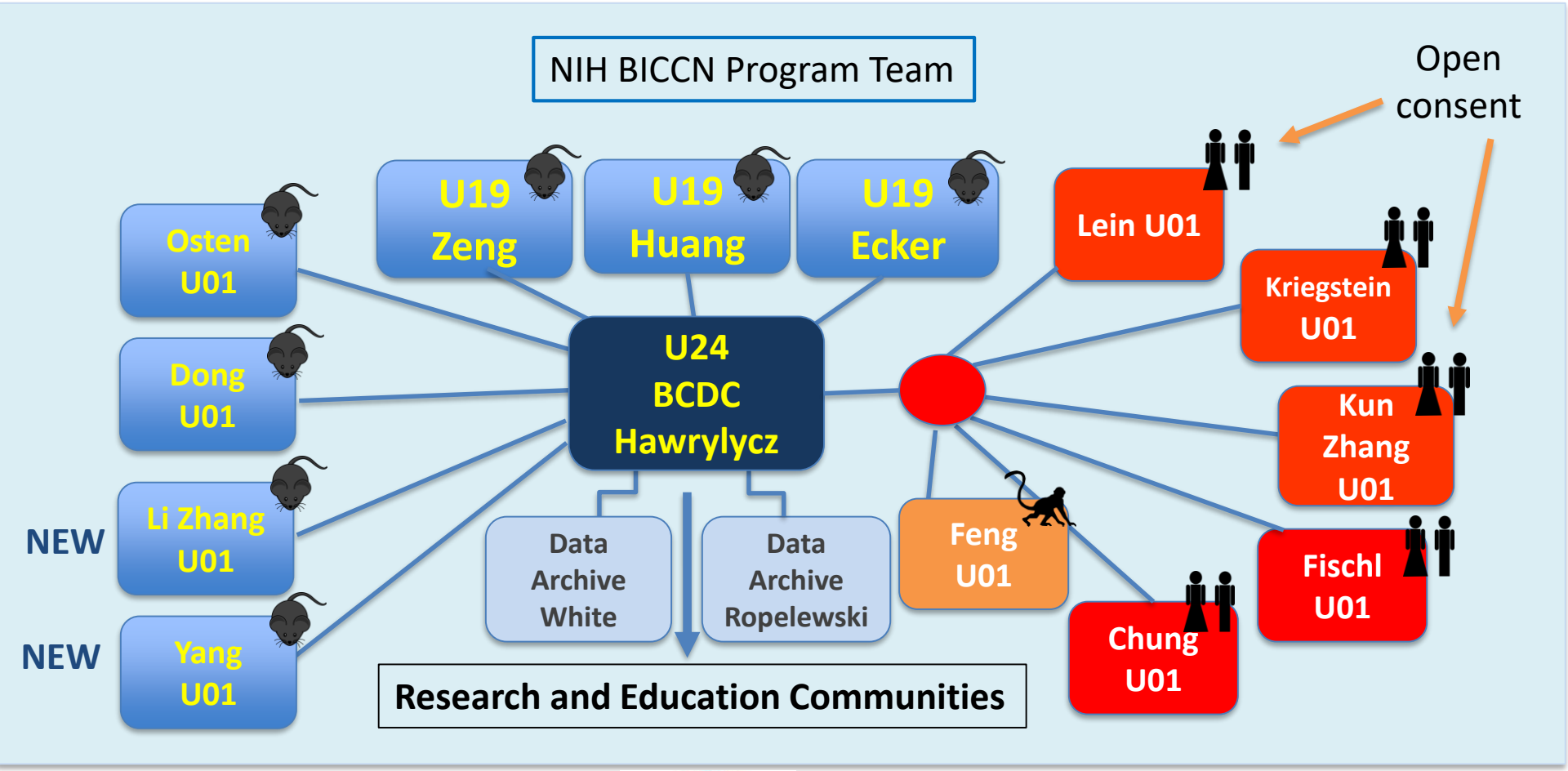
BRAIN Initiative Cell Census Network (BICCN) Overview

