Model Supported Pandemic Games

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Overview

Part 1: Recent work on gaming pandemics

Part 2: General discussion

Part 3: How to play COVID-35

Recent Work on Gaming Pandemics

“Wargaming the Pandemic”

Bill Gates | TED 2015 – The next outbreak? We’re not ready: **“We need to do simulations, germ games, not war games so that we see where the holes are.”**

Our Recent Games

This introductory brief covers work undertaken in **gaming pandemics** in recent years by the authors and other collaborators.

- The flu pandemic matrix game
- After the Apex
- After the Apex, the Dilemma Game
- COVID-35 version 1
- Building New Models
- COVID-35 version 2
- Plans for After the Apex II and III
- Overarching themes

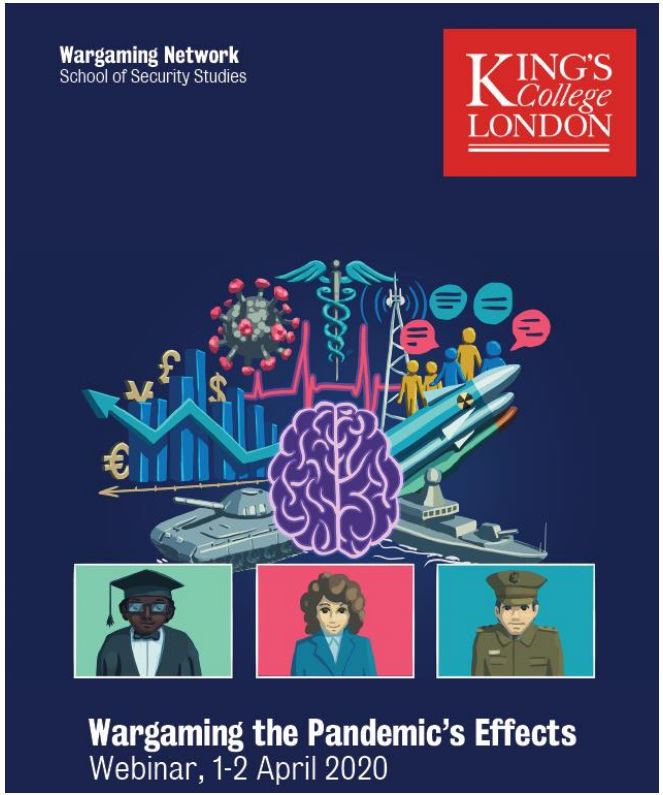
Pandemic related games

- Flattening the Curve,
  - matrix game by Tom Moat
- RAND paper
- Resilient Response 2020 (RERE20) Nov 2020
  - Wargame run by The Multinational Medical Coordination Centre / European Medical Command (MMCC/EMC) in cooperation with the European Centre of Excellence for Countering Hybrid Threats (Hybrid CoE) and the German Federal Office for Civil Protection and Disaster Relief (BBK)
- MORS course on Gaming Emergency Response to Disease
  - Led by Ed McGrady

