CoMSES Digest: Summer 2020

Volume 8, No. 2. March 16, 2020 – June 15, 2020

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Editor's Note

This is the second issue of Volume 8 of the Digest, and thus the second of a difficult year. When the first issue of this volume was published we in the U.S. were beginning to go into quarantine to try to flatten the curve of Covid-19 infections. Now many areas have reopened, but as I write this there are clear signs that Covid-19 has not left, and some places are delaying their reopening plans or considering steps back to closing. I know that other countries are at

different points along their own curves; some have achieved strong successes, while others are only beginning to face the challenges. Wherever your region is, I hope all of you are safe and well.

As in the last issue, the Calendar of Events is extremely provisional, with many conferences and workshops being postponed, canceled, or moved online. One example of moving online is the Winter School; the quality of the courses will remain high, even if the advantages of visiting Arizona in January are put aside for the moment. See the announcement below for more information.

Best,
John T. Murphy
CoMSES Digest Editor

CoMSES News

Open Modeling Foundation Update

Michael Barton, CoMSES Net Director
On 18-19 May, 32 scientists from the USA and Europe, representing 23 modeling organizations, met to discuss the Open Modeling Foundation initiative. With a few short presentations to provide attendees with context and background, most of the meeting was dedicated to discussion of the OMF initiative and its organization, community modeling standards, and the drafting of initial standards documents. The participants piloted a new collaborative decision-making platform, based on GitHub, as a way to work as an international organization with distributed governance to develop and administer common standards for modeling. The results of the outstanding efforts of the workshop participants can be seen in preliminary standards documents by clicking the 'View related issues' on any of the pages of the new site (https://openmodelingfoundation.github.io), which is now linked with the main OMF site at https://openmodelingfoundation.org. The documents and ideas contributed by the participants will be used as the basis for the next OMF planning meeting, provisionally planned for early September 2020. If you are interested in joining an OMF working group or if your organization is interested in becoming an OMF member organization, you can now indicate that on the OMF members page (https://openmodelingfoundation.org/membership/).

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

COMSES Net organizes a virtual Winter School on Agent-Based Modeling of Social-Ecological Systems from January 4-15, 2021

Purpose of the Winter School

The overall aim of the winter school is that the participants will learn about the opportunities and challenges of agent-based modeling of social-ecological systems. Participants will engage intensely with a few comprehensive models, learn best practices in doing modeling in a team, and learn about the different modeling challenges across the various social and natural sciences.

Content of the Course

The winter school has two main components: 1) lectures and 2) project work. In addition, participants will present their own work in speed talks. Lectures will introduce participants to different concepts in the social and natural sciences critical for modeling social-ecological systems, such as human behavior, collective behavior, resilience, and land cover change. Students will also learn and use best practices to do modeling (reproducibility, model documentation, analysis of models) and how to work together in remote teams using Github. The participants will be introduced to various stylized agent-based models of actual research projects on social-ecological systems. Groups of participants will chose one of the models and adapt, expand, and analyze the model to better understand the impact of a particular assumptions on the overall outcome of the social-ecological system. The models are written in NetLogo. Therefore, participants must be able to write NetLogo programming code.

Schedule

Due to the COVID-19 situation we will hold a virtual Winter School, spread out over 2 weeks from **January 4-15, 2021**. The online live interactive component is kept at four hours a day, which will be during the morning in Arizona, USA (GMT -7). The first week focuses on lectures, training in best practices and the start of group projects. The second week focuses on group projects and the presentation of the results.

For more information and to submit you application
see https://complexity.asu.edu/cbie/winterschool

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

The 34th annual European Simulation and Modelling Conference
(extended, late) Submission Deadline: July 15th
October 21-23, 2020
Toulouse, France
https://www.comses.net/events/580/

Complex Networks 2020: Ninth International Conference on Complex Networks and Their Applications
December 1-3, 2020
Madrid, Spain
Submission Deadline: September 2, 2020
https://www.comses.net/events/583/

Conferences and Workshops

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

SBP_BRiMS (In person, new dates)
Conference: Oct 18-21, 2020
Washington D.C., USA
https://www.comses.net/events/564/

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

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/

Complex Networks 2020: Ninth International Conference on Complex Networks and Their Applications
December 1-3, 2020
Madrid, Spain
https://www.comses.net/events/583/

Courses

Westgrid Resource Computing Summer School
Through July 6th
https://www.comses.net/events/581/

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

Grimm & Railsback Agent-based Modeling Workshop (Online; Registration Closed)
July 27 – August 4, 2020
Humboldt State University, Arcata, California, USA
https://www.comses.net/events/576/

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

Model Library

Newly Reviewed:

Eleven 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!

