



Scenario Development Tool: Rapid & Agile Planning

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Problem

- Planning is a manual, communication intensive exercise that is expected to be carried out in a short amount of time and while employing minimal resources.
- Why aren't we using existing simulations (ONESAF, Combat XXI)?

Example: Amphibious Force Landing

- SMEs from Navy & Marines - Surface, Aviation, Mine Warfare, Logistics.
- What is the difference between Fires supplying 100 bombs per day vs. 80?
- Effect on Landing Force Rate of advance? Success?
- Currently, everyone must know everything and plan for every scenario!

Scenario Development Tool

- Enable rapid and agile exploration by interfacing inputs & outputs with existing sims.
- Web-based, domain-specific, graphical user interface for input specification.
- Multivariable output visualization via response surfaces.

Exploration Concept

Scenario Slice
(combat-focused)

Assumption Categories

Composition

Combat Res.

Support Res.

Task Design

Adv. Composition

Adv. Activity

Neutral
Composition

Neutral Activity

Discrete Assumptions

Simulation

Continuous Assumptions

Equip Perf.

Sensor Env.

Weapons Env.

Comm. Env.

Terrain

Infrastructure

Res. remaining

BT Value

AT Value

Op. Env. Damage

Soundness

Outputs
(Responses)

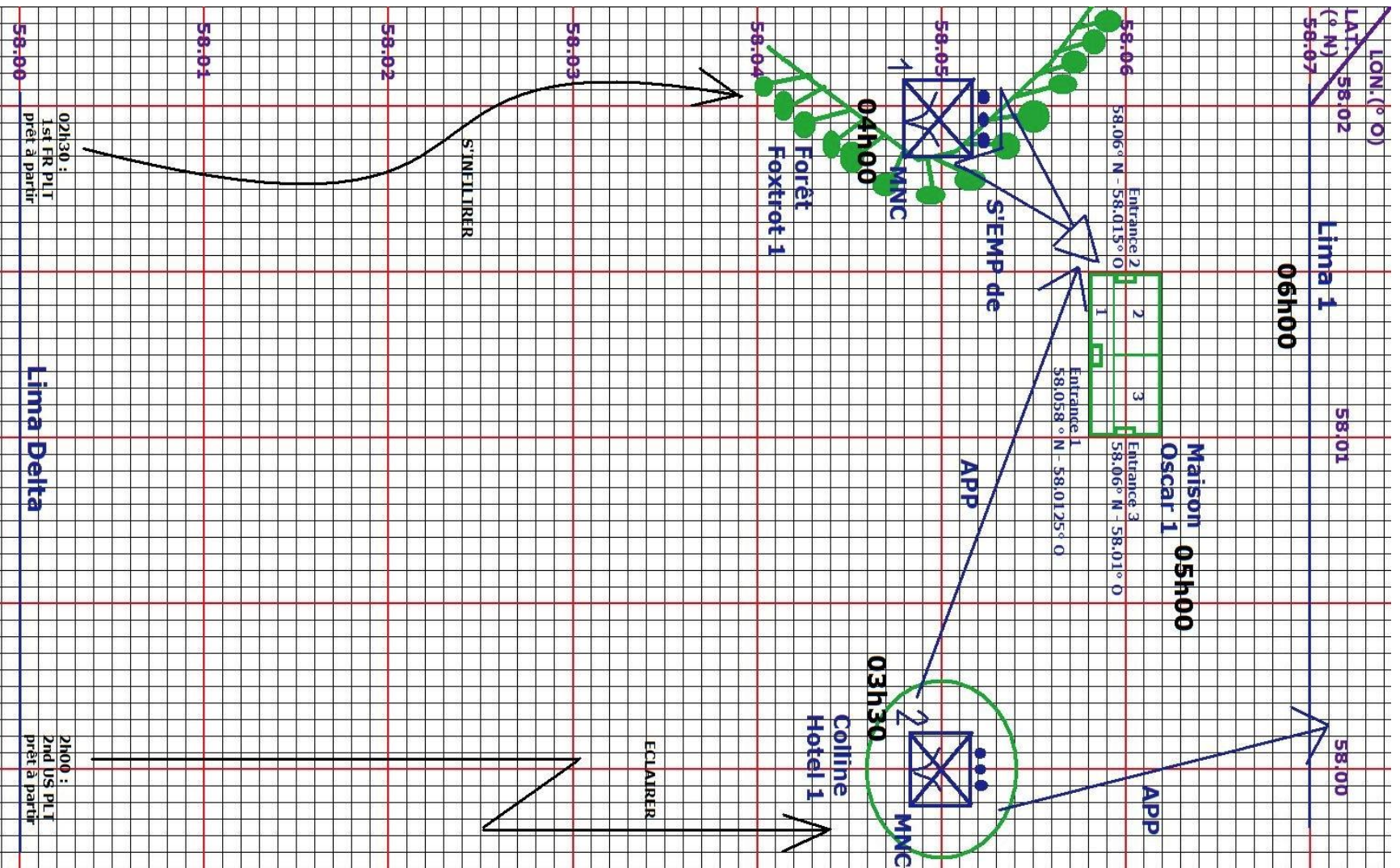
Outputs/Responses

- 1. Feasibility (0-100)** – Percent of friendly resources (fuel, ammunition, etc.) remaining at end of scenario.
- 2. Break-Through (BT) Value** (attack or defense). To what extent is the attacker able to bring forces into the back of the defender.
- 3. Attrition (AT) Value** (attack or defense). To what extent is the attacker able to neutralize the defending forces.
- 4. Operational Environment Damage (OED)** Total percent of non-friendly and non-adversary entities (i.e., infrastructure, neutral forces) within the boundaries of the scenario that remain usable.
- 5. Soundness** – Can every task be carried out given the course specified?