The flu pandemic matrix game

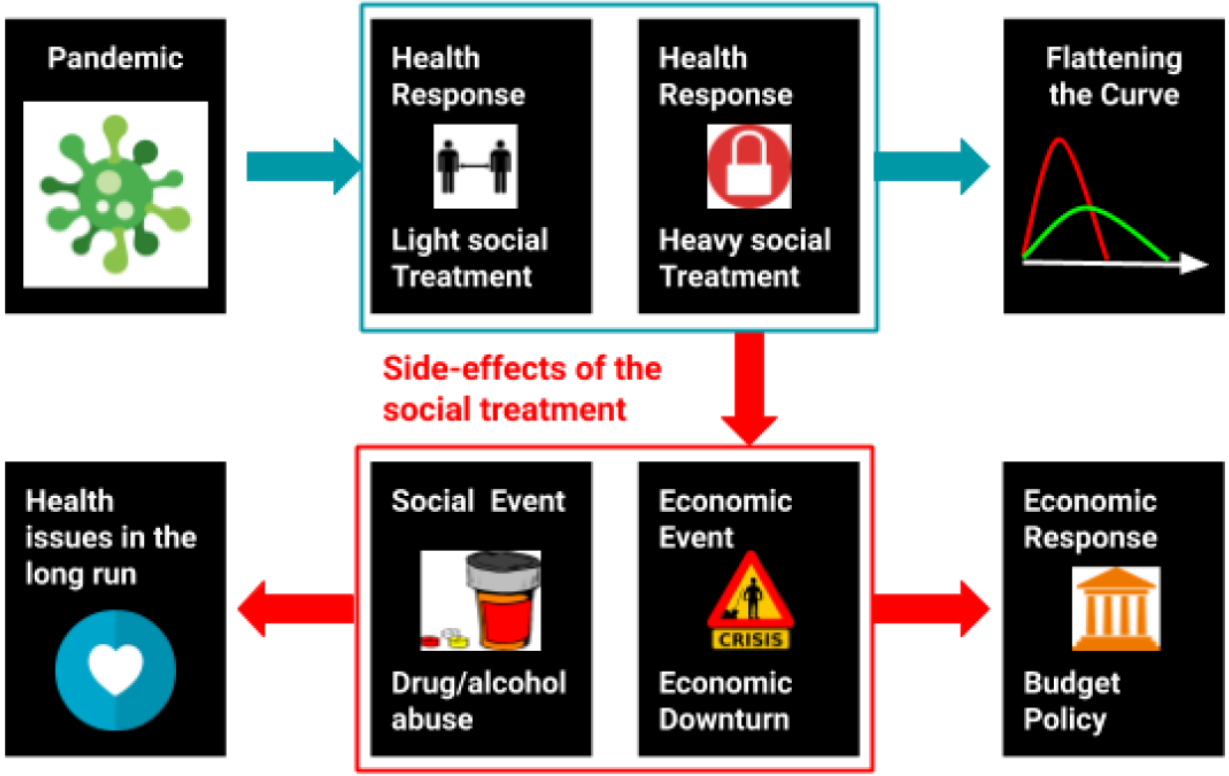
- **Exploratory activity** led by Global Affairs Canada in 2019 to explore the utility of games to explore international crises other than armed conflict.
- **Conventional matrix game design** with six teams (Westland, Eastland, Southland, Medicines Across Borders (NGO), Global Health Organisation, Big Pharma Foundation) set in a fictional alternative world.
    - Chosen to avoid players drilling into real country/organisation specifics
- **No supporting models**, pandemic evolved according to a script.
- The game was deemed a success and some players with real experiences of aid missions felt that the game produced realistic behaviours
- The game has subsequently been reported in the literature:
    - Smith, J., Sears, N., Taylor, B., & Johnson, M. (2020). Serious games for serious crises: reflections from an infectious disease outbreak matrix game. Globalization and health, 16(1), 1-8.
    - https://globalizationandhealth.biomedcentral.com/articles/10.1186/s12992-020-00547-6

After the Apex



- Early during the COVID-19 pandemic a meeting was held by the Kings Wargaming Network to discuss gaming the pandemic.
- Ben Williams raised the question of gaming the **recovery from the pandemic and the interplay between different policy drivers once the initial healthcare situation had been stabilised**. Ben Taylor followed up and we started to work on After the Apex.
- **Game built around the three "front lines" of health, economy and social cohesion**, with positive actions in one possibly having negative consequences in others.

Gaming Around the Three Frontlines



After the Apex

- **Game intended to be portable to any real or fictitious country and to have utility in supporting exploration of policy options by subject matter of experts or policy makers**
- Concept of a **matrix game as a vehicle for conversations between SMEs**
- Another conventional **matrix game** with no supporting software models
- Five players (national government, lower level government, healthcare sector, business sector and ‘chaos’), all representing actors in the fictional country of Bretonia.
- Conceived as having the federal political structure of Canada and the culture and economy of France.
- Game supported by scripted news stories and events to challenge players

After the Apex playtests

- The game was played twice in June 2020. Observations included:
  - Lower level government does not act with one voice and in all countries there are local differences, so there should be at least two lower level government players
  - **The chaos player represents everything that could go wrong in order to prevent the game from being too cooperative.**
    - Having an advocate for the reasons why player actions might fail, or for the negative consequences of actions was a good feature of the game.
    - However chaos player actions representing behaviour by foreign countries (e.g. cutting off PPE supplies) could be too disruptive.
  - **Having simple status tracks for the front lines** (e.g., level of infections, hospitalisations, economic losses, domestic stress and social unrest) with changes determined on the fly by adjudicators was seen as unsatisfactory

After the Apex playtests

- Decision was taken to develop a new model-based matrix game set **in the revised context of New Bretonia**
- New Bretonia to have two provinces and a federal district (like Belgium), and some better developed neighbouring countries
- The chaos player to be limited to domestic chaos (international chaos being the preserve of game controllers)

After the Apex, the Dilemma Game

- Anja van der Hulst demonstrated a **dilemma game engine** developed by TNO. This allows decision makers to be faced with a series of policy dilemmas, with **arguments before and against a proposed policy**, in the form of an **online solo game**.
  - This is a potentially highly portable way of delivering problems to real decision makers to challenge their thinking before any of the issues become real life dilemmas
- A dilemma game was built around the scenario and events seen in After the Apex.
  - It was run in two sessions at **Connections (US) in August 2020** with positive feedback from players.
  - Decisions made revealed quite different decision-making rationales between players in a primarily North American group, and one with players from Europe and Asia.

