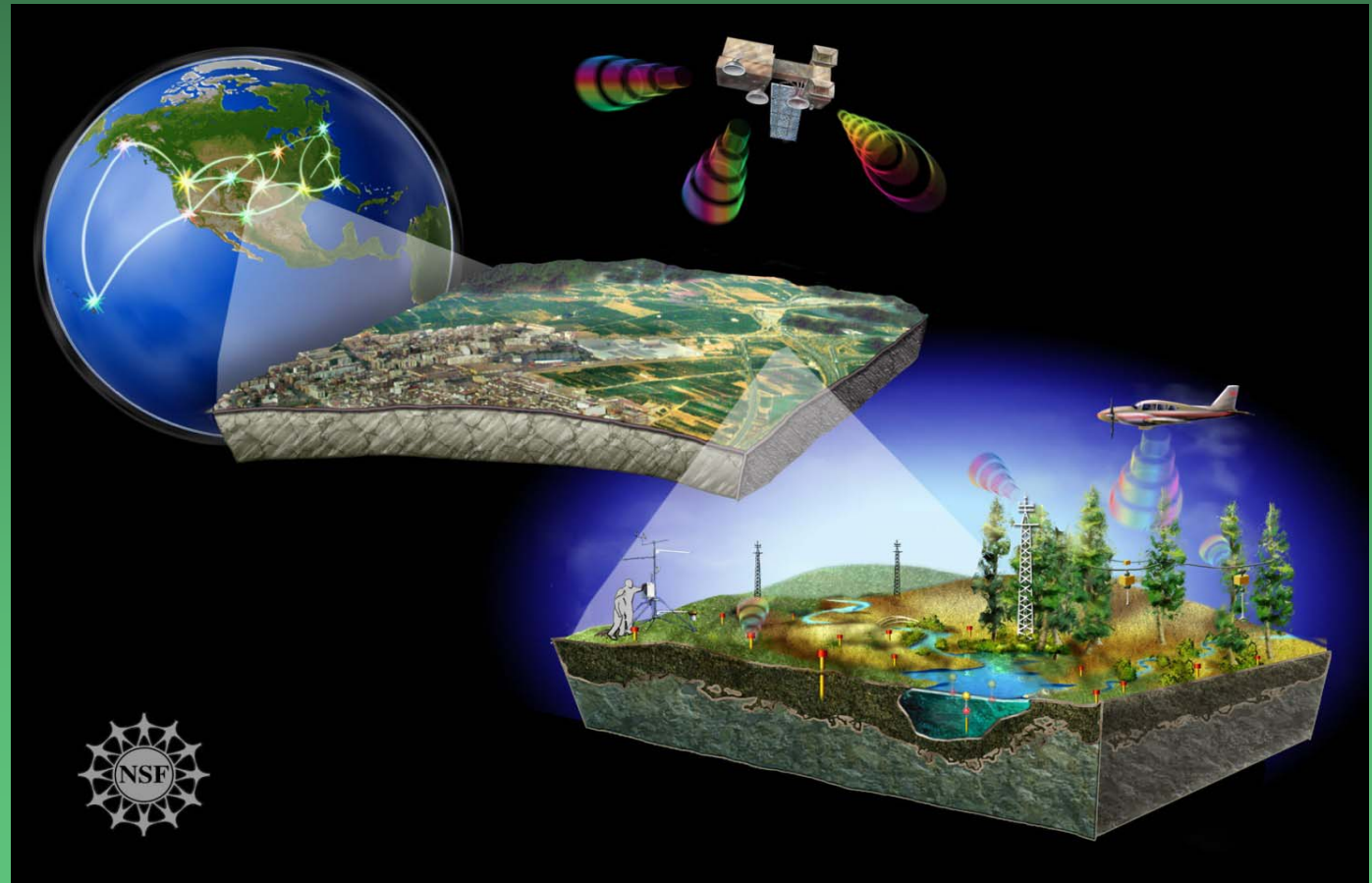


# The National Ecological Observatory Network (NEON)

Jim MacMahon

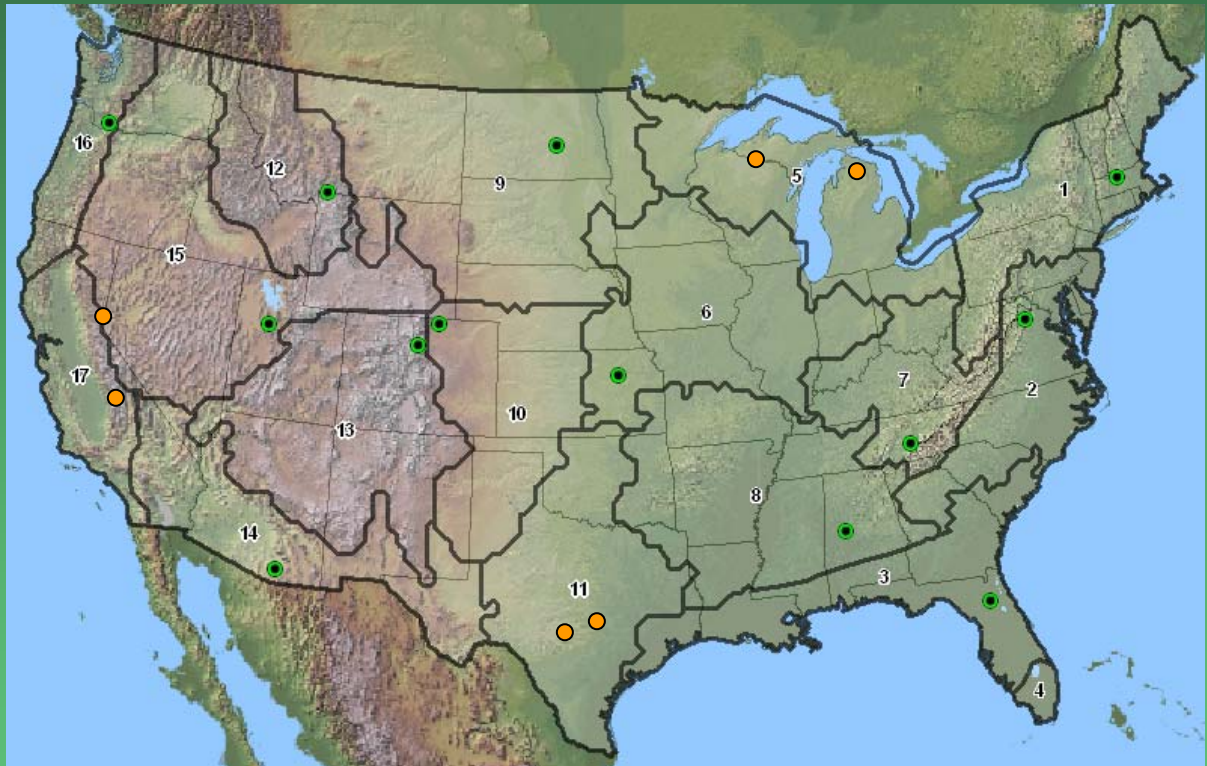
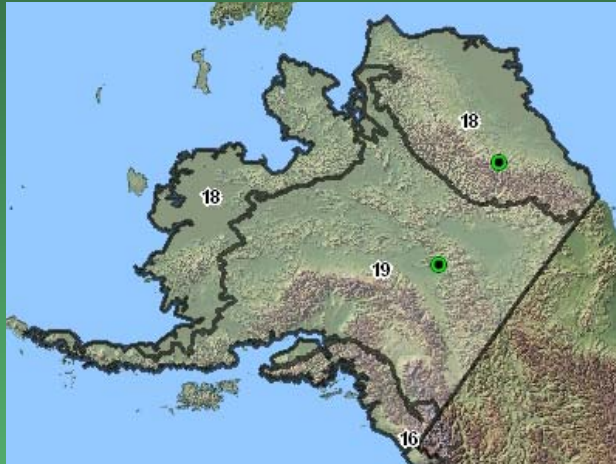
Chairman, NEON Inc.,  
Board of Directors



# Overall Strategy

- Backbone of core wildland sites as controls (30 year life-span)
- Deployment of relocatable scientific assets at pre-determined, science-driven locations
- Use of airborne and space-based instruments to interpolate site specific measurements
