

BBMRI.nl

Biobanking and
BioMolecular resources
Research Infrastructure
The Netherlands

Data-centric multi-omics analysis platform used in the BBMRI-NL project

Leon Mei, Leiden University Medical Center

X-omics/BBMRI-NL workshop on 2021-01-20

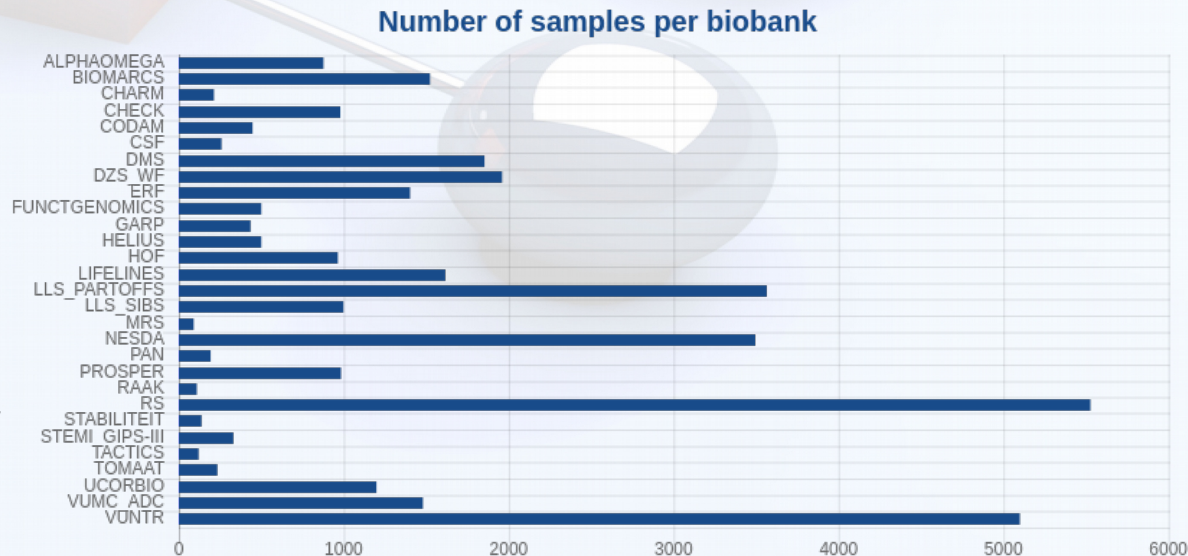


BBMRI-NL

For many, by many*

<https://www.bbmri.nl/>

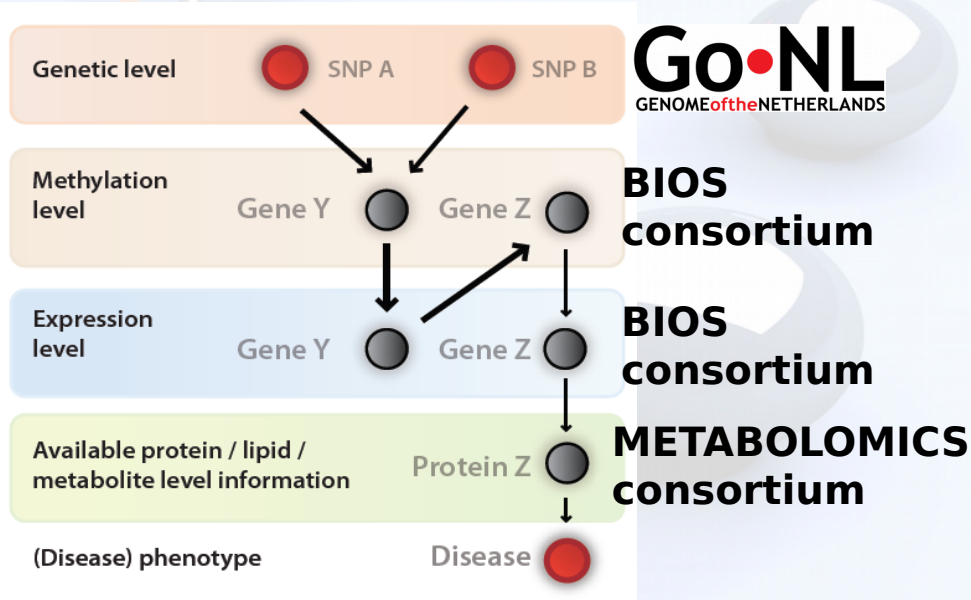
<https://omics-explorer.bbmri.nl/>