SDT Workflow

1. Scenario and value ranges of input variables are specified via graphical interface.
2. A formal specification of the scenario is built (i.e. C-BML, MSDL).
3. CBMS links the specification to the computer simulation (ONESAF, Combat XXI).
4. Simulation is executed for all specified value ranges.
5. Outputs of the simulation are visualized via response surface.

Use Case: Multi-national Company



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A Multi-national Company plans to take possession of Oscar 1, a house surrounded by an Enemy force.

For mission success:

- 1. Move to a secure area and place a device monitoring on Oscar 1.**
- 2. Move along a discrete path to a location close to Oscar 1 to settle in for an assault.**
- 3. Assault and clean the enemies at Oscar 1, seize possession of the house.**
- 4. Fall north of Oscar 1 and install a monitoring device to the North, West and East of the seized location.**

Assumptions to Explore

- Level of Fuel
 - Friendly Tanks
- Readiness Level
 - Friendly Tanks
 - Enemy (Oscar 1) Equipment
- Goal: See how changes in resources and readiness affect MNC attrition.

Demo

Chrome File Edit View History Bookmarks Window Help

Wed 11:01 AM

CBMS

vmasc-cbms1.vmasc.edu/client/#map_page

Force

Picture

Common

Units

Connection

vmasc-cbms1

Subscription

all units

Log

27 FEB 2013

SOE

26

Broad Street

Lafayette Road

Cusseta

Search Locate Layers

The map interface displays a tactical simulation environment. A central area is highlighted with a blue box, containing several blue diamond-shaped units. To the north, there are several red diamond-shaped units. The map includes a network of roads, with 'Broad Street' and 'Lafayette Road' labeled. A red line with a '26' shield icon represents a major road. A yellow line indicates a path or route. The interface includes a top toolbar with various icons and a 'SOF' label, a 'Force' button, and a bottom toolbar with 'Search', 'Locate', and 'Layers' options. A unit list is visible on the left side.

Units

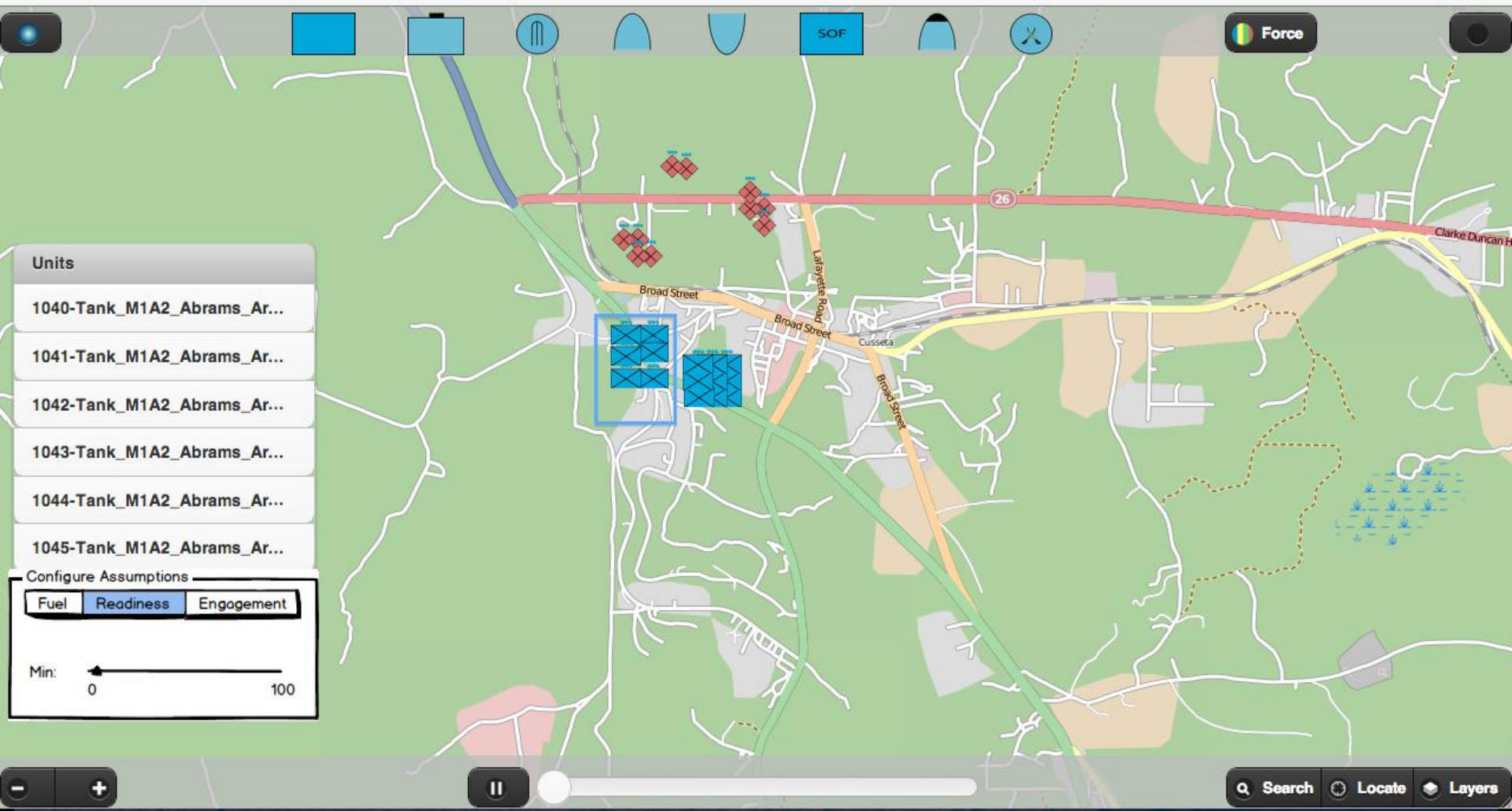
- 1040-Tank_M1A2_Abrams_Ar...
- 1041-Tank_M1A2_Abrams_Ar...
- 1042-Tank_M1A2_Abrams_Ar...
- 1043-Tank_M1A2_Abrams_Ar...
- 1044-Tank_M1A2_Abrams_Ar...
- 1045-Tank_M1A2_Abrams_Ar...