COVID-35 version 1

- Julia Smith from the **faculty of Health Sciences at Simon Fraser University in Vancouver** was one of the contributors to the **flu pandemic game**. We discussed the idea of a **classroom game for a pandemic response class** being run at SFU and in Autumn 2020 a spreadsheet-based game was built.
  - Since this was an undergraduate class, and the teaching objective was that government policy making under a pandemic is difficult, the players were given a limited number of policy “levers” (travel restrictions, business closure, social lockdown, healthcare initiatives) and very basic linear rules were applied to evaluate some simple metrics.
  - **In COVID-35 teams of players represent the leadership of one of a group of fictional interconnected countries.** The countries are loosely based on some aspects of real countries and built-in scaling factors mean that the different countries do respond differently to the same policies
    - (e.g., totalitarian governments can manage much more effective lock-downs than countries where defying federal authority is matter of principle for citizens)
  - **The game was run online as an end-of-course integration activity.** Feedback was positive and the class instructors felt that the game had led to a higher-than-expected level of insight in the student final papers.
    - There was general agreement that COVID-35, or a game developed from it, would be a positive addition to future editions of the course.

COVID-35 version 2

- **A revised COVID-35 game** has now been built.
- The players have largely the same options that they had before (four possible levels of intervention in four dimensions, plus the options to provide aid to other countries or to the Global Health Organisation), but the evaluation of the consequences of their choices is performed by the new models.
- The game has **2-month time step**.
- At present the vaccine functionality is not being used - but we hope to explore this soon.
- A first test game with players not involved in the development took place on 1 September and a number of enhancements will now be made before the game is played again at Simon Fraser at the end of the year
- You have a chance to be the next players of COVID-35 tomorrow!

Plans for After the Apex II and III

- Our next project will be to return to After the Apex and produce two new versions.
  - **After the Apex II** will use the new models to give players the opportunity to explore how New Bretonia will fare in the face of a new virus emerging in a neighbouring country. This will be a scenario without access to vaccines.
  - **After the Apex III** will look at the scenario where New Bretonia has stabilised the situation under some form of lock-down a year after the initial wave of infection, and now needs to run a vaccine campaign to take the pressure off the healthcare system, and to allow the non-pharmaceutical interventions to be relaxed without triggering a new wave of infections.
- We hope to develop and play these two matrix games over the next six months.

Collaborative networks

- The following have been users and/or co-developers of one or more of the games described above:
  - Prof Ben Williams (Université Clermont Auvergne)
  - Dr Sara Meger (University of Melbourne)
  - Ms Huey Woon Lee (Singapore Management University)
  - Dr Katherine Muyskens (Yale-National University of Singapore)
  - Prof Kelley Lee, Ms Julianne Piper and Dr Julia Smith (Simon Fraser University)
  - Ms Madeline Johnson (Global Affairs Canada)
- All of **these professionals work outside of the traditional defence and security environment** in areas such as: finance, health management, international relations, medical ethics and management science,
  - **We are achieving broadening of the community and the transfer of gaming know-how from defence to other disciplines.**

Model Taxonomy

	No Model Supported	Yes Model Supported
	Games	Model Complexity
Exploratory Games	Flu Pandemic Game	After the Apex the Apex 2+ After
Educational Games	After the Apex, the Dilemma Game	Covid-35 35 version 2 Covid-