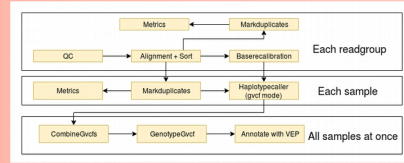
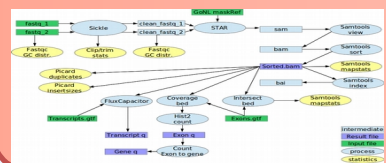
*100+ researchers working on 25 Cohorts, BIOS, GoNL, Metabolomics
Rainbow together building BBMRI-omics.

Multi-omics Data

**N~100,000
 GWAS**
N=770 Go.NL
N~4,000
N~4,000
N~35,000
N>250,000



Data analysis pipelines



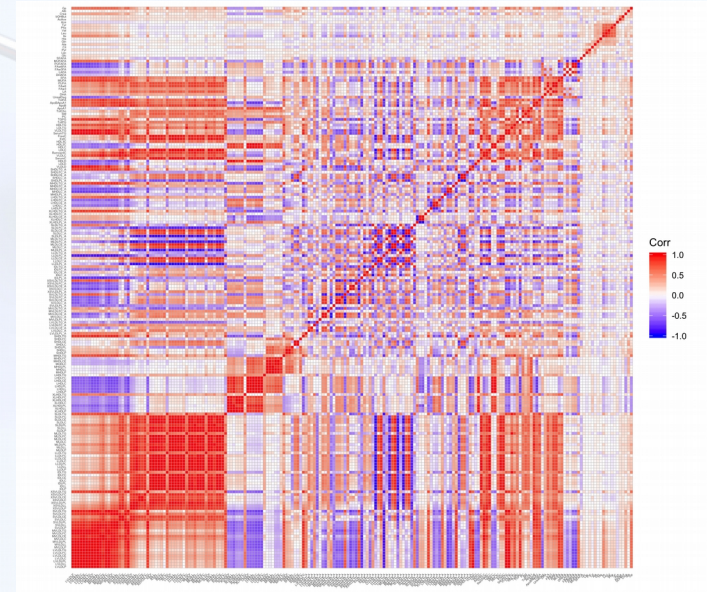
Building a central database for the research community