- Comprehensive cyberinfrastructure (CI) to integrate measurements and deliver data products to the community (scientific, educational, general public)

# NEON Climate Domains

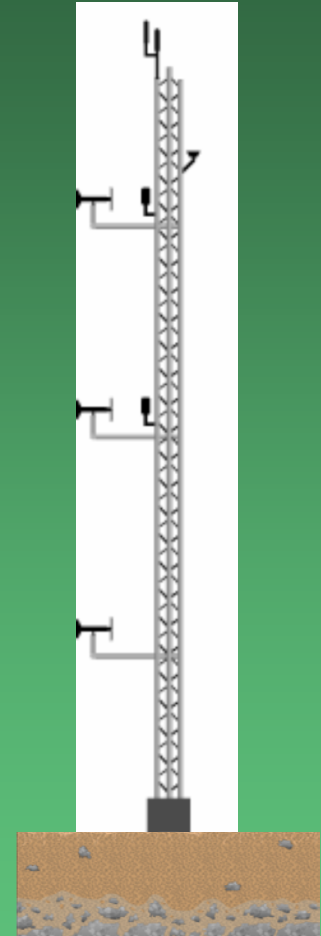


# Data Acquisition Systems

- FIU: Fundamental Instrument Unit
- FSU: Fundamental Sentinel Unit
- MRP: Mobile Relocatable Platform
  - RTS: Relocatable Tower System
  - RDS: Rapid Deployment System
- AOP: Airborne Observation Platform
- LUAP: Land-use Analysis Package
- GCE: Global Change Experiment
- STREON: Stream Research Experimental and Observational Network

