1ug/10ul	X no	Write a note	Image: A marked of the second seco	5417-157-167-16
Is Control Use Screen Position Sample Lineage Derives from Specimen Children Link to ELN	x no Is Single Cell x no x no Is Single Cell x no Specimen yw; BEAF-32 330274/CyO; CP190 33903 fl RNA 0-1h yw 8 X aliquots 1ug/10ul s yw RNA extraction for smth sectors	x no	Write a note	Image: A marked of the second seco	544-155-84
Is Control Use Screen Position Sample Lineage Derives from Specimen Children Link to ELN Used in Experiments	x no Is Single Cell x no x no Is Single Cell x no Specimen yw; BEAF-32 330274/CyO; CP190 33903 fl RNA 0-1h yw 8 X aliquots 1ug/10ul s yw RNA extraction for smth sectors	x no	Write a note	Image: A marked of the second seco	Note: Felth Ang

- Samples have code, project and location
- Samples may be linked to **protocols**
- Samples can be annotated
- Activable sections for control, singlecell and plated samples
- Connection to ELN



Describe protocols with details and share with your lab

Fixation and Staining of sponges in PFA • gemmules are grown in glass bottom dishes • under the hood; prepare fixative • 3.7 % (P)FA [37 % stock solution] • 100 % ice-cold EtOH • e.g; 720 uL EtOH + 80 uL PFA • remove all of the FLW from the sponges • add 200 uL of the fixative directly to the glass bottom (sponges should be covered) • otherwise, use more fixative -> 1 mL • incubate for 30 min - 1 h at 4 oC • wash 3 x with 5 mL PBS • keep third wahing step for 10 min • remove PBE • add 200 uL of staining solution • e.g; DAPI, Phalloidin, antibody staining term details ID If*6b3b6-1f8a-4e8a-8bad-21le868df7c3 Type LABELING Parent protocol Fixation and staining	ixation in 3.7 % PFA in 100 % Et	OH, staining with [JAPI and Phallo	oldin					
 gemmules are grown in glass bottom dishes under the hood: prepare fixative 3.7 % (P)FA [37 % stock solution] 100 % ice-cold EtOH e.g.: 720 uL EtOH + 80 uL PFA remove all of the FLW from the sponges add 200 uL of the fixative directly to the glass bottom (sponges should be covered) otherwise, use more fixative> 1 mL incubate for 30 min - 1 h at 4 oC wash 3 x with 5 mL PBS keep third wahing step for 10 min remove PBS add 200 uL of staining solution e.g.: DAPI, Phalloidin, antibody staining Item details ID 1f76b3b6-1f8a-4e8a-8bad-21le868df7c3 1									X
 gemmules are grown in glass bottom dishes under the hood: prepare fixative 3.7 % (P)FA [37 % stock solution] 100 % ice-cold EtOH e.g.: 720 uL EtOH + 80 uL PFA remove all of the FLW from the sponges add 200 uL of the fixative directly to the glass bottom (sponges should be covered) otherwise, use more fixative> 1 mL incubate for 30 min - 1 h at 4 oC wash 3 x with 5 mL PBS keep third wahing step for 10 min remove PBS add 200 uL of staining solution e.g.: DAPI, Phalloidin, antibody staining Item details ID 1f76b3b6-1f8a-4e8a-8bad-21le868df7c3 1	Fixation an	d Stainin	g of spo	onges i	n PFA	4			
 under the hood: prepare fixative 3.7 % (P)FA [37 % stock solution] 100 % ice-cold EtOH e.g.: 720 uL EtOH + 80 uL PFA remove all of the FLW from the sponges add 200 uL of the fixative directly to the glass bottom (sponges should be covered) otherwise, use more fixative> 1 mL incubate for 30 min - 1 h at 4 oC wash 3 x with 5 mL PBS keep third wahing step for 10 min remove PBS add 200 uL of staining solution e.g.: DAPI, Phalloidin, antibody staining Item details ID 1f76b3b6-1f8a-4e8a-8bad-21le868df7c3 Type LABELING				0-31					
