Sharing and Annotating Data in Compliance with MIFlowCyt: the Minimum Information about a Flow Cytometry Experiment

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Why share your data?

- Carrots are tasty
  - Promote open scientific inquiry and progress in the field
  - Re-exploration of existing datasets
  - Reproducible research
  - Get credited for sharing good quality data
    - Thomson Reuters Data Citation Index
- Sticks hurt
  - Required by funding agencies and journals

What to share?

- A dump of FCS files is not enough
  - Data without context are not understandable to others

MIFlowCyt: The Minimum Information about a Flow Cytometry Experiment

Jamie A. Lee,[*] Josef Spidlen,[†] Keith Boyce,[‡] Jennifer Cai,[*] Nicholas Crosbie,[§] Mark Dalphin,[¶] Jeff Furlong,[ǁ] Maura Gasparetto,[†] Michael Goldberg,[#] Elizabeth M. Goralczyk,[**] Bill Hyun,[††] Kirstin Jansen,[ǁ] Tobias Kollmann,[‡‡] Megan Kong,[*] Robert Leif,[§§] Shannon McWeeney,[¶¶] Thomas D. Moloshok,[**] Wayne Moore,[ǁǁ] Garry Nolan,[##] John Nolan,[***] Janko Nikolich-Zugich,[†††] David Parrish,[‡] Barclay Purcell,[‡‡‡] Yu Qian,[*] Biruntha Selvaraj,[‡‡‡] Clayton Smith,[†] Olga Tchuvatkina,[#] Anne Wertheimer,[§§§] Peter Wilkinson,[¶¶¶] Christopher Wilson,[ǁǁǁ] James Wood,[ǁǁǁǁ] Robert Zigon,[###] the International Society for Analytical Cytology Data Standards Task Force, Richard H. Scheuermann,[*,****] and Ryan R. Brinkman[†]

Author information ▶ Copyright and License information ▶

JAL and JS contributed equally to the work in this article

- Outlines the minimum information required to report about flow cytometry experiments
- Represents the community consensus
  - ISAC Recommendation
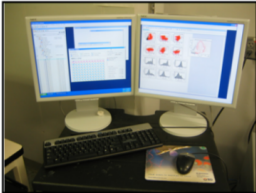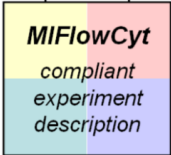- Required/recommended by *Cytometry A* and *Nature*

MIFlowCyt

MIFlowCyt components

Experiment overview

Sample description

Data analysis

Instrumentation

MIFlowCyt *compliant experiment description*

MIFlowCyt components

Experiment overview

- Purpose
- Keywords
- Experiment variables
- Date(s)
- Organization(s)
- Primary contact
- Quality control measures

Sample description

- Description
- Sample material
- Treatment
- Fluorescent reagents
- Source
- Biological samples: Organism with taxonomy, phenotype, genotype, age, gender, ...
- Location for environmental samples

Data analysis

- FCS data files
- Compensation and other transformations
- Gating details including gate description, statistics and boundaries or images or gate membership details

Instrumentation details

- Make
- Model
- User-adjustable components (e.g., detector voltages)
- Customized configurations

MIFlowCyt summary

- Formalizes what to describe so that others understand
- Does not prescribe how to share
- Does not prescribe how to do what you do

How to share all these details?
You are doing most of it already

- Manuscript, *e.g.*, the methods section
- Manuscript's supplemental information
- Data repository

FlowRepository – What is it?

- A public online resource of annotated flow cytometry datasets
  - Primarily those associated with peer-reviewed publications
- Web-based application created by extending and adapting Cytobank
  - Mainly to incorporate MIFlowCyt and journal integration
- Open source
  - Affero General Public License
- Supported by ISAC, ICCS and ESCCA
- Hosted by Carnegie Mellon University

FlowRepository – What do you need to start?

- A computer with Internet connection
  - Fast connection is good, especially when uploading large datasets
- Web browser
  - Firefox or Chrome recommended
  - Safari or Internet Explorer also work but may not look great
- Ability to run Java Applets in the Web browser
  - Required for online analysis and FCS de-identification

- Navigate your Web browser to https://flowrepository.org

- Demonstration (offline)
  - Access FlowRepository
  - Deposit, annotate and share a dataset

FLOWRepository

Login

Help

The following open access article describes how to upload and annotate flow cytometry data sets: Spidlen J, Breuer K and Brinkman R. Preparing a Minimum Information about a Flow Cytometry Experiment (MIFlowCyt) Compliant Manuscript Using the International Society for Advancement of Cytometry (ISAC) FCS File Repository (FlowRepository.org). Current Protocols in Cytometry, UNIT 10.18, July 2012.

We also have a Quick start guide and a FAQ section.

You may download slides from our Workshop at CYTO 2012: Publishing MIFlowCyt Compliant Data to ISAC's FlowRepository.org for Cytometry A and Other Journals

Additional links and help options are listed in our support page.

You can contact us by filling out a support ticket.

Citing FlowRepository

Please reference us by citing:

Spidlen J, Breuer K, Rosenberg C, Kotecha N and Brinkman RR. FlowRepository - A Resource of Annotated Flow Cytometry Datasets Associated with Peer-reviewed Publications. Cytometry A. 2012 Sep; 81(9):727-31.

Supporting journal

Cytometry

FlowRepository

FlowRepository is a database of flow cytometry experiments where you can query and download data collected and annotated according to the MIFlowCyt standard.

