Newly certified models in the CoMSES model library and newly published models added to the model library.

open abm

... a node in the CoMSES Network

CoMSES Digest: Winter 2016

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From the Editor: A New Year for CoMSES

Welcome to the Winter 2016 issue of the CoMSES Digest! We finish 2016 by continuing the expanded version of the Digest. In this issue you will find news from the CoMSES network, a report from the most recent CoMSES board meeting, a list of postings in the OpenABM forums, and another commentary article, in addition to the report on the OpenABM Model Library. Among the most important news is the upcoming CoMSES board elections; the new role that CoMSES will play in the NSF 'Big Data Research and Development' initiative means that the Board and all CoMSES members will have a new avenue to explore in promoting good practice in scientific modeling.

Looking ahead to the new year, please contact me (johntmurphy@uchicago.edu) if you would like to contribute any items, large or small, to the new Digest. Submission that would be considered include reports on ongoing projects, special sessions at conferences,

commentary on the state of the field, or discussions of other work underway.

  2017 will be an exciting year for CoMSES, and we hope that it is a bright and happy one for all of you as well.

John T. Murphy,
CoMSES Digest Editor

CoMSES News

Elections for CoMSES Board Positions

  New elections for the CoMSES Executive Board will be conducted soon. The Executive Board meets periodically to conduct strategic planning and development and to advise on the operations of the network. Board members will also be members of a new working group of a NSF supported center to advance transparency in scientific computation. The board works with the ex-officio members (PI's of projects of CoMSES) to manage the activities of the network. If you would like to serve on the CoMSES executive board, please **nominate yourself by sending a note to Mady Tyson (**mhtyson@asu.edu**)**.

  As stated in the bylaws, the board consists of six members who serve for terms of three years. Each year elections are held for two members. The outgoing board members are Bill Rand and Christophe LePage; the new members will join Mariam Kiran and Gary Polhill (with terms through 2017) and Moira Zellner and Forrest Stonedahl (with terms through 2018)

Virtual Meetings

  CoMSES will begin to host 'virtual' meetings, starting in 2017. These would be mixes of contributed videos and online interactions that would take the place of (expensive) in-person meetings. Planning for the first of these will begin in the early part of next year. Watch for a call for proposals, or contact CoMSES leadership to find out more and express any interest in participating.

From the Board

Notes from the December Meeting of the CoMSES Executive Board

  The CoMSES Executive Board met earlier this month. Aside from the upcoming election (see 'CoMSES News', above) two major topics were the new NSF 'Big Data Spoke' award and the collaboration with the CSDMS community.

The Big Data Spoke award presents an important opportunity for CoMSES (and CoMSES members) to advance the goals of the CoMSES network, and specifically to promote and work toward standards for open science and transparency in scientific communication. The Board is currently exploring examples of other organizations and how they have worked toward similar goals.

One of those is CSDMS, the 'Community Surface Dynamics Modeling System'. CSDMS (pronounced "systems") also operates a model repository (https://csdms.colorado.edu), and has experience in building a modeling community around shared interests, techniques, and software. CoMSES leaders are working on building the relationship with CSDMS around this shared interest and also around any common themes in their research domains. Pursuant to that, CoMSES is participating heavily the upcoming CSDMS annual meeting, "CSDMS annual meeting 2017: Modeling Coupled Earth and Human Systems - The Dynamic Duo." CoMSES members are encouraged to attend and have been invited as keynote speakers. If you are also interested in attending this meeting, which will be held May 23rd-25th in Boulder, Colorado, contact CoMSES leaders.

From the Forums

As usual, this is a quick summary of Forum topics and posts; if you are interested in these or would be interested in others like them, log in and subscribe to receive email notices when posts are added.

