CoMSES NETWORK | OpenABM

CoMSES Digest: Fall 2022

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Editor's Note

Greetings from the CoMSES Net team! The CoMSES community is continuing to grow as interest in agent-based models soars. The complex nature of many of today's social and ecological problems continues to drive researchers towards ABM as an important and effective tool to better analyze and understand pressing global issues. We urge all of you to continue contributing your time as well as your models to CoMSES so that future research continues to advance.

In this issue our guest editors, Andrew Bell, Uta Berger, Tatiana Filatova, Volker Grimm, and colleagues, describe a new initiative into the advancement of reusable building blocks in agent-based models:

If you are an ABMer,[1] or aspire to be one, then it's likely the following things are all true for you:

1. You've wondered how best to model an agent behavior, and wished it was easier to see what others have done and what worked/did not work, especially since you feel a certain decision or types of interactions have been already coded before;
2. You've wanted to adopt ideas from someone else's model, but only those useful for your needs, and found it hard to access just the pieces of myriads of computational codes written by others;
3. You've seen the same decision of a farmer, household, fish or tree agent coded over and over again by others, and you are now lost among the alternatives;
4. You've written a little piece of code and thought, 'I'm going to use that again', but you forgot the details of your solution when you looked at your efficient code again months later;
5. You may also have thought, 'I bet others could find it useful, if I shared it.', but you're still waiting for someone to ask about it.

Advances in the area of agent-based modeling have been stymied by slow convergence around computational standards and agreed-upon approaches to representing behaviors and environments. As a means to address this, members of our community have for many years advocated the sharing of model components (or modules, primitives, building blocks, with varying degrees of scale and complexity). Regardless of the name used, the underlying idea is the same: a small piece of code needed for a task that an agent or a group of agents perform that can be properly applied across a broad class of ABMs. Software engineers call them "design patterns" following older ideas of "numerical recipes" and "pattern languages" for architecture, towns, and buildings. Although we are ostensibly professionals in the areas of social science and human interactions, we have yet to succeed in getting this engine of inter-researcher exchange going, another example of the "cobbler's children have no shoes" syndrome.

This time, it's going to work.

As a consortium of sharing-motivated ABMers, we are developing an experiment in model 'building block' sharing, learning from this to develop a platform that allows demand and supply for sharing to meet. We plan for a searchable repository of 're-usable building blocks' (RBB) for ABM development that is easy to contribute to, paired with a discussion forum where demand for modeling tools can be expressed, and where open questions in ABM development may be informed. Think 'Stack Overflow,' but for us.

Over the coming weeks, we will be finalizing our pilot design and user testing across our consortium, with a plan to launch our pilot in late October. If you would like to be notified when our pilot launches, or be a part of early user testing, or simply wish to be connected with this effort in some way – please send us an email! bellar@bu.edu, or t.filatova@tudelft.nl.

[1]Agent-based modeler (ABMer) also known as 'A-beamer': a scientist, practitioner or student interested in creating computational models of societies, economies, regions, cities, communities, organizations or plant and animal species, sometimes linked to environmental or technological systems. In ecology, ABMs are often called "individual-based models", but they are still ABMs.

CoMSES News

Newly Funded CUAHSI Activities
Jerad Bales, CUAHSI

CUAHSI has been funded for three major activities through the new NOAA Cooperative Institute for Research to Operations in Hydrology at the University of Alabama. (1) An Analysis and Demonstration of the National Water Model's Applicability to Community Resilience Planning, will be funded in partnership with the Global Resilience Institute at Northeastern University. The goal of the project is to better understand how communities, apply (or could apply) the National Water Model (NWM) to conduct resilience planning, to demonstrate a set of applications with local communities, and to investigate how the NWM could help address the prevalent lack of capacity that some communities face that prevents them from engaging in resilience planning. (2) Enhance HydroShare to support large and distributed data such as those created by modern modeling and data analysis studies. (3) Redesign and reimplement core HydroShare functionality in a cloud deployment environment, leveraging by container encapsulated cloud applications and infrastructure-as-code deployment tooling to support easy application upgrades and porting.

These activities are supportive of CoMSES goals. Sign up for the CUAHSI newsletter here.

CoMSES Net Is Hiring!

As part of the ASU College of Global Futures, our mission is to improve the ways we understand and collectively navigate our increasingly complex world. We currently have openings for two full-time research software engineers to help support a diverse, international community of interdisciplinary scientists and researchers who use computational methods and research software to better understand and adapt to our rapidly changing world. Join CoMSES Net and help us build software tools that support open, transparent, reusable, and interoperable scientific computation in the study of complex social and natural systems.

For more information, please email us at: editors@comses.net

New Publications

Recently, two perspective papers were published in leading international journals calling for FAIR practices in modeling. The authors included CoMSES.Net members and partners. "How to make models more useful" was published in the Proceedings of the National Academy of Sciences (US). "Making modeling and software FAIR" was published in Environmental Modelling & Software. Full citations are below.

