Lewis Rhodes Labs
David Follett
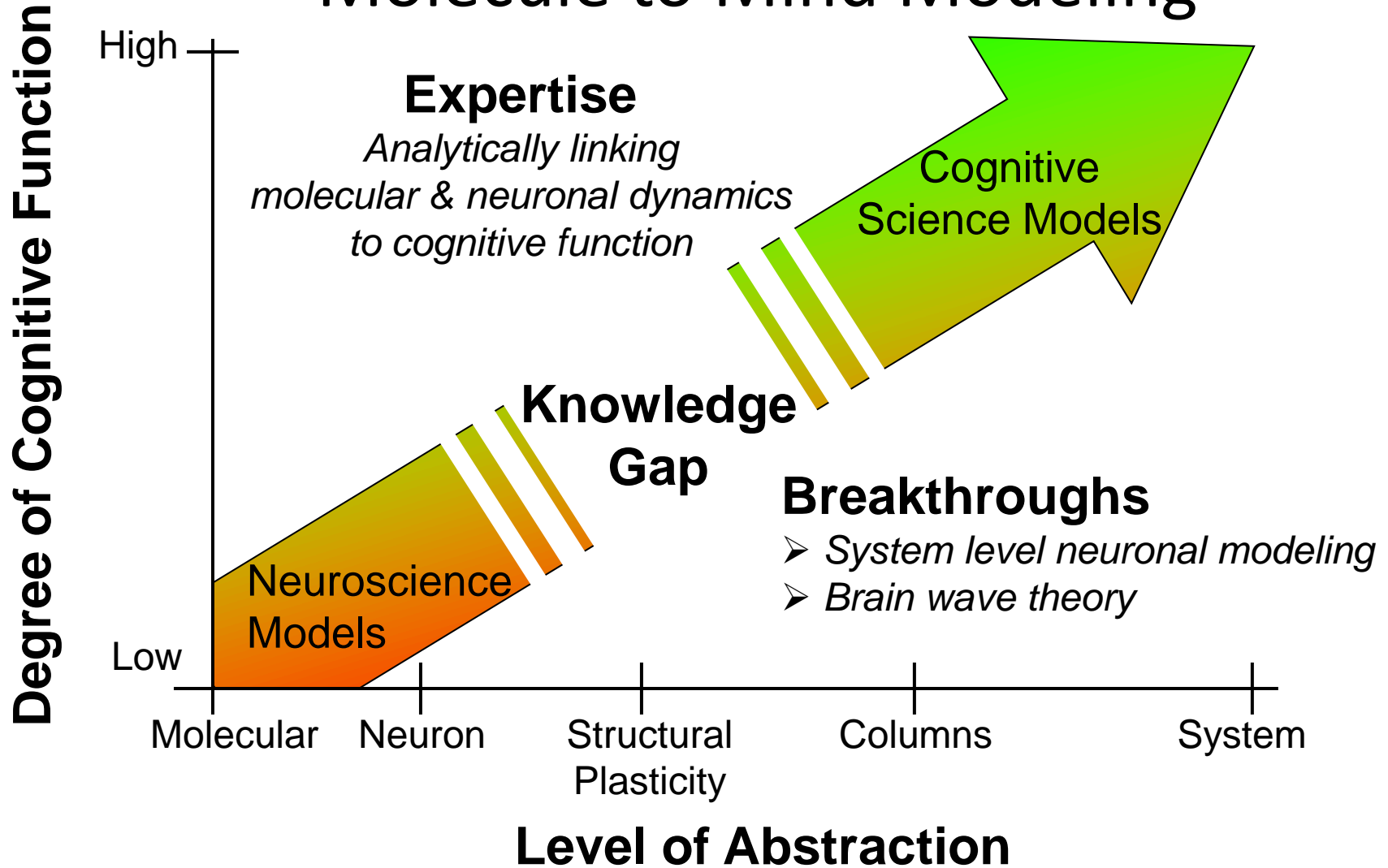Cassandra Roth
David Fair
Dr. Pamela Follett MD, MPH

Knowledge Gap Pioneers
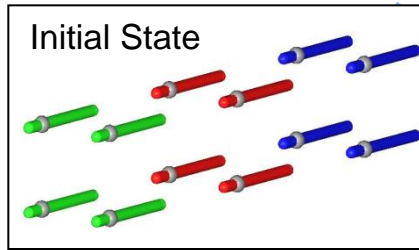## Molecule to Mind Modeling