- MIOvPOPsurveillance by Aniruddha Belsare
- NetLogo model of USA mass shootings by Smarzhevskiy Ivan
- BAMERS: Macroeconomic effect of extortion by Alejandro Platas López
- Neighbor Influenced Energy Retrofit (NIER) agent-based model by Eric Boria
- Hydroman by Dean Massey and Moira Zellner
- Multilevel Group Selection I by Garry Sotnik
- General Housing Model by J M Applegate
- The Garbage Can Model of Organizational Choice by Guido Fioretti
- Emergence of Organizations out of Garbage Can Dynamics by Guido Fioretti
- OfficeMoves: Personalities and Performance in an Interdependent Environment by Alan Dugger
- FishMob: Interactions between fisher mobility and spatial resource heterogeneity by Emilie Lindkvist

New Model Uploads

More new models were uploaded this quarter than in any other period of the Digest's history. Forty new models were published, resoundingly passing the previous highest count for a single quarter of 30. The models included three that examined aspects of Covid-19. Three of the submissions were written in Python and two (including one of the Covid-19 simulations) were in Gama. Also represented were isolated submissions in Python, Java, and R (without toolkits), as well as submissions in Repast, Swarm, and NetworkX. The remaining submissions were in NetLogo, including one that linked NetLogo to a tool for simulating energy use in buildings called EnergyPlus.

Exploring the Effects of Link Recommendations on Social Networks

Ciara Sibley Andrew Crooks | Published Thu Mar 19 16:42:22 2020

The purpose of this model is explore how “friend-of-friend” link recommendations, which are commonly used on social networking sites, impact online social network structure. Specifically, this model generates online social networks, by connecting individuals based upon varying proportions of a) connections from the real world and b) link recommendations. Links formed by recommendation mimic mutual connection, or friend-of-friend algorithms. Generated networks can then be analyzed, by the included scripts, to assess the influence that different proportions of link recommendations have on network properties, specifically: clustering, modularity, path length, eccentricity, diameter, and degree distribution.

Artificial Long House Valley

Amy Warren Lisa Sattenspiel | Published Thu Mar 19 17:42:38 2020

This model extends the original Artifical Anasazi (AA) model to include individual agents, who vary in age and sex, and are aggregated into households. This allows more realistic simulations of population dynamics within the Long House Valley of Arizona from AD 800 to 1350 than are possible in the original model. The parts of this model that are directly derived from the AA model are based on Janssen’s 1999 Netlogo implementation of the model; the code for all extensions and adaptations in the model described here (the Artificial Long House Valley (ALHV) model) have been written by the authors. The AA model included only ideal and homogeneous “individuals” who do not participate in the population processes (e.g., birth and death)–these processes were assumed to act on entire households only. The ALHV model incorporates actual individual agents and all demographic processes affect these individuals. Individuals are aggregated into households that participate in annual agricultural and demographic cycles. Thus, the ALHV model is a combination of individual processes (birth and death) and household-level processes (e.g., finding suitable agriculture plots).

Artificial Long House Valley-Black Mesa

Amy Warren Lisa Sattenspiel | Published Thu Mar 19 18:26:20 2020

This model is an extension of the Artificial Long House Valley (ALHV) model developed by the authors (Swedlund et al. 2016; Warren and Sattenspiel 2020). The ALHV model simulates the population dynamics of individuals within the Long House Valley of Arizona from AD 800 to 1350. Individuals are aggregated

into households that participate in annual agricultural and demographic cycles. The present version of the model incorporates features of the ALHV model including realistic age-specific fertility and mortality and, in addition, it adds the Black Mesa environment and population, as well as additional methods to allow migration between the two regions.