Query

Enter a term to search all publicly available experiments:

[   ] Query

Show query fields

Links

Browse public datasets   Browse OMIP datasets   Referencing Flow Repository and Cytobank

Browse community datasets   Quick start guide   FlowRepository Steering Committee & Advisory Board
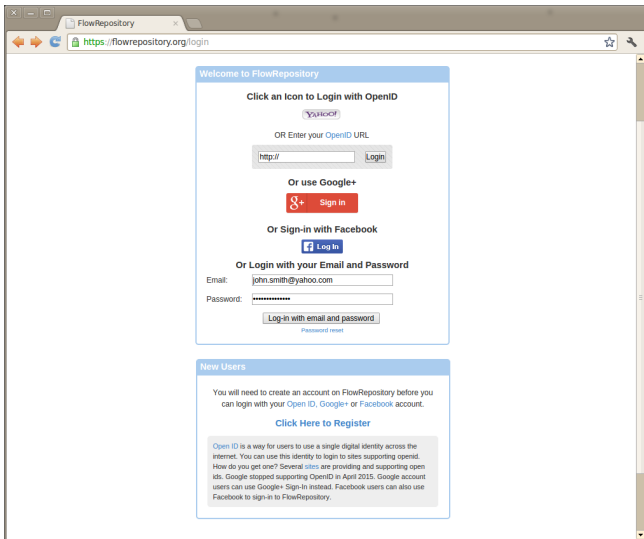
Browse most popular datasets   Submit data   Funding

Terms of Service   Privacy Policy   Support   Feedback   Developers

Register/login in order to be deposit data

Registration

Register for FlowRepository

Open ID is a way for users to use a single digital identity across the internet. You can use this identity to login to sites supporting openid. How do you get one? Several sites are providing and supporting open ids. Google stopped supporting OpenID in April 2015. Google account users can use Google+ Sign-In instead. Facebook users may use Facebook. Click here if you need help with this form.

First Name   John

Last Name   Smith

Sign-in with Google+ or Facebook, or select your Open ID provider

G+   Sign in

Log In

Open ID Provider   Yahoo ▾

Contact Email   john.smith@yahoo.com

You can also opt-out and use an email/password login only (note that email / password login is always available even if you register using one of the above).

Email / Password Sign-In Only

Contact Email   john.smith@yahoo.com

This will match your Open ID, Facebook or Google+ registered email.

Privacy   ☑ Do not display my email address to other users

Optional Information

Select Password   [   ]

Confirm Password   [   ]

Passwords can be used instead of OpenID, Google+ or Facebook login. Please use 8 or more characters and include a number, an upper-case character and a lower-case character.

ResearcherID (http://www.researcherid.com)   G-1234-2015

ORCID (http://orcid.org/)   0001-0001-1234-1234

Location   Vancouver, BC, Canada

Company/Organization   BC Cancer Agency

How did you find out about FlowRepository?   In an article/publication ▾

FlowRepository does not warrant or assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information displayed on this website.

☑ I agree to the FlowRepository Terms Of Service

Register

Share your data - typical steps

1. Create a new experiment
2. Upload data (FCS files)
3. Prepare annotation templates
   - Or prepare spreadsheets with annotations
4. Annotate the experiment
   - Describe samples and sample sources
   - Provide experimental variables
   - Describe instrumentation settings
5. Provide analysis details
   - Either analyze data online
   - Or upload third party analysis files (e.g., FlowJo workspaces, FCS Express projects, FACS Diva files, etc.)
6. Review (and improve) your MIFlowCyt compliance
7. Share with reviewers
8. Share with everyone

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Create a new experiment

Create a new experiment (continued)

Conclusion
(optional)

Several immunophenotypes correlated with the survival times were identified. Details about this would typically be listed here but I am not at liberty to share this information during this talk.

Comments
(optional)

For reagent and instrument details as well as the original manual gating strategy please see: Ganesan and Chattopadhyay et al., Immunologic and virologic events in early HIV infection predict subsequent rate of progression. Journal of Infectious Diseases, 2010:201:272–284.

Quality Control Measures
(optional)

Per-channel empirical distribution comparison

Quality Control Experiment
(optional)

-- None --

Create a new experiment (continued)

Keywords (optional): HIV, AIDS Free Survival, Bioinformatics

Organizations (optional):
-- None --
BC Cancer Agency, Terry Fox Laboratory
University of British Columbia, Faculty of Medica

Add new organization

Pubmed IDs (optional): 20001854, 18667932

* required field

Create Experiment

Upload and annotation of your own dataset

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Data upload (Option 1, HTML5-based)

Data upload (Option 1, HTML5-based)

Data upload (Option 1, HTML5-based)

Data upload (Option 2, Java-based)

Data upload (Option 2, Java-based)

Data upload - de-identification (needs Java)

☑ **De-identify all FCS files before uploading**

De-identification

- Remove identifiers that could be used to identify an individual
- Generally, privacy rules do not apply on de-identified data
  - → Allows for sharing
  - Check with your regulatory authority as applicable

Implementation in FlowRepository

- Automated removal of all keyword values unless in our *safe* list
  - Safe list: Over 220 keywords identified from hundreds of FCS data files produced by dozens of instruments from several vendors
  - Downside: Also removes everything unknown
- Integrated in the upload process
  - Performed locally → no sensitive information leaves your computer

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Prepare annotation data
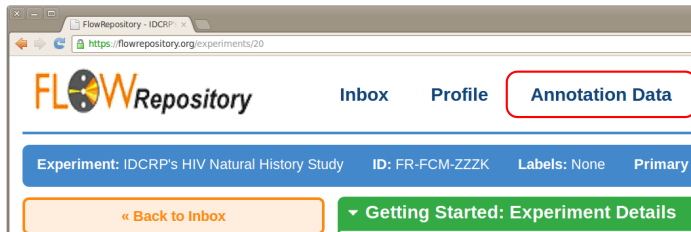
- Follow the Annotation Data link
  - Set of *concepts* applicable to samples even from different datasets

Prepare annotation data – reagents

- Define reagents used in the dataset

Prepare annotation data – add reagents

- Provide details as required by MIFlowCyt

Prepare annotation data – instruments

- Your instrument is most likely in the system already

Model ▲	Manufacturer	Other			
A10-Bryte	Apogee Flow Systems http://www.apogeeflow.com			Edit	Remove
A40-Military	Apogee Flow Systems http://www.apogeeflow.com			Edit	Remove
A50-Micro	Apogee Flow Systems http://www.apogeeflow.com			Edit	Remove
A50-Universal	Apogee Flow Systems http://www.apogeeflow.com			Edit	Remove
Accuri C6	Becton Dickinson (BD Biosciences) http://www.bdbiosciences.com			Edit	Remove
Attune	Applied Biosystems http://www.appliedbiosystems.com			Edit	Remove
Auto-A40	Apogee Flow Systems http://www.apogeeflow.com			Edit	Remove

