CONFIDENTIAL

OPERATION: CONSTELLATION

Document Type: Secret

To the order of the respected party. If you are not the intended recipient of this document, please promptly discard it securely or destroy it.

Invitation Letter attached:

Attn: OPERATION OUTBREAK TEAM

Dear team,

Thank you for **accepting** to complete this operation. By this point, you should have gathered a team of 3+ people and your faculty sponsor. Now it's time to protect your community from Cain Jett and his crime syndicate. The clock is ticking and we are counting on you. Before time expires, you will craft an outbreak response network and conduct network analysis using the secret instructions provided. Be creative, be bold, and most importantly, work together as a team.

When you have completed the operation, submit your report for a chance to win an award from Operation Outbreak.

You may submit your report **here** (links to a Google Form).

We look forward to seeing what you build.

Sincerely,

Agent Brown

Agent Brown

operation outbreak

Outbreak Response Network

Operation: Constellation Instructions

Who is involved in outbreak response in your community? Who are the local authoritative figures of an outbreak? Which members of your community would be considered "essential workers" during a health crisis? What happens to other members when one member of the outbreak response system is removed? Your team will investigate these questions and more in this operation as you conduct your own network analysis of the players of outbreak response.

Note for Faculty Sponsor

Project-based learning involves the team in hands-on problem solving, and it requires creativity and teamwork. Unstructured projects lack predefined solutions and even guardrail rubrics. This pushes team members to define and structure the problem themselves, leading to better learning transfer.

The process is as follows:

1. **Identify a Problem**: Start by asking questions to understand the problem.
2. **Develop Solutions**: Brainstorm multiple ideas, encouraging wild and diverse thinking.
3. **Prototype**: Create simple models or mock-ups to visualize solutions.
4. **Test**: Try out prototypes in real settings to gather feedback and refine the solution.

Key Points:

- ***Flexibility***: Projects can vary in scope and duration, but Operation: Constellation is expected to be a multi-week endeavor.
- ***Interdisciplinary Work***: Combining subjects and using technology enhances learning.
- ***Real-world Application***: Solving problems from real organizations provides practical experience.

Benefits:

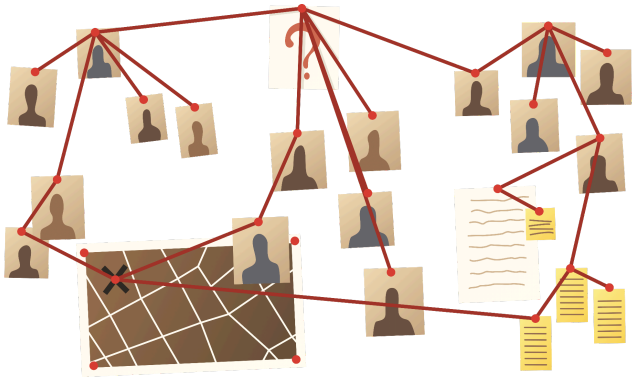
- ***Creativity***: Encourages innovative thinking and solution development.
- ***Collaboration***: Team works together, enhancing communication and teamwork skills.
- ***Critical Thinking***: Testing and refining solutions promote deep understanding and adaptability.
- ***Practical Skills***: Team learns to frame problems, generate ideas, and design solutions.

Operation Objectives

- **Visualize** a network of groups and individuals involved in outbreak response.
- **Analyze** how different members in society work together to combat an outbreak.
- **Explain** how collaboration (within a single group) affects the larger network.
- **Explain** how cooperation (group-to-group) affects the larger network.
- **Give examples** of how different groups cooperate to contain an outbreak, and explain the effects of cooperation versus non-cooperation.

Suggested Materials

- Poster boards
- Yarn or string
- Push pins or stickers
- Markers and pens
- Scratch paper
- Computers for research



Introduction

This operation will reveal the many specialized yet interconnected groups who play a role in outbreak response. At Operation Outbreak we train people for outbreak response through roleplaying seven work units: *Government Officials, Healthcare Workers, Bankers, Reporters, Public Health Officials, Store Clerks,* and *Biomedical Researchers*. There are more groups than these seven, however, whose decisions in and reactions toward an outbreak have consequences that affect others. Your team will brainstorm, link, craft, and analyze the outbreak response network in your community to draw conclusions about local outbreak resilience. You will submit your findings through the **Operation: Constellation submission form**.