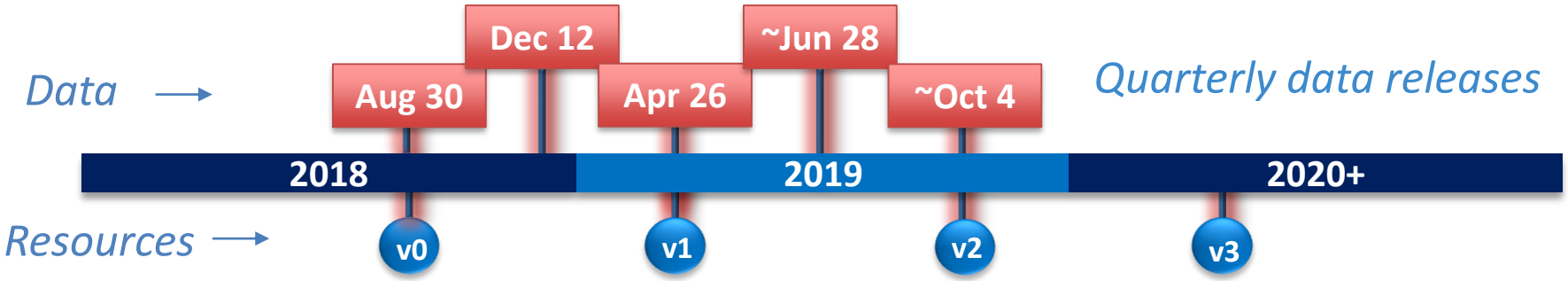
Goals of the BICCN

- An intellectual framework for cell diversity and brain organization rules
- Open-access 3D digital brain cell atlases with molecular, anatomical, and physiological annotations
- A comprehensive neural circuit diagram in mouse brain
- Stage for phase 3 large-scale human/NHP brain cell census
- Scalable technologies and reagents for brain cell census and cell-specific targeting

BICCN Groups

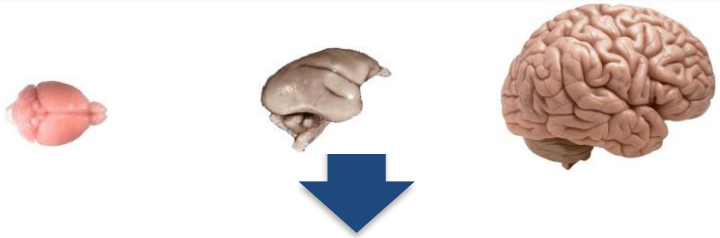


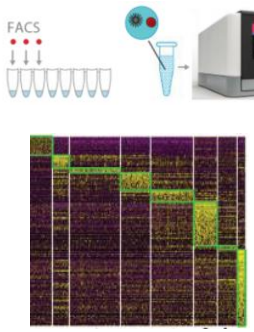
BICCN / BCDC: Data and Resource Release Map



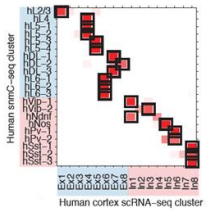
Portal	Cell Registry	Brain Explorer	Brain Explorer
Teams, Files, Grants	Data index, project pages	Cell Features, Labels,CCF pos. - 3D samples (CCF+MNI) - Feature-driven search - Focus on transcriptomics	Image modalities - More visualization - Taxonomy exploration - Integrated search

