CoMSES Digest: Spring 2020

Volume 8, No. 1. December 16, 2019 – March 15, 2020

Table of Contents:

- Editor's Note
- CoMSES News:
  - CoMSES Net and the COVID-19 Pandemic
  - Open Modeling Foundation Update
  - ESSA Special Interest Group Qual2Rule Survey
  - Dockerization tutorial
  - Winter School on Agent-Based Modeling of Social-Ecological Systems
- Calendar of Events
  - Submission Deadlines
  - Conferences and Workshops
  - Courses
- Model Library
  - Newly Reviewed
  - New Uploads
  - Most Downloaded

Editor's Note

This issue is the opening of volume 8 of the CoMSES Digest, and thus marks a continuation of over 7 years of building a global community of modelers. At no time has that sense of community been more meaningful or more necessary. Since the last issue the world has changed. In December the spread of the coronavirus and the disease it causes had barely begun in the earliest affected areas. In the short time since then it has spread around the globe. Now many nations are seeing it race through their populations.

As I write this in the area around Chicago, Illinois, USA, we are under a stay-at-home directive. Many of you may be as well; a few may recently have had similar restrictions lifted, while many others can anticipate them. Courses are canceled or switching to online formats; universities are vacant; workshops and conferences are made virtual, postponed, or canceled. The economic impacts are immense. The challenges faced by health care professionals are chilling. Those whose family and friends have contracted the virus need and deserve every support. Many who become ill will recover only with difficulty, and many others will not survive.

Our community of modelers plays a key role in our responses to the pandemic. Everyone, from heads of households to heads of state, is making decisions based on models. I know that by staying at home I am 'flattening the curve' of new cases that would otherwise overwhelm Chicago's health care capacity, and I know this from models. Whether they are simple or complex, differential equation-based or agent-based, highly abstract or richly realistic, models are playing an immediate and crucial role in the effort to slow the virus and save lives. This somewhat sudden intense spotlight has led to an intense discussion in the modeling community to reflect, in realtime, on the foundations of modeling and on the role of models in science and policy. The CoMSES Forums have been one venue for these discussions. The CoMSES board has discussed them as well; see the special statement from the CoMSES Net Director, Michael Barton, that leads this issue of journal, as well as this press release.

If you are a member of CoMSES net you are surely aware of this key role for models and modeling. Please know that the 'network' part of CoMSES Net- the community- is just as important. At workshops and conferences I have gotten to know many of you, and this global group of colleagues includes many I consider close friends. I am sure all of you have made similar connections. To all of you: take care of yourselves, your families and friends, and each other.

John T. Murphy
CoMSES Digest Editor

CoMSES News

CoMSES Net and the COVID-19 Pandemic - a Message to Members and Colleagues

Michael Barton, CoMSES Net Director

The scientific community is responding rapidly and actively to find tools to limit the impact of the COVID-19 pandemic to health and society. Modeling is critical to this effort, of course, and the global scope of this crisis makes it more important than ever that scientists everywhere cooperate to share their knowledge and expertise--including their model code.

The CoMSES Net community has long been a leading advocate of open, transparent, and reproducible scientific modeling. It is essential that the models being used for designing health and social policy be available for others to examine and verify their results. This engenders public trust and ensures that the best models can be made available to public officials and health experts. It also enables more rapid improvement of models when scientists can search for effective modeling solutions developed by made available by colleagues.

We strongly urge all CoMSES Net members to make any models they are developing accessible to others on a FAIR-aligned repository and to convince their colleagues to do likewise (a partial list of trusted repositories can be found here). The CoMSES Net Model Library already makes hundreds of models openly available and is ready to provide a platform for disseminating additional model code. A hallmark of science is the open exchange of knowledge, and CoMSES Net will continue to promote this transparency. In the words of Nick Barnes "Publish your computer code: it is good enough" (Nature 2010, 467, 753).

