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SHOWCASE

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# Cell Types: From Data to Taxonomy to Product

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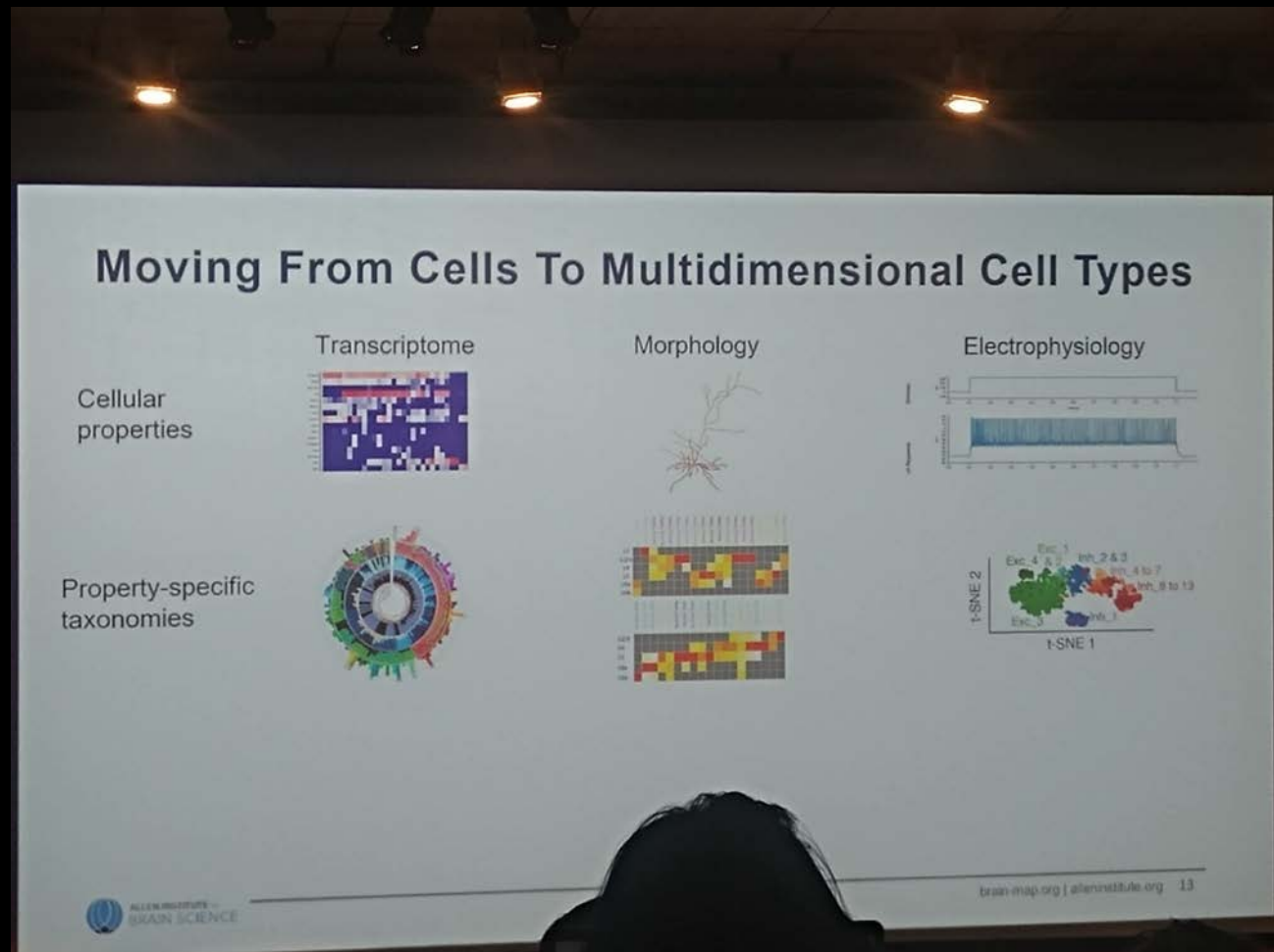
# “Cell type”?