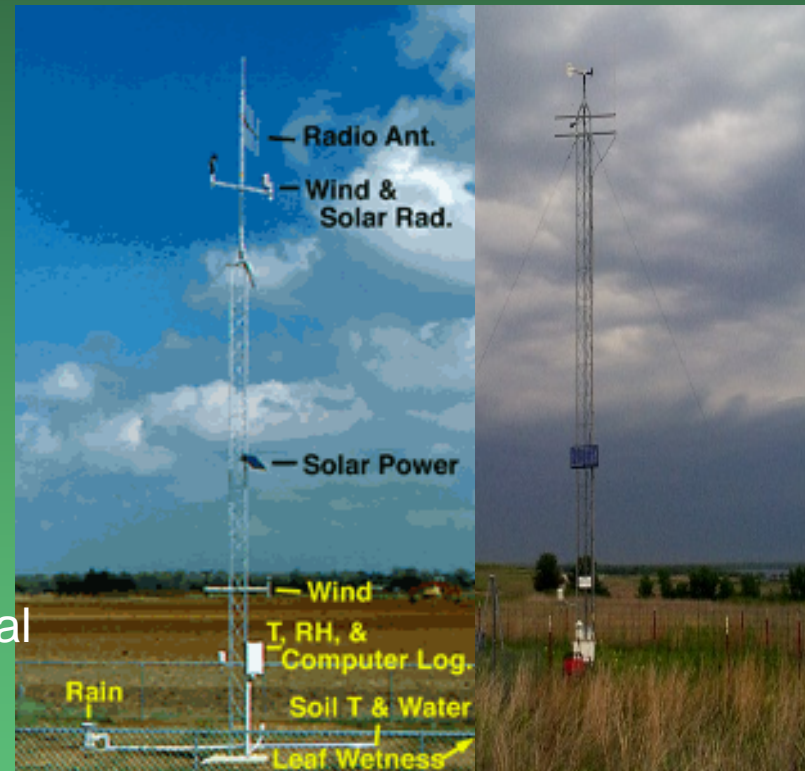
# FIU

- Canopy-height dependent tower
- Meteorological instruments
- Basic air quality instruments
- Location / science question dependent combination of any of the packages:
  - Eddy covariance
  - Advanced air quality
  - Dust sensors
- Aquatic sensor-array
- Canopy microclimate sensor-array
- Soil sensor-array



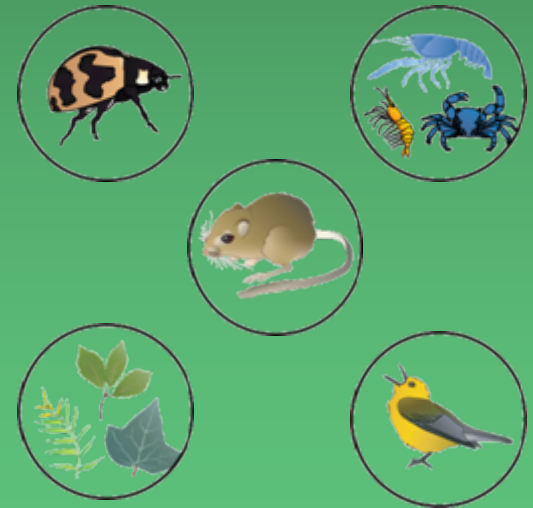
# BioMesoNet

- PAR—photosynthetically active radiation
- UV; solar radiation
- IR up/down
- Profiles ( $d[\ ]/dz$ )
  - Temperature, Moisture, CO<sub>2</sub>, Soil temperature, Soil moisture
- Air temperature (1.5m, 9m)
- Relative humidity (1.5m)
- Wind speed and direction (2m, 9m, 10m)
- Barometric pressure
- Rainfall
- Soil temperature (10 cm below both natural sod cover and bare soil)
- Soil temperature (5 and 30 cm)
- Soil moisture (5, 25, 60 and 75 cm)



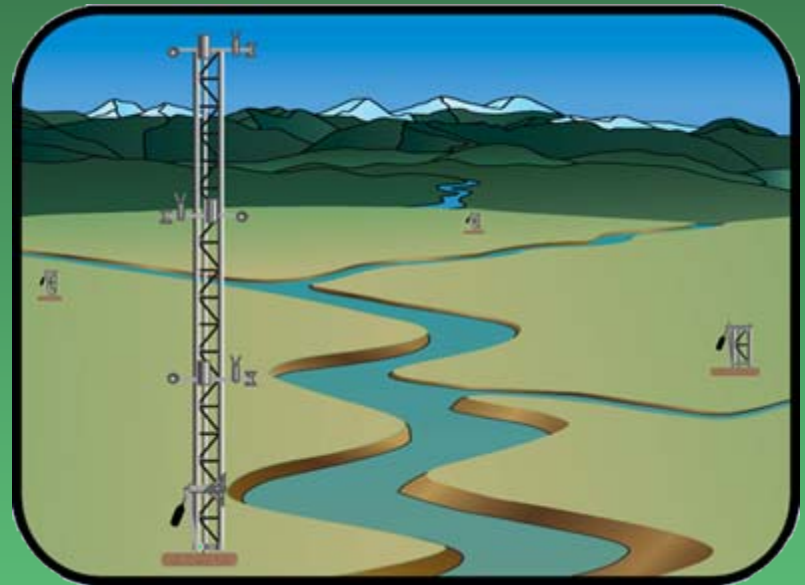
# FSU

- Sampling and survey of:
  - Vascular plants
  - Small mammals
  - Birds
  - Fish, Aquatic invertebrates, algae
  - Terrestrial invertebrates
- Bioanalysis of samples:
  - DNA
  - Isotope
  - Pathogens
  - Others



# MRP: RTS

- Relocatable Tower System
  - Permanent tower pad
  - Tower base
  - Relocatable tower superstructure with relevant sensor package(s):
    - Eddy covariance
    - Advanced air quality
    - Dust sensors