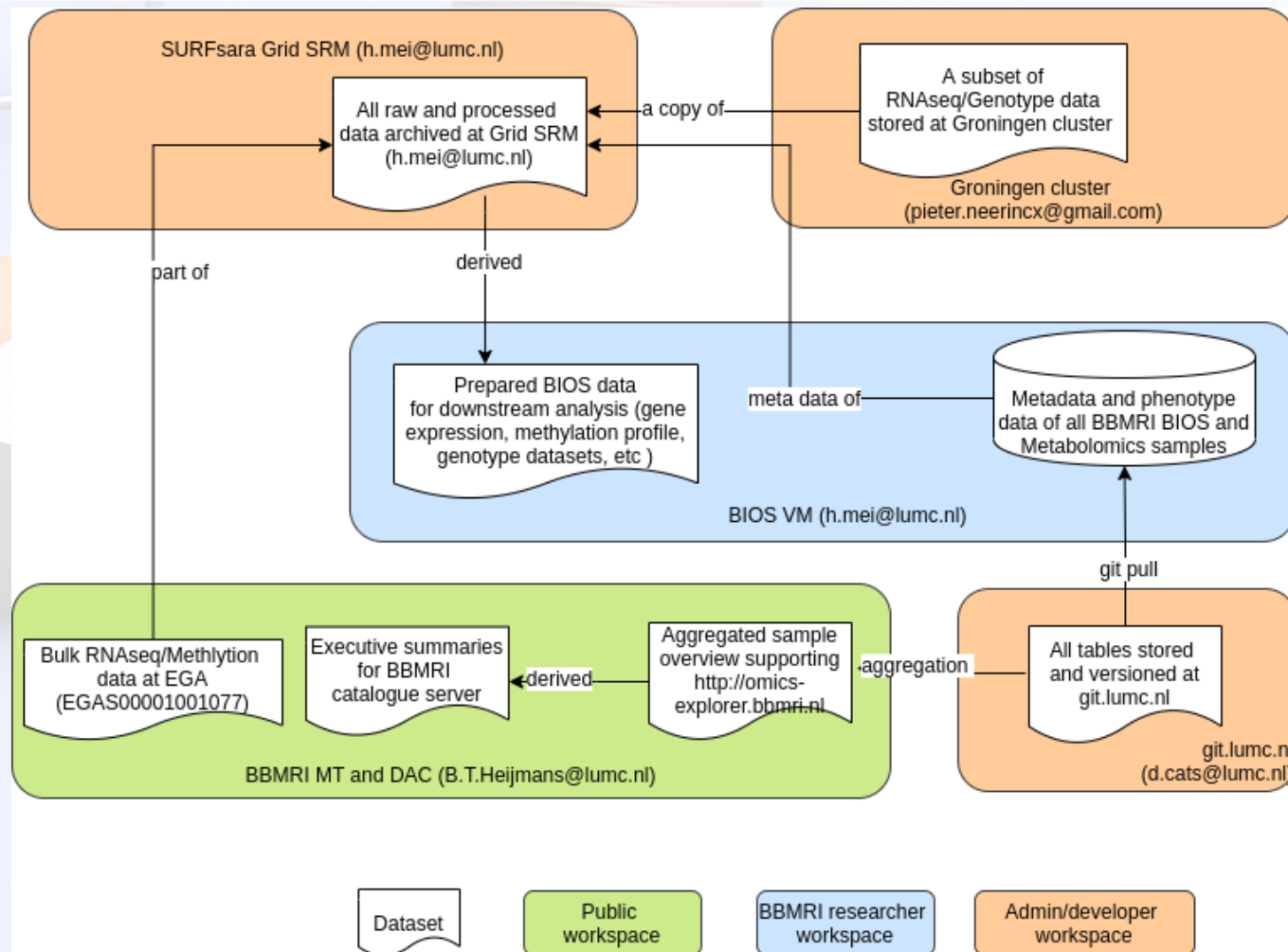
- To store raw and processed data
- Reference data for case-control studies and imputation
- Linking to clinical phenotypes

Metabolomics

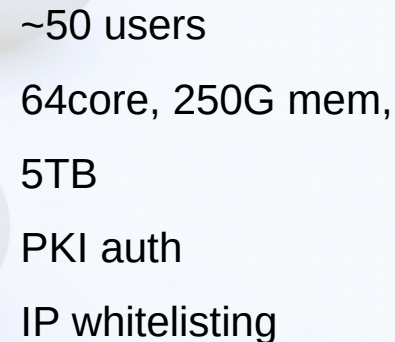
Available metabolic measurements from the plasma of
~35,000 individuals

NMR metabolomics (Nightingale Health Ltd): It
comprises 226 features (metabolites and derived
measures)