Exploring Urban Shrinkage

Andrew Crooks | Published Thu Mar 19 22:15:47 2020

While the world's total urban population continues to grow, this growth is not equal. Some cities are declining, resulting in urban shrinkage which is now a global phenomenon. Many problems emerge due to urban shrinkage including population loss, economic depression, vacant properties and the contraction of housing markets. To explore this issue, this paper presents an agent-based model stylized on spatially explicit data of Detroit Tri-county area, an area witnessing urban shrinkage. Specifically, the model examines how micro-level housing trades impact urban shrinkage by capturing interactions between sellers and buyers within different sub-housing markets. The stylized model results highlight not only how we can simulate housing transactions but the aggregate market conditions relating to urban shrinkage (i.e., the contraction of housing markets). To this end, the paper demonstrates the potential of simulation to explore urban shrinkage and potentially offers a means to test polices to alleviate this issue.

Impacts of consensus protocols and trade network topologies on blockchain system performance

Zhou HE | Published Fri Mar 20 14:45:52 2020

This model is programmed in Python 3.6. We model how different consensus protocols and trade network topologies affect the performance of a blockchain system. The model consists of multiple trader and miner agents (Trader.py and Tx.py), and one system agent (System.py). We investigated three consensus protocols, namely proof-of-work (PoW), proof-of-stake (PoS), and delegated proof-of-stake (DPoS). We also examined three common trade network topologies: random, small-world, and scale-free. To reproduce our results, you may need to create some databases using, e.g., MySQL; or read and write some CSV files as model configurations.

Agent-based model of repeated conservation auctions in low-income countries

Elsa Cardona Hugo Storm Sebastian Rasch | Published Sun Mar 22 20:48:37 2020

Our model allows simulating repeated conservation auctions in low-income countries. It is designed to assess policy-making by exploring the extent to

which non-targeted repeated auctions can provide biodiversity conservation cost-effectively, while alleviating poverty. Targeting landholders in order to integrate both goals is claimed to be overambitious and underachieving because of the trade-offs they imply. The simulations offer insight on the possible outcomes that can derive from implementing conservation auctions in low-income countries, where landholders are likely to be risk averse and to face uncertainty.

BAMERS: Macroeconomic effect of extortion

Alejandro Platas López | Published Mon Mar 23 16:32:53 2020

Inspired by the European project called GLODERS that thoroughly analyzed the dynamics of extortive systems, Bottom-up Adaptive Macroeconomics with Extortion (BAMERS) is a model to study the effect of extortion on macroeconomic aggregates through simulation. This methodology is adequate to cope with the scarce data associated to the hidden nature of extortion, which difficults analytical approaches. As a first approximation, a generic economy with healthy macroeconomics signals is modeled and validated, i.e., moderate inflation, as well as a reasonable unemployment rate are warranteed. Such economy is used to study the effect of extortion in such signals. It is worth mentioning that, as far as is known, there is no work that analyzes the effects of extortion on macroeconomic indicators from an agent-based perspective. Our results show that there is significant effects on some macroeconomics indicators, in particular, propensity to consume has a direct linear relationship with extortion, indicating that people become poorer, which impacts both the Gini Index and inflation. The GDP shows a marked contraction with the slightest presence of extortion in the economic system.

Non-attentional visual information transmission in groups under predation

J. Fransje Weerden, van | Published Wed Mar 25 16:30:30 2020

Our aim is to show effects of group living when only low-level cognition is assumed, such as pattern recognition needed for normal functioning, without assuming individuals have knowledge about others around them or warn them actively.
The model is of a group of vigilant foragers staying within a patch, under attack by a predator. The foragers use attentional scanning for predator detection, and flee after detection. This fleeing action constitutes a visual cue to danger, and can be received non-attentionally by others if it occurs within their limited visual field. The focus of this model is on the effectiveness of this non-attentional visual information reception.

PoliSEA: model of Policy – Social Ecological system Adaptation

Kirill Orach Maja Schlüter | Published Thu Mar 26 22:39:21 2020

PoliSEA represents a continuous policy process cycle, integrated with the dynamics of a fishery social-ecological system. The policy process in the model is represented by interactions between policymakers and interest groups and subsequent voting during which policymaker decide to increase or decrease the fishing quota for the next season. Policymakers' positions can be influenced by lobbying of interest groups or interest group coalitions. The quota adopted through the policy process determines the amount of fish that can be harvested from the fish population during the season.