Barton, C.M., Ames, D., Chen, M., Frank, K., Jagers, H.R.A., Lee, A., Reis, S., Swantek, L., 2022. Making modeling and software FAIR. Env. Mod. Software 156, 105496. https://doi.org/10.1016/j.envsoft.2022.105496

Barton, C.M., Lee, A., Janssen, M.A., van der Leeuw, S., Tucker, G.E., Porter, C., Greenberg, J., Swantek, L., Frank, K., Chen, M., Jagers, H.R.A., 2022. How to make models more useful. PNAS 119, e2202112119. https://doi.org/10.1073/pnas.2202112119

Additionally, a paper discussing containerization for models was published by members of the CoMSES.Net core team. The full citation is below.

Vanegas Ferro, M., Lee, A., Pritchard, C., Barton, C.M., Janssen, M.A., 2022. Containerization for creating reusable model code. Socio-Environmental Systems Modelling 3, 18074–18074. https://doi.org/10.18174/sesmo.18074

Codebase Augmentation Pilot Project

The CoMSES Team is collecting computational models from different domains and manually curating them to adhere to good FAIR practices and building durable containerization recipes (i.e., Dockerfile and Singularity recipes with archival best practices in mind) for these models that support execution on any Docker or Singularity supported machine as well as the Open Science Grid. The current set of computational models being curated are available at https://github.com/comses-education#codebase-augmentation-pilot-project- if you would like to submit a computational model for consideration for our codebase augmentation pilot project, please let us know!

Update your CoMSES Profile!

Please consider keeping the CoMSES community informed by updating your user account on CoMSES Net! Let fellow researchers and modelers get to know you by including a biography, research interests, and/or institutional affiliation. You can navigate to your account in the upper right corner of the website to edit your profile and link your account to GitHub and ORCID. As always, feel free to join the conversation by visiting the Forums tab or by starting a discussion on a specific model, event, or job posting.

Calendar of Events

Please follow the links to the local event organizers for the latest information or go to https://comses.net/events/ for a listing of all recent events. You can also subscribe to new events by following us on Twitter or subscribing to our RSS Events feed.

Upcoming Deadlines

CfP: Computing Conference 2023
Dates: Thursday, June 22, 2023 - Friday, June 23, 2023
Submission Deadline: Saturday, October 15, 2022

Computing Conference (formerly called Science and Information (SAI) Conference) is a research conference held in London, UK since 2013. The conference series has featured keynote talks, special sessions, poster presentation, tutorials, workshops, and contributed papers each year. The goal of the conference is to be a premier venue for researchers and industry practitioners to share new ideas, research results and development experiences in various fields.

Special Issue: Simulation for Crisis and Disaster Management
Submission Deadline: Monday, October 31, 2022

Computational simulation provides an inexpensive and time efficient means of carrying out what-if scenarios and studies into alternative strategies for a given situation. Furthermore, it enables investigations and predictions into how the complex dynamics of a real-world system are likely to be affected by changes to internal and/or external factors. Over the past two decades, the development and application of computational simulation models has been seen at a rapidly increasing rate in a wide range of domains. Crisis and Disaster Management (CDM) is one domain in which this has been witnessed, driven by the significant increase in the number of large-scale and unprecedented emergency situations, and the need to better manage them and

lessen their impact. These include areas such as pandemics, forest fires, floods, fatal industrial injuries, and wide-scale population movements (e.g., refugees).

Model Library

Newly Reviewed

One models passed CoMSES's peer review process this quarter. Some are still unpublished while their companion publications undergo journal peer review; others are currently under review by CoMSES. Published include the following models:

- Social Consequences of Past Compound Events - Laacher See Eruption looks at the impact of the interaction between climate change trajectory and an extreme event, such as the Laacher See eruption, on the generational development of hunter-gatherer bands. Historic data is used to model the distribution and population dynamics of hunter-gatherer bands during these circumstances. (Kevin Su and Brennen Bouwmeester)

New Model Uploads

19 new models were published in the CoMSES Model Library on a wide variety of topics that illustrate the depth and breadth of our community. These include:

- small-scale farmer decision-making in the contexts of diversified agroforestry adoption and increased water scarcity induced by climate change
- addressing disparities to access to primary health care for Latinos in the U.S.
- the spread of methods within and between scientific communities, exploring the effects of bias, competence, and interdisciplinarity
- back-calculation of the evolutionary dynamics involved in the unification process of the Warring State period in Ancient China
- the emergence of intersectional life course inequalities through transitions in the workplace for LGBTQ citizens

These models and more can be discovered at the CoMSES Model Library - you can also keep up-to-date with newly published models on our Twitter and RSS feeds.

Most Downloaded Models

Published models were downloaded a total of 8,626 times this quarter, across 989 unique codebases. Here are the top 5:

1. DroneStrikes_TerroristAttacks by B Shapiro (78 downloads)
2. Charging behaviour of electric vehicle drivers by Mart van der Kam, Annemijn Peters, Wilfried van Sark, and Floor Alkemade (70 downloads)
3. The simulation on the study of the optimal business strategy with the interaction between technologies and consumers by sej-yoo (57 downloads)
4. Artificial Anasazi by Marco Janssen (54 downloads)
5. Game of Thrones model by Claudine Gravel-Miguel and Sean Bergin (53 downloads)

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CoMSES Net is headquartered in The School of Complex Adaptive Systems College of Global Futures