# MRP: RDS

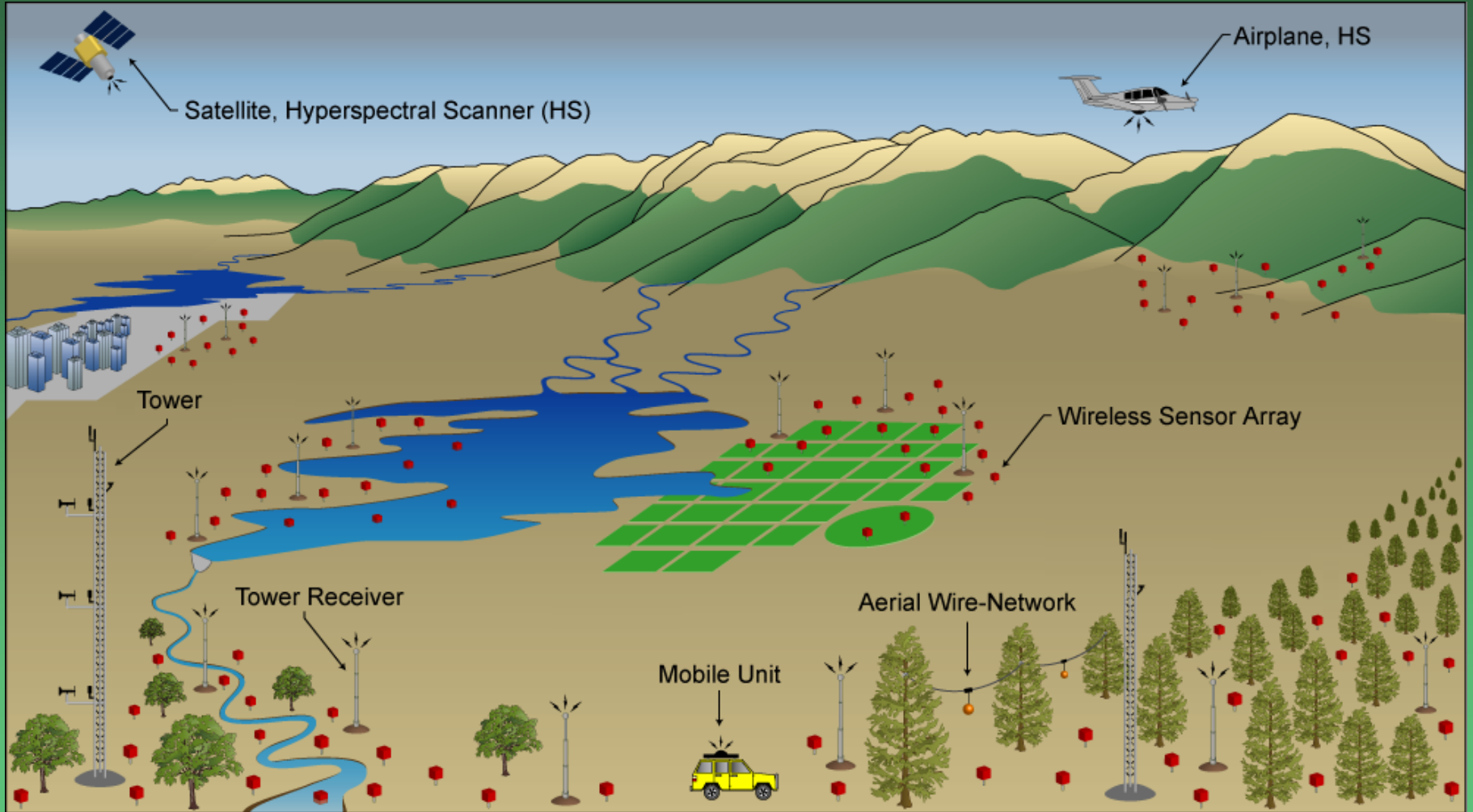
- Rapid Deployment System

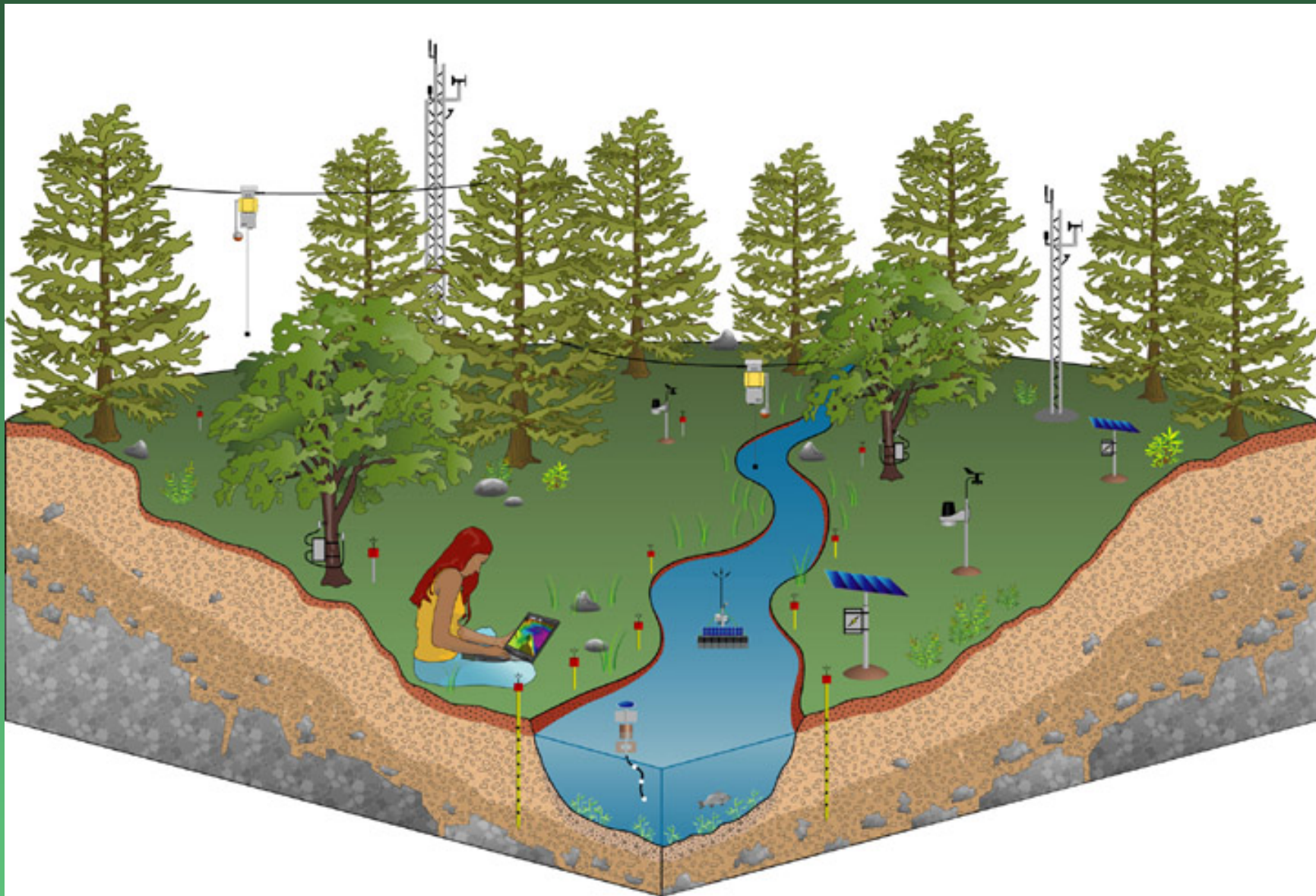
- Towing vehicle

- Trailer to transport one or more of the following modular units:

- Aquatics, Canopy, Climate, Invasive Species, Education, Soils, Infectious Disease







# AOP

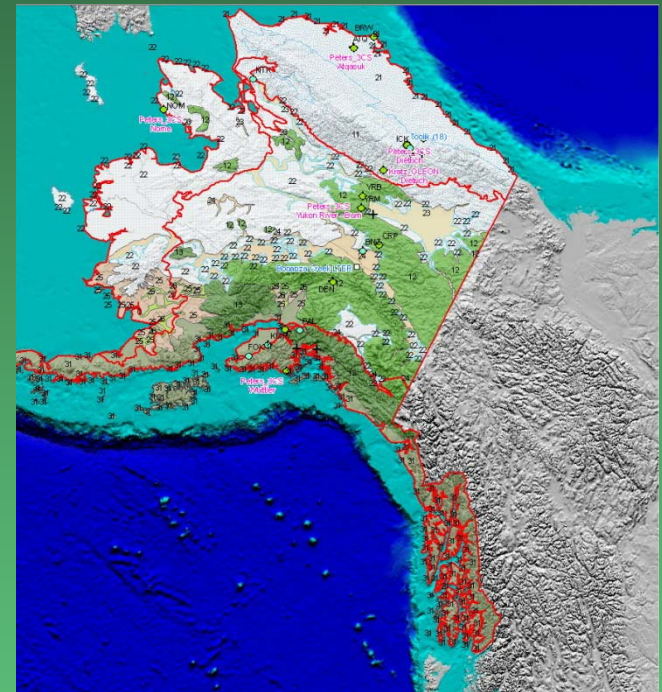
- High resolution airborne images for extrapolating locally calibrated results to regions
- Prototype system: Carnegie Airborne Observatory (fully integrated imaging spectrometer, wLiDAR mounted on common frame)



# LUAP

To provide data at the site to national scale:

- Land-use / land-cover (LULC) context of NEON observations,