 3.7 % (P)FA [37 % stock solution] 100 % ice-cold EtOH e.g.: 720 uL EtOH + 80 uL PFA remove all of the FLW from the sponges add 200 uL of the fixative directly to the glass bottom (sponges should be covered) otherwise, use more fixative> 1 mL incubate for 30 min - 1 h at 4 oC wash 3 x with 5 mL PBS keep third wahing step for 10 min remove PBS add 200 uL of staining solution e.g.: DAPI, Phalloidin, antibody staining Ip 1f76b3b6-1f8a-4e8a-8bad-21le868df7c3 LABELING 			n aishes						
 e.g.: 720 uL EtOH + 80 uL PFA remove all of the FLW from the sponges add 200 uL of the fixative directly to the glass bottom (sponges should be covered) otherwise, use more fixative -> 1 mL incubate for 30 min - 1 h at 4 oC wash 3 x with 5 mL PBS keep third wahing step for 10 min remove PBS add 200 uL of staining solution e.g.: DAPI, Phalloidin, antibody staining Item details Itf76b3b6-1f8a-4e8a-8bad-21le868df7c3 LABELING LABELING Itf8a-fe8a-fe8ad-21le868df7c3			1]						
 remove all of the FLW from the sponges add 200 uL of the fixative directly to the glass bottom (sponges should be covered) otherwise, use more fixative -> 1 mL incubate for 30 min - 1 h at 4 oC wash 3 x with 5 mL PBS keep third wahing step for 10 min remove PBS add 200 uL of staining solution e.g.: DAPI, Phalloidin, antibody staining Item details Iff6b3b6-1f8a-4e8a-8bad-21le868df7c3 LABELING									
 add 200 uL of the fixative directly to the glass bottom (sponges should be covered) otherwise, use more fixative> 1 mL incubate for 30 min - 1 h at 4 oC wash 3 x with 5 mL PBS keep third wahing step for 10 min remove PBS add 200 uL of staining solution 	0		ITAS						
 otherwise, use more fixative -> 1 mL incubate for 30 min - 1 h at 4 oC wash 3 x with 5 mL PBS keep third wahing step for 10 min remove PBS add 200 uL of staining solution e.g.: DAPI, Phalloidin, antibody staining Item details ID 1f76b3b6-1f8a-4e8a-8bad-211e868df7c3 Type LABELING			0	m (sponges s	should be c	overe	d)		
 wash 3 x with 5 mL PBS keep third wahing step for 10 min remove PBS add 200 LL of staining solution			-						
 keep third wahing step for 10 min remove PBS add 200 uL of staining solution e.g.: DAPI, Phalloidin, antibody staining Item details ID 1f76b3b6-1f8a-4e8a-8bad-21le868df7c3 Type LABELING									
	• wash 3 x with 5 m	L PBS	nin						
Item details ID 1f76b3b6-1f8a-4e8a-8bad-211e868df7c3 Type LABELING	 wash 3 x with 5 m keep third w 	L PBS	nin						
ID 1f76b3b6-1f8a-4e8a-8bad-211e868df7c3 Type LABELING	 wash 3 x with 5 m keep third w remove PBS add 200 uL of stair 	L PBS ahing step for 10 n ning solution							
ID 1f76b3b6-1f8a-4e8a-8bad-211e868df7c3 Type LABELING	 wash 3 x with 5 m keep third w remove PBS add 200 uL of stair 	L PBS ahing step for 10 n ning solution							
Type LABELING C	 wash 3 x with 5 m keep third w remove PBS add 200 uL of stair 	L PBS ahing step for 10 n ning solution							
	 wash 3 x with 5 m keep third w. remove PBS add 200 uL of staii e.g.: DAPI, Ph 	L PBS ahing step for 10 n ning solution							
Parent protocol Fixation and staining	 wash 3 x with 5 m keep third w remove PBS add 200 uL of staii e.g.: DAPI, Ph 	L PBS ahing step for 10 n ning solution nalloidin, antibody	staining	ibad-211e868df	7c3 📋				
	• wash 3 x with 5 m • keep third w • remove PBS • add 200 uL of stai • e.g.: DAPI, PP Item details	L PBS ahing step for 10 m ning solution nalloidin, antibody 11761	staining 5356-1f8a-4e8a-8	bad-211e868df	7c3				
Modified 2023-10-27 18:16:23	 wash 3 x with 5 m keep third w. remove PBS add 200 uL of stai e.g.: DAPI, PF Item details ID Type 	L PBS ahing step for 10 m ning solution nalloidin, antibody 1f761 LABEI	staining 5356-1f8a-4e8a-8 LING 📋		7c3				

- Protocols are cooking recipes
- Rich text formatting
- Embed tables and images
- Attach documents e.g. excel table
- Export to PDF
- **Protocols** may be **versioned** ("Clone")
- **Protocols** act as templates for **Experiments**