Open Modeling Foundation Update

Michael Barton, CoMSES Net Director

As we mentioned in previous digests, CoMSES Net is coordinating an international consortium of organizations representing modeling scientists to develop and administer standards that support open, reproducible, interoperable models. We are calling this organization the Open Modeling Foundation (OMF). Launched in an informal meeting of organizations in June 2018, we now have funding from the Alfred P Sloan Foundation for planning meetings and to begin developing supporting cyberinfrastructure. We also have a large National Science Foundation proposal pending to expand these efforts. Collaborators in these efforts include the Community Surface Dynamics Modeling System, the Consortium of Universities for the Advancement of Hydrologic Science, the International Environmental Modeling and Software Society, the International Society for Ecological Modeling, Analysis and Integrated Modeling of the Earth System, and the

Decision Support System for Agrotechnology Transfer.

By the beginning of 2020, we were planning for three strategic planning workshops to get the OMF going. To get the broadest possible representation from the modeling community, we decided to hold the first two immediately before or after major international conferences to draw diverse participants and provide venues for the meetings. The first was to be held at the Community Surface Dynamics Modeling System, in Boulder, CO on the 2 days immediately preceding the CSDMS Annual Meeting: May 17-18. Its focus is especially on the geoscience modeling community. The second meeting was to take place in Brussels, Belgium, immediately following the International Environmental Modeling and Software Society Annual Conference: July 10-11 or 11-12. This second workshop aims to target especially the environmental modeling science community. The third workshop was planned for fall 2020 at Arizona State University, where the CoMSES Net administration team is located.

Needless to say, the current pandemic and associated travel restrictions have caused us to significantly revise these plans. We are transforming the May and July meetings to be held online as videoconferences. We will do the same with the fall 2020 meeting unless the health and travel situation improves dramatically.

In the meantime, we have an OMF website under construction. We also are developing associated GitHub sites for community input on standards, and plan for a companion GitHub site that will support distributed governance of the OMF. We will continue to update our community about this important initiative for the future of transdisciplinary modeling science. If you have questions, please don't hesitate to contact CoMSES Net.

ESSA Special Interest Group Qual2Rule Survey

Dear CoMSES Network members,

Agent-based models thrive in part due to the consideration of diverse information sources (e.g., theory and data) in the modelling process. However, practices for integrating data in agent-based models are equally diverse and depend on the disciplinary background that informs the nature of the collected data. A large number of models thus rely on qualitative data, in addition or as an alternative to quantitative input.

As part of the ESSA Special Interest Group Qual2Rule, we aim to develop a better understanding of the current approaches for the inclusion of *qualitative data* undertaken within the community. We thus invite the agent-based modelling community (understood

here in a loose sense) to offer some insight into their practices as part of an anonymous survey linked below.

Note that the used survey tool is GDPR compliant, but may occasionally show some ads above or below the questionnaire items. We apologise for this inconvenience in advance.

Link to the survey: https://eSurv.org?u=qual2abm

In case of any questions or comments regarding this survey, please contact Christopher Frantz (christopher.frantz@ntnu.no). If you want to find out more about the ESSA Special Interest Group Qual2Rule, please have a look here: http://www.essa.eu.org/sig/sig-qual2rule/

Kind regards,
Christopher Frantz

Containerization tutorial

At CoMSES Net we use containerization as a way to distribute and deploy our computational models. A container is a compressed bundle of your code and the specific versions of any software dependencies your code uses and can also include input data and the exact instructions needed to generate reproducible results. Containerizing your models enables you to run your model on your local computer or on remote cloud environments (as long as these environments have the software that allows you to run the containers). This can be useful if you are developing your model in a team and want a convenient way for everyone to be running the same code with the same library versions, or if you plan to run it on a high throughput computing service like the Open Science Grid. In addition, since models often have software dependencies that may become unavailable in the future, containers are one way to archive them. We are starting to develop a series of tutorials on how to containerize your models using Docker. To read our written and video tutorials on how to containerize a NetLogo model see:

- What is a Container and why should you Dockerize your Model
- Dockerizing a NetLogo model in Headless mode
- Dockerizing a NetLogo model – GUI version

Winter School on Agent-Based Modeling of Social-Ecological Systems

The fourth International Winter School on Agent-Based Modeling of Social-Ecological Systems was held in Tempe, AZ from January 6-10, 2020. The Winter School has become an annual tradition for CoMSES Net. Seventeen participants (graduate students, postdocs and faculty) from different continents came to Tempe for a 5-day immersive experience that combined lectures on social and ecological sciences, hands-on education on best-practices for computational modeling, and group projects with individual instructors building on models from existing projects including water governance in Mexico City, hurricane evacuations in Florida and resource sharing in environments with high uncertainty.

