Introduction to ecological modelling with `SpaDES`

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

Dates and Times:

Sept 14-16, 2016 google calendar link
8:30am - 4:30pm (PDT) each day
Cost: Free
Where: Pacific Forestry Centre, Victoria, BC
WebEx: Limited trial. Contact Eliot.McIntire@canada.ca if you would like to participate remotely.
Rooms:
- **Wed: Dilbert Hall**
- **Thurs: Sage**
- **Fri: Sage**

Workshop content

(raw version of notes available on github)

0. Before the course (slides)
    - Set up your laptop
    - Set your goals for course
    - all course material (incomplete until course begins), zipped
1. `SpaDES` in action (Eliot and Alex) (slides)
    - 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) (slides)
    - Events
    - Modules
    - Types of `SpaDES` modules:
        - events (*e.g.*, Fire, Vegetation Change)
        - data preparation (*e.g.*, climate data downloading)
        - individual-based modules (*e.g.*, caribou, wolves, mountain pine beetle)
        - parents and children
    - Data
3. Getting technical (Alex) (slides)
    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) (slides)
    a. anatomy of a `SpaDES` module
    b. new module template: `newModule`
    c. module metadata `defineModule`
    d. scheduling events: `scheduleEvent`
    e. `time`
    f. visualizations: `Plot`
    g. debugging (`spades(sim, debug = TRUE)`)
    h. finding SpaDES tools
    i. summary statistics
    j. module development checklist
5. Simulation experiments and replication (Eliot) (slides)
    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
6. Getting the most out of R for ecological models (Eliot and Alex) (slides)
    a. Spatial data (`raster` and `sp` packages)
    b. Matrices
    c. The `data.table` package
    d. `SpaDES` functions for spreading, moving, neighbourhoods etc. section 2 of spades-package help file
    e. The `Rcpp` package
7. Module integration (Alex) (slides)
    a. Building "models", *i.e.*, groups of modules (parents and children)
    b. Using metadata
    c. Visual tools: `objectDiagram`, `moduleDiagram`, `eventDiagram`
8. Sharing modules & models (Alex) (slides)
    a. `SpaDES` module repositories
    b. Using GitHub.com
    c. `shiny` apps and shinyapps.io (*e.g.*, Proof of concept)
    d. Data sources
9. Data to decisions (Eliot) (slides)

a. Building a reproducible workflow
b. Caching

Resources:

- SpaDES wiki
- R documentation for `SpaDES`
- Development release of `SpaDES`
- Link to this Outline
- Contact info: Eliot.McIntire@canada.ca or Alex.Chubaty@canada.ca

Future offering

Dec 7-9, 2016 (tentative)
Depending on how the WebEx goes in September, this offering may be offered remotely.