Submission Requirements

This operation is due before the timer on the website hits ZERO. Your report will address the following:

1. Who in my community is involved in outbreak response?
2. Who are the local authoritative figures of outbreak response?
3. Who in my community are considered "essential workers" if a health crisis were to occur?
4. What happens to each group of my local outbreak response network if a group is removed?
5. If a group is removed, what is the contingency plan?

Useful Vocabulary

1. **Outbreak Science**: A complex, interweaving subject on the comprehensive understanding of infectious disease outbreaks, from the molecules inside pathogens to the societal factors that influence how diseases spread.
2. **Network Science**: A complex field of science that investigates networks, including telecommunication networks, computer networks, biological networks, cognitive and semantic networks, and social networks.
3. **Public Health**: A field that aims to protect the health of entire communities and increase their quality of life.
4. **Zoonotic Spillover**: The transmission of a pathogen from an non-human animal host to humans, initiating potential outbreaks and pandemics.
5. **Design Thinking**: An iterative process of testing solutions that involves defining the problem by empathizing with those involved or affected, ideating, and prototyping.

Phase 1: Prepare

Team Discussion

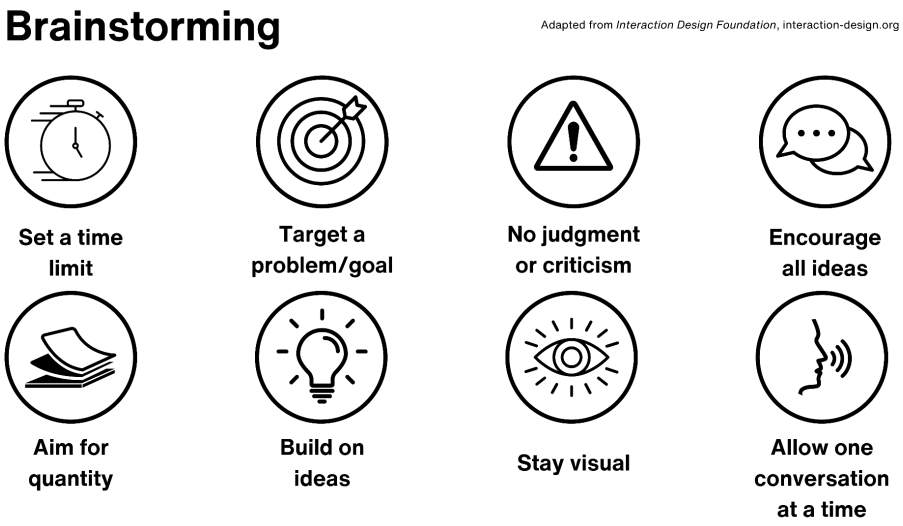
First, hold a team discussion about the complexity of outbreak preparedness and response. It helps to choose a recent or current outbreak as a reference for the discussion (see HealthMap.org). Discussion prompts may include the following:

- Where do outbreaks come from?
- Why do outbreaks occur?
- Why would an outbreak turn into an epidemic? An epidemic into a pandemic?
- What policies currently exist to safeguard the public from outbreaks?
- How might outbreaks affect people unequally?

Brainstorming

After a discussion about the complexity of outbreak response, your team should brainstorm every possible group who is either affected by or involved in outbreak response. You can brainstorm using the textbook *Outbreak Science* (https://operationoutbreak.org/

resources/), through Google Search, or by other media. Record your ideas in some collaborative format. A few guidelines for brainstorming below:



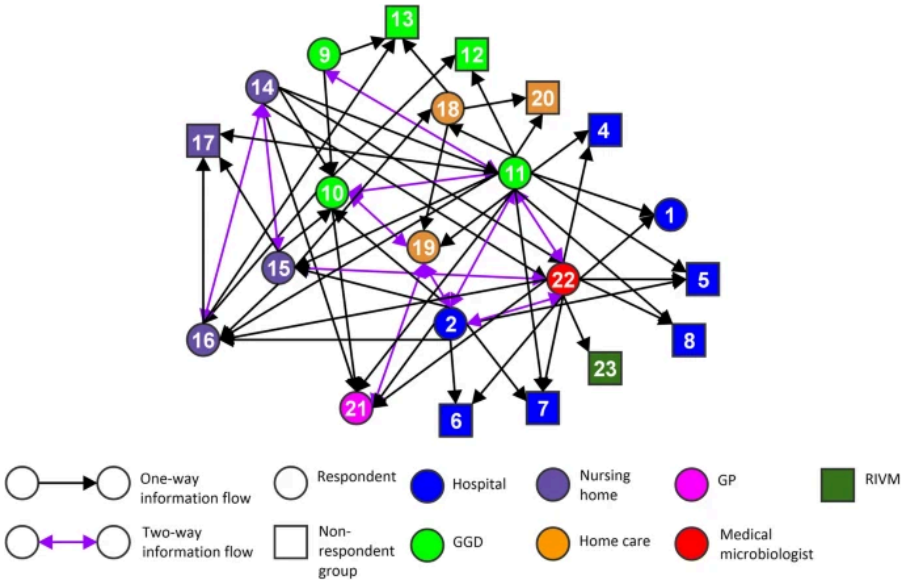
At the conclusion of the brainstorming session, make a big list of all the ideas generated. This list will serve as a reference list when you create your network visualization in Phase 2.

Phase 2: Design

Visualizing the Network

Who in my community is involved in outbreak response?
Who are the local authoritative figures of outbreak response?
Who in my community are considered "essential workers" if a health crisis were to occur?

Network science is a complex field investigating human social systems from the top-down. Constructing a network is a great way to visualize and analyze how different members of society interact. For example, the network shown below was developed to visualize information flow during an outbreak in the Netherlands.



Source: de Vries, M., Kenis, P., Kraaij-Dirkzwager, M. et al. Collaborative emergency preparedness and response to cross-institutional outbreaks of multidrug-resistant organisms: a scenario-based approach in two regions of the Netherlands. *BMC Public Health* **19**, 52 (2019). https://doi.org/10.1186/s12889-018-6376-7

After the brainstorming session, create your first network visualization for outbreak response.[1] First, map out as many members of society as possible. For now, think broadly: don't worry about an outbreak of a specific pathogen. Start with the one of the seven work units involved in Operation Outbreak from which to build: *Government Officials, Healthcare Workers, Bankers, Reporters, Public Health Officials, Store Clerks,* and *Biomedical Researchers*.

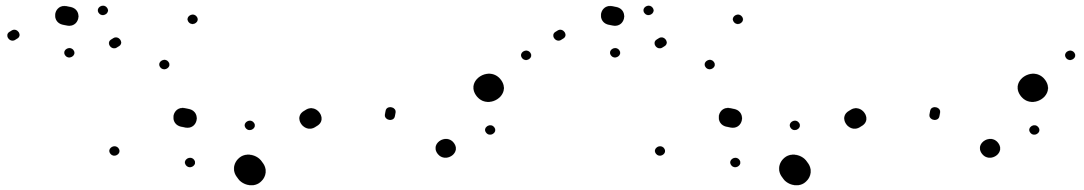
As your team builds the network, new groups may come to mind. Consider the following:

- What is the official name of the group or player involved?
- What role(s) do they play in society?
- Why are they important to society?
- Where are they located (geographically or hierarchically)?

[1] How your team designs the network visualization is up to you. You may choose to represent groups or organizations using dots or push pins, where connections across these groups may be represented using strings or yarn to build an evidence wall. Or, you may want to represent the network in a different way, such as through a road map, thematic map, or flow map. Be creative!

- How are they affected by the outbreak *directly*? How does the outbreak affect them indirectly?
- Who do they communicate with?
- What modes of communication do they use?

Next, consider the impact each group has relative to the other groups. If you are using plot points to visualize your network, you could, for example, increase or decrease the *size of the plot point* based on how important that group should be to the rest of society during an outbreak. Some dots may be small; others might be very large; this is up to your *perceived* importance about the group.