Neighbor Influenced Energy Retrofit (NIER) agent-based model

Eric Boria | Published Fri Apr 3 02:19:28 2020

The NIER model is intended to add qualitative variables of building owner types and peer group scales to existing energy efficiency retrofit adoption models. The model was developed through a combined methodology with qualitative research, which included interviews with key stakeholders in Cleveland, Ohio and Detroit and Grand Rapids, Michigan. The concepts that the NIER model adds to traditional economic feasibility studies of energy retrofit decision-making are differences in building owner types (reflecting strategies for managing buildings) and peer group scale (neighborhoods of various sizes and large-scale Districts). Insights from the NIER model include: large peer group comparisons can quickly raise the average energy efficiency values of Leader and Conformist building owner types, but leave Stigma-avoider owner types as unmotivated to retrofit; policy interventions such as upgrading buildings to energy-related codes at the point of sale can motivate retrofits among the lowest efficient buildings, which are predominantly represented by the Stigma-avoider type of owner; small neighborhood peer groups can successfully amplify normal retrofit incentives.

AncientS-ABM: Agent-Based Modeling of Past Societies Social Organization

Angelos Chliaoutakis | Published Thu Apr 9 16:21:19 2020

AncientS-ABM is an agent-based model for simulating and evaluating the potential social organization of an artificial past society, configured by available archaeological data. Unlike most existing agent-based models used in archaeology, our ABM framework includes completely autonomous, *utility-based*agents. It also incorporates different social organization paradigms, different decision-making processes, and also different cultivation technologies used in ancient societies. Equipped with such paradigms, the model allows us

to explore the transition from a simple to a more complex society by focusing on the historical social dynamics; and to assess the influence of social organization on agents' population growth, agent community numbers, sizes and distribution.

Market-level effects of firm-level adaptation and intermediation in networked markets of fresh foods: a case study in Colombia.

Cesar Garcia-Diaz | Published Sun Apr 12 00:53:47 2020 | Last modified Sun Apr 12 05:40:52 2020

This a model developed as a part of the paper Mejía, G. & García-Díaz, C. (2018). Market-level effects of firm-level adaptation and intermediation in networked markets of fresh foods: a case study in Colombia. Agricultural Systems 160: 132-142.

It simulates the competition dynamics of the potato market in Bogotá, Colombia. The model explores the economic impact of intermediary actors on the potato supply chain.

MIOvPOPsurveillance

Aniruddha Belsare | Published Mon Apr 13 20:51:19 2020

MI*Ov*POPsurveillance is set up to simulate harvest-based chronic wasting disease (CWD) surveillance of white-tailed deer *(Odocoileus virginianus)* populations in select Michigan Counties. New regions can be readily added, also the model can be readily adapted for other disease systems and used for informed-decision making during planning and implementation stages of disease surveillance in wildlife and free-ranging species.

Hybrid Agent-Based and Equation Based Model for Infectious Disease Spread

Elizabeth Hunter Brian Mac Namee John Kelleher | Published Sun Apr 19 20:00:38 2020

Our model is hybrid agent-based and equation based model for human air-borne infectious diseases measles. It follows an SEIR (susceptible, exposed,infected, and recovered) type compartmental model with the agents moving be-tween the four state relating to infectiousness. However, the disease model can switch back and forth between agent-based and equation based depending on the number of infected agents. Our society model is specific using the data to create a realistic synthetic population for a county in Ireland. The model includes transportation with agents moving between their current location and desired destination using predetermined destinations or destinations selected using a gravity model.

Gender differentiation model

Sylvie Huet | Published Mon Apr 20 16:01:40 2020 | Last modified Thu Apr 23 08:12:47 2020

This is a gender differentiation model in terms of reputations, prestige and self-esteem (presented in a paper submitted to Nature Human Behaviour). The model is based on the influence function of the Leviathan model (Deffuant, Carletti, Huet 2013 and Huet and Deffuant 2017) considering two groups.

This agent-based model studies how inequalities can be explained by the difference of open-mindness between two groups of interacting agents. We consider agents having an opinion/esteem about each other and about themselves. During dyadic meetings, agents change their respective opinion about each other and possibly about other agents they gossip about, with a noisy perception of the opinions of their interlocutor. Highly valued agents are more influential in such encounters. We study an heterogeneous population of two different groups: one more open to influence of others, taking less into account their perceived difference of esteem, called L; a second one less prone to it, called S, who designed the credibility they give to others strongly based on how higher or lower valued than themselves they perceive them.