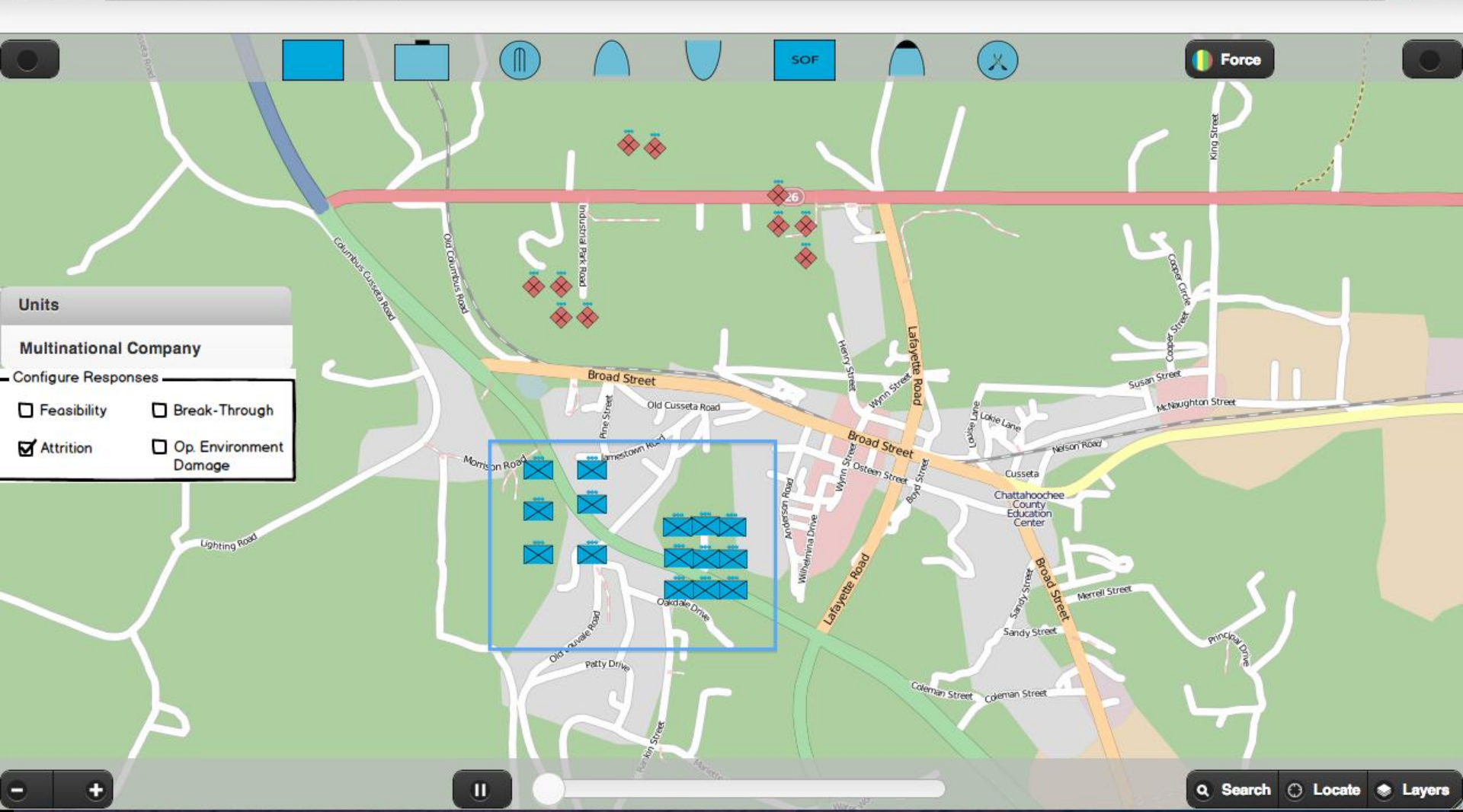
The map displays a terrain-based environment with various roads and landmarks. A red line representing a major road (Route 26) runs horizontally across the top. A yellow line representing another road runs diagonally from the bottom right towards the center. A blue box highlights a cluster of units in the center-left area. Red diamond-shaped icons are scattered in the upper-left quadrant. The interface includes a top toolbar with icons for zooming, a 'SOF' button, and a 'Force' button. A 'Units' list on the left side contains the following entries:

- 1040-Tank_M1A2_Abrams_Ar...
- 1041-Tank_M1A2_Abrams_Ar...
- 1042-Tank_M1A2_Abrams_Ar...
- 1043-Tank_M1A2_Abrams_Ar...
- 1044-Tank_M1A2_Abrams_Ar...
- 1045-Tank_M1A2_Abrams_Ar...

At the bottom left, the 'Configure Assumptions' panel is visible, with tabs for 'Fuel', 'Readiness', and 'Engagement'. The 'Fuel' tab is selected, and a slider below it is set to 'Min: 0'.

At the bottom right, there are buttons for 'Search', 'Locate', and 'Layers'. A zoom control bar is also present at the bottom center.