- Cell type was defined by anatomy and physiology (can be biased).
- Ideally defined by function, difficult and ambiguous.
- Now able to do better with transcriptomics, imaging, and cluster analysis: can organize in subtypes based on transcriptomic data, or define joint morphoelectric types.

# “Cell type”?

## Multimodal experiments:

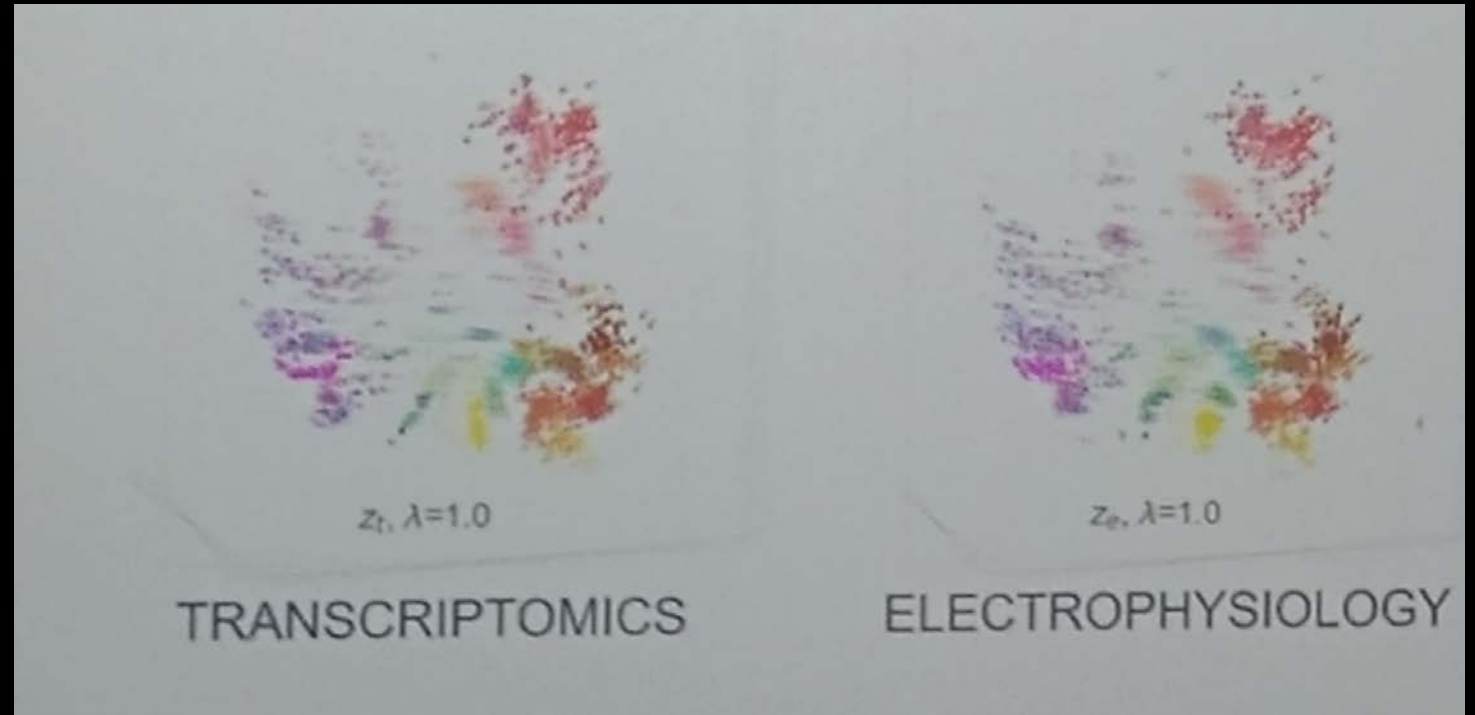
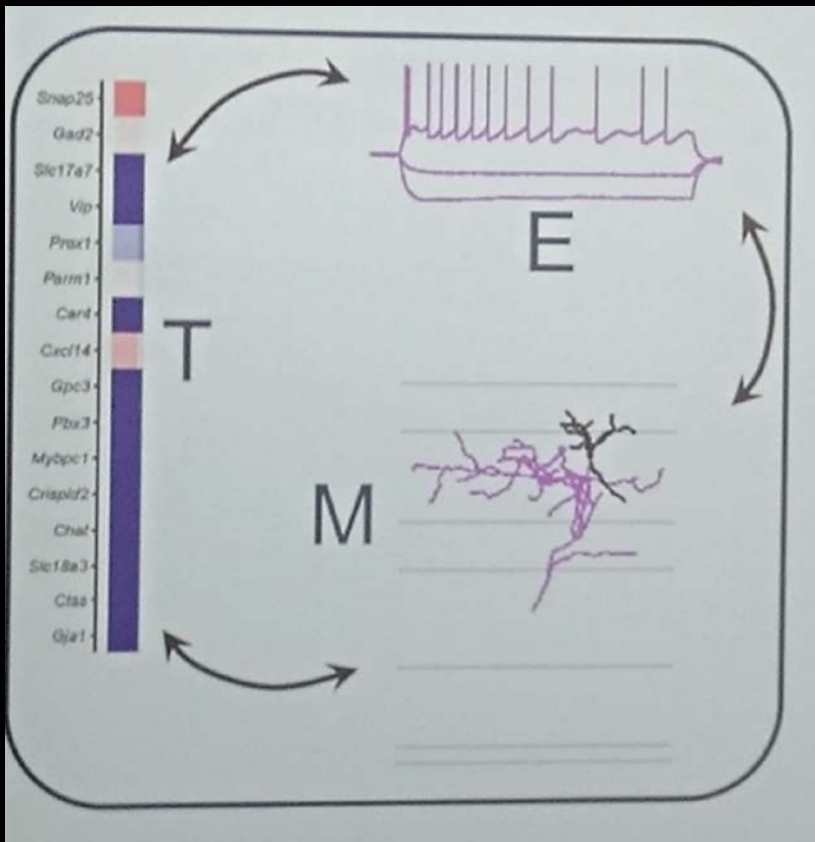
- Where is it?
- What does it look like?
- Firing pattern?
- Transcriptome?