Finally, add connections between groups. A connection between two groups can be *any* connection (e.g., communicative, operational, strategic) so long as it is justified with sound evidence and reasoning.

- **Communicative**: Does information flow between the two groups? Do they use the same medium to communicate?
- **Operational**: Do the two groups conduct activities together? Are they engaged in overlapping work?
- **Strategic**: Are the two groups supposed to work together? Is there an authority or institutional structure that brings these two groups together?

Connection Type	Questions to Consider	Examples
Communicative	Does information flow between the two groups? Do they use the same medium to communicate?	Media to Government: Journalists report ongoing updates which government workers read, hear, or watch.
Operational	Do the two groups conduct activities together? Are they engaged in overlapping work?	Biomedical Researcher to Healthcare: Scientists conduct clinical trials with a new vaccine candidate.

Strategic	Are the two groups supposed to work together? Is there an authority or institutional structure that brings these two groups together?	Government to Pharmaceutical Company: Decision makers collaborate on how to fund and distribute a newly-approved vaccine.

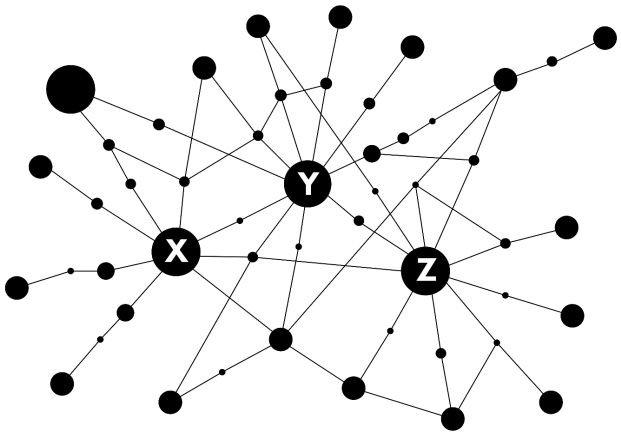
While they will likely be complicated, interconnected, even overwhelming, these networks highlight how infectious disease systematically impacts society. Aim to construct your network in an organized and comprehensible way.

Network Analysis

What happens to each group of my local outbreak response network if a group is removed?
If a group is removed, what is the contingency plan?

Refine your outbreak response network by considering the different relationships between groups across the network. Organize it in such a way that you can illuminate and articulate these relationships. For instance, consider the following:

- How does group X affect group Y? Group X to group Z?
- What would happen to group Y if group X stopped communicating with group Y?
- What would happen to group Z if group X stopped communicating with group Y?
- What would happen to group Y and group Z if group X experienced infighting (i.e., internal conflict or discord, either through disagreements, power struggles, or competition among individuals in the group)?
- What does group X need from group Y in order to cooperate? (e.g., goods/materials, specific tools or technology, strategic meetings, goal alignment)



It's recommended that you start by analyzing *Public Health Officials* as a group and member of society by asking the questions above. Then, continue group by group, analyzing how the groups affect or influence one another. Competitive teams should analyze 5+ distinct connections (X/Y/Z).

Phase 3: Preparing Your Findings

Project	*How will I present my network visualization and analysis in a clear and comprehensive way? What if Cain Jett and his crime syndicate targeted my community—how would the outbreak response network mobilize?*

Now that your team has designed and analyzed your local outbreak response network, you are ready to prepare your findings. Include the following:

- Team Name
- High-quality image(s) or file(s) of your network visualization
- Comprehensive description of your completed operation including your methods

Submit Your Completed Operation

Conclusion

Outbreak science is a complex field that explores infectious disease outbreaks, from pathogen biology to the societal factors influencing disease spread. Through this project, your team gained insights into outbreak impacts on society, analyzed historical response scenarios, and applied your findings to a local context while developing skills in design thinking, presentation, and collaboration.

Supplementary Discussion Questions for Faculty Sponsor

1. What are the overall goals of the network?
2. What role does this group play in the network?
3. Who governs this group? How do they communicate internally and externally? Who is in charge of making decisions?
4. Does this member or group have the experience, skills, and connections to meet the network's overall goal?
5. What resources does this member or group need to be sustainable?
6. How would this member or group adapt its strategy over time during the course of the outbreak?