FIBE - FIsher BEhaviour model

Nanda Wijermans Maja Schlüter Kirill Orach Wijnand Boonstra Jonas Hentati-Sundberg |
Published Mon Apr 20 19:13:24 2020

FIBE represents a simple fishery model. Fish that reproduce and fisher with different fishing styles that fish as their main source of income. The aim of the model is to reflect the different fishing behaviours as described and observed in the (Swedish) Baltic Sea fishery and explore the consequences of different approximations of human/fisher behaviour in under different environmental and managerial scenarios.

The overarching aim is to advance the incorporation and understanding of human behaviour (diversity) in fisheries research and management. In particular focusing on insights from social (fishery) science of fisher behaviour.

The Garbage Can Model of Organizational Choice

Guido Fioretti | Published Mon Apr 20 21:34:57 2020 | Last modified Thu Apr 23 18:55:40 2020

The Garbage Can Model of Organizational Choice is a fundamental model of organizational decision-making originally proposed by J.D. Cohen, J.G. March and J.P. Olsen in 1972. In the 2000s, G. Fioretti and A. Lomi presented a NetLogo agent-based interpretation of this model. This code is the NetLogo 6.1.1 updated version of the Fioretti-Lomi model.

Emergence of Organizations out of Garbage Can Dynamics

Guido Fioretti | Published Mon Apr 20 22:44:34 2020 | Last modified Sun Apr 26 12:54:56 2020

The Garbage Can Model of Organizational Choice (GCM) is a fundamental model of organizational decision-making originally propossed by J.D. Cohen, J.G. March and J.P. Olsen in 1972. In their model, decisions are made out of random meetings of decision-makers, opportunities, solutions and problems within an organization.
With this model, these very same agents are supposed to meet in society at large where they make decisions according to GCM rules. Furthermore, under certain additional conditions decision-makers, opportunities, solutions and problems form stable organizations. In this artificial ecology organizations are born, grow and eventually vanish with time.

COVID-19 ABM

Gudrun Wallentin | Published Tue Apr 21 07:20:07 2020 | Last modified Tue Apr 21 08:59:02 2020

Model of the Corona pandemic outbreak

The COVID-19 ABM aims to predict the qualitative behaviour of the CoViD-19 epidemic dynamics for the greater region of Salzburg City. Specifically, by means of scenario testing, it aims to help assessing how containment interventions can allow a stepwise relaxation of the lockdown without risking a new outbreak.

Introduction of a contact tracking app for outbreak control

Tim Verwaart | Published Tue Apr 21 08:29:23 2020

The application of a smartphone application to register physical encounters between individuals is considered by public health authorities, as a means to reduce the number of infections in the 2020 COVID-19 pandemic. The general idea is that continuous registration of all other smartphones in the vicinity of an individual’s smartphone potentially enables early warning of the owners of the other smartphones, in case the individual is tested positive as infected. Those other individuals can then go into isolation and be considered for testing. The purpose of the present simulation is to explore the potential effects of this application on frequencies of infection, isolation, and positive and negative infection test results.

Multilevel Group Selection I

Garry Sotnik | Published Tue Apr 21 18:07:27 2020 | Last modified Tue Apr 28 03:46:31 2020

The Multilevel Group Selection I (MGS I) model simulates a population of contributing and non-contributing agents, competing on a social landscape for higher-value spots in an effort to withstand some selection pressure. It may be

useful to both scientists and students in hypothesis testing, theory development, or more generally in understanding multilevel group selection.

Ornstein-Uhlenbeck Pandemic package

Peter Cotton | Published Fri Apr 24 19:52:12 2020 | Last modified Fri May 8 15:16:02 2020

Pandemic (pip install pandemic)

An agent model in which commuting, compliance, testing and contagion parameters drive infection in a population of thousands of millions. Agents follow Ornstein-Uhlenbeck processes in the plane and collisions drive transmission. Results are stored at SwarmPrediction.com for further analysis, and can be retrieved by anyone.

This is a very simple simulation that in a special case can be shown to be approximated by a compartmental model with time varying infection rate.

Traffic and Shipments out of Inter-Firm Communication in a Textile Industrial District

Guido Fioretti Guido Fioretti | Published Mon Apr 27 16:20:15 2020

This article presents an agent-based model of an Italian textile district where thousands of small firms specialize in particular phases of fabrics production. It reconstructs the web of communication between firms as they arrange production chains. In turn, production chains result in road traffic between the geographical areas on which the district extends. The reconstructed traffic exhibits a pattern that has been observed, but not foreseen, by policy makers.