Can define a cell identity by joining these modalities.

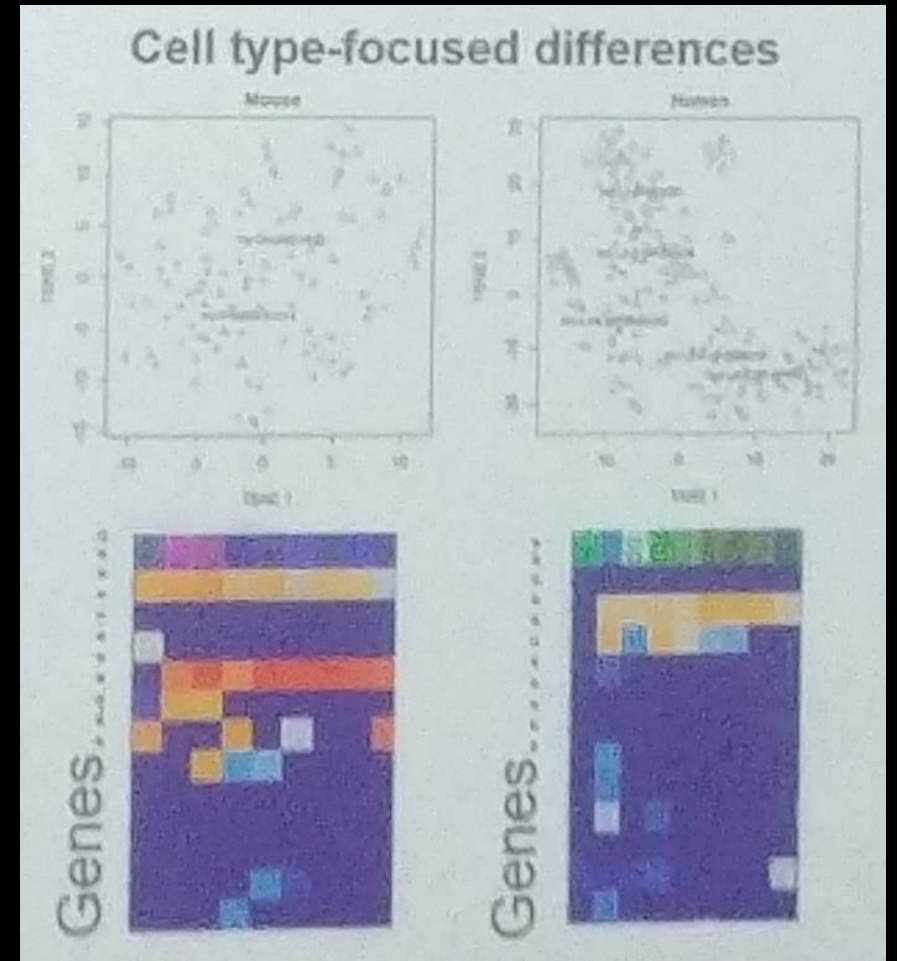
# Predictive power over cell types & properties

May be able to predict one features based on the other ones.



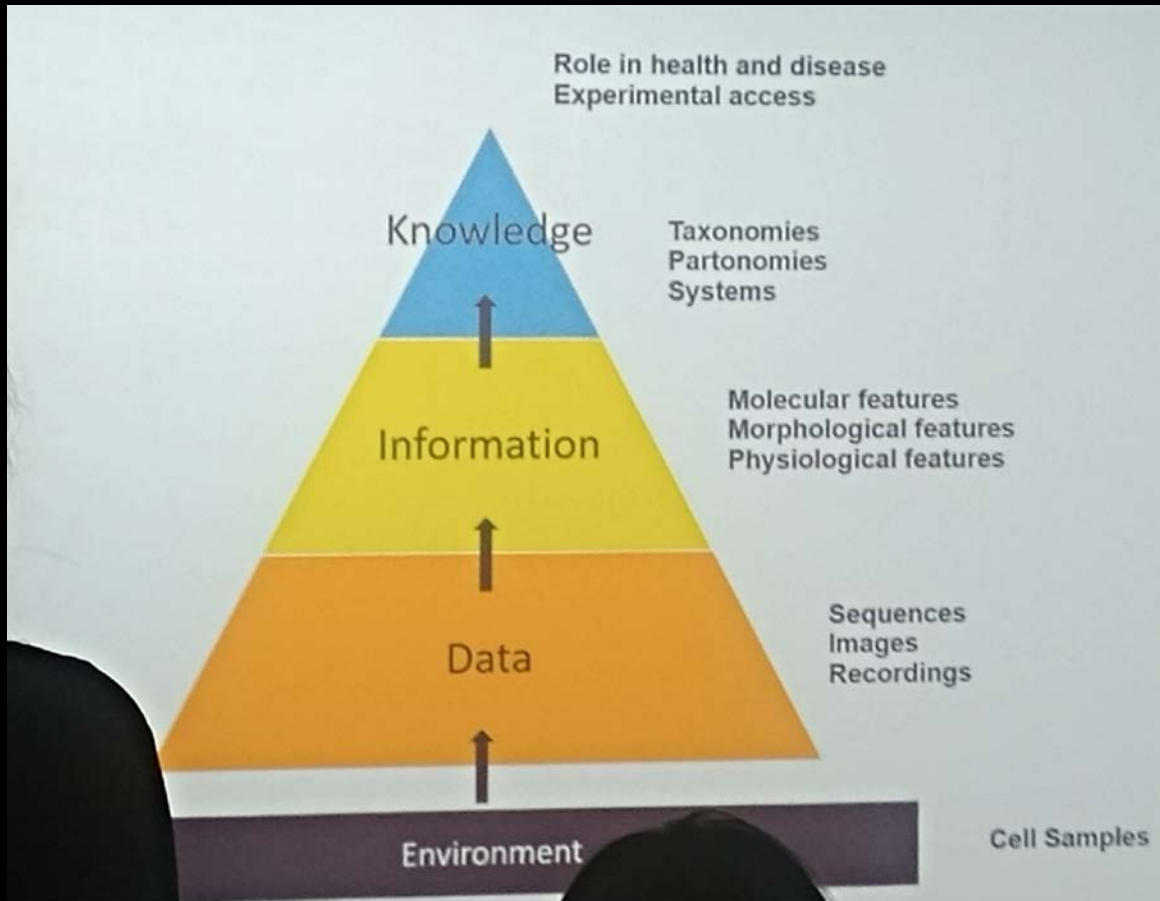
# Now what?

