Introduction to ecological modelling with `SpaDES`

This workshop assumes good familiarity with R as well as several of its contributed packages.

Topics covered

0. Before the course slides
    - Set up your laptop
    - Set your goals for course
1. `SpaDES` in action (Eliot and Alex)
    - The demo modules in the SpaDES package
    - LCC2005 model ("Land Cover Classification 2005")
    - Vegetation simulation (SpaDES-Landis)
    - Agent based models – wolf IBM
    - A shiny app on shinyapps.io (*e.g.*, Proof of concept)
2. Thinking the `SpaDES` way (Eliot)
    - Events
    - Modules
    - Data
3. Getting technical (Alex)
    a. The parts
        - The simList
            - Modules
            - Events within modules
            - data
        - The `spades` call
    b. Surface dive
        - creating the `simList` (`simInit()`)
        - run model (`spades()`)
        - where to get help
        - using pre-built modules (`downloadModule`)
4. Building `SpaDES` modules (Alex)
    a. new module template: `newModule`
    b. module metadata `defineModule`
    c. scheduling events: `scheduleEvent`
    d. `time`
    e. visualizations: `Plot`
    f. debugging (`spades(sim, debug = TRUE)`)
    g. finding SpaDES tools
    h. summary statistics
5. Types of `SpaDES` modules (Alex)

    a. events (*e.g.*, Fire)
    b. data preparation (*e.g.*, climate data downloading)
    c. individual-based modules (*e.g.*, caribou)
6. Simulation experiments and replication (Eliot)
    a. using the `experiment()` function for replication, scenario creation, and parameter experiments
    b. running parallel simulations on supercomputers and clusters
    c. Pattern Oriented Modeling (`POM()` function) for estimating unknown parameters
7. Getting the most out of R (Eliot and Alex)
    a. Spatial data (`raster` and `sp` packages)
    b. Matrices
    c. The `data.table` package
    d. The `Rcpp` package
    e. Other performance notes
8. Module integration (Alex)
    a. Building "models", *i.e.*, groups of modules (parents and children)
    b. Using metadata
    c. Visual tools: `objectDiagram`, `moduleDiagram`, `eventDiagram`
9. Sharing modules & models (Alex)
    a. `SpaDES` module repositories
    b. Using GitHub.com
    c. `shiny` apps and shinyapps.io (*e.g.*, Proof of concept)
    d. Data sources
10. Data to decisions (Eliot)
    a. Building a reproducible workflow
    b. Caching

Resources:

- SpaDES wiki
- R documentation for `SpaDES`
- Development release of `SpaDES`