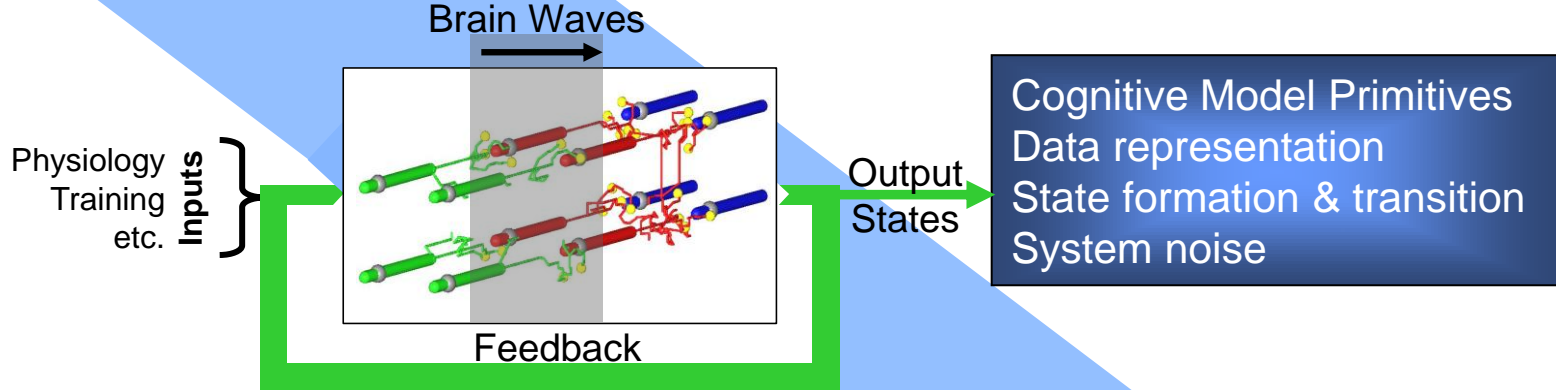**Degree of Cognitive Function** (vertical axis, Low to High)

High

Expertise
Analytically linking molecular & neuronal dynamics to cognitive function

Cognitive Science Models

Knowledge Gap

Breakthroughs
➢ *System level neuronal modeling*
➢ *Brain wave theory*

Neuroscience Models

Low

Molecular   Neuron   Structural Plasticity   Columns   System

Level of Abstraction

Bridging the Knowledge Gap

Initial State

System Level Developmental Model
➢ Non-deterministic, self organizing
➢ Neuron algorithms derived from published molecular mechanisms
➢ Brain wave mathematics
 • Relate processing to spatial/temporal wave topology

Development

Brain Waves

Physiology Training etc. **Inputs**

Output States

Feedback

Cognitive Model Primitives
Data representation
State formation & transition
System noise

Proof points: Hypoxic/Ischemic brain injury

Perturbation

➢ Model predicts
  • Adaptive response to molecular injury leading to loss of cognitive function
  • Prediction of brain wave alterations and relation to magnitude of clinical presentation
  • Novel therapeutic opportunities

➢ **Follett et al.** *J Child Neurol*, 2009

Brain Waves

Inputs

Output States

Feedback

Lewis Rhodes Labs 2010   David@lewis-rhodes.com
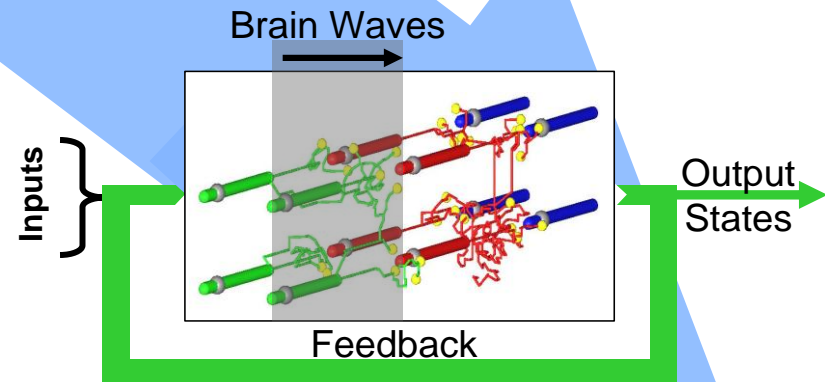
Partnering

❖ Molecule to Mind Research insights:

  ➢ Cognitive state formation and transitions

  ➢ Brain Wave – Cortex dynamics

  ➢ Data representation

  ➢ Critical role of noise in cognitive processing

Inclusion of Molecule to Mind primitives will revolutionize cognitive modeling

❖ Desired partners:

  ➢ Cognitive model thought leaders

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