

Structural Plasticity: *Mechanisms and Effects?*

Crucial for:

- Understanding development, learning and homeostasis
- Inducing functional recovery from injury and disease

What do we need?

- Genetic tools for perturbation and observation
- Novel modeling paradigms (multiscale, computationally efficient)
- Technology for observation and manipulation (nanosensors, targeted delivery of biomolecules, devices for activity-based therapy)
- New methods for data storage, exchange, search and analysis

Integrating Adaptive Neural Systems with Adaptive Engineered Systems

Crucial for development and optimization of advanced intelligent prosthetic devices and neuroprosthetic implants

What do we need?

- Better understanding of activity-dependent learning, central pattern generation, neural coding
- New modeling paradigms (multiscale models, validation and sensitivity analysis)
- Novel algorithms for adaptive control and learning
- Technology for observation and manipulation (nanosensors, biosensors, neuromorphic sensors and controllers, bioactuators, biocompatible materials, brain-computer interface)