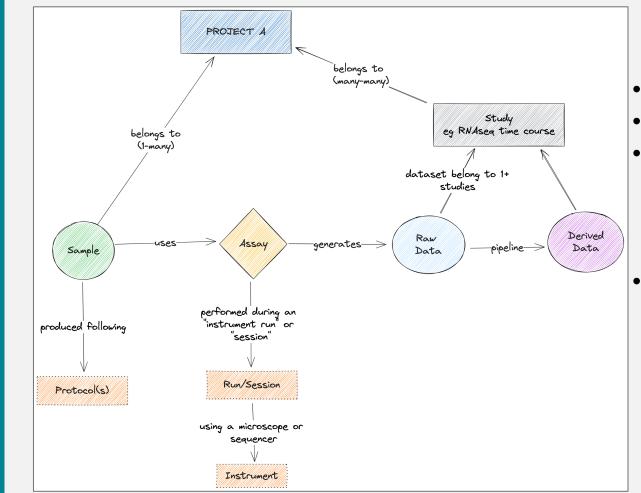
An experiment is an entry in your ELN

≡	c + - Q 🥵 🖉 🛒	: @admin ~
Fixation and staining - version 2	🕑 Edit 🖉 Copy URL 🕞 Clone 🗸 💽 Derive Lab Note	👫 PDF 🔋 Delete
Summary Fixation in 3.7 % PFA in 100 % EtOH, staini	ng with DAPI and Phalloidin	
 gemmules are grown in glas under the hood: prepare fix 3.7 % (P)FA [37 % stock 100 % ice-cold EtOH e.g.: 720 uL EtOH + 80 remove all of the FLW from add 200 uL of the fixative di otherwise, use more fi incubate for 30 min - 1 h at 4 wash 3 x with 5 mL PBS keep third wahing step remove PBS add 200 uL of staining soluti 	ative solution] uL PFA the sponges rectly to the glass bottom (sponges should be covered) kative> 1 mL 4 oC for 10 min on	MK
• e.g.: DAPI, Phalloidin, a		
Item details ID Type Parent protocol	1f76b3b6-1f8a-4e8a-8bad-211e868df7c3	
Modified	2023-10-27 18:16:23	

- Experiments represent a particular lunch
- Experiments are grouped into **Projects**
- Experiments have a life-cycle
- Frozen experiment are electronically timestamped



Performing an Assay generates (raw) Datasets



Dataset Management

- Raw data is generated by Assays
- Raw & Derived are organized into Studies
- A Study groups datasets of the same technology (e.g. sequencing) and experiment type (e.g. ChIP-seq) that may come from multiple assays
- Similar to the ISA model (MAGE-TAB)



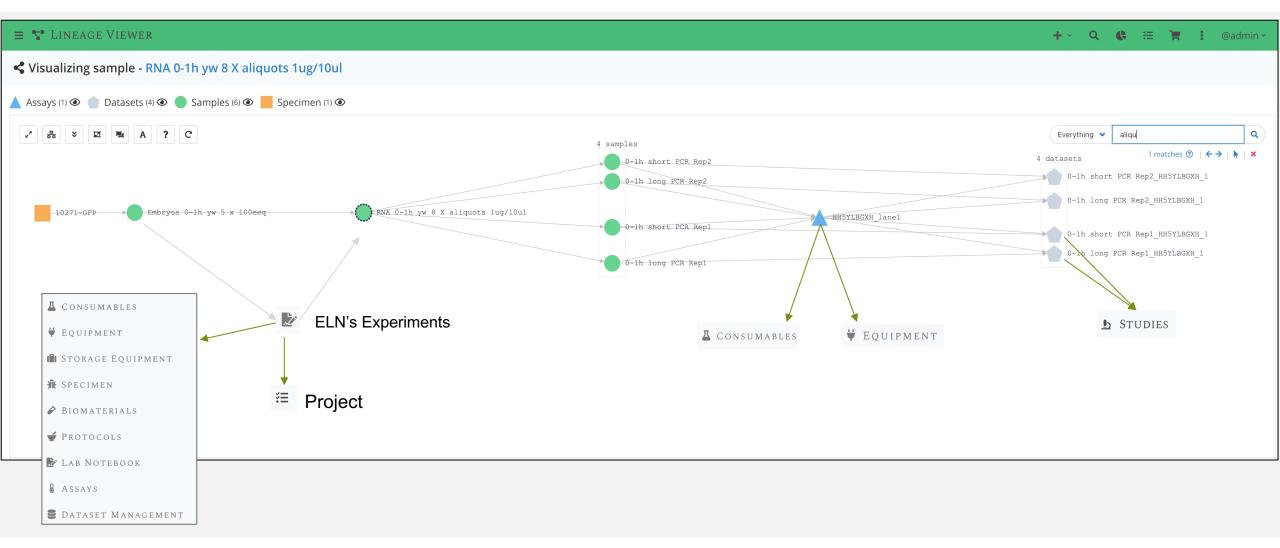
Flexible dataset granularity and composition