General Forum

Title: Call for Papers for SummerSim Bio-Medical and Population Modeling Track
https://www.openabm.org/forum/call-papers-summersim-bio-medical-and-population-modeling-track

Title: ABM: Corruption in sports using the ODD
https://www.openabm.org/forum/abm-corruption-sports-using-odd

Title: Software citation tools and development
https://www.openabm.org/forum/software-citation-tools-development

Jobs and Appointments

Title: Three postdoc positions in Norway, related to Modeling of Social Conflict
https://www.openabm.org/forum/three-postdoc-positions-norway-related-modeling-social-conflict

Title: Two Postdoc positions at Northwestern University Kellogg SOM

https://www.openabm.org/forum/2-postdoc-positions-northwestern-university-kellogg-som

Title: Two postdoc positions for modeling social-ecological systems at Stockholm Resilience Centre
https://www.openabm.org/forum/two-postdoc-positions-modeling-social-ecological-systems-stockholm-resilience-centre

Title: Post-Doc: Modeling Religious and Social Conflict, Norway
https://www.openabm.org/forum/post-doc-modeling-religious-and-social-conflict-norway

Title: Researchers in land-use change and socio-ecological systems, Karlsruhe Institute of Technology (KIT), Germany
https://www.openabm.org/forum/researchers-land-use-change-and-socio-ecological-systems-karlsruhe-institute-technology-kit

Title: PhD position – Effects of microinsurance on safety nets and natural resource use. A model-based analysis
https://www.openabm.org/forum/phd-position-effects-microinsurance-safety-nets-and-natural-resource-use-model-based-analysis

Title: PhD positions on collective escape of bird flocks from raptors (2.0 fte)
https://www.openabm.org/forum/phd-positions-collective-escape-bird-flocks-raptors-20-fte

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Model Library

Nine new models were uploaded, covering a typically wide range of topics. In the 'Kulayinjana' model, CoMSES Board Member Christophe LePage and colleagues uses participatory modeling to co-design a role-playing game with members of rural communities near Hwange National Park, Zimbabwe. Hideyuki Nagai and Setsuya Kurahashi model urban dynamics based on transportation and residence selection. In 'Adoption as a Social Marker', Paul Smaldino explores what delays or suppresses adoption, and how structural constraints on information flow lead to this. Gudrun Wallentin has contributed four models: one of the movements of bicyclists in Salzburg; one of the flocking behavior of pigeons; one exploring patterns of tree line change in the Alps in the second half of the 20th century; and one (with Christian Neuwirth) of a spatially explicit fish-plankton system. The last of these includes six alternative versions that can be compared. Andrew White has updated a model of hunter-gatherer demography, including the formation and dissolution of households. Finally, Christophe Sibertin-Blanc offers a model of social violence, in this case over the possible construction of a dam in France that, in real life, led to a deadly clash between police and protestors.

In total, 46 new models were uploaded in 2016, continuing an upward trend from 2014 (29) and 2015 (37).

New Model Uploads

Kalayinjana

Christophe Le Page, Arthur Perrotton, Michel de Garine-Wichatitsky, Barry Bitu, Killion Koyisis, Ferdinand Mwamba, Cephus Ncube, Victor Ncube, Siphusisiwe Ndlovu, Raphael Ngwenya, Ambu Nyathi, Fumbane Nyathi, Patrick Sibanda, Zenzo Sibanda.

The model aims at supporting the setting-up of a fair and balanced dialogue arena where rural communities and protected area managers at the periphery of Hwange National Park (Zimbabwe) may collaborate to produce effective management plans. Adopting the Companion Modelling approach, we conducted a participatory modelling experiment to co-design a role-playing game simulating the interactions between farming activities, livestock herding and wildlife in a virtual landscape reproducing local socioecological dynamics.

Urban-Dynamics-2017

Hideyuki Nagai, Setsuya Kurahashi

This model is designed to observe a change of an urban structure through daily transportation behavior and residence selection of residents. By using this model, we can estimate measures to allocate a facility for stopping off and promote bustle around it, and some policies on transportation..

Adoption as a Social Marker

Paul Smaldino

Social identities are among the key factors driving behavior in complex societies. Signals of social identity are known to influence individual behaviors in the adoption of innovations. Yet the population-level consequences of identity signaling on the diffusion of innovations are largely unknown. Here we use both analytical and agent-based modeling to consider the spread of a beneficial innovation in a structured population in which there exist two groups who are averse to being mistaken for each other. We investigate the dynamics of adoption and consider the role of structural factors such as demographic skew and communication scale on population- level outcomes. We find that outgroup aversion can lead to adoption being delayed or suppressed in one group, and that population-wide underadoption is common

Hybrid fish-plankton model

Gudrun Wallentin, Christian Neuwirth

This predator prey model is comprised of six alternative designs that are tested to explain a fish-plankton system. Comparisons between models focused on differences in the spatial extent of stocks and agents.