- On the socio-economic context of the LULC.
- Offers ecologists whose primary expertise is not in geospatial analysis:
  - Spatially extensive datasets in a number of standard spatial / temporal resolutions,
  - An interface that supports the exploration and discovery of multiple related geospatial datasets.



# Continental Scale Experiment #1

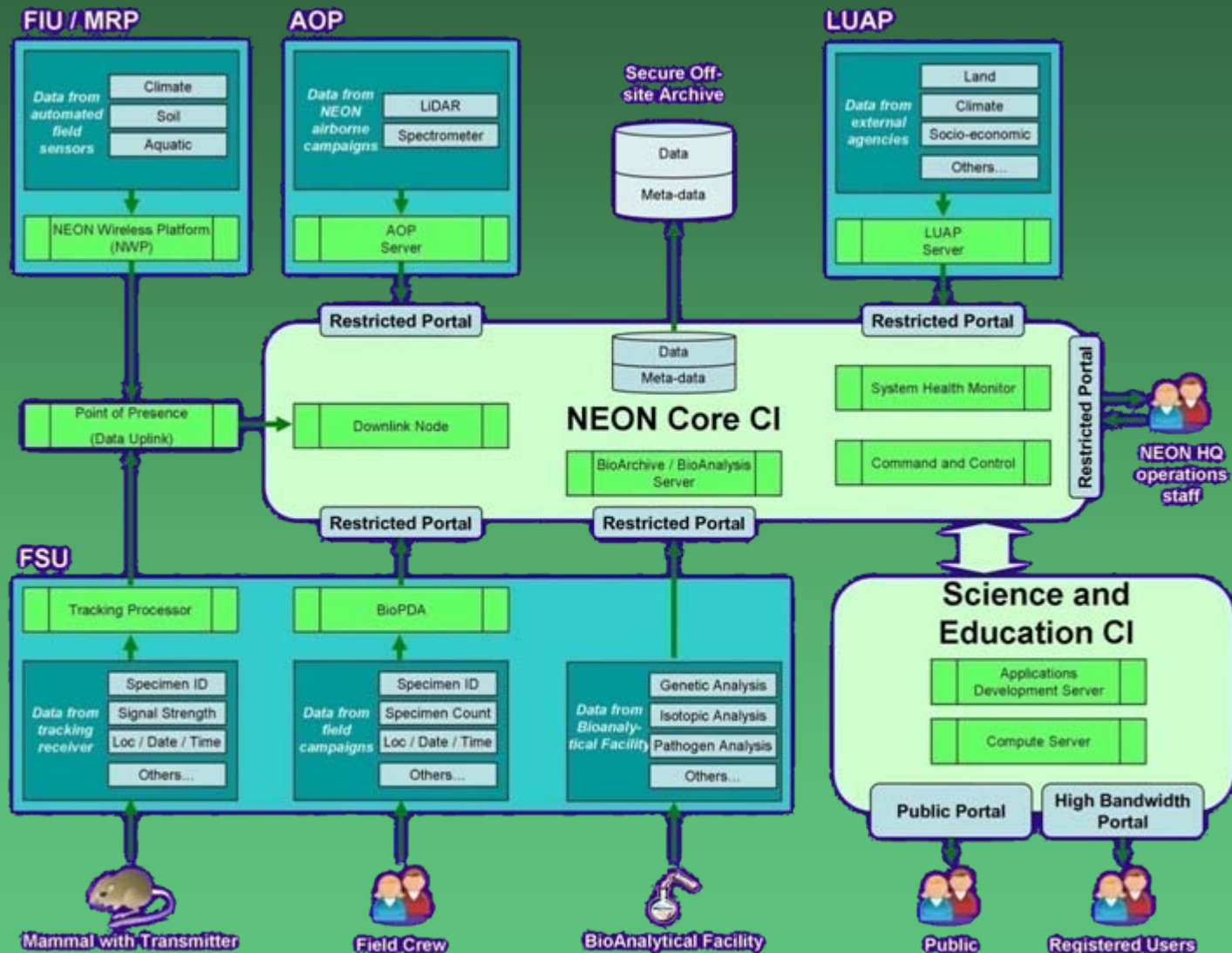
- Terrestrial Global Change Experiment (GCE)
  - Leads: Melinda Smith, Alan Knapp, Chris Field
  - Questions:
    - How do ecosystems of the US differ in their sensitivity to global change drivers?
    - How will they respond to global changes?