Tabs: Keywords | Organizations | Manufacturers | Reagents | **Instruments** | Organisms | Templates

New instrument

Search:

Prepare annotation data – organisms

- The NCBI Taxonomy contains hundreds of thousands of organisms
- FlowRepository contains 20,000 of these
  - Selected based on either having a common English name or appearance in GeneBank
- But this is still a long list (for drop down selections)
  - → We only show what has been used or explicitly requested

Keywords	Organizations	Manufacturers	Reagents	Instruments	Organisms	Templates

Add organism

Search: [   ]

NCBI Taxonomy ID ▲	Scientific name ⇕	Genbank common name ⇕
2	Bacteria	eubacteria
3055	Chlamydomonas reinhardtii	Chlamydomonas reinhardtii (green algae)
4890	Ascomycota	ascomycetes
4932	Saccharomyces cerevisiae	baker's yeast
9541	Macaca fascicularis	crab-eating macaque
9544	Macaca mulatta	Rhesus monkey
9606	Homo sapiens	human
9999	Spermophilus parryii	Arctic ground squirrel
10090	Mus musculus	house mouse
10116	Rattus norvegicus	Norway rat

Prepare annotation data – add organism

- Follow the
  Add organism link
- Start typing either the
  Latin or the English
  name
- Auto-complete will
  show suggestions after
  the first 3 characters

Prepare annotation data – templates

- Start with sample sources

Keywords	Organizations	Manufacturers	Reagents	Instruments	Organisms	Templates

New annotation template for samples
New annotation template for sample sources

Search: [   ]

Annotation Type ▲	Template Name ▴	User ▴	Public ▴		
Sample	Sample template Kollmann #1	Karin Breuer	yes	Show	Remove
Sample	JS Sample 1	Josef Spidlen	no	Show	Remove
Sample source	sample source template Kollmann #1	Karin Breuer	yes	Show	Remove
Sample source	12w MOLD/RkJ M mouse	Josef Spidlen	no	Show	Remove

Showing 1 to 4 of 4 entries

- Different items required based on the sample source type
- Form changes accordingly
- Use ? for variable fields

Prepare annotation data – create sample source templates

- Different items required based on the sample source type
- Form changes accordingly
- Use ? for variable fields

Prepare annotation data – create sample templates

Upload and annotation of your own dataset

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Prepare spreadsheets with annotations

- Use your favorite spreadsheet editor
  - MS Excel, GoogleDoc Spreadsheet, OpenOffice Calc, etc.
- Name one column as **FCS File**; values should correspond to file names in your dataset
- Other "understandable" columns:
  - Samples: Sample Description, Sample Characteristic, Sample Treatment, Sample Source Description, Sample Source Treatment, Age, Age unit, Gender, Phenotype, Genotype, Location, Other Sample Source Information
  - Experiment Variables: Condition, Dose, Timepoint, Individual, Experimental variable sample type
  - Instrumentation Details: Instrument, Default Instrument Settings, Optical Filters Installation Dates, Other Flow Fluidics Information, Other Instrument Settings Information, Flow Cell Type

Use your favorite spreadsheet editor

Save as a CSV (Comma Separated Values) file
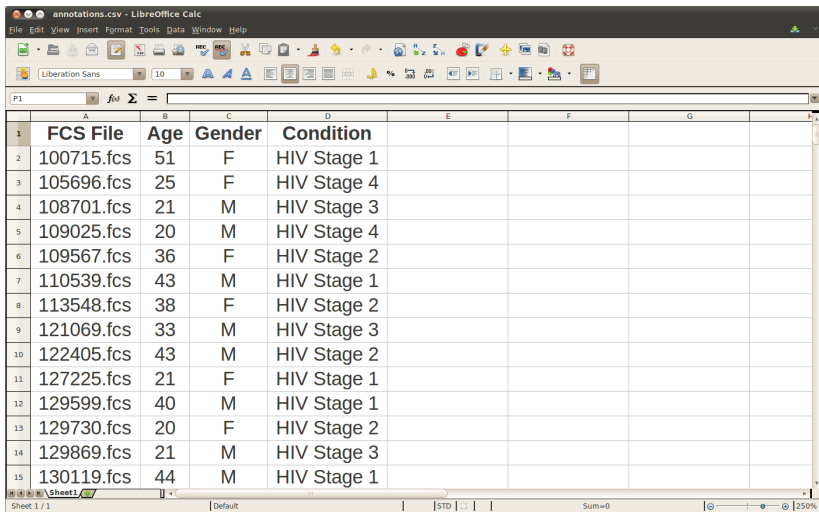- Look in the File menu for Save As, Download, or Export

Upload and annotation of your own dataset

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« Back to Inbox

My Working Illustration »

MIFlowCyt Annotation »

Actions ⓘ

Experiment

Edit Experiment Details

Delete Experiment

FCS Files

Download FCS Files

Upload More FCS Files

De-identify FCS Files

Review Keywords in FCS files

Sharing Permissions ⓘ

Full Access Users

⏻ Nima Aghaeepour [PR]

Josef Spidlen [x]

⏻ Ryan Brinkman [x]

Invite a new user

Share with a User (Full Access)

This experiment is currently private.

Share with Everyone

You can also **create a secret access code** to share with reviewers.

Share with Reviewers

Did you know?

You can request a one-on-one session to get started with your data by filling out a

Getting Started: Experiment Details ✕

This Experiment Details Page contains information about the experiment listed above.