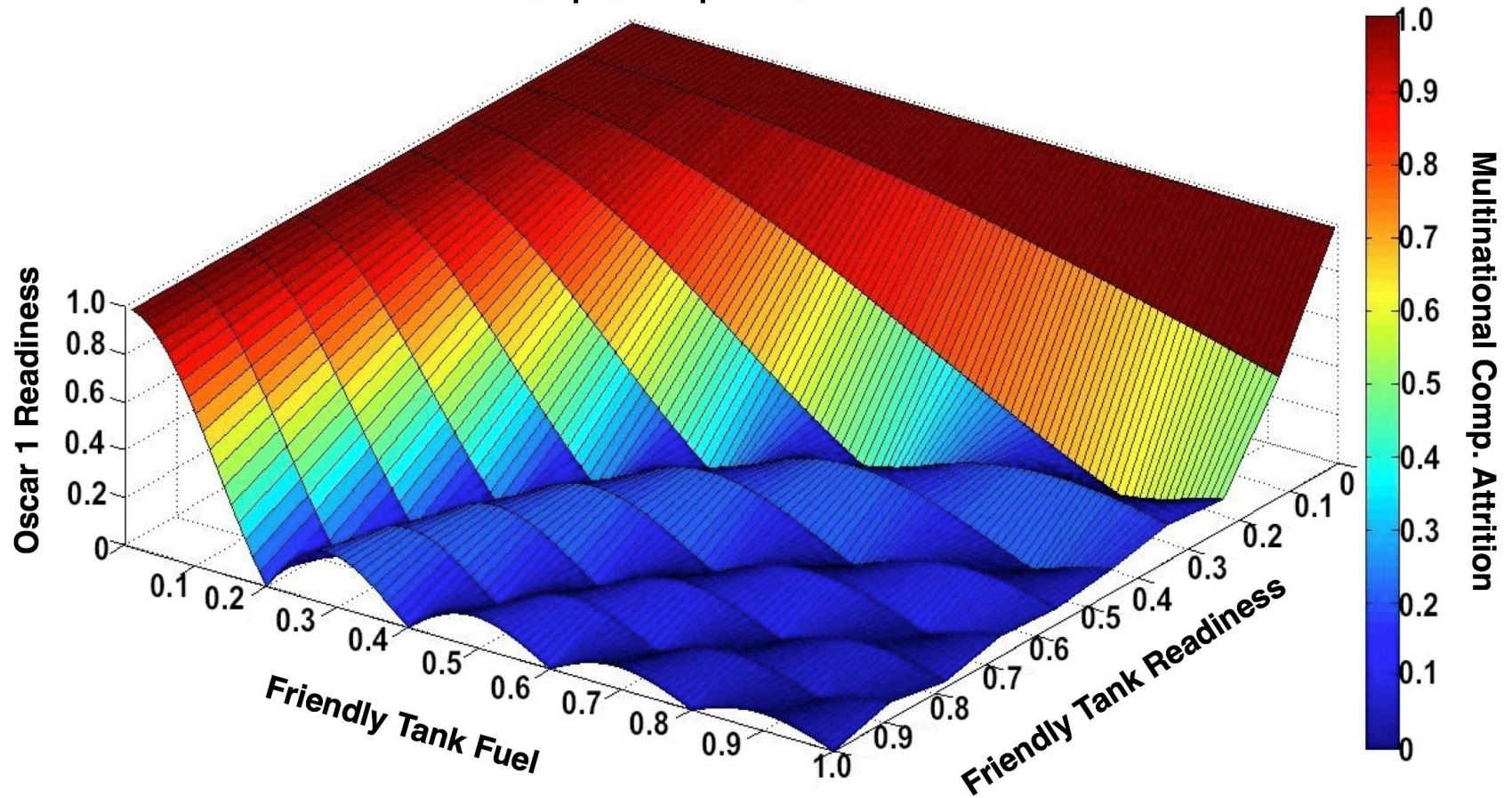


Review of Exploration



- Level of Fuel
 - Friendly Tanks
- Readiness Level
 - Friendly Tanks
 - Enemy Equipment
- Goal: See how changes in resources and readiness affect MNC attrition.