- Matched, high quality data across the entire mouse and human brain
- Experimentally-validated, within-species cell type assignments
- Multiple tools for exploring similarities and differences between species





# Cell Types: From Data to Taxonomy to Product

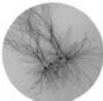

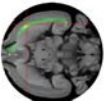

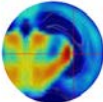





## Tools to explore data and information

- Transcriptomics Genetic Tools
- Connectivity Common Coordinate Framework
- Ephys/morphology coding

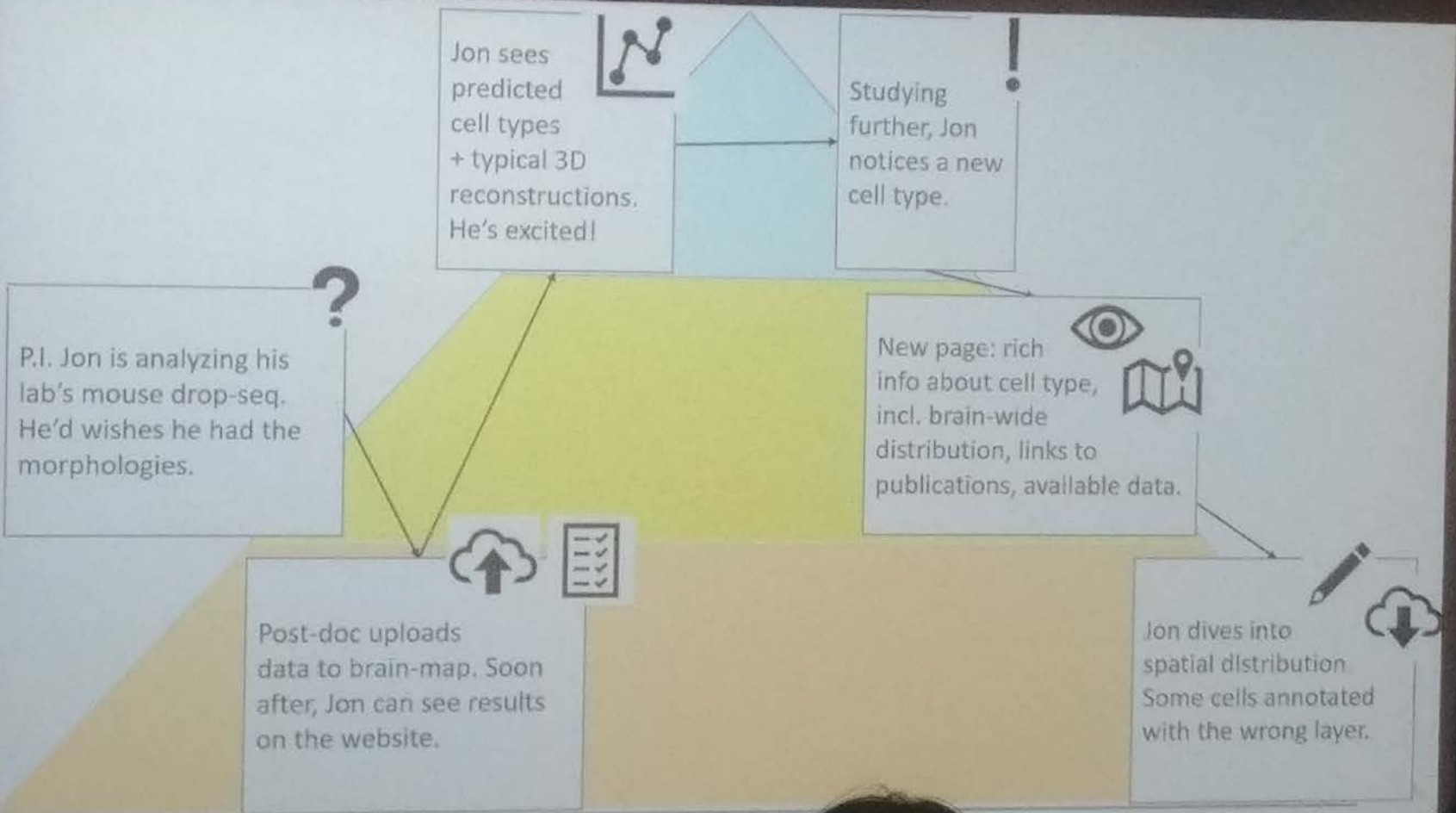
## Cell census: Large Scale Data Generation