- Start describing samples
- Add flow cytometer information
- Review experiment variables
- Analyze your data on-line
- Review MIFlowCyt annotation
- Download FCS files

For more tips and guides please see:

- FlowRepository Quick start guide
- Documentation site for Cytobank and FlowRepository

Experiment Details ⓘ

Illustrations ⓘ

Attachments ⓘ

FCS Files (466) ⓘ

Download Files Upload More Files De-identify FCS Files Review Keywords in FCS Files

File Name		Sample	Tube Name	Experiment Variables	Panel	Events	Size
100715.fcs	details	100715.fcs	describe sample	Tube_025		Panel 1	65016	4 MB
105696.fcs	details	105696.fcs	describe sample	Tube_009		Panel 1	455184	27.8 MB
108701.fcs	details	108701.fcs	describe sample	Tube_001		Panel 1	1000000	61 MB
109025.fcs	details	109025.fcs	describe sample	Tube_009		Panel 1	210186	12.8 MB
109567.fcs	details	109567.fcs	describe sample	Tube_017		Panel 1	160074	9.8 MB
110539.fcs	details	110539.fcs	describe sample	Tube_022		Panel 1	364212	22.2 MB
113548.fcs	details	113548.fcs	describe sample	Tube_003		Panel 1	177102	10.8 MB
121069.fcs	details	121069.fcs	describe sample	Tube_001		Panel 1	542538	33.1 MB
122405.fcs	details	122405.fcs	describe sample	Tube_010		Panel 1	476208	29.1 MB

Describing samples

Describing samples – apply a template

Describing samples – create a sample source

- Use templates again
- Adjust accordingly for each sample
- Or just leave it (we can fix it later using spread-sheets)

Describing samples – 3 options to save

▼ **100715.fcs Sample Information**

Apply template:	[PBMC from HIV+ Subject Template ▾] Create templates
Description *	PBMC from HIV+ Subject
Sample source	[HIV+ subject ▾] [New]
Sample characteristic	[HIV+ ▾] [New]
Sample treatment	[PBMCs were thawed in warm .. ▾] [New]
Staining	-- None -- B cells, MHCII, PerCPCy5.5 (BD Biosciences BD#custo T cells, CD40, FITC/OG (eBioscience eBio#11-0409) CD14 positive cells, CD14, Alexa 700 (BD Biosciences CD86, CD86, PE (eBioscience eBio#12-0869) [New]
Staining cocktail(s)	-- None -- Cocktail no [New]

[Save and proceed to next FCS file] [Apply to all undescribed FCS files] [Apply to undescribed FCS files in Panel 1]

Samples and sample sources are now described

But not everything is correct!

- Our *Sample source organisms* vary in age and gender
- We left this out from our template
- Time to fix this
  - We can now use the spreadsheet created earlier

Upload the spreadsheet as attachment

Parse the attachment – click on (P)

Information extracted from attachment

- Review the result

Note: We also provided one experimental variable (the condition)

The following information extracted from attachment annotations.csv

FCS file	age	gender	condition
100715.fcs	51	F	HIV Stage 1
105696.fcs	25	F	HIV Stage 4
108701.fcs	21	M	HIV Stage 3
109025.fcs	20	M	HIV Stage 4
109567.fcs	36	F	HIV Stage 2
110539.fcs	43	M	HIV Stage 1
113548.fcs	38	F	HIV Stage 2
121069.fcs	33	M	HIV Stage 3
122405.fcs	43	M	HIV Stage 2
127225.fcs	21	F	HIV Stage 1
129599.fcs	40	M	HIV Stage 1
129730.fcs	20	F	HIV Stage 2
129869.fcs	21	M	HIV Stage 3
130119.fcs	44	M	HIV Stage 1
132447.fcs	17	F	HIV Stage 1

Upload and annotation of your own dataset

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Provide experimental variables

- Follow *Review experiment variables* in the Getting Started panel
- Or navigate to your *Working Illustration*

Getting Started: Experiment Details

This Experiment Details Page contains information about the experiment listed above.

- Start describing samples
- Add flow cytometer information
- Review experiment variables
- Analyze your data on-line
- Review MIFlowCyt annotation
- Download FCS files

For more tips and guides please see:

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Illustrations

Name	Active Dimensions			Author	Created	Updated
Josef's Working Illustration	Channels (0) x Populations (1)	Print View	PDF	Josef Spidlen	May 2012	May 2012

Reset Working Illustration

Provide experimental variables

- Example: patients treated by various dosages of Lexiva^{TM}

Provide experimental variables

- Example: patients treated by various dosages of Lexiva^{TM}
- Click on Dosages, than Setup

List doses

- Provide a comma-separated list of all doses

▾ **Add Doses**   ⓘ

Enter a comma separated list of Doses to add:

| Lexiva 1400 bid, Lexiva 1400 qd+Norvir 200 qd, Lexiva 700 bid+Norvir 100 bid | Add Doses |

Assign FCS files to the right doses

- Drag & Drop files into the appropriate boxes
- Or use the *Filter* with *Move to*

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Instrumentation description

- Navigate to the details of an FCS file

Instrumentation description

- Press the *Describe instrument settings* button

Instrumentation description

- Select the make and model of the instrument used

Instrumentation description

- New instruments may be added in the annotation data section

Instrumentation description

- **Simple case:** Same instrument with default settings for all FCS files

Describe instrument settings

Instrument *

BD LSR II, Becton Dickinson (BD Biosciences)

Use default instrument settings ☑

Installation dates for filters in optical paths

The instrument has been purchased new on July 1, 2011; all optical filters are original and came with the instrument.

Other

PMT voltages specified within the FCS data files.

☑ Use these settings for all FCS files in this experiment

Cancel Save

Instrumentation description

- **Advanced case:** Describe all details
  - Required by MIFlowCyt for customized instruments only
  - See `http://flowrepository.org/quick_start_guide`

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Analyze data online

- Navigate to your *Working illustration*
- Click on *Gate* in the Populations panel

Analyze data online

- Online data analysis is not our focus
- Only basic analysis supported

Analyze data online

More on analyzing data online in Cytobank or FlowRepository:

UNIT 10.17 Web-Based Analysis and Publication of Flow Cytometry Experiments

Nikesh Kotecha[1,2,3], Peter O. Krutzik[1,2], Jonathan M. Irish[1]

Lab Protocol Title
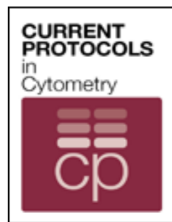
Current Protocols in Cytometry

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8. Share with everyone

Provide third party analysis files, figures, tables, etc.