Calendar of Events

Note that the calendar of events is heavily disrupted; many events are canceled, postponed, or being converted to online-only. Please follow the links for the latest information, as many are in an uncertain state.

Submission Deadlines

Special Issue of Mind & Society on Advanced Modelling of Organizational Behaviour
Submission Deadline: April 1, 2020
https://www.comses.net/events/560/

Conference on Complex Systems CCS2020
Abstract Submission Deadline: May 15th, 2020
Conference: October 19-23, 2020
Palma de Mallorca, Spain
https://www.comses.net/events/577/

Call for EoI: proposal for a Lorentz workshop on 'Othering and polarization'
Submission Deadline: May 19, 2020
https://www.comses.net/events/538/

Conferences and Workshops

GI_Forum2020: Session on Spatial Simulation
Conference: July 6-9, 2020
Salzburg, Austria
https://www.comses.net/events/554/

SBP_BRiMS
Conference: July 14-17, 2020
Washington D.C., USA
https://www.comses.net/events/564/

FOODSIM 2020- Postponed to September
https://www.comses.net/events/558/

Annual Simulation Symposium (Society for Modeling and Simulation International)
May 19-21, 2020
Virtual Conference only
https://www.comses.net/events/567/

ABM In Economics (Western Economics Association International)
June 26-30, 2020
Sessions in ABM (TBD)
https://www.comses.net/events/568/

Social Cohesion 2020 @ Groningen
July 6-17, 2020
Groningen, Netherlands (Applications closed)
https://www.comses.net/events/569/

Social Simulation Conference 2020
September 14-18
Milan, Italy
https://www.comses.net/events/575/

11th International Conference on Geographic Information Science (GIScience 2020)
September 15-18
Poznan, Poland
https://www.comses.net/events/579/

The 34th annual European Simulation and Modelling Conference
October 21-23, 2020
Toulouse, France
https://www.comses.net/events/580/

Courses

eX Modelo
Conference: May 25-29, 2020
Near Paris, France
https://www.comses.net/events/556/

Earth Surface Processes Modeling Institute (University of Colorado - Boulder)
August 13-21, 2020
Boulder, Colorado, USA
Registration Deadline: April 1, 2020

Summer school: Joint ESSA / DeSIRE Summer School 2020 "Agent Based Modelling for Resilience - Making it happen!"
June 22-26 (Pending Decision; update to be issued April 6th)
Wageningen, The Netherlands
https://www.comses.net/events/574/

Advanced Computing for Social Change Institute (USA)
July 26-30
Portland, Oregon, USA
https://www.comses.net/events/572/

Grimm & Railsback Agent-based Modeling Workshop,
July 27 – August 4, 2020

Humboldt State University, Arcata, California, USA
https://www.comses.net/events/576/

Earth Surface Processes Modeling Institute
August 13-21, 2020
University of Colorado - Boulder
https://www.comses.net/events/559/

Model Library

Newly Reviewed:

Seven models passed CoMSES's peer review process. CoMSES Net Peer Review is a community service provided by CoMSES Net members that verifies that a computational model's source code and documentation meets baseline standards. The model should be runnable, accompanied by sufficiently detailed narrative documentation, and have "clean", commented code (admittedly a fairly subjective criteria reliant on community norms). Peer reviewed models in the CoMSES Computational Model Library are eligible to receive a DOI that also serves as a preferred method of model citation. Regardless of whether you submit your model for CoMSES Peer Review and receive a DOI, be sure to cite your models in your publications!

