

## **Request for Information (RFI)**

**DARPA-SN-24-104**

### **Geoeconomic Modeling for National Security**

**Responses Accepted:** Until 2:00 PM (Eastern) on December 18, 2024

**Point of Contact:** DARPA/STO

**Email Address:** DARPA-SN-24-104@darpa.mil

### **Description**

UPDATE: DARPA is extending the submission deadline for the subject RFI seeking information on the current state of geoeconomic modeling for national security applications. The information requested in the RFI remains unchanged. Any responses submitted before the initial RFI deadline in October 2024 are requested to be re-submitted to the inbox.

The RFI focuses on three key aspects:

**Geoeconomic Models:** Capabilities, limitations, and challenges of existing models used to analyze economic activity and predict outcomes. This includes structured econometric models, semi-structured models, and agent-based models.

**Data for Geoeconomic Modeling:** Availability, quality, and limitations of data used to calibrate and train these models. The RFI acknowledges the challenge of accessing proprietary data and explores solutions.

**User Interaction with Models:** Best practices for integrating data analysis with the modeling process to support informed decision-making.

DARPA is particularly interested in:

- Capabilities and limitations of current approaches to modeling and predicting economic activity.
- Integration of existing models into a larger ecosystem for comprehensive analysis.
- Novel concepts that could fundamentally improve geoeconomic modeling for national security purposes.

The RFI includes specific details requested for both models and data, such as:

- Model type, original objective, scalability, performance metrics, and calibration methods.
- Data description, source, scale, completeness, accuracy, access restrictions, and format.

### **BACKGROUND**

Economic factors drive national-level decisions and affect how the U.S., our allies and partners, and our adversaries react to global events. As a result, the ability to accurately model and predict how policy and technology impact global economic activity has the potential to improve national security. Such modeling capabilities could help inform policymakers' approach to economic sanctions or other tools designed to influence nations' behavior without military action, as well as to better understand, predict, and mitigate conflicts that may arise due to economic conditions.

There are three aspects of geoeconomic models this RFI considers. The first aspect is the models themselves, which are constructed to answer specific questions based on available data and may not be designed to answer the broader range of questions relevant to national security issues. Such models include structured econometric models<sup>1,2</sup>, semi-structured models<sup>3,4</sup>, and agent-based models, which emulate microeconomic interactions to expose macroeconomic insights<sup>5,6</sup>, among others. Each of these model types requires the modeler to choose the scale of parameters and interactions to model as well as to calibrate and/or train appropriately.

The second aspect to consider is access to useful data to be used for calibration and/or training. While much relevant data are captured and shared openly by governments and other institutions, a great deal of valuable data and subsequently extracted information are considered proprietary by the companies that collect and process them and are consequently not available for sharing without significant restrictions and/or cost. Furthermore, existing data flows typically suffer from significant delays in compilation and distribution, may be incomplete, and will almost surely contain inaccuracies (which may be intentional or unintentional). Third, a useful system requires interaction with data analysts. The system should enable users to explore alternative strategies and challenge their own assumptions.

DARPA conjectures that a coordinated system of models may provide the fidelity, reliability, and timeliness to significantly improve geoeconomic decision making for national security. As such, DARPA is interested in assessing the current state of geoeconomic modeling technology, including capabilities, limitations, challenges, and metrics for detecting, tracking, and predicting global economic activity. Applications of interest for such technology may include (but are not limited to):

- Predicting the effects of specific economic and technology sanctions on capital and trade flows;
- Quantifying the consequences of different modeling assumptions;
- Detecting reactions and quantifying causal effects of economic and technology sanctions;
- Detecting and characterizing significant changes in the structure of the global financial system such as pathways for capital flows and currencies;
- Identifying and predicting economic tipping points that may lead to armed conflict;
- Identifying significant movement in production and associated trade flows; and
- Additional applications responders believe are important national security issues.

## REQUESTED INFORMATION

This RFI seeks responses that provide details on how functions like those listed above (or with similar objectives) are performed today and what are the limitations of the current approaches. In

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<sup>1</sup> Pesenti, P., "The Global Economy Model: Theoretical Framework," IMF Econ Rev 55, 243–284, 2008.

<sup>2</sup> Kumhof, M., *et al.*, "The Global Integrated Monetary and Fiscal Model (GIMF) – Theoretical Structure," IMF Working Paper No. 10/34, 2010.

<sup>3</sup> Brayton, Flint, and Peter Tinsley, "A Guide to FRB/US: A Macroeconomic Model of the United States." Finance and Economics Discussion Series 1996-42, Federal Reserve Board, 1996.

<sup>4</sup> Andrieu, M., *et al.*, "The Flexible System of Global Models (FSGM)," IMF Working Paper No. 15/64, 2015.