	≡ S Datasets								+- Q (6) /⊟)	egirardot -			
	Search								Q Personal C	Computational Sup All	🗧 🗳 Lineage Gra	aph	^
Integrated Data				1-24 v of 24					▼ ⁰ · <u>¥</u> ~ <u>1</u> ~ · <u>R</u> < ≡				
v23.10.0 (= v23.10.0)	Studies	Name	Туре	QC	Samples	Assay	Age	CellLine	Compound	Compound Dc	Assays (1) 💿 🥤	Datasets (6) 🔘 🔵 Samples (1) 🞯	22
Import datasets 🛩	X d4fbfc8e-69e3-482f-befb-156aa1ef803f	free text search	Select option 👻	Select option 👻		free text search	free text search	free text search	free text search	free text search			
	 Single-gastruloid trancriptomics: control vs glycolysis inhib 	. 96t6	single-end fastq	PASSED	96t6	AACJ2Y7M5_lane1	96h post-aggregatio	E14, Bra::GFP mESCs	2-Deoxy-D-glucose	6 mM	2	Everything 💙 Find Element	a
CONSUMABLES	 Single-gastruloid trancriptomics: control vs glycolysis inhib 	. 96t5	single-end fastq	PASSED	96t5	AACJ2Y7M5_lane1	96h post-aggregatio	E14, Bra::GFP mESCs	2-Deoxy-D-glucose	6 mM	· ·	Lionyumig Find Lionont	
₩ EQUIPMENT	 Single-gastruloid trancriptomics: control vs glycolysis inhib 	. 96t4	single-end fastq	PASSED	96t4	AACJ2Y7M5_lane1	96h post-aggregatio	E14, Bra::GFP mESCs	2-Deoxy-D-glucose	6 mM	용 🔵	RibosOnMitos-wtSP-d7lowGlucose	
I STORAGE EQUIPMENT	 Single-gastruloid trancriptomics: control vs glycolysis inhib 	. 96t3	single-end fastq	PASSED	96t3	AACJ2Y7M5_lane1	96h post-aggregatio	E14, Bra::GFP mESCs	2-Deoxy-D-glucose	6 mM			
★ SPECIMEN	 Single-gastruloid trancriptomics: control vs glycolysis inhib 	. 96t2	single-end fastq	PASSED	96t2	AACJ2Y7M5_lane1	96h post-aggregatio	E14, Bra::GFP mESCs	2-Deoxy-D-glucose	6 mM	*		
BIOMATERIALS	 Single-gastruloid trancriptomics: control vs glycolysis inhib 	. 96t1	single-end fastq	PASSED	96t1	AACJ2Y7M5_lane1	96h post-aggregatio	E14, Bra::GFP mESCs	2-Deoxy-D-glucose	6 mM			
Y PROTOCOLS	 Single-gastruloid trancriptomics: control vs glycolysis inhib 	96c6	single-end fastq	PASSED	96c6	AACJ2Y7M5_lane1	96h post-aggregatio	E14, Bra::GFP mESCs	none	NA		RibosOnMitos-wtSP-d7lowGlucose-2021_02_15_gemin_Krios2	
▶ LAB NOTEBOOK	Single-gastruloid trancriptomics: control vs glycolysis inhib	. 96c5	single-end fastq	PASSED	96c5	AACJ2Y7M5_lane1	96h post-aggregatio	E14, Bra::GFP mESCs	none	NA	묘	6 datasets	
	Single-gastruloid trancriptomics: control vs glycolysis inhib	. 96c4	single-end fastq	PASSED	96c4	AACJ2Y7M5_lane1	96h post-aggregatio	E14, Bra::GFP mESCs	none	NA		RibosOnMitos-WTd7low-210215Kri2 raw	
8 Assays	Single-gastruloid trancriptomics: control vs glycolysis inhib	. 96c3	single-end fastq	PASSED	96c3	AACJ2Y7M5_lane1	96h post-aggregatio	E14, Bra::GFP mESCs	none	NA	A		
DATASET MANAGEMENT	Single-gastruloid trancriptomics: control vs glycolysis inhib	. 96c2	single-end fastq	PASSED	96c2	AACJ2Y7M5_lane1	96h post-aggregatio	E14, Bra::GFP mESCs	none	NA			
Studies	Single-gastruloid trancriptomics: control vs glycolysis inhib	. 96c1	single-end fastq	PASSED	96c1	AACJ2Y7M5_lane1	96h post-aggregatio	E14, Bra::GFP mESCs	none	NA	C	RibosOnMitos-WTd7low-210215Kri2 1 stacks	
Upload Sessions	General Single-gastruloid trancriptomics: control vs glycolysis inhib	. 48t6	single-end fastq	PASSED	48t6	AACJ2Y7M5_lane1	48h post-aggregatio	E14, Bra::GFP mESCs	2-Deoxy-D-glucose	6 mM			
• Datasets	Single-gastruloid trancriptomics: control vs glycolysis inhib	. 48t5	single-end fastq	PASSED	48t5	AACJ2Y7M5_lane1	48h post-aggregatio	E14, Bra::GFP mESCs	2-Deoxy-D-glucose	6 mM			
Datafiles	□ Single-gastruloid trancriptomics: control vs glycolysis inhib	. 48t4	single-end fastq	PASSED	48t4	AACJ2Y7M5_lane1	48h post-aggregatio	E14, Bra::GFP mESCs	2-Deoxy-D-glucose	6 mM		RibosOnMitos-WTd7low-210215Kri2 2 alignmentE	Files
Archives	Single-gastruloid trancriptomics: control vs glycolysis inhib	. 48t3	single-end fastq	PASSED	48t3	AACJ2Y7M5_lane1	48h post-aggregatio	E14, Bra::GFP mESCs	2-Deoxy-D-glucose	6 mM			1103
	G Single-gastruloid trancriptomics: control vs glycolysis inhib	. 48t2	single-end fastq	PASSED	48t2	AACJ2Y7M5_lane1	48h post-aggregatio	E14, Bra::GFP mESCs	2-Deoxy-D-glucose	6 mM			
GBCS · 2018-present · 🗐 🎭 📨	Single-gastruloid transmission control vs. alvcolvsis inhih	48t1 Name	single-end faste	PASSED QC	48r1 Samples	AACI2V7M5 Jane1 Assay	48h nost-aggregatio	E14_BranGEP_mESCs CellLine	2-Deoxy-D-glucose Compound	6 mM Compound Dose		RibosOnMitos-WTd7low-210215Kri2 3 segmenta	tions
abes zoro-present - a a	500005	Name	Туре	42	Jampies	лэзау	ABE	centine	compound	compound Dose			
												RibosOnMitos-WTd7low-210215Kri2 4_motiveI	Lists
												T	