Homing pigeon model
Gudrun Wallentin

The purpose of the Homing Pigeon Model was to use an agent-based modeling approach to explore flight patterns that result from simulated movement behaviour of flocking pigeon agents in comparison to observed flight trajectories in order to gain a better understanding of social and navigational behaviour of pigeons. The flocking behaviour in the model is an extension of the existing flocking model in the Model Library of the NetLogo modelling software (Wilensky, 1999) that in turn is an implementation of the boids model (Reynolds, 1987). The agents are eight homing pigeons that together form a flock, in which each pigeon has a social rank.

Salzburg Bicycle Model
Gudrun Wallentin

The purpose of the model was to simulate the spatio-temporal distribution of cyclists in the city of Salzburg during a weekday in late spring. The spatial distribution of the cycle trip density across the city's street network was expected to emerge from the behaviour of individual cyclists. The model was thus intended to be used as a base model to generate and test hypotheses on driving factors of cycle traffic and their implications for traffic management, route preferences, and effects of cycling infrastructure or the identification of accident-prone sites.

ForagerNet3: Demography V3
Andrew Allen White

The FN3D_V3 model has three main levels: person, household, and system. Inter-related person- and household-level methods represent birth, death, and the creation/dissolution of male-female pair bonds (note: the terms "pair bond" and "marriage" are used inter-changeably in this description and denote the same behavior in the model). These methods and their inter-relationships were informed by data from ethnographic hunter-gatherers. Many parameters in the model are continuously variable, allowing the model to be used to "sweep" through a range of values and observe how differences in parameters are related to model behavior. The dependency ratio (the ratio of consumers to producers in a household) is a key variable in many economic decisions embedded in the methods.

TREELIM
Gudrun Wallentin

In addition to the effects of climate change, land use change is expected to trigger dynamic processes that may shift alpine tree lines upwards. To gain a conceptual understanding of the spatio-temporal processes shaping tree line patterns, we developed an individual-based and spatially-explicit model of spontaneous forest regeneration at the alpine tree line. The model presented here predicts patterns of natural forest regeneration on a summer pasture in the Austrian Central Alps between 1954 and 2006.

Inteplay of Actors About the Construction of A Dam
Christophe Sibertin-Blanc

France was amazed to learn of the death of an opponent to the construction of a dam in the forest of Sivens, Tarn (France), during clashes with the police on the night of 25 to 26 October 2014. Such an accident is all exceptional. However, the violence of the means deployed to realize this construction and the determination of opponents, woven in the game of all the actors of this project, foreshadowed the possibility of such a dramatic event. Using the SocLab environment for modeling and simulation of organized action systems, we present a model of this actors' interplay whose simulation results highlight the overdetermined nature of the emergence of an extremely intensive conflict (Model 1). Variations of this model enable to identify main determinants of this conflict, notably the position of the State, and to consider other possible futures: The existence of alternatives to the extreme conflict (Model 2) and its avoidance (Model 3).

Certified Models

James D. A. Millington's model of "Aspiration, Attainment and Success: An agent-based model of distance-based school allocation" completed the OpenABM certification process. The model was originally submitted in 2012, and has now been downloaded nearly 250 times.

Another model also completed the certification process and is awaiting full 'publication' on the OpenABM site; full details will be given later, but the topic area is one of the most prolific fields for models in the OpenABM library, archaeology and human prehistory.

Most Downloaded Models in the Model Library
(September 16, 2016 – December 15, 2016)

1. (66 Downloads) Artificial Anasazi *by Marco Janssen*

2. (65 Downloads) A Computational Model of Workers Protest *by Jae-Woo Kim*

3. (62 Downloads) A Land-Use Model to Illustrate Ambiguity in Design *by Julia Schindler*

4. (60 Downloads) A Consumer-Demand Simulation for Smart Metering Tariffs (Innovation Diffusion) **Martin Rixin**

5. (55 Downloads) A Mathematical Model of the Beer Game *by Mert Edali and Hakan Yasarcan*

Commentary:

Editor's Note: Commentaries represent the opinions and views of the authors. Each commentary can

How You Write The Code Matters

By John T. Murphy

The challenge in writing an essay entitled, "How you write the code matters," is, of course, that there is a strong sense in which it, in fact, does not.