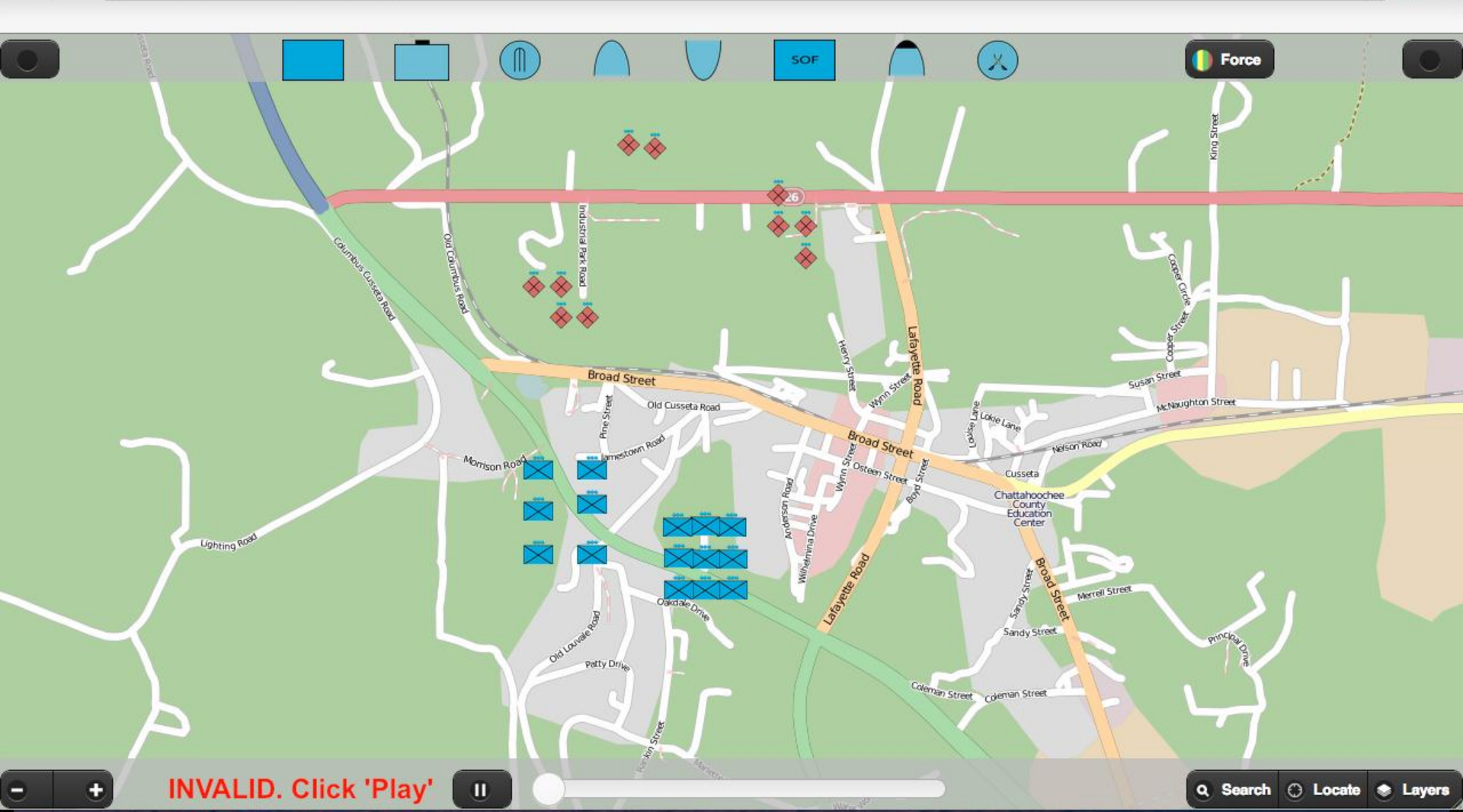
Assumption Exploration



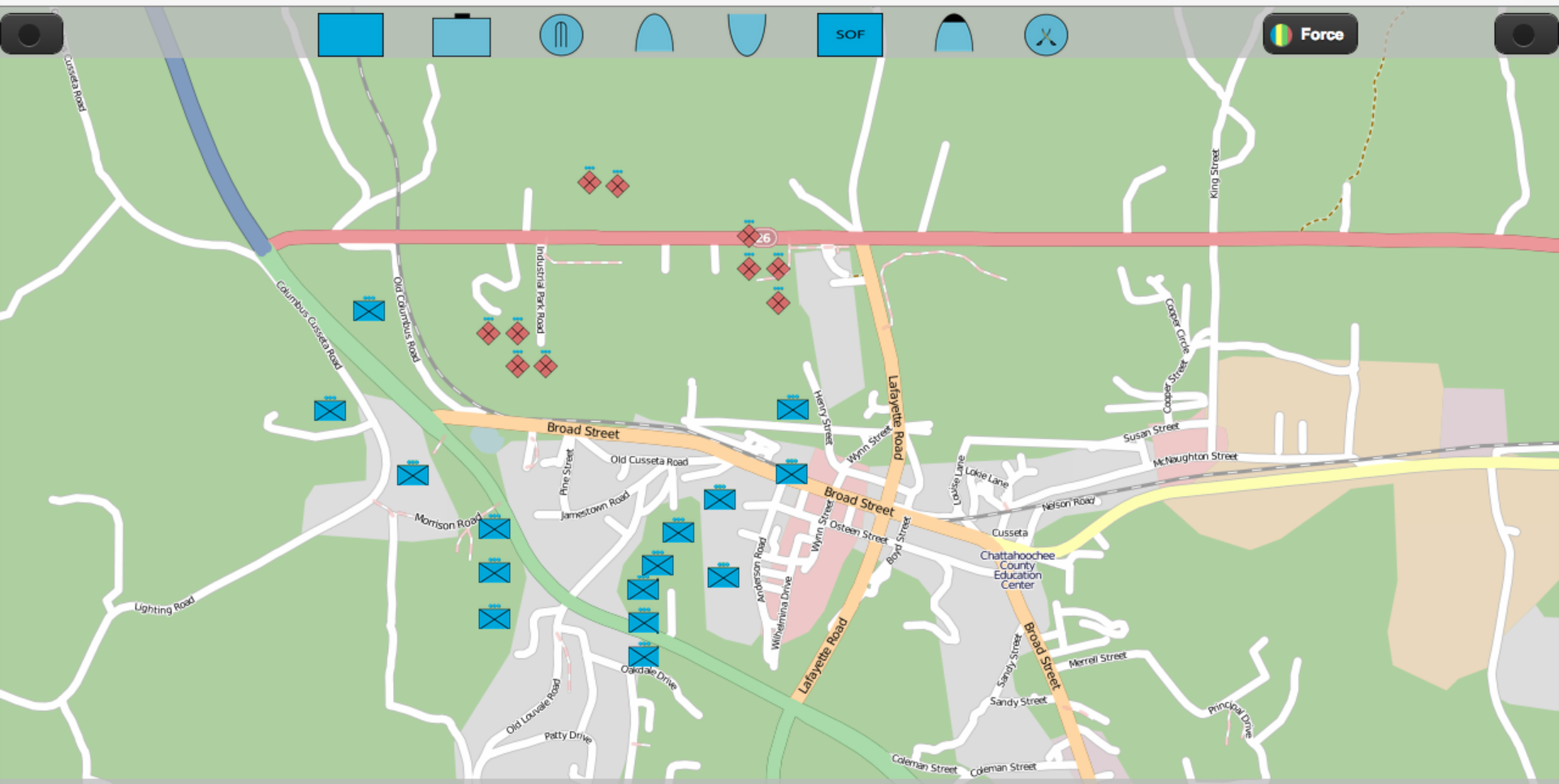
What about validity?