Allen Brain Atlases and Data

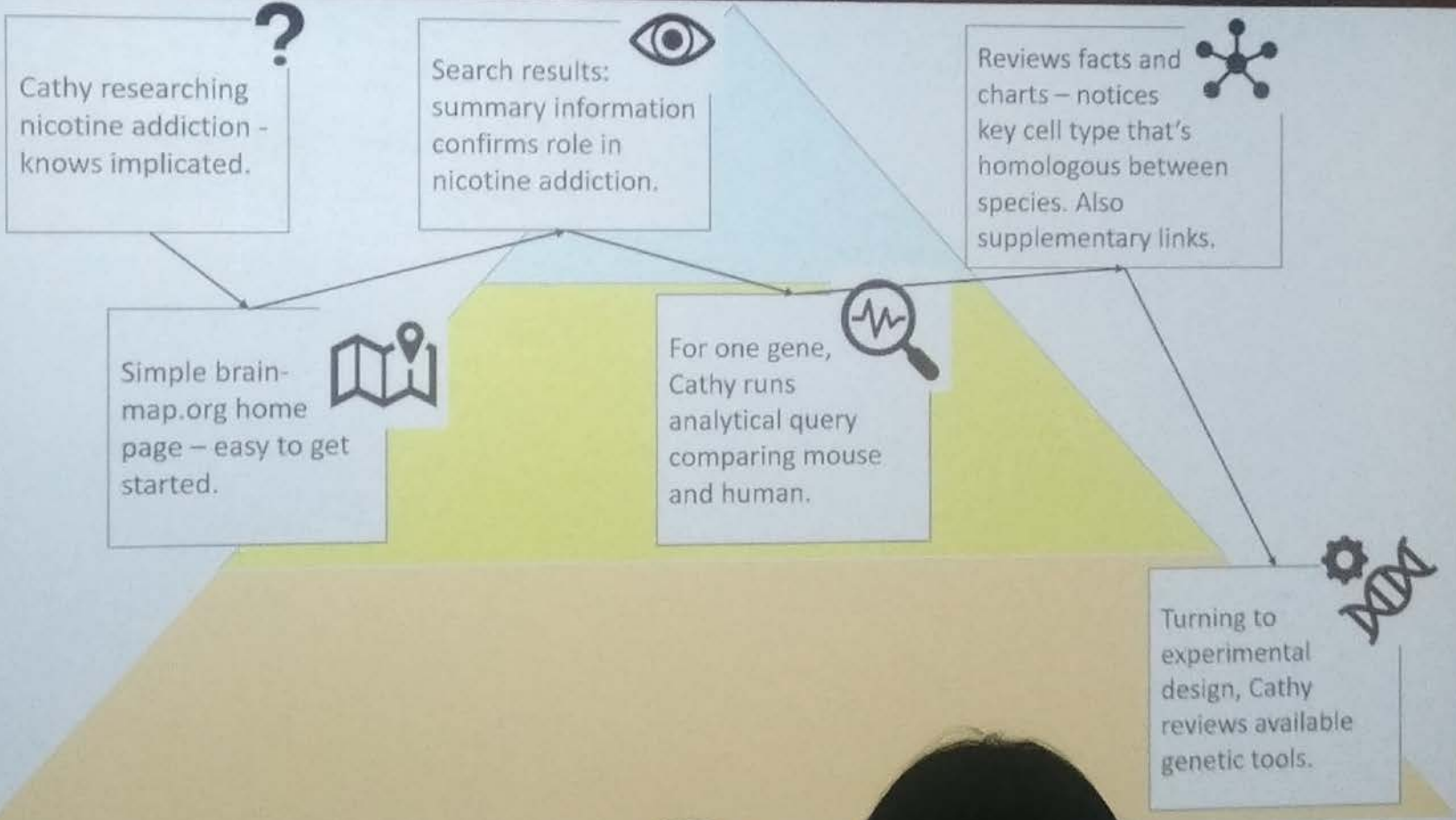
|   |   |   |  |
|---|---|---|--|
|  <p><b>CELL TYPES DATABASE</b><br/>A database of biological features derived from single cells, from both human and mouse.<br/><a href="#">View Data →</a></p> |  <p><b>BRAIN OBSERVATORY</b><br/>A new approach to open data, featuring a survey of in vivo recordings from the mouse visual cortex.<br/><a href="#">View Data →</a></p> |  <p><b>MOUSE BRAIN CONNECTIVITY ATLAS</b><br/>A brain-wide map of neural projections, including cell class-specific data.<br/><a href="#">View Atlas →</a></p>   |  <p><b>REFERENCE ATLASES</b><br/>High resolution anatomical reference atlases and histology for mouse and human.<br/><a href="#">View Atlases →</a></p> |
|  <p><b>MOUSE BRAIN ATLAS</b><br/>A unique multimodal atlas of the adult mouse brain, featuring anatomic and genomic data.<br/><a href="#">View Atlas →</a></p> |  <p><b>DEVELOPING MOUSE BRAIN ATLAS</b><br/>A detailed atlas of gene expression across 7 stages of development.<br/><a href="#">View Atlas →</a></p>                     |  <p><b>MOUSE SPINAL CORD ATLAS</b><br/>A detailed atlas of gene expression across the adult and juvenile mouse spinal cord.<br/><a href="#">View Atlas →</a></p> |  <p><b>ADULT AND DEVELOPING NHP ATLAS</b><br/>The NIH Blueprint Non-Human Primate Atlas characterizes the developing rhesus macaque brain.</p>          |

## Cell Type Database:

- Electrophysiological data
  - Morphological data
  - Transcriptomic data
- Measured from individual cells and simulation models.







# THANK YOU FOR THE OPPORTUNITY



# SUPPLEMENTARY SLIDES

## Goals of the Allen Institute:

- Gain a comprehensive understanding of cells types across the mouse and human brain.
- Gain novel insights into the function of cell types and neural networks in visually guided behaviour
- Disseminate out foundational resources and knowledge to the wider community
- Play an even larger role in the BRAIN initiative and global research collaborations
- Explore new directions, reinvent Allen institute for Brain Science.