- A Dataset is made of one or multiple files and/or folder to accommodates different use cases
- Derived datasets may optionally be linked to samples (and assays)
- Datasets can be accessed and filtered by assays, studies, projects, samples or annotations
- Actual files/folders are stored in group-specific, read-only LabID data library (local network)
- Datasets can be archived to free up space



LabID covers the whole data production phases





A growing number of supported assay types & technologies



Assay support: Standards, Formats, Vocabulary & Metadata definition matching CF, users & public repository needs

- Generic Assay to kick in when specific assay type is missing
- Next: proteomics, metabolomics and flow cytometry



Supporting standards with sub-types and controlled vocabulary

- BIOMATERIALS
- Sample
- Sequencing Library

•

- EM Sample
- **Q** Assays
- Generic
- Light Microscopy
- Light Microscopy Screen
- Nanopore Sequencing
- Illumina Sequencing
- Transmission EM
- Volume EM
- Instrument Runs

- Sample and Assay sub-types to support standards' needs
- Custom properties can be defined by admin
- (Custom)Properties & Annotations can be linked to controlled vocabulary

Dox Dox HP_1a			
ID	f6b5e90a-6054-492f-bfe6-1fa6b6f65971 📋		
Name	Dox Dox HP_1a		
Code	_		
Project	emBASE Migration - Lancrin Group 📋		
Status	CREATED	Sample QC	PASSED
Organism	Mouse (Mus musculus)	Material Type	cell (Cell)
Description	_		
Order Number	order-324	ustom Pro	operty
Storage Locations	_		
Locations paths			
Workflow	Generation of Tal1 Δ/Δ doxycycline-indu Δ/Δ	cible Embryonic Stem C Δ mESCs)	ell (ESC) lines (i3TFs Tal1
		Û	
	ESC growth, hematopoiet		ell sorting
		Û	ell sorting
			ell sorting
Sequencing Library		Û	ell sorting
Sequencing Library Library Kit Type	Preparation	۵ RNA-seq Orientation	5'-3'-5' (5'-3'-5')
	Preparation	0 RNA-seq	5'-3'-5' (5'-3'-5')
Library Kit Type	Preparation	۵ RNA-seq Orientation	5'-3'-5' (5'-3'-5')
Library Kit Type Barcode	Preparation GCTCATGA	Orientation SEQ Supp	5'-3'-5' (5'-3'-3'-5') ort
Library Kit Type Barcode Source	Preparation GCTCATGA MINIS TRANSCRIPTOMIC (TRANSCRIPTOMIC)	& RNA-seq Orientation SEQ Supp Strategy	5'-3'-5' (5'-3'-3'-5') ort RNA-Seq (RNA-Seq)
Library Kit Type Barcode Source Selection	Preparation GCTCATGA MINIS TRANSCRIPTOMIC (TRANSCRIPTOMIC)	Divertation Divertation Divertion Di	5'-3'-5' (5'-3'-3'-5') ort RNA-Seq (RNA-Seq) oligo-dT