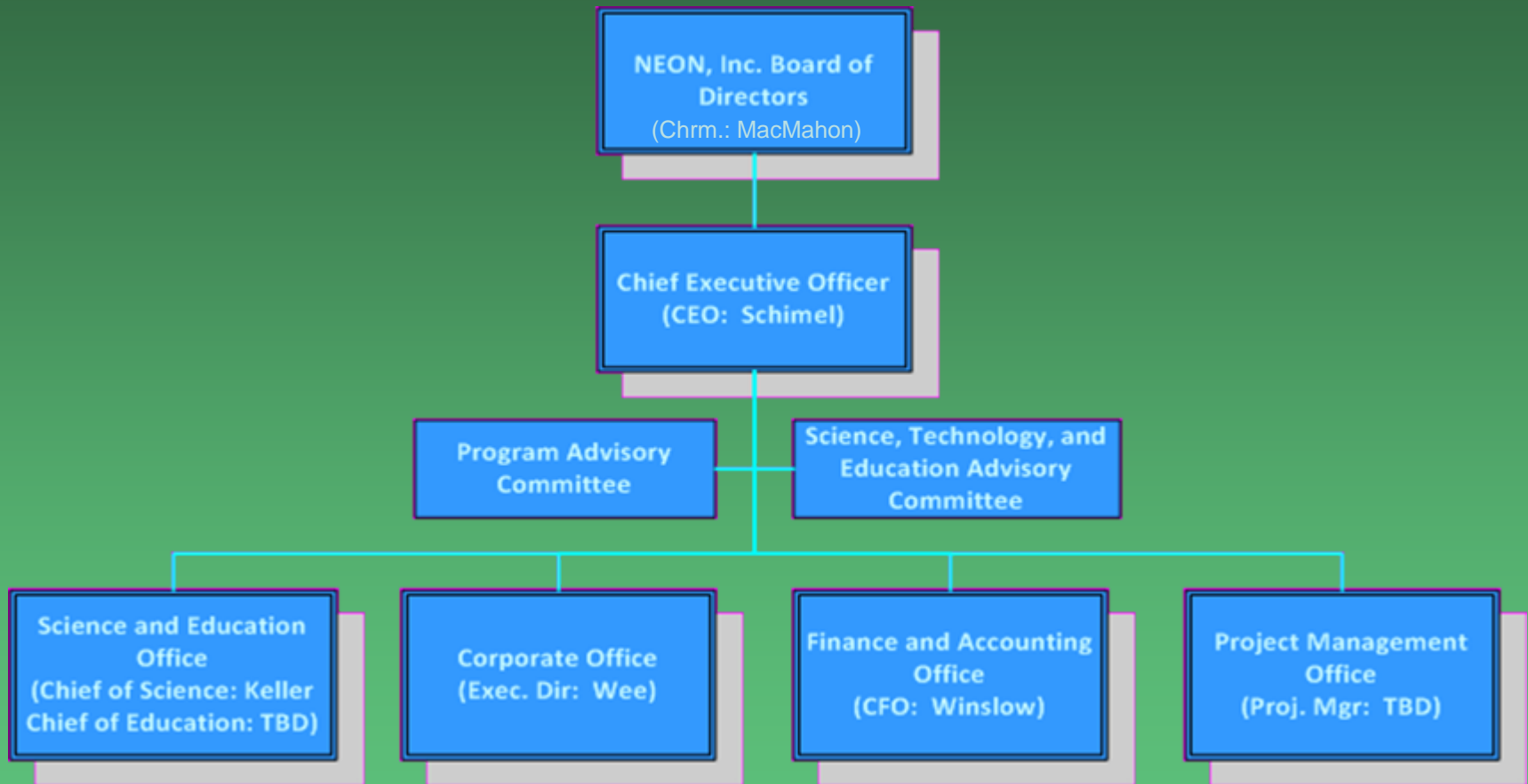
# Continental Scale Experiment #2

- Stream Research Experimental and Observational Network (STREON)
  - Leads: Walter Dodds, Margaret Palmer, Brad Cardinale
  - Primary question: How will chronic nutrient inputs, extreme events (droughts and floods), and simplification of food webs (loss of consumers) impact the *resistance* and *resilience* of stream ecosystem function?