<sup>5</sup> Poledna, S., *et al.* "Economic forecasting with an agent-based model," European Economic Review 151, 2022.

<sup>6</sup> Hommes, C., *et al.*, "CANVAS: A Canadian Behavioral Agent-Based Model," Staff Working Papers 22-51, Bank of Canada, 2022.

addition, DARPA is interested in insights into how current approaches can be adapted to integrate into a larger ecosystem, as well as concepts that could fundamentally change how the desired objectives could be achieved. Specific details of interest include:

1. Models

- Type of model;
- Original objective for developing the model;
- Scalability and fidelity (e.g., number of countries, industries, households, parameters, interactions, time scales, etc.);
- How performance is measured (i.e., what are key metrics?) and how measurements are validated;
- Ability to investigate and explain effects of shocks and counterfactuals;
- Approach for calibration and/or training, including assumed data availability and impacts of data uncertainty;
- Limiting factors (e.g., computation, data availability, data accuracy, etc.);
- Ability to integrate or interact with other models or aggregated models (e.g., application program interface (API)); and
- Extensibility to address example applications listed above.

2. Data

- General description of data, including sector of the economy and source(s), as appropriate;
- Scale and fidelity (e.g., number of countries, industries, households, parameters, time scales, time periods, etc.);
- Completeness;
- Accuracy and means of validation;
- Restrictions on access to relevant data, such as, but not limited to, privacy, proprietary, or cost considerations;
- Existing or potential approaches for providing access to the data or data products for use in model training and/or validation;
- Data format and existence of API(s); and
- Other relevant and/or distinguishing characteristics.

3. User interaction

- Best practices to support robust decision making; and
- Key insights from operational use.

DARPA will review the RFI responses as received and may hold a follow-up workshop with the intent of thoroughly exploring the current model capabilities and data availability and identifying gaps and opportunities to inform development of a composable system of geoeconomic models for national security. If a workshop is conducted, attendance will be by invitation only based on the responses received to this RFI.

## **SUBMISSION FORMAT**

Respondents to this RFI are encouraged to be as succinct as possible, while also providing actionable insight. Format specifications for responses include 12-point font, single-spaced, 8.5 by 11-inch paper, with 1-inch margins in Microsoft Word or Adobe PDF format (total not to exceed 7 pages including cover sheet, technical description and bibliography).

To the maximum extent possible, respondents are encouraged to send non-proprietary information; if proprietary information is included, respondents are responsible for clearly identifying such information. Responses containing proprietary information must have each page containing such information clearly marked with a label such as “Proprietary” or “Company Proprietary.” **DO NOT INCLUDE ANY CLASSIFIED INFORMATION IN THE RFI RESPONSE.**

Cover Sheet (1 page): Provide the following information

- a. Response title
- b. Technical point of contact name, organization, telephone number, and email address

Technical Description: 4 page maximum.

Bibliography (not to exceed 2 pages): All references must be cited in the Technical Description.

Responses that do not follow the instructions above will not be reviewed.

Industry leaders who employ best practices that may be outside the traditional Department of Defense industrial base are encouraged to respond to this request. For those new to DARPA or national security, the agency offers comprehensive, free resources on how to do business with DARPA via DARPACONNECT. Register for access via <https://www.darpaconnect.us/home>.

## **SUBMISSION INSTRUCTIONS AND CONTACT INFORMATION**

All responses to this RFI must be emailed to [DARPA-SN-24-104@darpa.mil](mailto:DARPA-SN-24-104@darpa.mil). Responses will be accepted any time from the publication of this RFI until **5:00 PM (Eastern) on October 15, 2024**. All technical and administrative correspondence and questions regarding this RFI should also be sent to the same email address.

## **DISCLAIMERS AND IMPORTANT NOTES**

- This is an RFI issued solely for information and research purposes; it does not constitute a formal solicitation for proposals. In accordance with FAR 15.201(e), responses to this RFI are not offers and cannot be accepted by the Government as such.
- Responses do not bind DARPA to any further actions related to this topic including requesting follow-on proposals from respondents to this RFI.
- Submission is voluntary and is not required to propose to a subsequent solicitation (if any) on this topic.
- DARPA will not provide reimbursement for costs incurred in responding to this RFI.
- DARPA is under no obligation to acknowledge receipt of the information received or

provide feedback to respondents with respect to any information submitted under this RFI.

- DARPA will disclose submission contents only for the purpose of review. Submissions may be reviewed by the Government (DARPA and partners) and Scientific, Engineering and Technical Assistance (SETA) support contractors.
- The information provided in this notice is subject to change in content, relative importance, or other meaningful ways without further notification.