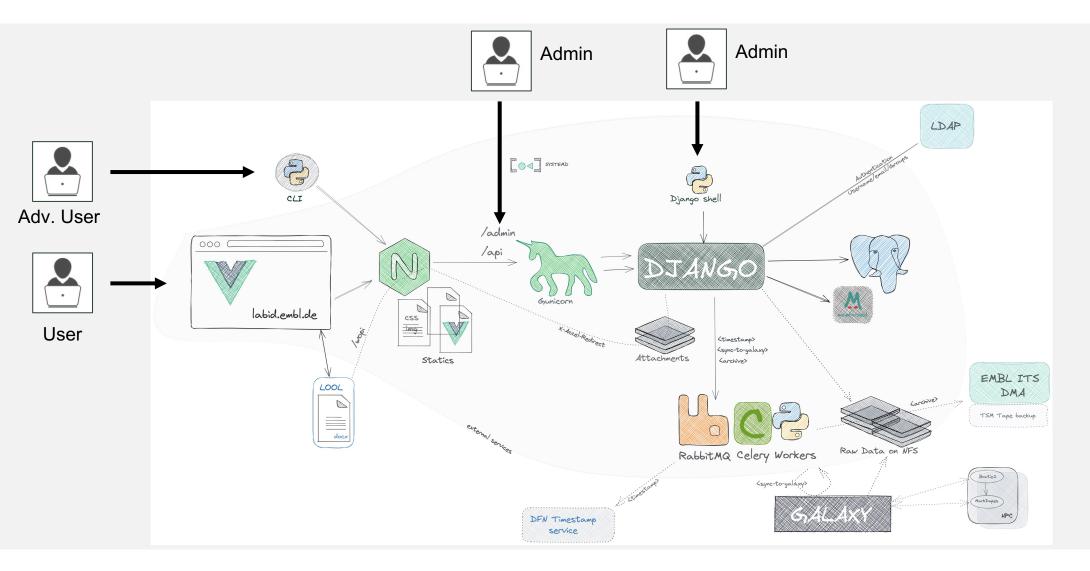
Generic Data Loader Wizard to support the many flavors of a "dataset"

Welcome, Charles Girardot		■ DATASET LOADER				+~ Q 😫 🕾	🗧 🏋 🚦 @girardot ~
~			2	8	\$	۲	ø
		Start	Select Data	Assay details	Build datasets	Verify	Assign samples
LabID Integrated Data		Select Assay Type A new as Select assay type → ○ (optic		taset registration 👔		No, I wan	it to add data to an existing assay >
Integrated Data		* _* Generic Assays					•
v23.10.0 (= v23.10.0)		Seneric			No Template	Select assay as template or	Continue without template
		☑ Sequencing Assays					•
Import datasets A		O Nanopore sequencing					
Import <u>raw</u> datasets 🚯		O Illumina sequencing					
Import datasets 🛛 🚯		Light Microscopy Assa	ays				•
L		O Light microscopy					
💼 STORAGE EQUIPMENT		O Light microscopy screen					
	1	Electron Microscopy	Assays				•
		O Transmission em					
		🔿 Volume em					

- > Intuitive wizard to guide user in dataset registration & ensure minimal information is provided
- **Flexible** on Dataset granularity (file, folder) and composition (multiple files per datasets)
- > Derived Datasets can also be loaded and linked to their parent datasets



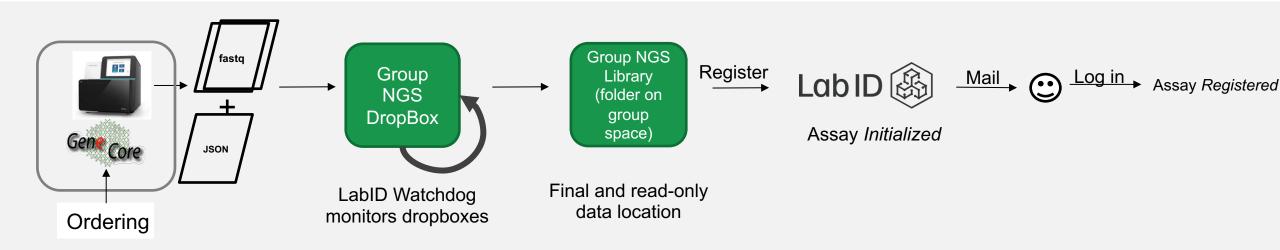
LabID offers several clients and use a range of services



The API allows to easily develop your own clients



Automated Data Ingestion



- No data loss
- Information available at GeneCore is passed on
- Enforce minimum information collection: samples, meta-data
- Files are protected from user manipulation (read-only) while accessible for analysis