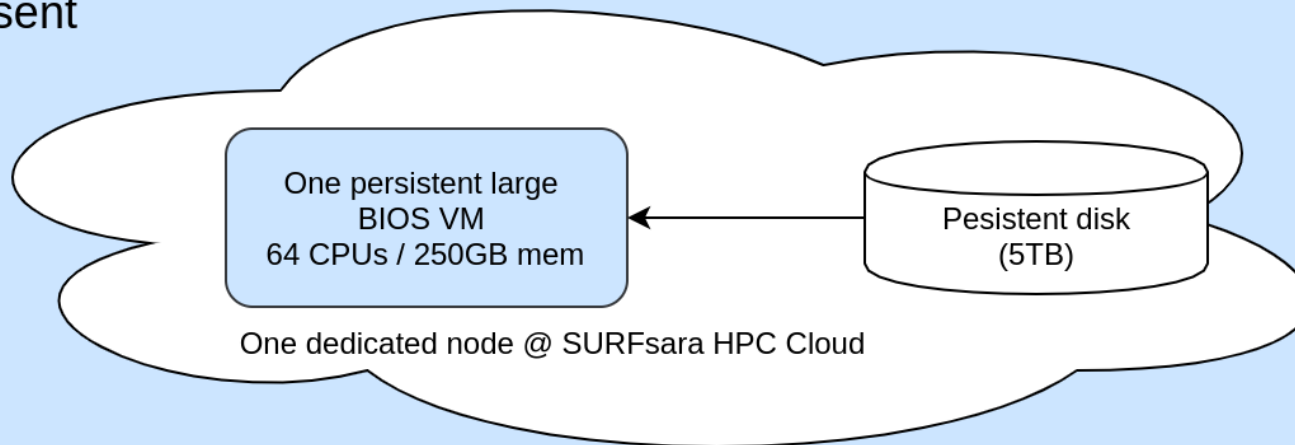
Data-centric multi-omics





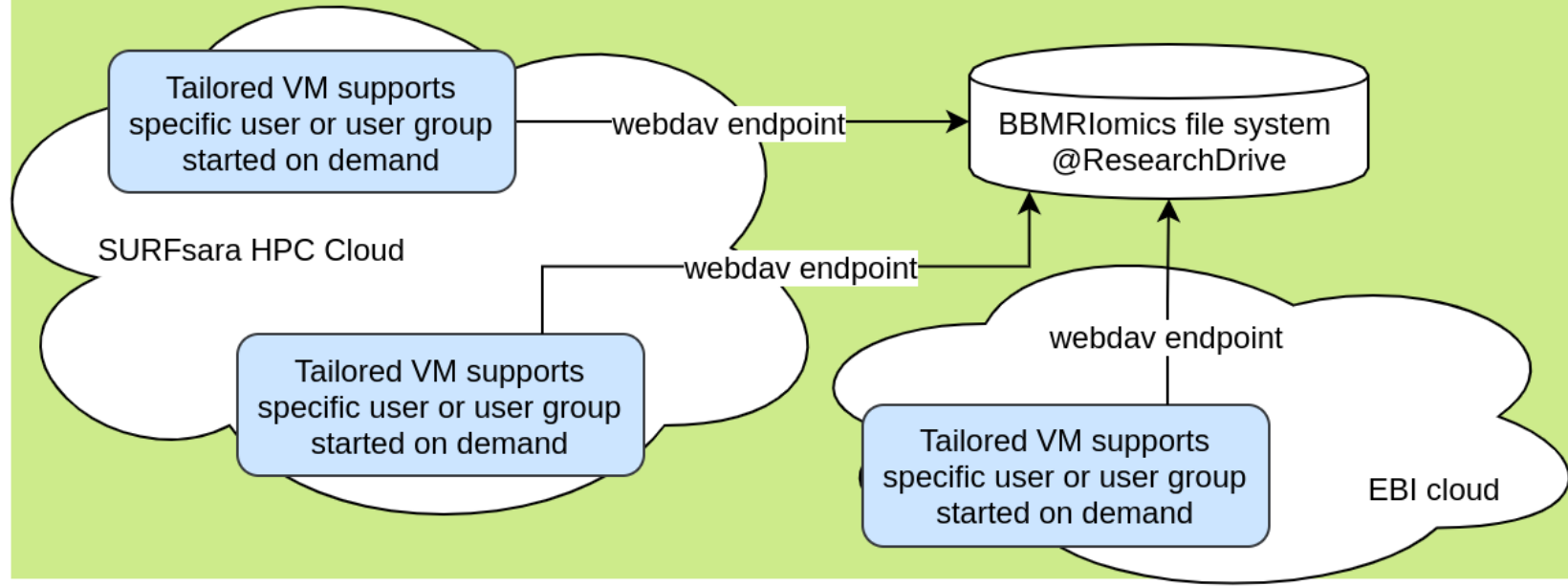
BIOS VM Present

Present