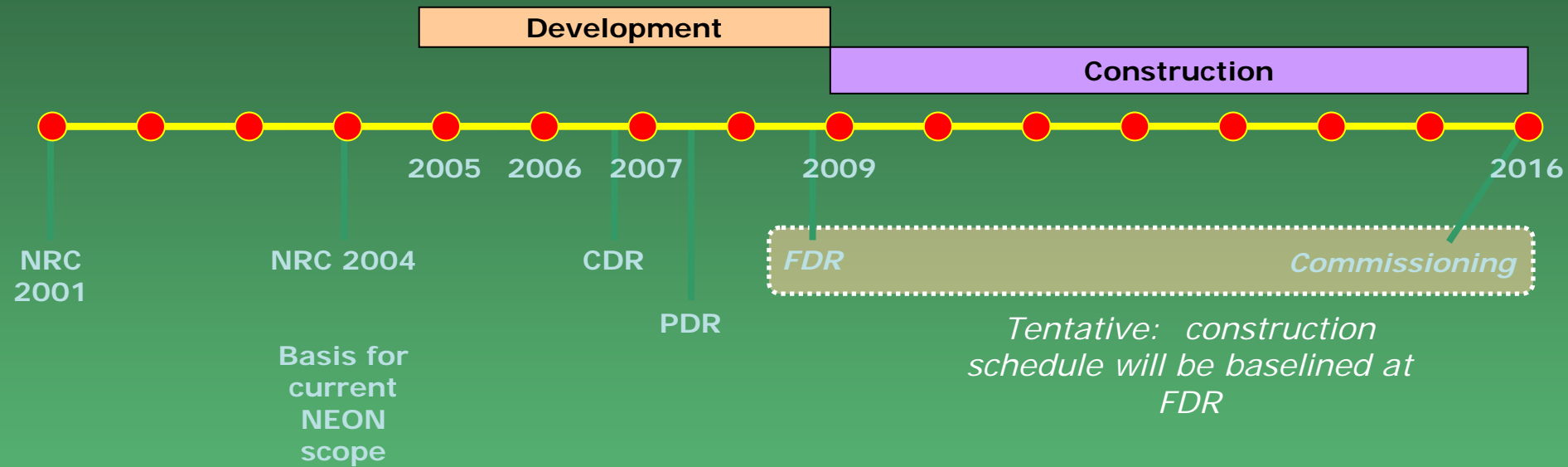
# NEON Cyberinfrastructure (CI)