Closing Thoughts

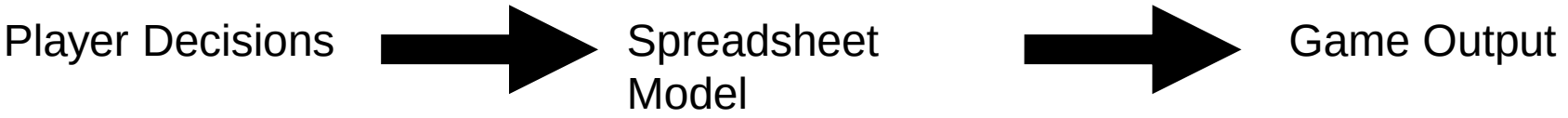
- The following issues have emerged in our deliberations:
  - **Exploratory games vs educational games:** The same subject area can be explored in different ways. Game designers need to know how a game is to be used in order to produce a fit-for-purpose design. After the Apex and COVID-35 are games of the same “scenario”, but are designed to give different players different experiences.
  - **Fictional contexts for real problems:** Designing a game in a fictional country does not lead into the realm of fantasy and science fiction. Players and facilitators can anchor their thinking and adjudication in their real world knowledge, but the risk of getting hung up on specific details is minimised. The games can focus on the principles and not specifics.
  - **Model supported games:** A seminar or matrix game with ad hoc adjudication may be great for initial explorations of situations to understand them better, but model supported games provide added richness and credibility - provided that the models don’t get in the way of game play or have the players “play the models” rather than “playing the game”.
  - **Re-usable models:** Models need not be tied to supporting a single game. Our models were designed to be flexible enough to support two different games. Developing flexible models sharing common elements that can support different game scenarios and even different sorts of games, is a cost-effective approach.

Discussion

How to Play COVID-35

Background

- Model-supported classroom game for use by Health Science Students at the end of their course on pandemic management.
- Provide a safe-to-fail environment for students to experiment and learn about pandemic responses.



Scenario

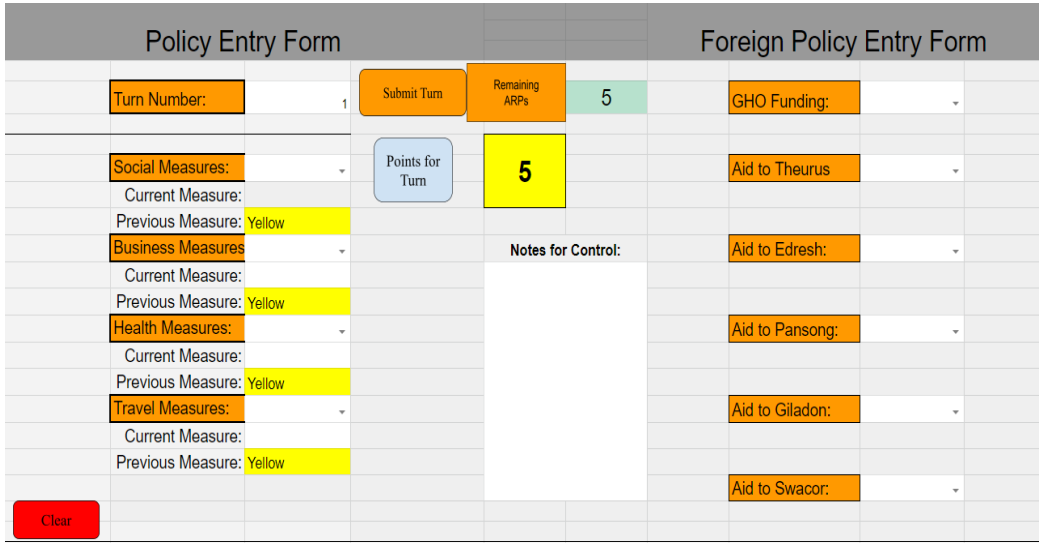
- **COVID-35 broken out in Mepria.**
- **Turn 0**: Declared a Public Health Emergency of International Concern by GHO.
- **Objective**: Contain and eliminate the pandemic over 12 turns while maintaining social, economic, and political stability.

7 Player Controlled Actors

Actor	Government Type	Level of Economic Development
Theurus	Liberal Parliamentary Democracy	High Income Country
Swacor	Liberal Presidential Democracy	High Income Country
Mepria	Authoritarian Regime	Medium Income Country
Pansong	Liberal Democracy	Medium Income Country
Giladon	Illiberal Democracy	Low Income Country
Edresh	Liberal Democracy	Low Income Country
Global Health Organization	International Organization	N/A

Policy Entry Form

- **Domestic Policy**: Left side.
  - Levels of social, business, health, and travel restriction measures.
  - *Social Measures MUST be selected prior to Business Measures*.
- **Foreign Aid**: Right side.
  - Select who to send ARPs to.
  - ARPs become usable the following turn.
- **ARP Counter**: Points for turn.
- All cells must be filled; notes to Control are optional.