Community Forest Management with Monitoring and Sanctioning

Maya Lapp | Published Wed Apr 29 18:51:33 2020

This NetLogo ABM builds on Elena Vallino's model of Loggers using community-based natural resource management for a forest ecosystem. In it we introduce an alternative mechanism for Logger cheating and enforcement of CBNRM rules.

Reflexivity in a diffusion of innovations model

Carlos Cordoba Cesar Garcia-Diaz | Published Thu May 7 00:32:38 2020

In this agent-based model, agents decide to adopt a new product according to a utility function that depends on two kinds of social influences. First, there is a local influence exerted on an agent by her closest neighbors that have already adopted, and also by herself if she feels the product suits her personal needs. Second, there is a global influence which leads agents to adopt when they become aware of emerging trends happening in the system. For this, we endow

agents with a reflexive capacity that allows them to recognize a trend, even if they can not perceive a significant change in their neighborhood.

Results reveal the appearance of slowdown periods along the adoption rate curve, in contrast with the classic stylized bell-shaped behavior. Results also show that network structure plays an important role in the effect of reflexivity: while some structures (e.g., scale-free networks) may amplify it, others (e.g., small-world structure) weaken such an effect.

Peer review model with heterogeneous grade language

Thomas Feliciani Ramanathan Moorthy Pablo Lucas Kalpana Shankar | Published Thu May 7 07:39:49 2020

This ABM re-implements and extends the simulation model of peer review described in Squazzoni & Gandelli (Squazzoni & Gandelli, 2013 - doi:10.18564/jasss.2128) (hereafter: 'SG'). The SG model was originally developed for NetLogo and is also available in CoMSES at this link.
The purpose of the original SG model was to explore how different author and reviewer strategies would impact the outcome of a journal peer review system on an array of dimensions including peer review efficacy, efficiency and equality. In SG, reviewer evaluation consists of a continuous variable in the range [0,1], and this evaluation scale is the same for all reviewers. Our present extension to the SG model allows to explore the consequences of two more realistic assumptions on reviewer evaluation: (1) that the evaluation scale is discrete (e.g. like in a Likert scale); (2) that there may be differences among their interpretation of the grades of the evaluation scale (i.e. that the grade language is heterogeneous).

Human Resource Management Parameter Experimentation Tool

Carmen Iasiello | Published Thu May 7 16:59:33 2020

The agent based model presented here is an explicit instantiation of the Two-Factor Theory (Herzberg et al., 1959) of worker satisfaction and dissatisfaction. By utilizing agent-based modeling, it allows users to test the empirically found variations on the Two-Factor Theory to test its application to specific industries or organizations.

General Housing Model

J Applegate | Published Thu May 7 23:35:58 2020

The General Housing Model demonstrates a basic housing market with bank lending, renters, owners and landlords. This model was developed as a base to which students contributed additional functions during Arizona State

University's 2020 Winter School: Agent-Based Modeling of Social-Ecological Systems.

Simulating Sustainability of Collective Awareness Platform for Sustainability and Social Innovation (CAPS)

Peter Gerbrands | Published Fri May 8 20:34:42 2020

In an associated paper which focuses on analyzing the structure of several egocentric networks of collective awareness platforms for sustainable innovation (CAPS), this model is developed. It answers the question whether the network structure is determinative for the sustainability of the created awareness. Based on a thorough literature review a model is developed to explain and operationalize the concept of sustainability of a social network in terms of importance, effectiveness and robustness. By developing this agent-based model, the expected outcomes after the dissolution of the CAPS are predicted and compared with the results of a network with the same participants but with different ties. Twitter data from different CAPS is collected and used to feed the simulation. The results show that the structure of the network is of key importance for its sustainability. With this knowledge and the ability to simulate the results after network changes have taken place, CAPS can assess the sustainability of their legacy and actively steer towards a longer lasting potential for social innovation. The retrieved knowledge urges organizations like the European Commission to adopt a more blended approach focusing not only on solving societal issues but on building a community to sustain the initiated development.