- Dawkins Weasel by Kristin Crouse
- Evolution of Sex by Kristin Crouse
- Population Genetics by Kristin Crouse
- Flibs'NLogo - An elementary form of evolutionary cognition by Cosimo Leuci
- MigrAgent by Rocco Paolillo

New Model Uploads

Twenty-two models were uploaded. These included models of agricultural and urban land use, dynamic network structure, territory size and intergroup mortality risk, conflict resolution, and the daily tram commute. The venerable 'Telephone' game has an implementation by Julia Kasmire. Other domains included the diffusion of information, governing the commons, a visit to the Sugarscape, microfinance, and both micro- and macroeconomics. Fans of archaeological models will want to check out Sean Bergin's model of neolithic geographic expansion into Italy and the Iberian Peninsula, and fans of card games will enjoy a model by Marco Janssen of the "Port of Mars" game.

A Balance Model of Opinion Hyperpolarization by Simon Schweighofer, Frank

Schweitzer, David Garcia

Contains python3 code to replicate the opinion dynamics model from our (so far unpublished) JASSS sumbission “A Balance Model of Opinion Hyperpolarization”. The main function is run_model(), which returns a dictionary object containing various outcome metrics.

Vertical Communication in Organizations by Victorien Barbet Juliette Rouchier Noé Guiraud vinz2711

We propose an ABM replicating the evolution of action oriented groups (like NPO) due to disagreement among members on the practices to implement. Looking at the stability and representativeness (ability of groups to federate) we introduce vertical communication: the possibility for group to communicate around their practices to their members. We test for three levels (to whom it is addressed) and four types (how it influences agents) of communication.

A Pastoral Stoking Strategy Model with Fodder Import and Loan Scenarios by Yanbo Li

This model was built to estimate the impacts of exogenous fodder input and credit loans services on livelihood, rangeland health and profits of pastoral production in a small holder pastoral household in the arid steppe rangeland of Inner Mongolia, China. The model simulated the long-term dynamic of herd size and structure, the forage demand and supply, the cash flow, and the situation of loan debt under three different stocking strategies: (1) No external fodder input, (2) fodders were only imported when natural disaster occurred, and (3) frequent import of external fodder, with different amount of available credit loans. Monte-Carlo method was used to address the influence of climate variability.

A Bottom-Up Simulation on Competition and Displacement of Online Interpersonal Communication Platforms by great-sage-futao

This model aims to simulate Competition and Displacement of Online Interpersonal Communication Platforms process from a bottom-up angle. Individual interpersonal communication platform adoption and abandonment serve as the micro-foundation of the simulation model. The evolution mode of platform user online communication network determines how present platform users adjust their communication relationships as well as how new users join that network. This evolution mode together with innovations proposed by individual interpersonal communication platforms would also have impacts on the platform competition and displacement process and result by influencing individual platform adoption and abandonment behaviors. Three scenes were designed to simulate some common competition situations occurred in the past and current time, that two homogeneous interpersonal communication platforms competed with each other when this kind of platforms first came into the public eye, that a late entrant platform with a major

innovation competed with the leading incumbent platform during the following days, as well as that both the leading incumbent and the late entrant continued to propose many small innovations to compete in recent days, respectively.

A Model of the Gender Cliff in the Relative Contribution to the Household Income by André Grow Jan Van Bavel

In Western countries, the distribution of relative incomes within marriages tends to be skewed in a remarkable way. Husbands usually do not only earn more than their female partners, but there also is a striking discontinuity in their relative contributions to the household income at the 50/50 point: many wives contribute just a bit less than or as much as their husbands, but few contribute more. Our model makes it possible to study a social mechanism that might create this 'cliff': women and men differ in their incomes (even outside marriage) and this may differentially affect their abilities to find similar- or higher-income partners. This may ultimately contribute to inequalities within the households that form. The model and associated files make it possible to assess the merit of this mechanism in 27 European countries.

Governing the commons by Marco Janssen

Model on the use of shared renewable resources including impact of imitation via success-bias and altruistic punishment.
The model is discussed in Introduction to Agent-Based Modeling by Marco Janssen. For more information see https://intro2abm.com/

Consumats on a network by Marco Janssen

Consumer agents make choices which products to choose using the consumat approach. In this approach agents will make choices using deliberation, repetition, imitation or social comparison dependent on the level of need satisfaction and uncertainty.
The model is discussed in Introduction to Agent-Based Modeling by Marco Janssen. For more information see https://intro2abm.com/

Do microfinance institutes help slum-dwellers in coping with frequent disasters? An Agent-Based Modelling study by Mitali Yeshwant Joshi

The model aims to investigate the role of Microfinance Institutes (MFIs) in strengthening the coping capacity of slum-dwellers (residents) in case of frequent disasters. The main purpose of the model is system understanding. It aids in understanding the following research question: Are the microcredits provided by MFI to start a small business helpful in increasing coping capacity of a slum dweller for recovering from frequent and intense disasters?