- Exploring assumptions gives us insight but what about validity?
- Is success - accomplishing every task - possible given the course specified in a scenario?
 - ▣ If not, how does failure occur?
- Feedback should be immediate
 - ▣ No simulation execution

The screenshot displays a military simulation interface. At the top, a browser window shows the URL `vmasc-cbms1.vmasc.edu.edu/client/`. Below the browser is a toolbar with various icons, including a blue square, a blue circle with a vertical line, a blue circle with a horizontal line, a blue circle with a diagonal line, and a blue circle with a cross. A "SOF" button is also present. On the right side, there is a "Force" button with a rainbow-colored bar. The main area is a map showing a network of roads and terrain. A blue box highlights a cluster of units in the lower-left quadrant. A control panel on the left side is titled "Units" and "Multinational Company". It has a "Configure Assumptions" section with three tabs: "Fuel", "Readiness", and "Engagement". The "Engagement" tab is selected. Below the tabs are three checkboxes: "No Force" (checked), "Deadly Force" (unchecked), and "Return Hostile Fire" (unchecked). The map shows several units represented by blue squares with an 'X' and some by red diamonds. Roads are labeled with names like "Broad Street", "Lafayette Road", "Columbus Cusseta Road", and "Industrial Park Road". The "Chattahoochee County Education Center" is also visible on the map. At the bottom, there is a search bar with "Search", "Locate", and "Layers" buttons, and a zoom control with a slider.



INVALID. Click 'Play'

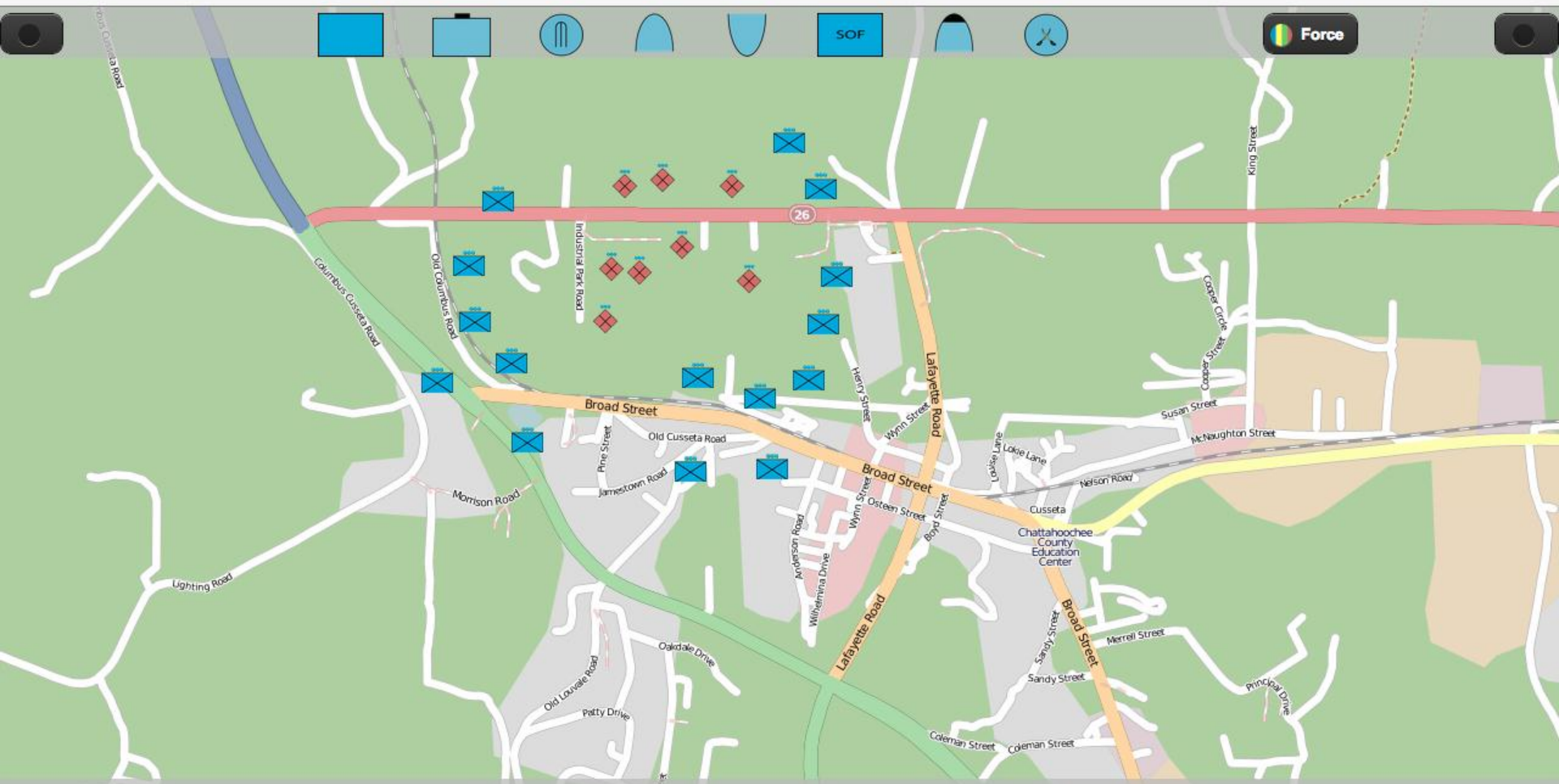


INVALID.