Scalable BBMRIomics Workspace

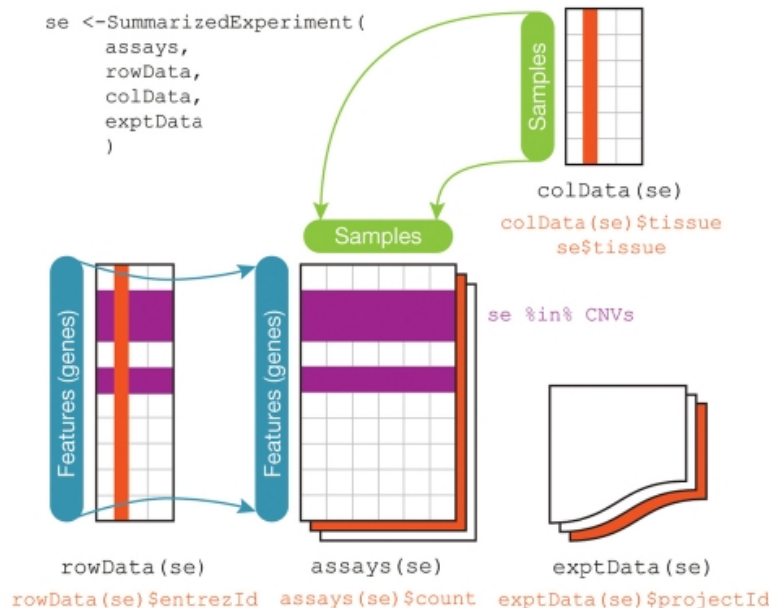
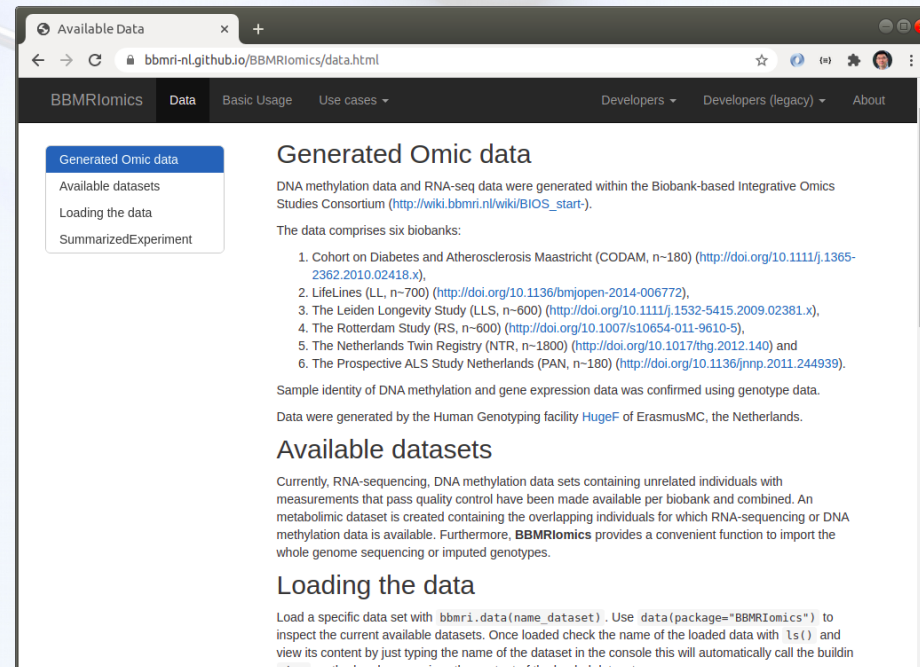
Pilot: Research Science Cloud