- Upload these as attachments

Upload and annotation of your own dataset

1. Create a new experiment
2. Upload data (FCS files)
3. Prepare annotation templates
   - Or prepare spreadsheets with annotations
4. Annotate the experiment
   - Describe samples and sample sources
   - Provide experimental variables
   - Describe instrumentation settings
5. Provide analysis details
   - Either analyze data online
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Experiment: IDCRP's HIV Natural History Study **ID:** FR-FCM-ZZZB **Labels:** None **Primary Researcher:** Nima Aghaeepour **Public:** No | MIFlowCyt Score: 100.00% |

« Back to Inbox

My Working Illustration »

MIFlowCyt Annotation »

▼ Actions

Experiment
Edit Experiment Details
Delete Experiment

FCS Files
Download FCS Files
Upload More FCS Files
De-identify FCS Files
Review Keywords in FCS files

▼ Sharing Permissions

Full Access Users
Nima Aghaeepour [PR]
Josef Spidlen [x]
Ryan Brinkman [x]

Invite a new user
Share with a User (Full Access)

This experiment is currently **private.**

Share with Everyone

You can also **create a secret access code** to share with reviewers.

Share with Reviewers

▼ Did you know?

You can request a one-on-one session to get started with your data by filling out a support ticket.

A guide to Cytobank is available at Current Protocols in Cytometry.

We also have a Quick start guide.

You can print/save your illustrations to PDF from the illustration view's left menu.

You can export your data to Excel from the

▶ Getting Started: Experiment Details ✕

▶ Experiment Details ⓘ

▼ Illustrations ⓘ

Name	Active Dimensions			Author	Created	Updated
Illustration 1	Channels (3) x Fcs Files (2) x Populations (3)	Print View	🔴 PDF Delete	Josef Spidlen	11:37 AM	
Josef's Working Illustration	Channels (3) x Fcs Files (2) x Populations (3)	Print View	🔴 PDF	Josef Spidlen	May 2012	11:11 AM

Delete My Saved Illustrations Reset Working Illustration

▼ Attachments ⓘ

File Name	Date	Uploaded By	Size	md5sum
annotations.csv ✕ 🔴 File specific sample source details	Jun 07	Josef Spidlen	15.5 KB	1de7e15...
HIV_Analysis.jo ✕ Complete analysis in FlowJo	11:57 AM	Josef Spidlen	14.4 MB	d8a8ab5...
HIV_Analysis_Overview.png ✕ Overview figure	12:08 PM	Josef Spidlen	169.3 KB	4958a88...
HIV_Analysis_Class_Comparison.jpg ✕ HIV class comparison figure	12:08 PM	Josef Spidlen	201.9 KB	5795d5e...
All_Statistics.xlsx ✕ Tables and stats	12:09 PM	Josef Spidlen	253.6 KB	95641c1...
Extended_description.docx ✕ More details on experimental design	12:09 PM	Josef Spidlen	208.2 KB	76f301b...

Attach a file
Choose File No file chosen
Upload

▼ FCS Files (466) ⓘ

Download Files Upload More Files De-identify FCS Files Review Keywords in FCS Files

File Name	Sample	Tube Name	Experiment Variables	Panel	Events	Size
100715.fcs details	show sample description	Tube_025	HIV Stage 1, Lexiva 1400 bid	Panel 1	65016	4 MB
105696.fcs details	show sample description	Tube_009	HIV Stage 4, Lexiva 1400 bid	Panel 1	455184	27.8 MB
108701.fcs details	show sample description	Tube_001	HIV Stage 3, Lexiva 1400 bid	Panel 1	1000000	61 MB
109025.fcs details	show sample description	Tube_009	HIV Stage 4, Lexiva 1400 qd+Norvir 200 qd	Panel 1	210186	12.8 MB

https://flowrepository.org/experiments/11

Experiment: IDCRP's HIV Natural History Study   **ID:** FR-FCM-ZZZB   **Labels:** None   **Primary Researcher:** Nima Aghaeepour   **Public:** No

MIFlowCyt Score: 100.00%

« Back to Inbox

My Working Illustration »

MIFlowCyt Annotation »

► Actions

Experiment
Edit Experiment Details
Delete Experiment

FCS Files
Download FCS Files
Upload More FCS Files
De-identify FCS Files
Review Keywords in FCS files

► Sharing Permissions

Full Access
Nima
Josef
Ryan

Invite a new
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► Getting Started: Experiment Details   ✕

► Experiment Details   ⓘ

► Illustrations   ⓘ

Name	Active Dimensions		Author	Created	Updated
Illustration 1	Channels (3) x Fcs Files (2) x Populations (3)	Print View PDF Delete	Josef Spidlen	11:37 AM	
Josef's Working Illustration	Channels (3) x Fcs Files (2) x Populations (3)	Print View PDF	Josef Spidlen	May 2012	11:11 AM

Delete My Saved Illustrations   Reset Working Illustration

► Attachments   ⓘ

File Name	Date	Uploaded By	Size	md5sum
annotations.csv ✕ ⓟ	Jun 07	Josef Spidlen	15.5 KB	1de7e15...

HIV class comparison figure

| All_Statistics.xlsx ✕ | | 12:09 PM | Josef Spidlen | 253.6 KB | 95641c1... |
| Extended_description.docx ✕ | 12:09 PM | Josef Spidlen | 208.2 KB | 76f301b... |

More details on experimental design

Tables and stats

Attach a file
Choose File   No file chosen
Upload

► FCS Files (466)   ⓘ

Download Files   Upload More Files   De-identify FCS Files   Review Keywords in FCS files

File Name	Sample	Tube Name	Experiment Variables	Panel	Events	Size
100715.fcs details	show sample description	Tube_025	HIV Stage 1, Lexiva 1400 bid	Panel 1	65016	4 MB
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108701.fcs details	show sample description	Tube_001	HIV Stage 3, Lexiva 1400 bid	Panel 1	1000000	61 MB
109025.fcs details	show sample description	Tube_009	HIV Stage 4, Lexiva 1400 qd+Norvir 200 qd	Panel 1	210186	12.8 MB

- Click on the MIFlowCyt Score bar
- In this case, there is nothing to improve in terms of the score

Experiment: IDCRP's HIV Natural History Study   **ID:** FR-FCM-ZZZB   **Labels:** None   **Primary Researcher:** Nima Aghaeepour   **Public:** No

MIFlowCyt Score: 100.00%

« Back to Experiment Summary

▼ MIFlowCyt
Show MIFlowCyt score details
Report Suspicious Score...