Hydroman

Dean Massey Moira Zellner | Published Sat May 16 17:02:25 2020

Hydroman is a flexible spatially explicit model coupling human and hydrological processes to explore shallow water tables and land cover interactions in flat agricultural landscapes, modeled after the Argentine Pampas. Hydroman aligned well with established hydrological models, and was validated with water table patterns and crop yield observed in the study area.

FlowLogo for a real case study

Vahid Aghaie | Published Mon May 18 13:45:18 2020

Juan Castilla-Rho et al. (2015) developed a platform, named FLowLogo, which integrates a 2D, finite-difference solution of the governing equations of groundwater flow with agent-based simulation. We used this model for Rafsanjan Aquifer, which is located in an arid region in Iran. To use FLowLogo for a real case study, one needs to add GIS shapefiles of boundary conditions

and modify the code written in NetLogo a little bit. The FlowLogo model used in our research is presented here.

Eco-Evolutionary Pathways Toward Industrial Cities

Handi Chandra Putra | Published Thu May 21 15:41:22 2020

Industrial location theory has not emphasized environmental concerns, and research on industrial symbiosis has not emphasized workforce housing concerns. This article brings jobs, housing, and environmental considerations together in an agent-based model of industrial
and household location. It shows that four classic outcomes emerge from the interplay of a relatively small number of explanatory factors: the isolated enterprise with commuters; the company town; the economic agglomeration; and the balanced city.

An agent-based model of building occupant behavior during load shedding

Handi Chandra Putra | Published Thu May 21 15:50:44 2020

Load shedding enjoys increasing popularity as a way to reduce power consumption in buildings during hours of peak demand on the electricity grid. This practice has well known cost saving and reliability benefits for the grid, and the contracts utilities sign with their “interruptible” customers often pass on substantial electricity cost savings to participants. Less well-studied are the impacts of load shedding on building occupants, hence this study investigates those impacts on occupant comfort and adaptive behaviors. It documents experience in two office buildings located near Philadelphia (USA) that vary in terms of controllability and the set of adaptive actions available to occupants. An agent-based model (ABM) framework generalizes the case-study insights in a “what-if” format to support operational decision making by building managers and tenants. The framework, implemented in EnergyPlus and NetLogo, simulates occupants that have heterogeneous thermal and lighting preferences. The simulated occupants pursue local adaptive actions such as adjusting clothing or using portable fans when central building controls are not responsive, and experience organizational constraints, including a corporate dress code and miscommunication with building managers. The model predicts occupant decisions to act fairly well but has limited ability to predict which specific adaptive actions occupants will select.

The Coevolution of the Firm and the Product Attribute Space

Cesar Garcia-Diaz | Published Fri May 22 00:06:28 2020

This model inspects the performance of firms as the product attribute space changes, which evolves as a consequence of firms’ actions. Firms may create

new product variants by dragging demand from other existing variants. Firms decide whether to open new product variants, to invade existing ones, or to keep their variant portfolio. At each variant there is a Cournot competition each round. Competition is nested since many firms compete at many variants simultaneously, affecting firm composition at each location (variant).

After the Cournot outcomes, at each round firms decide whether to (i) keep their existing product variant niche, (ii) invade an existing variant, (iii) create a new variant, or (iv) abandon a variant. Firms' profits across their niche take into consideration the niche-width cost and the cost of opening a new variant.

Wildlife-Human Interactions in Shared Landscapes (WHISL)

Andres Baeza-Castro Neil Carter Nicholas Magliocca | Published Fri May 22 17:39:50 2020

This model simulates a group of farmers that have encounters with individuals of a wildlife population. Each farmer owns a set of cells that represent their farm. Each farmer must decide what cells inside their farm will be used to produce an agricultural good that is self in an external market at a given price. The farmer must decide to protect the farm from potential encounters with individuals of the wildlife population. This decision in the model is called "fencing". Each time that a cell is fenced, the chances of a wildlife individual to move to that cell is reduced. Each encounter reduces the productive outcome obtained of the affected cell. Farmers, therefore, can reduce the risk of encounters by exclusion. The decision of excluding wildlife is made considering the perception of risk of encounters. In the model, the perception of risk is subjective, as it depends on past encounters and on the perception of risk from other farmers in the community. The community of farmers passes information about this risk perception through a social network. The user (observer) of the model can control the importance of the social network on the individual perception of risk.