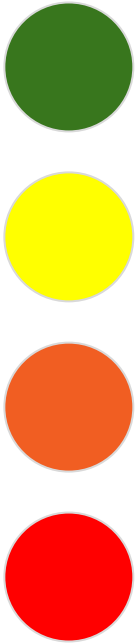


Administrative Resource Points (ARPs)

- Government's capacity to act in a given turn, a proxy for political capital, bureaucratic capacity, and economic ability.
  - ARPs earned every turn, and are non-bankable (Spend it or lose it - or donate it!).
- Required to implement player's desired restriction measures in a given turn.
  - Forces prioritization of player's courses of action by limiting what actions can be taken.
  - Surplus points encouraged to be donated.
- Countries have different per-turn ARP incomes to reflect their relative developmental levels.
  - Less developed countries and the GHO depend on ARP donations.
- ARPs can be requested, but must convince the donor country.

Measure of Restrictions in the Policy Domains

- **Four Policy Areas**:
  - Social, Business, Health, and Travel.
- **Restrictions Impact**:
  - Economic Outlook.
  - Infection Levels.
  - ICU Usage Rates.
  - Government Popularity.
- **Trade-offs required to contain the pandemic and its negative externalities**.
  - Stronger restrictions = greater reduction in infections, but also greater adverse impacts on the economy and popularity.
  - Initial restrictions boosts government popularity, but saps them the longer they continue.



Business Measures
No Restrictions.
Work From Home Recommended; Government Offices Closed.
Work at home required where possible. Distanced workplaces regulations
Non-Essential Business Closed.

Cost of Restrictions

- ARP cost determined by previous turn's measures.
  - **Maintaining Same Level**: No cost.
  - **Lowering Restriction Level**: 1 ARP per level reduced.
  - **Raising Restrictions**: Gradual increase > Sudden State of emergencies.
    - Green -> Yellow: 1 ARP.
    - Yellow -> Orange: 2 ARPs.
      - Yellow -> Red: 5 ARPs.
    - Orange -> Red: 3 ARPs.
- **Authoritarian Regimes**: Lower ARP requirement to implement highest restrictions levels.

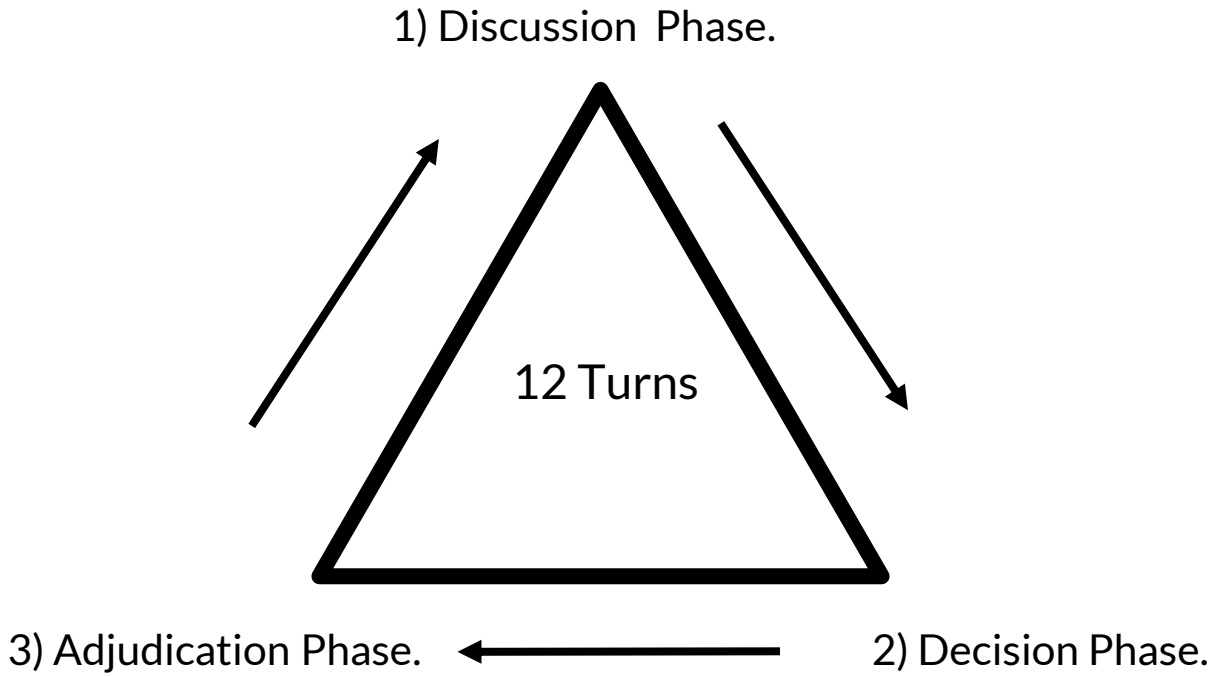
Cost Chart		
Previous Policy Level	**Proposed Policy Level**	**Cost**
Green	Green	0
Green	Yellow	1
Yellow	Green	1
Yellow	Yellow	0
Yellow	Orange	2
Yellow	Red	5
Orange	Green	2
Orange	Yellow	1
Orange	Orange	0
Orange	Red	3
Red	Orange	1
Red	Red	0