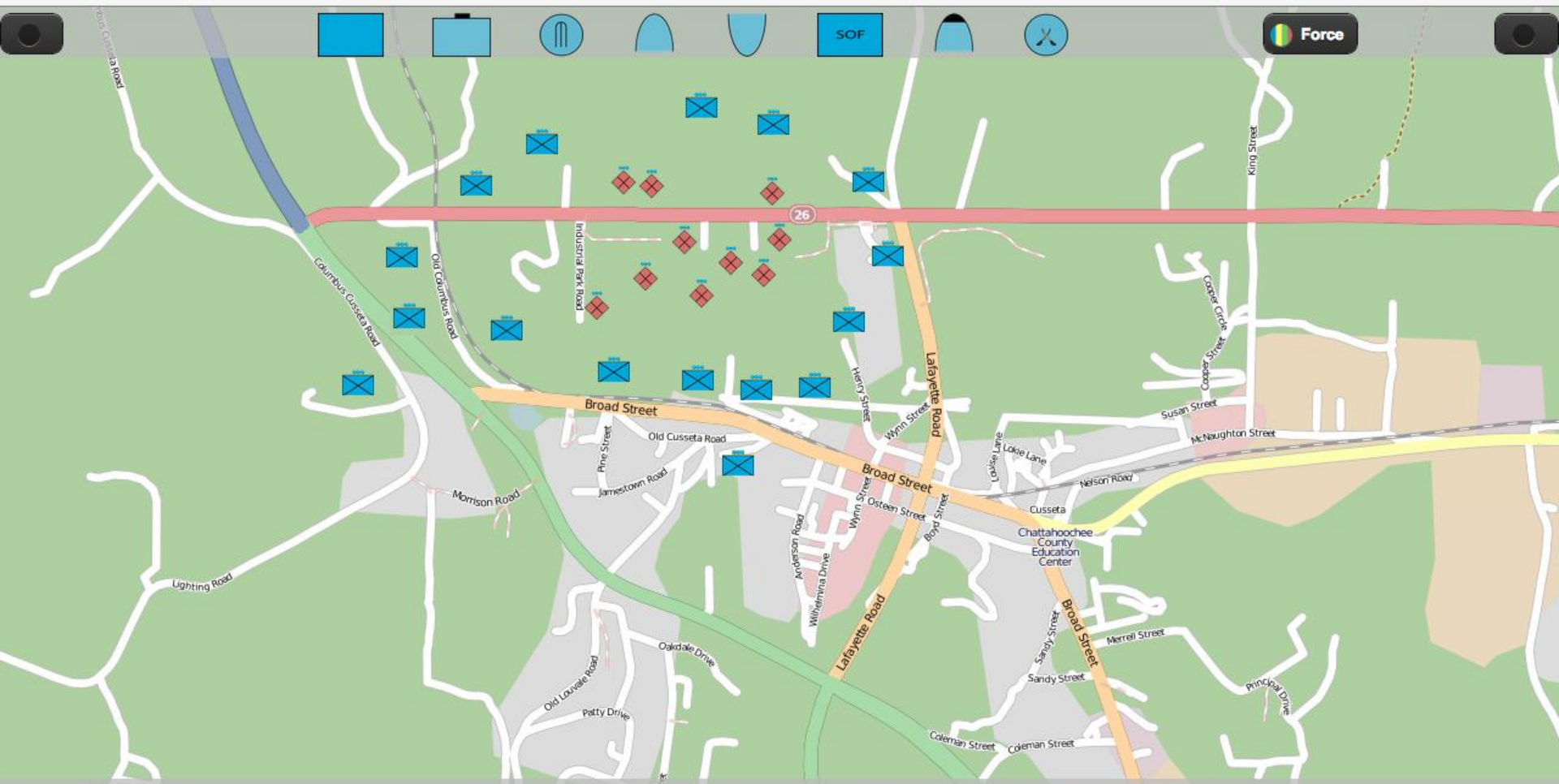
The map interface displays a geographic area with various streets and landmarks. Key streets include Columbus Cusseta Road, Broad Street, Lafayette Road, and Industrial Park Road. Landmarks such as the Chattahoochee County Education Center and Industrial Park Road are visible. The map is overlaid with several blue 'X' markers and red diamond markers. A toolbar at the top contains navigation icons and a 'Force' button. A search bar at the bottom right includes 'Search', 'Locate', and 'Layers' options. A prominent red error message 'INVALID.' is displayed in the bottom left corner of the map area.

INVALID.