Code is functional, and its function is to generate results that are useful to us as scientists. "Good code" gives correct (i.e. useful) results, and code that gives incorrect results is either useless or (worse) misleading. How you write the code is, in this sense, superficial- it doesn't matter.

The first premise of OpenABM is that making code available is necessary to ensuring that the science based on this code is reproducible. Theoretically, this is also sufficient: a record of the code can, in theory, almost always be used to reconstruct the model that was implemented in it. While it is common for languages and hardware to change in subtle ways that sometimes make perfect replication impossible even after only a short time, few have changed so much that it is entirely impossible to discern how original code would have run.

But this is only the first premise of OpenABM; the second is revealed in the process of model certification. To become a certified model, the code must be documented and shown to be useable- not just that it can be run, but that it can be used.

To make the difference clear, we can look at an extreme. Code could be written that would be virtually impenetrable to a human being- and, in fact, code 'obfuscators' deliberately mangle code through tactics such as replacing meaningful variable names with nonsense, removing all comments, or distorting whitespace and line breaks, breaking code across files, or breaking units of code into separate fragments. All of this can be done without changing the output of the running code. These tactics protect code against infringement, but they are, of course, the opposite of the goal of OpenABM. This goal is not just reproducibility, but clarity.

This suggests that code has an additional function: it should be usable by researchers as a document of the scientific process that it represents. This additional demand runs counter to the pure running of the code: how you write the code definitely matters. OpenABM's certification process focuses on this second function, and it requires that the code be documented and runnable by someone other than the original author.

In practice this straw man- that code is only functional- is widely off the mark; it's easy to specify multiple functions that code plays:

1) The results that it produces
2) As a document and record of the scientific processes used

3) As a representation of, or a reflection of, a body of theory (model)
4) As a framework for performing multiple different kinds of tests within a single domain
5) As a module or component for other simulations

It is possible to evaluate code on the basis of how it fulfills these functions. (This is in addition to other ways to evaluate the code, such as the computational efficiency with which it achieves its tasks.) And it's also notable that the ability of the code to perform some of these functions is not one-sided, but instead can be subjective and dependent on the training, ability, and familiarity of the people working with the code.

But the real difficulty is that all of this must be couched in terms of costs. There is an old saying in software development: that development can be done well, quickly, or cheaply- pick any two. Software development must always balance these, but this balance is more complicated when 'well' can have multiple meanings. One of the main motivations of the CoMSES network is the establishment of a community of modeling professionals who understand all of these different aspects, and can realistically assess whether effort spent on one or more of them is appropriate.

A brief commentary is not intended to provide a full resolution to these issues; instead, I will close with three short observations.

First, the different functions and the balance among them can be conceived within the framework of a lifecycle; at different points in the development cycle, different aspects carry different weights. Understanding this shift and moving the code through this process is a key part of scientific computational modeling.

Second, the design, budget, and standards of practice should allow for this. There is an increasing recognition that any research project needs a data management plan; the creation and distribution of code generally falls under this, but because code serves a range of different functions, the lifecycle of code may be more complicated than has generally been recognized.

Third, there is an additional aspect pertaining to team structure. Models typically occupy a central position in research project, and the computational model serving function #3 above can become a place where domain specialists, coders, and individuals who bridge those two aspects, intersect. But this also means that the subjective element becomes highly salient: the domain specialist may know little about 'good' code design, and may not value time spent on this aspect; a person trained strictly in software engineering may assume that good code design is exclusively based on metrics based in engineering principles that make the code less, rather than, more accessible and less reflective of the underlying science. Individuals on the team may have different levels of experience and training in these fields, and may play different roles as the project progresses. The challenge in this situation is that when there must be a balance between the different components, and when the costs of each must be assessed, who decides?

While the CoMSES network has many purposes and many aspects that bring us together as researchers, one is the navigation of this work: finding the balance that allows computational models to achieve as many of the goals we have for it as possible. The next few years will see more steps forward in solidifying the ways that computational modeling can be conducted as a profession; I hope that CoMSES and OpenABM can continue to play a leading role in this important work.

This essay is open for comments as a general forum topic at: https://www.openabm.org/forum/how-you-write-code-matters-john-t-murphy