City Sandbox by Javier Sandoval

This model grows land use patterns that emerge as a result of land-use compatibilities stablished in urban development plans, land topography, and street networks. It contains urban brushes to paint streets and land uses as a way to learn about urban pattern emergence through free experimentation.

Simulation model for citizenship competences and conflict resolution by Cecilia Avila Manuel Balaguera Valentina Tabares
This model represents an agent-based social simulation for citizenship competences. In this model people interact by solving different conflicts and a conflict is solved or not considering two possible escenarios: when individual citizenship competences are considered and when not. In both cases the TKI conflict resolution styles are considered. Each conflict has associated a competence and the information about the conflicts and their competences is retrieved from an ontology which was developed in Protégé. To do so, a NetLogo extension was developed using the Java programming language and the JENA API (to make queries over the ontology).

Telephone Game by Julia Kasmire
This is a model of a game of Telephone (also known as Chinese Whishpers in the UK), with agents representing people that can be asked, to play. The first player selects a word from their internal vocabulary and “whispers” it to the next player, who may mishear it depending on the current noise level, who whispers that word to the next player, and so on.

When the game ends, the word chosen by the first player is compared to the word heard by the last player. If they match exactly, all players earn large prize. If the words do not match exactly, a small prize is awarded to all players for each part of the words that do match. Players change color to reflect their current prize-count. A histogram shows the distribution of colors over all the players.

Port of Mars simplified by Marco Janssen
This is a simulation model to explore possible outcomes of the Port of Mars cardgame. Port of Mars is a resource allocation game examining how people navigate conflicts between individual goals and common interests relative to shared resources. The game involves five players, each of whom must decide how much of their time and effort to invest in maintaining public infrastructure and renewing shared resources and how much to expend in pursuit of their individual goals. In the game, “Upkeep” is a number that represents the physical health of the community. This number begins at 100 and goes down by twenty-five points each round, representing resource consumption and wear and tear on infrastructure. If that number reaches zero, the community collapses and everyone dies.

Sugarscape with spice by Marco Janssen

This is a variation of the Sugarspace model of Axtell and Epstein (1996) with spice and trade of sugar and spice. The model is not an exact replication since we have a somewhat simpler landscape of sugar and spice resources included, as well as a simple reproduction rule where agents with a certain accumulated wealth derive an offspring (if a nearby empty patch is available).
The model is discussed in Introduction to Agent-Based Modeling by Marco Janssen. For more information see https://intro2abm.com/

Diffusion of innovations by Marco Janssen

3 simple models to illustrate diffusion of innovations.
The models are discussed in Introduction to Agent-Based Modeling by Marco Janssen. For more information see https://intro2abm.com/

Rangeland and evolution of management styles by Marco Janssen

Provided is a landscape of properties where pastoralists make decisions how much livestock they put on their property and how much to suppress fire from occuring. Rangelands can be grass dominated, or unproductive shrubb dominated. Overgrazing and fire suppresion lead to shrub dominated landscapes. What management strategies evolve, and how is this impacted by policies?
The model is discussed in Introduction to Agent-Based Modeling by Marco Janssen. For more information see https://intro2abm.com/

Tram Commute by Julia Kasmire

A demonstration model showing how modellers can create a multi regional tram network with commuters, destinations and houses. The model offers options to create a random tram network made from modeller input or to load shapefiles for the Greater Manchester Metrolink.

BAM: The Bottom-up Adaptive Macroeconomics Model by Alejandro Platas López

Modeling an economy with stable macro signals, that works as a benchmark for studying the effects of the agent activities, e.g. extortion, at the service of the elaboration of public policies.