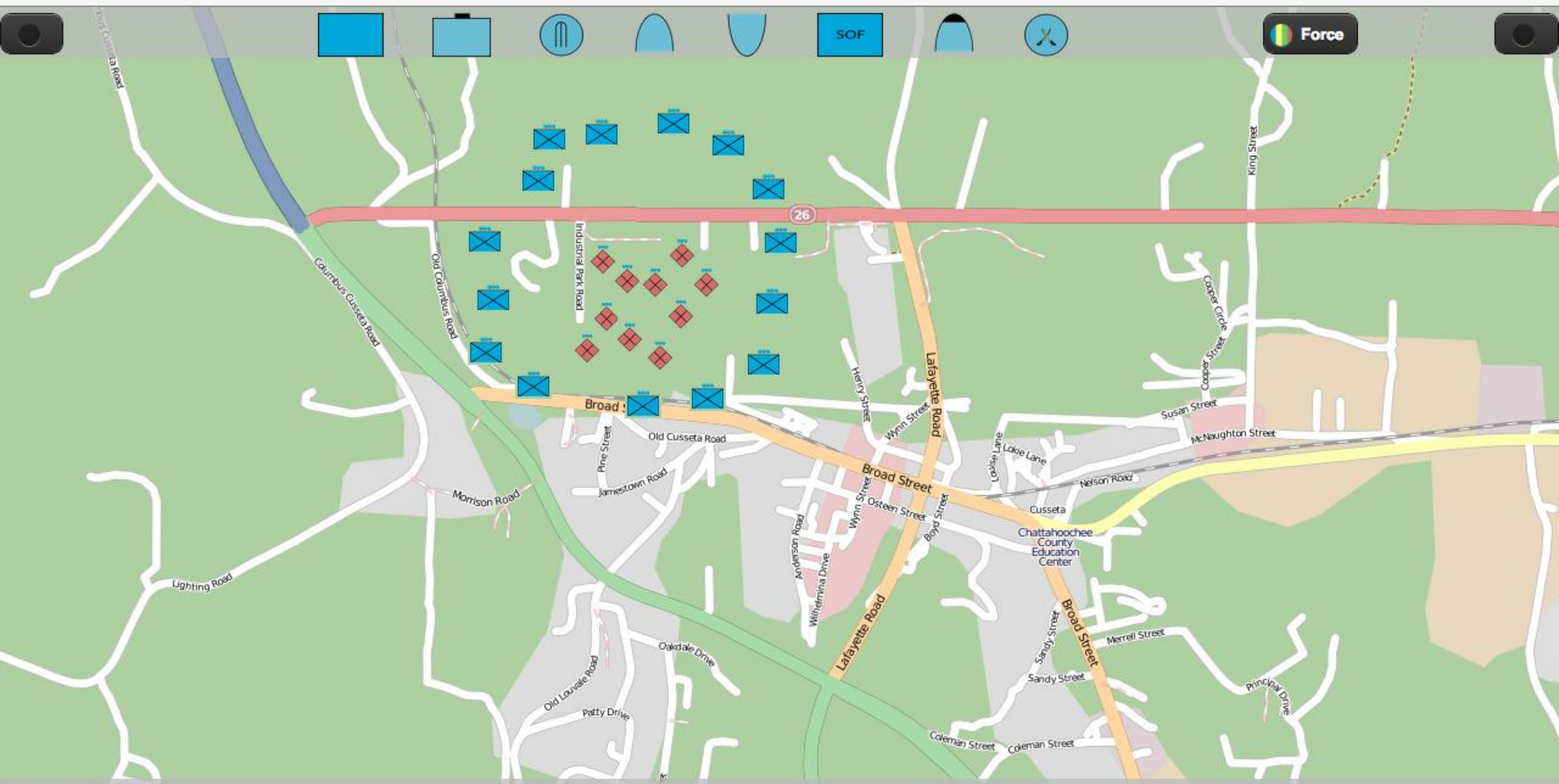
Search Locate Layers



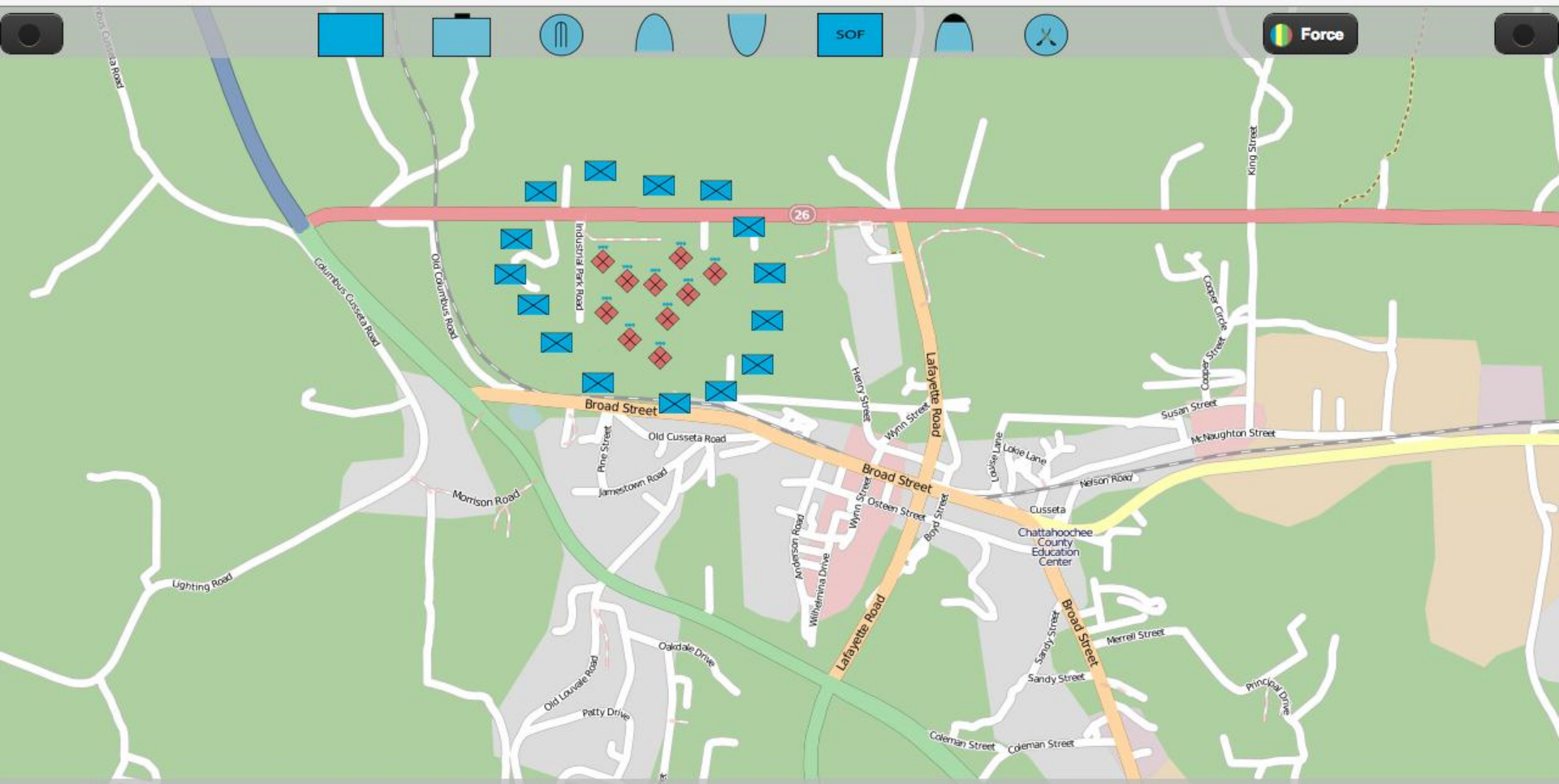
INVALID.



INVALID.



INVALID.



INVALID.

Future Work

How can we make this more useful?

- Polish existing solution
 - ▣ from development to production
- Pursue problems of larger scale.
 - ▣ make applicable to larger scenarios, different assumptions
- Key Limitation: A simulation related to the scenario must exist.