Data processing using Galaxy Workflow

b STUDIES	Search Q. 🍪 🚝 🎽 Menu 🗸 🚱	ata duplication E Galaxy	🛠 Workflow Visualize* Shared Data* Admin Help* User* 🞓 🚦	Using Using
			tory * 🛓 Download 👔 Delete 🕒 Details 🗌 include deleted	
AC-seq of wildtype or Dp	ppa2 knockout ESC upon release of 😰 Edit 🖉 Clone 😂 Sync with Galaxy	Libraries / Hackett Lab / VC20_007 ATAC-seq Dppa2KO		
Item details		Name	the description	Type
item details		D H67WL86X6_VC20_006-VC20_007_20s002698-1-	uploaded fastqsanger.gz file	fastqsanger.gz 845.3 a year ago 🕀 👜
ID	2735409c-3cc2-47a9-a7d7-799c7eb70695 📋	1_Carlhi_Jane IKOB67dDOX_1_sequence.txt.gz		MB Manag
Project	VC20_007 CnR in Dppa2KO 📋	HIGTWILBOXD_VC20_006-VC20_007_20x002688-1- 1_Carlin_LanetK08073DDX_2_sequence.txt.gz	uploaded fastqsanger.gz file	fastqsanger.gz 847.1 a year ago ⊕ 🔹 MB
Design	biological replicate, genotype design	H67WLBGXG_VC20_006-VC20_07_20s002698-1- 1_Carini_Jane1K0B67dDWT0Mmeg_t_sequence.txt.gz	uploaded fastqsanger.gz file	fastqsanger.gz 241.6 a year ago ⊕ 🐲 MB
PubMed ID		D H67WL86X6_VC20_066-VC20_087_20x002698-1-	uploaded fastosanger.gz file	fastqsanger.gz 242.5 a year ago 🕀 🕳
Description	x	1_Carlini_Jane 1KOB67dDWTOMneg_2_sequence.txt.gz		MB Manag
	Chromatin accessibility was assayed in wildtype or Dppa2 knockout ESC after 26 days of release of	□ □ H07WLBGXQ_VC20_006 1_Cartini_Jane 1K086minu		
	the trigger imposed by epigenetic editing. Samples were collected in two clonal knockout and wildtype lines after sorting at FACS of cells which maintained a repressive Esg1-tdTomato		s://galaxy.e	MDLOE
	(TOMneg) reporter expression after 26 days of DOX washout (release of the trigger).		e in general gree	
Nr. of datasets	4	Gartinijane (Koc77dDOX_t_sequence.txt.gz		MB Manag
Archives		HG7WLBGXQ_VC20_006+VC20_007_20ix002698-1- 1_CutIni_Jane1K0C77dDGX_2_sequence.txt.gz	uploaded fastqsanger.gz file	fastqsanger.gz 421.1 a year ago ⊕ 🐲 MB
Modified	2021-05-11 11:56:49	B G H67WLBGX0_VC20_006-VC20_007_205002698-1-	uploaded fastqsanger.gz file	fastqsanger.gz 1.1 GB a year ago 🕀 👜
	girardot	1_Carlini_Jane1K0C77dDWTOMneg_1_sequence.txt.gz		Manag
Modified by	Suggest			
Modified by Created	2021-05-05 14:34:19	HOTWERXX _VC20_066 vC20_077_20x020686-1- 1_Carliei_LinerNIXCF740WT0Mmg_2_xequence.txtgz	uploaded fastqsanger.gz file	fastqsanger.gz 1.1 GB a year ago 🕀 🏨 Maneg
Created		Herrik Borg, VC20, 064-VC20, 002-VC20, 00	uploaded fastqsanger.gz file	
-	2021-05-05 14:34:19		uploaded fastquanger.gz file	
Created Created by Owner	2021-05-05 14:34:19 carlini		l.	Manag
Created Created by		Herzweitskowa, Jucza, pole vicza, pole z zakowanie w krad zakowa w krad pole z zakowanie w krad zakowanie	l.	
Created by Owner Owned by Group Permissions		Herzweitskowa, v.cza, posi-v.cza, pos	l.	Manag
Created Created by Owner Owned by Group Permissions & Groups	2021-05-05 14:34:19 carlini carlini Hackett Group View Edit Delete	Herzweitskowa, v.cza, pole v.cza, pol	l.	Manag
Created Created by Owned by Group Permissions Created Stream Hackett Group	carlini carlini Hackett Group	Herzyn, Biolog, J., 202, 206 J. 2000 2008 - 1- 1, Carlin, Lewi KiOC 728 DVT DMrwg, J., Hergener, M. gz	l.	Manag
Created Created by Owner Owned by Group Permissions & Groups	2021-05-05 14:34:19 carlini carlini Hackett Group View Edit Delete	HortwiteRorg_v220,009 vC20,0027,0040988-1- Lowier,JawritiCC7200VTDWeg_2,Heyerone.htt.gz	Star	Manag
Created by Owner Owned by Group Permissions Groups Hackett Group & Users	2021-05-05 14:34:19 carlini carlini Hackett Group View Edit Delete	(Star	Manag
Created by Owner Owned by Group Permissions Hackett Groups Lackett Groups a Users carlini	2021-05-05 14:34:19 Cariini Cariini Hackett Group View Edit Delete		Star	Manag