Print View 📄 PDF

▼ Did you know?
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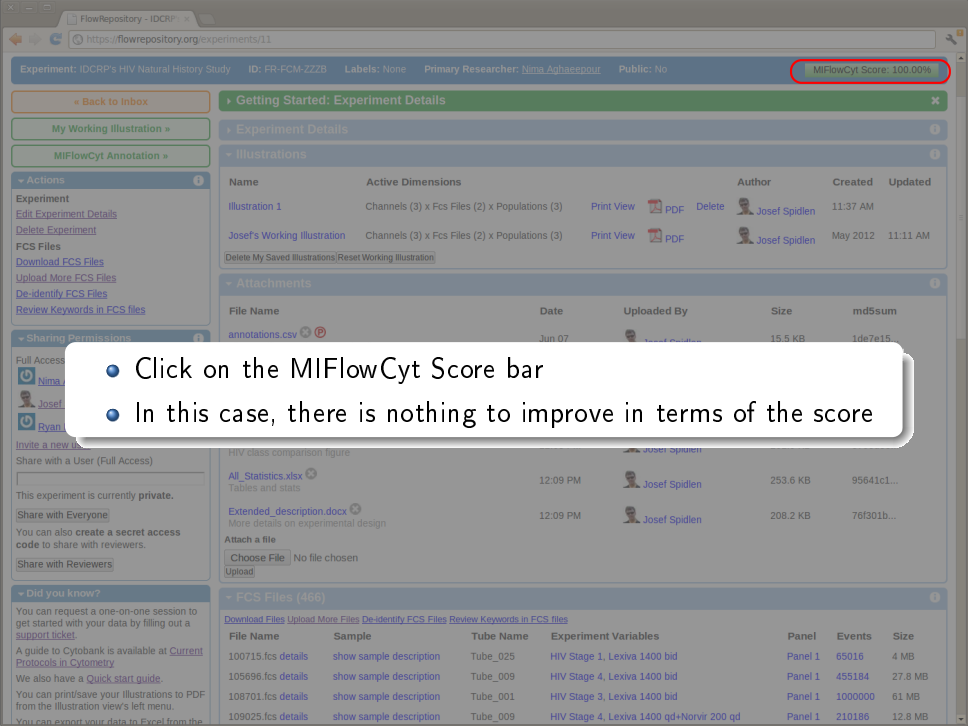You can print/save your illustrations to PDF from the Illustration view's left menu.

You can export your data to Excel from the Experiment Summary page.

Give other users full control to modify your experiments through the "Sharing Permissions" box.

Use the "Download Files" button to save copies of the original FCS Files to your computer.

MIFlowCyt Compliance Score for Experiment: IDCRP's HIV Natural History Study - Repository ID: FR-FCM-ZZZB

Total MIFlowCyt compliance score: **100.00%**

▼ 1 - Experiment Overview - 100.00% provided   ⓘ

Items considered relatively based on importance, 30% contribution to total score.

Item	Compliance [+ -]	Improve
Purpose	✓ Provided purpose	Fully provided
Keywords	✓ Provided keywords	Fully provided
Experiment variables	✓ Provided experiment variables	Fully provided
Organization	✓ Provided organization name Provided organization address	Fully provided
Contact	✓ First name of primary researcher provided Last name of primary researcher provided Email of primary researcher provided	Fully provided
Date	✓ Provided experiment starting date Provided experiment end date	Fully provided
Conclusions	✓ Provided conclusions	Fully provided
Quality control measures	✓ Provided quality control description	Fully provided

The "Improve" column would show direct links to pages/forms in case some information was still missing

▼ 2 - Flow Sample/Specimen Details - 100.00% provided   ⓘ

Items considered relatively based on importance, 30% contribution to total score.

FCS file	Compliance [+ -]	Improve
	✓ Provided sample description Provided sample source description	

Upload and annotation of your own dataset

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Data sharing

Share with reviewers

The page at https://flowrepository.org says:

Sharing this experiment with reviewers will also lock your experiment. Are you sure you want to do this?

Cancel   OK
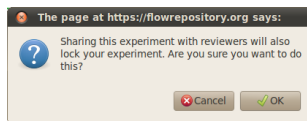
Share with reviewers
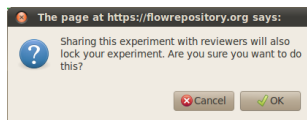
✔ Experiment was successfully updated. This experiment has been locked for reviewers' access and may be accessed via the following URL:
https://flowrepository.org/id/RvFrFl5UsYaDgWZoVC6bxPrNUjMMcjlgxYxyXW5jXy62tFXyij1uHrxHvllL9nLL.
Please share this URL with your reviewers.

▾ **Sharing Permissions** ⓘ

Full Access Users
This experiment is currently locked! No users have full edit access.

This experiment is **shared with reviewers** via a secret code. If your manuscript has been published already, please click here to publish this dataset and link it to the relevant journal and publication.

What to do with the secret code?

- Share the "secret code" with the editor in your cover letter
- The editor will pass it to reviewers
- Reviewers will use it to obtain read-only access to your dataset
  - By navigating directly to
    https://flowrepository.org/id/RvFrFl5UsYaDgWZ....
  - Or entering RvFrFl5UsYaDgWZ.... in the "Query" field

Query	ⓘ
Enter a term to search all publicly available experiments:	

RvFrFl5UsYaDgWZoVC6bxPrNUjMMcjlgxYxyXW5jXy62tFXyij1uHrxHvllL9nLL   Query

Show query fields

What to do if editor/reviewer requires changes?

- Depending on the journal,
  - The editor may contact FlowRepository administrators and arrange for the dataset to be unlocked
  - Or, you may have to fill out a FlowRepository support ticket and ask for the dataset to be unlocked

Terms of Service   **Privacy Policy**   **Support**   **Feedback**

Share your data - typical steps

1. Create a new experiment
2. Upload data (FCS files)
3. Prepare annotation templates
   - Or prepare spreadsheets with annotations
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Making the data public upon manuscript publication

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Sharing Permissions

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Making the data public upon manuscript publication

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  - Or, you may have to do this

▾ **Publish Your Experiment**

Here, you can make your experiment public. Are you publishing your dataset because a related manuscript has been published? If so, please tell us which journal. Also, please tell us the manuscript identifier(s) (PubMed and/or PMC) if available already.