COMOKIT

Alexis Drogoul Benoit Gaudou Patrick Taillandier Kevin Chapuis Nghi Huyng Quang Doanh Nguyen Ngoc Arthur BrugièrePierre Larmande Marc Choisy Damien Philippon | Published Tue May 26 08:04:35 2020 | Last modified Wed Jul 1 02:49:02 2020

In the face of the COVID-19 pandemic, public health authorities around the world have experimented, in a short period of time, with various combinations of interventions at different scales. However, as the pandemic continues to progress, there is a growing need for tools and methodologies to quickly analyze the impact of these interventions and answer concrete questions regarding their effectiveness, range and temporality.

COMOKIT, the COVID-19 modeling kit, is such a tool. It is a computer model that allows intervention strategies to be explored *in silico* before their possible implementation phase. It can take into account important dimensions of policy actions, such as the heterogeneity of individual responses or the spatial aspect of containment strategies.

In **COMOKIT**, built using the agent-based modeling and simulation platform GAMA, the profiles, activities and interactions of people, person-to-person and environmental transmissions, individual clinical statuses, public health policies and interventions are explicitly represented and they all serve as a basis for describing the dynamics of the epidemic in a detailed and realistic representation of space.

The Internal Organizational Plasticity Model (IOP 2.1.2)

Davide Secchi | Published Tue Jun 2 18:15:51 2020

IOP 2.1.2 is an agent-based simulation model designed to explore the relations between (1) employees, (2) tasks and (3) resources in an organizational setting. By comparing alternative cognitive strategies in the use of resources, employees face increasingly demanding waves of tasks that derive by challenges the organization face to adapt to a turbulent environment. The assumption tested by this model is that a successful organizational adaptation, called *plastic*, is necessarily tied to how employees handle pressure coming from existing and new tasks. By comparing alternative cognitive strategies, connected to 'docility' (Simon, 1993; Secchi, 2011) and 'extended' cognition (Clark, 2003, Secchi & Cowley, 2018), **IOP 2.1.2** is an attempt to indicate which strategy is most suitable and under which scenario.

The NetLogo HIV Spread Model Exploring Impact of PrEP Indication Guidelines

Arthur Hjorth Wouter Vermeer Uri Wilensky | Published Fri Jun 5 08:37:13 2020

This agent-based model was built as part of a replication effort of Jeness et al.'s work (linked below). The model simulates an MSM sexual activity network for the purpose of modeling the effects of respectively PrEP and ART on HIV prevention. The purpose of the model is to explore the differences between differerent interpretations of the NIH Indication Guidelines for PrEP.

Threshold Public Goods Game Models with Punishment

Gabriela Koľveková Manuela Raisová Martin Zoričak Vladimir Gazda | Published Sat Jun 6 16:52:54 2020

This is a set of threshold public goods games models. Set consists of baseline model, endogenous shared punishment model, endogenous shared

punishment model with activists and cooperation model. In each round, all agents are granted a budget of size set in GUI. Then they decide on how much they contribute to public goods and how much they keep. Public goods are provided only if the sum of contributions meets or exceeds the threshold defined in the GUI. After each round agents evaluate their strategy and payoff from this strategy.

OfficeMoves: Personalities and Performance in an Interdependent Environment
Alan Dugger | Published Thu Jun 11 23:12:05 2020

After a little work experience, we realize that different kinds of people prefer different work environments: some enjoy a fast-paced challenge; some want to get by; and, others want to show off.

From that experience, we also realize that different kinds of people affect their work environments differently: some increase the pace; some slow it down; and, others make it about themselves.

This model concerns how three different kinds of people affect their work environment and how that work environment affects them in return. The model explores how this circular relation between people's preferences and their environment creates patterns of association and performance over time.

Most Downloaded Models

The most downloaded models included models of geographic expansion (Sean Bergin), agricultural disease surveillance strategies (Aniruddha Belsare), banking networks (Valentina Guleva), and- as last quarter- two by Kristin Crouse on evolutionary dynamics.

1. Fertility Tradeoffs by Kristin Crouse (114 downloads)
2. Dynamic Interbank Network Simulator by Valentina Guleva (109 downloads)
3. The Hawk-Dove Game byKristin Crouse (106 downloads)
4. MOOvPOPsurveillance by Aniruddha Belsare, Matthew Gompper, and Joshua J Millspaugh (98 downloads)
5. Geographic Expansion Model (GEM) by Sean Bergin (87 downloads)

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