BICCN Data Types





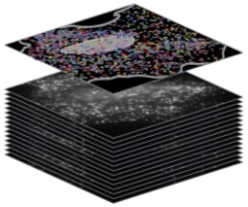
scRNA-seq
10X & SMARTer



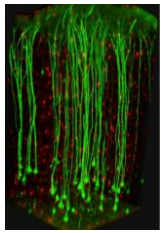
snRNA-seq
10X & SMARTer

snmC-seq

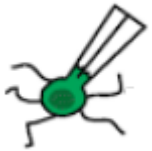
snATAC-seq



mFISH

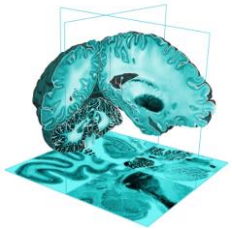


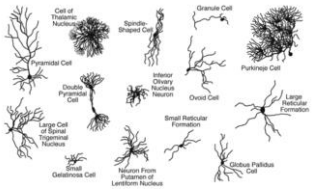
IHC



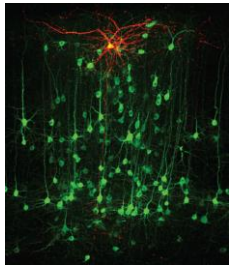
Patch-seq

MRI, OCT, histology, cell distribution





Morphology



Antero-/retro-grade, trans-synaptic tracing

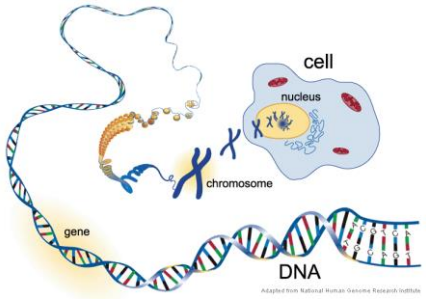
Molecular Signatures

Anatomical Phenotypes

Brain Cell Taxonomy

Open Questions:

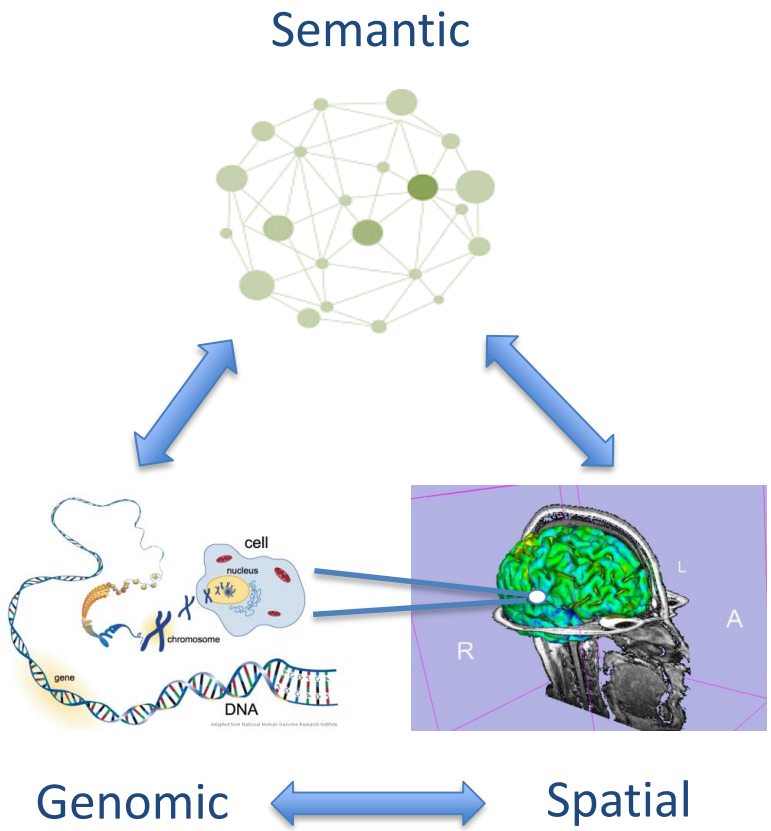
- How many cells in a brain sample need to be collected for a complete ('saturated') cell taxonomy?
- Which statistical criteria (S/N, k) and biological data (#DE, cell lineage, cross-species) should be used to constrain clustering analysis?
- How will the integrative analysis improve the cell diversity analysis and clustering?
- What additional datasets are extremely useful?



Brain Cell Taxonomy

Short to medium -term goals:

- Establishing an ontological framework and standard nomenclature for a brain cell taxonomy
- Establishing a data processing and analysis pipeline on the BICCN portal in synchrony with the joint publication
- Establishing best practices in single-cell omics research



BICCN Data Frameworks