PubMed ID(s):		A comma-separated list of PubMed identifiers (optional).
PMC ID(s):		A comma-separated list of PMC identifiers (optional).
Journal:	Nature Methods ▼	Select a related journal if available in the list (optional).
Other journal:		Type in the name of a journal (optional, use only if journal isn't present in the list above).
	Publish Experiment	Clicking on this button will publish the experiment and also link it to a journal or publication if specified.

Why two fields for journals?
Journals that have been associated with FlowRepository experiments in the past are included in the provided list. If a journal hasn't been linked to any experiment before, please just write down the name and our administratve stuff will do the rest. Specifically, we will lookup the journal, obtain its logo and URL, add it to the list, and link your experiment "properly".
My PubMed ID or PMC ID is not available yet, but it will be; what do I do?
Sometimes, PubMed IDs or PMC IDs are not available right after the publication. For now, you may leave it blank and publish the experiment. Once the PubMed ID and/or PMC ID is available, you can come back and link the manuscript to your experiment.

Summary

FlowRepository can be used to

- Access
- Review
- Download
- Deposit
- Annotate
- Share
- Analyze

flow cytometry datasets.

All you need is

- A computer with Internet connection and
- A web browser
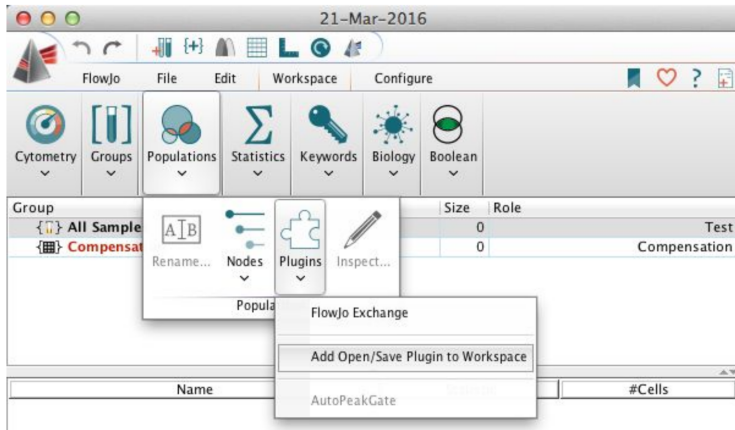 - With Java support if you want online analysis or de-identification

How can other access the data you just shared?

- From their web browser by going http://flowrepository.org
- Directly from R
  - See http://bioconductor.org/packages/FlowRepositoryR

How can other access the data you just shared?

- From their web browser by going http://flowrepository.org
- Directly from R
  - See http://bioconductor.org/packages/FlowRepositoryR
- From certain third-party software
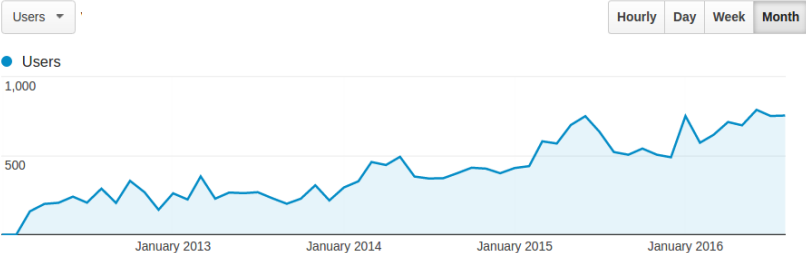 - Such as FlowJo :-)

Accessing FlowRepository data from FlowJo
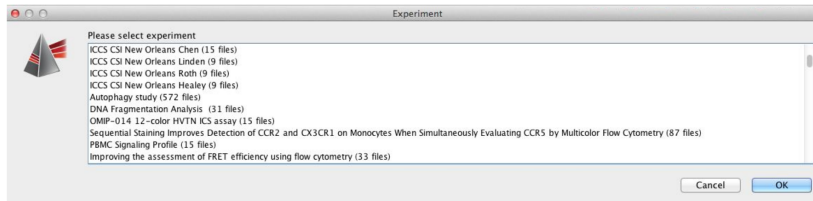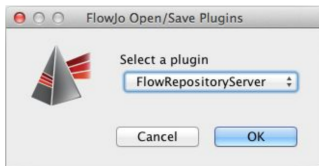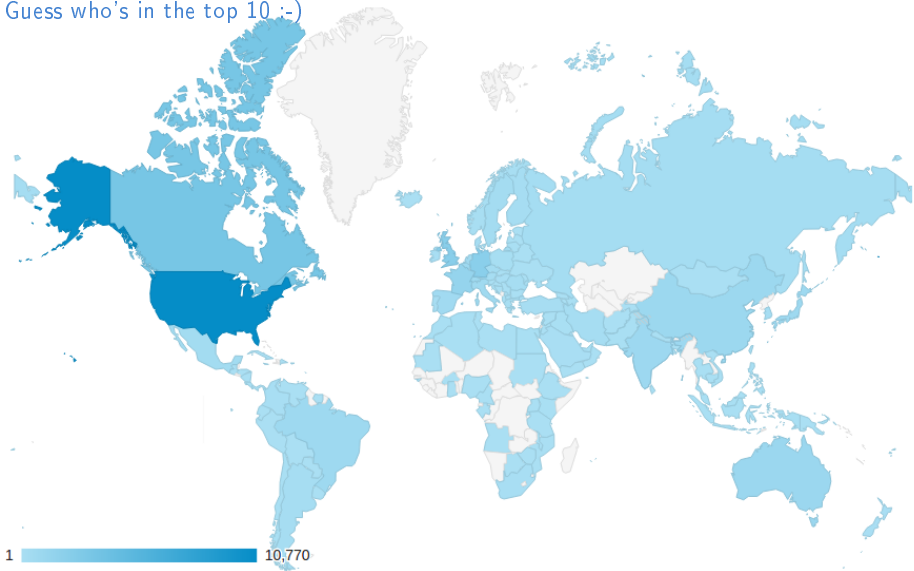
Number of distinct users monthly