Created by Owner Owned by Group Permissions Carlini girardot	2021-05-05 14:34:19 Cariini Cariini Hackett Group View Edit Delete	1_Christ_LevelWiGC7380WT0Mrey_2_sequence.kt.gz ✔ Concatenate	Star	Manag
Created by Owner Owned by Group Permissions Hackett Groups Lackett Groups a Users carlini	2021-05-05 14:34:19 Cariini Cariini Hackett Group View Edit Delete	1_Carifri_Jan Hi0C7380VTDMng,⊒_segurces itt gz	Star	t ATAC-seq Stan
Created by Owner Owned by Group Permissions Carlini girardot	2021-05-05 14:34:19 Cariini Cariini Hackett Group View Edit Delete	1_Carite_LevelWiGC738WT0Mrey_2_sequence.kt gz Concatenate 0 datasets 0 x	Star	et ATAC-seq Stand
Created by Owner Owned by Group Permissions Created by Group Competition Compe	2021-05-05 14:34:19 Carina Carina Hackett Group View Edit Delete View View View View Edit Delete	Lufrir_junt filoc/7/200/TOMmy_2_segurce.kt.gz	Star	t ATAC-seq Stand
Created by Created by Owner Owned by Group Permissions Carlini girardot Carlini girardot Carlini girardot Name IF	2021-05-05 14:34:19 carini carini darini Hackett Group View Edit Delete v v v v v 1 v v v 1-4 v of 4 (1) · 2* < = - 0 = :	Lorint_LevelWiC/730WT0Mreg_2_sequence kt gz	et Prenover Pr	et ATAC-seq Stand
Created by Created by Owner Owned by Group Permissions 4 Groups Hackett Group a Users carlini girardot Carlini Second	2021-05-05 14:34:19 carini carini darini Hackett Group View Edit Delete v v	Laring_law(NOC7280VTDMrsy_2_sequence it get	Star	t ATAC-seq Stand
Created by Created by Owner Owned by Group Permissions Groups Hackett Group Hackett Group Carlini girardot Datasets Carlini Girandot Datasets Carlini Girandot Datasets Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Carlini Girandot Carlini Carl	2021-05-05 14:34:19 carini carini darini Hackett Group View Edit Delete View Edit Delete View Edit Delete View View View View Edit Delete View View View View View Vie	Laring_law(NOC7280VTDMrsy_2_sequence it get	Star	T ATAC-seq Stand
Created by Created by Owner Owned by Group Permissions Groups Hacket Group a Users carlini girardot Datasets 2 Search Name IF Name IF Name IF Nordow JGWNOMneg, HG WT126d0W, HG7WLGO	2021-05-05 14:34:19 carlini carlini Hackett Group View Edit Delete View Edit Delete View Edit Delete View View View View View Edit Delete View View View View Description	Laring_law(NOC7280VTDMrsy_2_sequence it get	Star	TATAC-seq Stand
Created by Created by Owner Owned by Group Permissions Groups Hackett Group Hackett Group Carlini girardot Datasets Carlini Girandot Datasets Carlini Girandot Datasets Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Girandot Carlini Carlini Girandot Carlini Carl	2021-05-05 14:34:19 carlini carlini Hackett Group View Edit Delete View Edit Delete View Edit Delete View View View View View Edit Delete View View View View Description	Laring_law(NOC7280VTDMrsy_2_sequence it get	Star	TATAC-seq Stand



- Analyzed Data

Remain free

Use what you need

✓ Inventory, Biomaterial, Datasets & ELN modules can be use independently

Export about everything you want

- ✓ Export any collections (excel sheets)
- ✓ Export Lab Notebook and Protocols as PDF & static web site
- ✓ Export Studies with all metadata i.e. sample, assay and dataset annotations
- ✓ Datasets remains available on accessible disks

> Batch create, edit, share & delete

✓ Easily import data using excel spreadsheet

Free and Open Source

✓ Published under an open-source MIT license



Thank you for listening





Jelle Scholtalbers



Matthias Monfort

9





Eileen Furlong



Rainer Pepperkok

Alumni

Markus Fritz Vincent Schiano de Collela Frederic Jung Sajoscha Sauer

LabID Public Repository

https://gitlab.com/lab-integrated-data

LabID Demo Server

https://labid-demo.embl.de/

Documentation & Online Training

https://grp-gbcs.embl-community.io/labid-user-docs/

https://www.embl.org/gbcs