Ready to use data

BBMRIomics: An R interface to BBMRI-NL data

```
se <- SummarizedExperiment(
  assays,
  rowData,
  colData,
  exptData
)
```

The screenshot shows the BBMRIomics website with the following content:

- Available Data**: A tab in the top navigation bar.
- Generated Omic data**: A section with a list of available datasets:
 - Cohort on Diabetes and Atherosclerosis Maastricht (CODAM, n=180) (<http://doi.org/10.1111/j.1365-2362.2010.02418.x>).
 - LifeLines (LL, n=700) (<http://doi.org/10.1136/bmjopen-2014-006772>).
 - The Leiden Longevity Study (LLS, n=600) (<http://doi.org/10.1111/j.1532-5415.2009.02381.x>).
 - The Rotterdam Study (RS, n=600) (<http://doi.org/10.1007/s10654-011-9610-5>).
 - The Netherlands Twin Registry (NTR, n=1800) (<http://doi.org/10.1017/thg.2012.140>) and
 - The Prospective ALS Study Netherlands (PAN, n=180) (<http://doi.org/10.1136/jnnp.2011.244939>).
- Available datasets**: A section describing the current available datasets, including RNA-seq, DNA methylation, and whole genome sequencing data.
- Loading the data**: A section describing how to load specific data sets using the `bbMRI.data` function.

BBMRIomics workspace

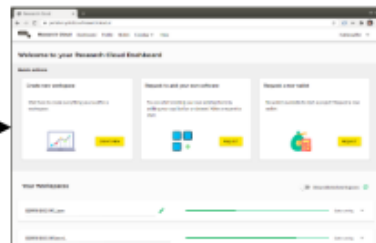
Homepage



Institutional Login



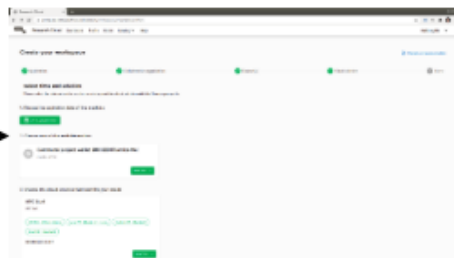
RSC Dashboard



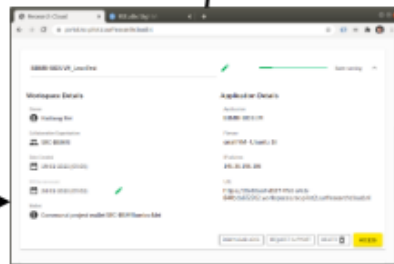
Rstudio Login



Compute Setup



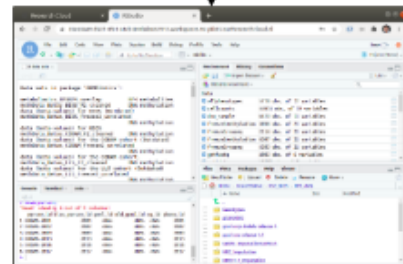
Launch Workspace



Choose Workspace



Ready for analysis!



Issues & Opportunities

- More cloud back-ends will be connected, e.g., Azure, Google.
- Programs and R-libs are pre-installed (template could be soon modifiable by CO admins)
- User specific libraries are not persistent
 - Executables and libraries could be persistently installed using softdrive in future
- NO automatic data backup at Researchdrive
- User accounts are manually created at RD and RSC. Connection to Podium will be nice.

BBMRI-OMICS:

Warehouse of data shared and used by the community



BBMRI-OMICS

For many, by many*

<https://www.bbmri.nl/>

**RDNL - Dutch Data
Prize 2018!**

*100+ researchers working on 25 Cohorts, BIOS, GoNL, Metabolomics Rainbow together building BBMRI-omics.

And special credits to Davy Cats (LUMC), Martin Brandt and RSC team (SURFsara), Maarten van Iterson (LUMC), Bas Heijmans (LUMC)