Flibs'NLogo - An elementary form of evolutionary cognition by Cosimo Leuci

Flibs’NLogo implements in NetLogo modelling environment, a genetic algorithm whose purpose is evolving a perfect predictor from a pool of digital creatures constituted by finite automata or flibs (finite living blobs) that are the agents of the model. The project is based on the structure described by Alexander K. Dewdney in “Exploring the field of genetic algorithms in a primordial computer sea full of flibs” from the vintage Scientific American

column “Computer Recreations”
As Dewdney summarized: “Flibs […] attempt to predict changes in their environment. In the primordial computer soup, during each generation, the best predictor crosses chromosomes with a randomly selected flib. Increasingly accurate predictors evolve until a perfect one emerges. A flib […] has a finite number of states, and for each signal it receives (a 0 or a 1) it sends a signal and enters a new state. The signal sent by a flib during each cycle of operation is its prediction of the next signal to be received from the environment”

Lethal Geometry by Kristin Crouse

Lethal Geometry examines the relationship between territory size and intergroup mortality risk under realistic assumptions. Furthermore, the model investigates how fertility is affected by this relationship. Territory sizes are expected to fluctuate over time in response to individual reproduction, random-walking, and lethal intergroup encounters. In turn, the individuals within these territories are expected to vary in their mortality and fertility rates.

Emergence of Small-World Networks in an Overlapping-Generation sModel of Social Dynamics, Trust and Economic Performance by Bogumił Kamiński Jakub Growiec Katarzyna Growiec

We study the impact of endogenous creation and destruction of social ties in an artificial society on aggregate outcomes such as generalized trust, willingness to cooperate, social utility and economic performance. To this end we put forward a computational multi-agent model where agents of overlapping generations interact in a dynamically evolving social network. In the model, four distinct dimensions of individuals’ social capital: degree, centrality, heterophilous and homophilous interactions, determine their generalized trust and willingness to cooperate, altogether helping them achieve certain levels of social utility (i.e., utility from social contacts) and economic performance. We find that the stationary state of the simulated social network exhibits realistic small-world topology. We also observe that societies whose social networks are relatively frequently reconfigured, display relatively higher generalized trust, willingness to cooperate, and economic performance – at the cost of lower social utility. Similar outcomes are found for societies where social tie dissolution is relatively weakly linked to family closeness.

Geographic Expansion Model (GEM) by Sean Bergin

The purpose of this model is to explore the importance of geographic factors to the settlement choices of early Neolithic agriculturalists. In the model, each agriculturalist spreads to one of the best locations within a modeler specified radius. The best location is determined by choosing either one factor such as elevation or slope; or by ranking geographic factors in order of importance.

ALABAMA-ABM by Bartosz Bartkowski Michael Strauch
A simple model that aims to demonstrate the influence of agri-environmental payments on land-use patterns in a virtual landscape. The landscape consists of grassland (which can be managed extensively or intensively) and a river. Agri-environmental payments are provided for extensive management of grassland. Additionally, there are boni for (a) extensive grassland in proximity of the river; and (b) clusters ("agglomerations") of extensive grassland. The farmers, who own randomly distributed grassland patches, make decisions either on the basis of simple income maximization or they maximize only up to an income threshold beyond which they seize making changes in management. The resulting landscape pattern is evaluated by means of three simple models for (a) agricultural yield, (b) habitat/biodiversity and (c) water quality. The latter two correspond to the two boni. The model has been developed within a small project called Aligning Agent-Based Modelling with Multi-Objective Land-Use Allocation (ALABAMA).

Most Downloaded Models

The most downloaded models included several that have been in the top five list before, but two newcomers, both models by Kristin Crouse and dealing with evolutionary dynamics.

1. Evolution of Sex by Kristin Crouse (161 downloads)
2. Dawkins Weasel by Kristin Crouse (138 downloads)
3. Increased costs of cooperation help cooperators in the long run by Paul Smaldino (136 downloads)
4. MOOvPOPsurveillance by Aniruddha Belsare Matthew Gompper Joshua J Millspaugh (111 downloads)
5. Agent-based Renewables model for Integrated Sustainable Energy (ARISE) by Muhammad Indra Al Irsyad Anthony Halog Rabindra Nepal (108 downloads)

We would like to thank the National Science Foundation for their support via grants NSF BCS-0623162, GEO-0909394, and IIS-1636796.