FlowRepository Visits by Country (2012 – 2016)

Guess who's in the top 10 :-)

1   10,770

FlowRepository Visits by Country (2012 – 2016)
Guess who's in the top 10 :-)

	Country	Visits			Country	Visits
1.	United States	10,770		11.	Japan	756
2.	Canada	3,316		12.	Switzerland	723
3.	United Kingdom	2,176		13.	Italy	664
4.	Germany	2,069		14.	Spain	611
5.	France	1,382		15.	Netherlands	539
6.	Australia	988		16.	Mexico	443
7.	China	927		17.	Czech Republic	414
8.	India	856		18.	Sweden	409
9.	Brazil	793		19.	Russia	327
10.	**Belgium**	756		20.	Singapore	317
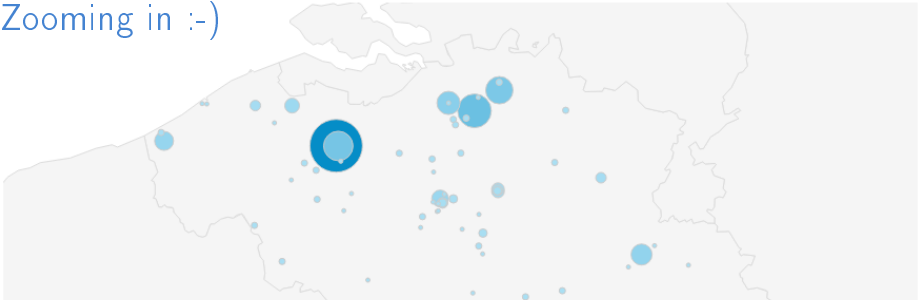
34,500 visits from 144 countries worldwide

1   10,770

Zooming in :-)
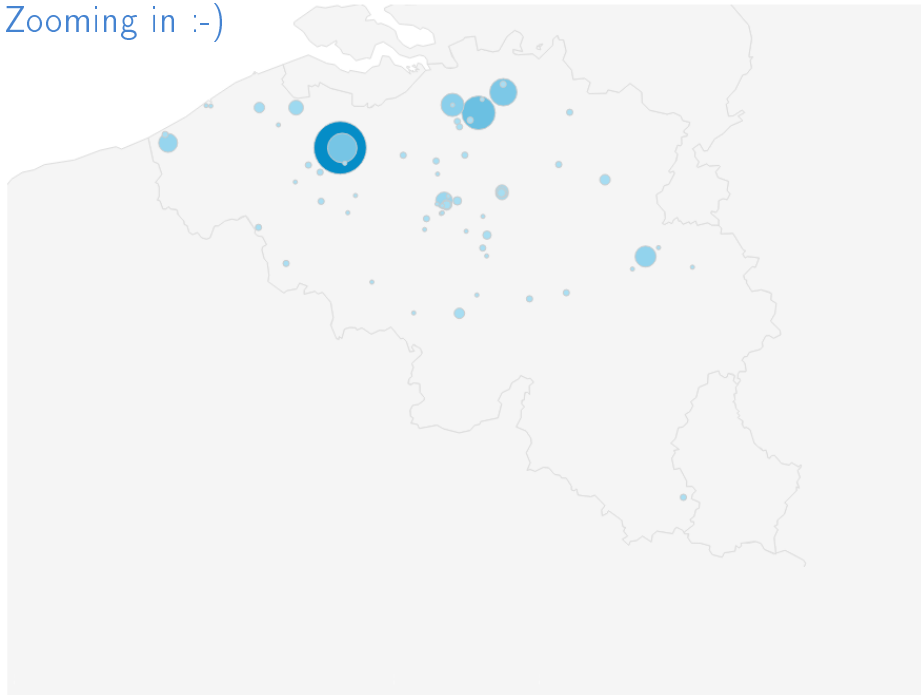
Zooming in :-)

	City	Visits		City	Visits
1.	Ghent	296	11.	Hasselt	8
2.	Ranst	87	12.	Bruges	8
3.	Zoersel	64	13.	Charleroi	7
4.	Antwerp	45	14.	Woluwe-Saint-Lambert	4
5.	Leuven	36	15.	Wavre	4
6.	Liege	33	16.	Boechout	3
7.	Veurne	28	17.	Malle	3
8.	Brussels	23	18.	Dendermonde	3
9.	Maldegem	18	19.	Nazareth	3
10.	Ixelles	14	20.	Oudenaarde	3

Some more stats... (as of September 2016)

- 927 Registered users
- 709 Datasets
  - 349 of these public
- 84,853 FCS files (640 GB)
- 20,346 dataset downloads
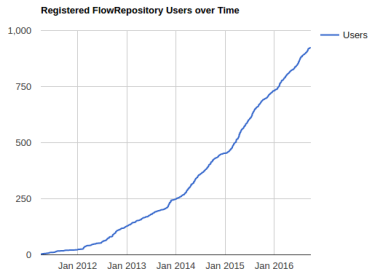
Please share your data.

Additional resources

- Spidlen J, Breuer K and Brinkman RR. Preparing a Minimum Information about a Flow Cytometry Experiment (MIFlowCyt) Compliant Manuscript Using the International Society for Advancement of Cytometry (ISAC) FCS File Repository (FlowRepository.org). *Curr Protoc Cytom*. 2012 Jul; Chapter 10: Unit 10.18.
- Spidlen J, Breuer K, Rosenberg C, Kotecha N and Brinkman RR. FlowRepository – A Resource of Annotated Flow Cytometry Datasets Associated with Peer-reviewed Publications. *Cytometry A*. 2012 Sep;81(9):727-31
- Spidlen J and Brinkman RR. Use FlowRepository to share your clinical data upon study publication. *Cytometry B Clin Cytom*. 2016 Jun; doi: 10.1002/cyto.b.21393. [Epub ahead of print]
- FlowRepository quick start guide: https://flowrepository.org/quick_start_guide

Acknowledgments