Output Dashboard: Output Metrics and Policy Record.

- Output Metrics and Policy Record.
  - Metrics:
    i. New Infections Per 100K.
    ii. ICU Utilization Rates.
    iii. Government Popularity.
    iv. GDP Outlook.
    v. Cumulative Deaths Per 100K.

  - Policy Record:
    i. Shows policies taken by other states on a turn-by-turn basis.
    ii. Shows GHO program history.

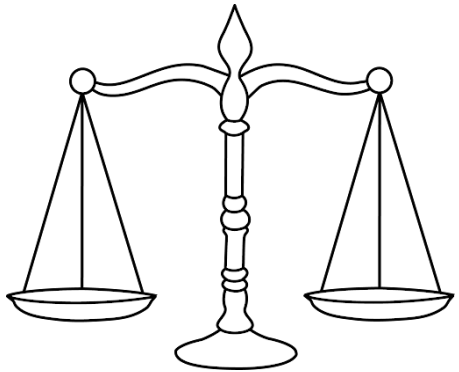
Turn Sequence



Discussion Phase

Domestic Environment:

- Social and Business Policy Interoperability.
- Must balance between measures to combat infection and their negative externalities.

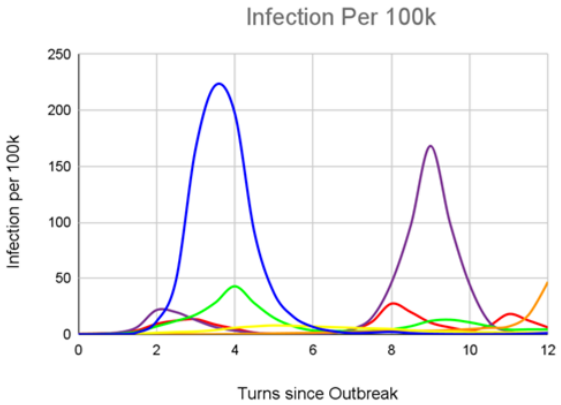


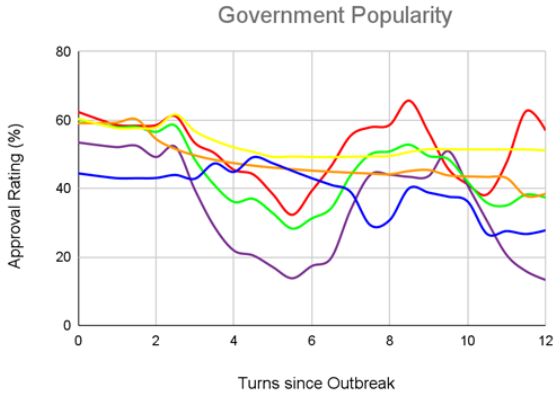
Global Environment:

- Global affairs conducted at GHO Forum to discuss foreign assistance, GHO Funding, and coordination.
- GHO mediates the forum to help coordinate a global response.

Decision and Adjudication Phase

Player Inputs → User Form Data Submission → Model Adjudication → Outputs





IT Issues.

- **Discord**: Players will be given a link to our discord channel. The GHO Forum is the default comm channel for this play session.
- **Google Script**: The user form uses a custom script, but the script must be given permission to function.
    - A Google account is required to give permission to the script. If you do not have a google account, we will provide you one.
    - **Steps to Activate Script**:
        i. **Click Clear or Submit Button**: Click any of the two button to prompt the script permission request.
        ii. **Authorization Request**: Click continue.
        iii. **Proceed to User Form**: Click proceed to user form.
        iv. **Allow Access**: Click Allow access to enable script functionality.

Questions?