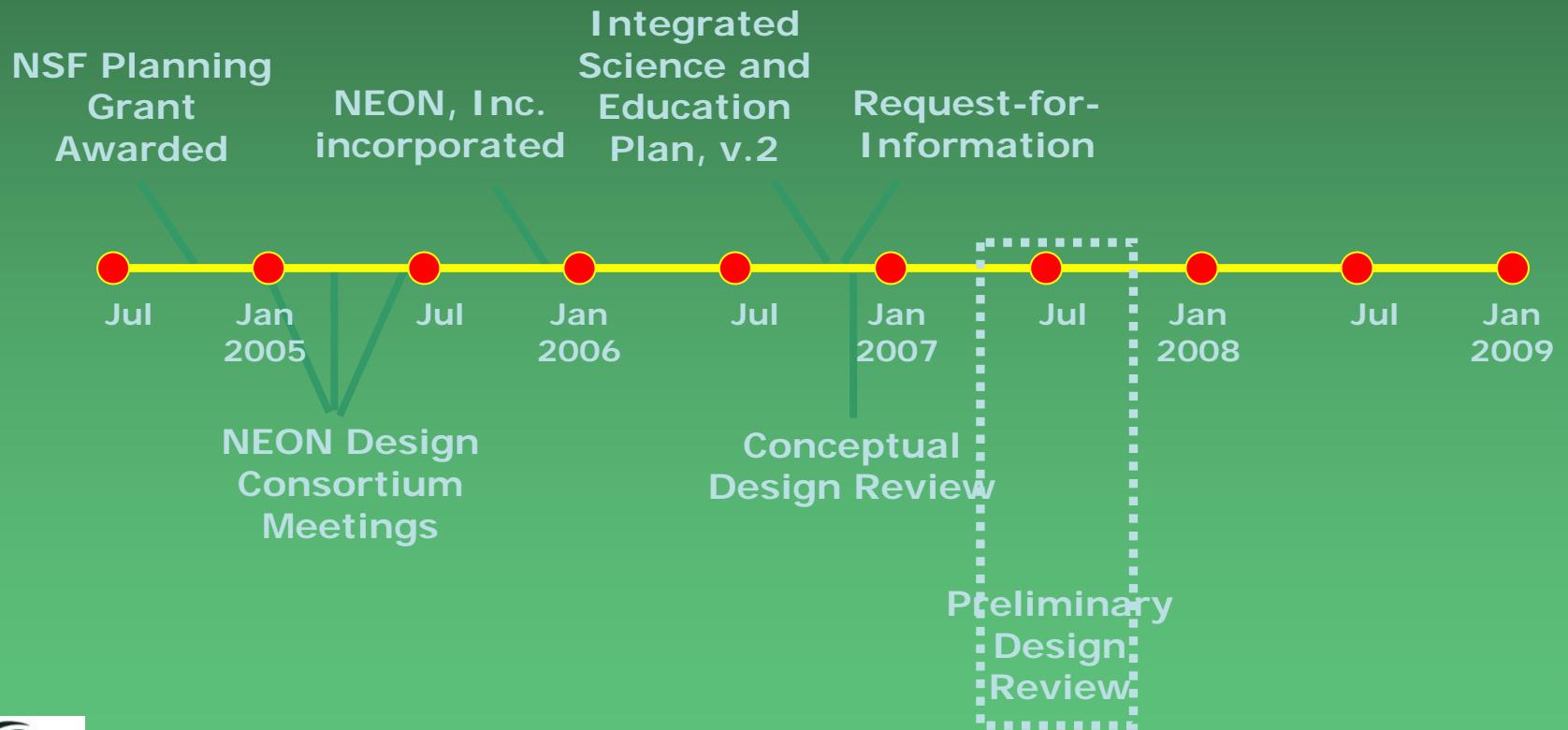
# NEON, Inc. Corporate Structure



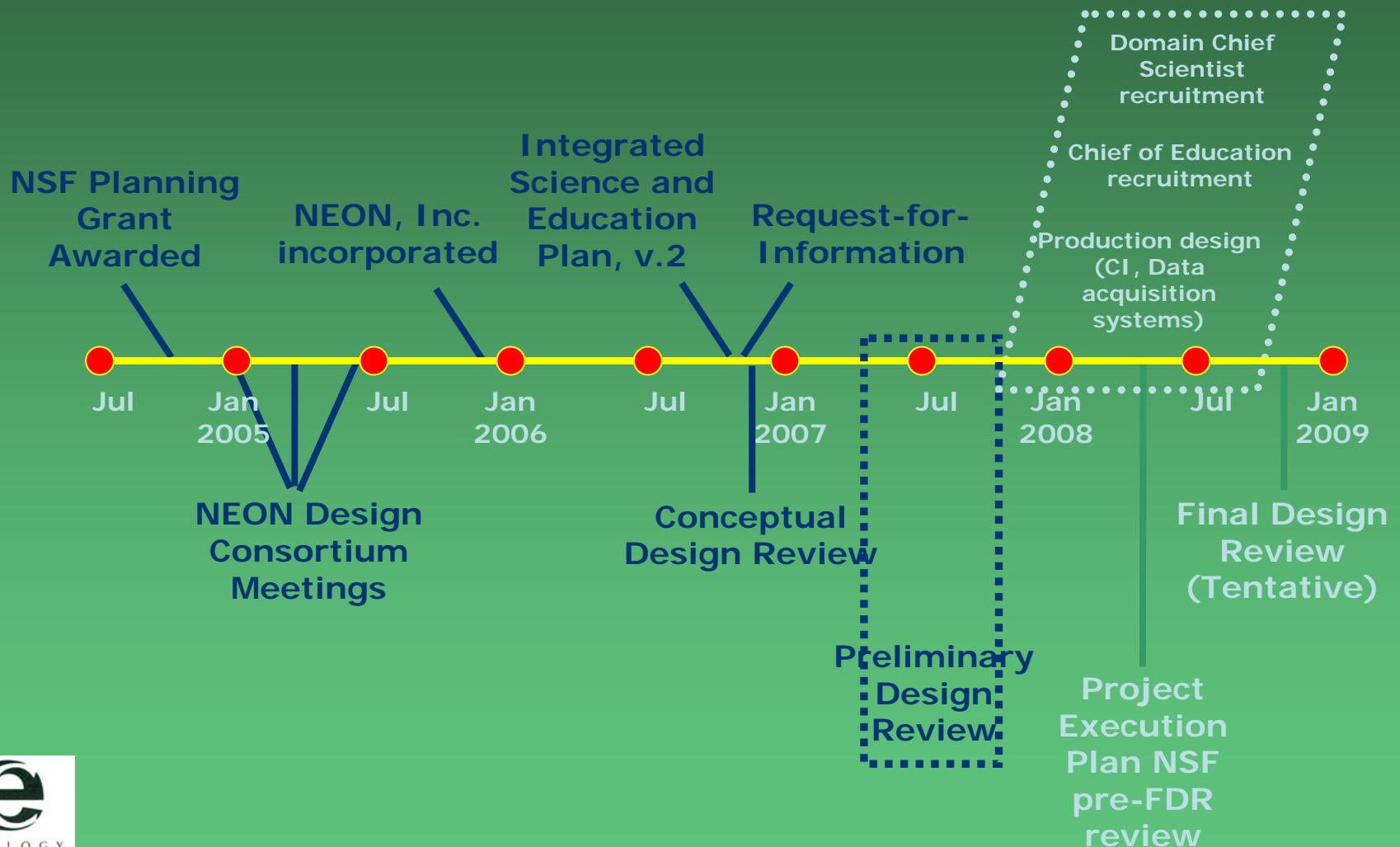
# NEON's Overall Trajectory



# NEON Development Phase



# NEON Development Phase



# Construction: Phased Approach

- Domain 0: “Virtual” Domain to fully test and deploy infrastructure over a wide range of environmental conditions
- Domain 1: Focus on end-to-end processes and refining of deployment protocols
- Domains 2 – 5: Focus on refining replicated roll-out protocols
- Domains 6 – 20
- Commissioning, circa 2016 (subject to confirmation)

*Thank you for inviting me.*

