

REQUEST FOR PROPOSAL

SIMULATED IOT DATA AND DATA APPLIANCE FOR AR/IOT NETWORK CHALLENGE

Issue Date: April 14, 2020

PART ONE: OVERVIEW

Sensis and US Ignite seeks a vendor to provide a data appliance and configure internet of things (IoT) data to simulate realistic, timestamped smart building data and personal area network data streams that would occur during emergency scenarios.

The RFP process will proceed according to the following schedule. The target dates are subject to change.

Target Date	Description
Apr 14, 2020	RFP made available to select organizations and posted on Sensis/US Ignite's website.
April 27, 2020	Questions or requests for clarification must be submitted via e-mail to rfp.chariotchallenge@sensisagency.com prior to 8:00 p.m. ET.
May 4, 2020	Responses are due to rfp.chariotchallenge@sensisagency.com by 12:00 p.m. ET.
May 11, 2020	Responses to be evaluated by the Sensis team. Follow-up interviews and negotiations, as necessary.
May 25, 2020	Vendor selected.
Jun 1, 2020	Master Services Agreement and Task Order(s) finalized.
Jun 1, 2020	Period of Performance begins (or sooner).
January 31, 2021	Period of Performance ends.



PART TWO: ABOUT THE PROJECT AND SENSIS/US IGNITE/NIST PSCR

About the Project

Sensis and US Ignite have partnered with The National Institute of Standards and Technology (NIST) Public Safety Communications Research (PSCR) to run a prize competition focused on augmented reality (AR)/IoT.

With the advent of 5G infrastructure, IoT devices & smart buildings, public safety data streams have become highly valued assets. This thereby increases capability of delivering relevant information and operational utility for the first responder community. Today, however, building and city data streams are difficult to segment, process, integrate, and act on. By advancing the solution state of both AR and IoT, NIST PSCR can demonstrate to both technical innovators and first responder stakeholders that access to various streams of IoT data, delivered in usable, unified, and coherent formats, can help first responders solve complex, scenario-specific, communication challenges, thus improving public safety capability. In order to efficiently build out these technologies, NIST PSCR seeks to integrate IoT sensor data into intuitive AR interfaces, making the data actionable in heads-up displays. High-performing prize challenge participants will be selected and given an opportunity to fully develop their solutions, preparing for and competing in a final live test event. Each participant will develop simulated IoT data streams and provide a solution to support the delivery of the simulated data in four specific emergency scenarios for teams participating in a challenge to develop AR interfaces. The data and scenarios should be able to be reset and rerun to allow judges to assess team solutions in a consistent manner during the AR challenge.

Together, Sensis and US Ignite will deliver prize challenge marketing and outreach, simulated IoT data, data appliance procurement and deployment, test facility procurement and live event execution, and technical support services to NIST PSCR challenge winners. The objective of the US Ignite and Sensis partnership, as it relates to simulating and delivering IoT data for the development challenge, includes:

- Identifying and managing the development of simulated IoT data to support staged activities in public safety scenarios to be used during the prize challenge competition.
- Identifying, procuring, managing, and maintaining an IoT streaming data appliance capable of delivering various emergency scenario data streams to challenge participants.

Sensis Overview

Sensis is a full-service, cross-cultural marketing and advertising agency in Los Angeles, Washington, DC, Austin and Atlanta, creating experiences out of cultural insights to drive behavior change. To learn more about Sensis, please visit their [website](#).

US Ignite Overview

US Ignite is a national nonprofit, a 501(c)(3), that is accelerating the smart city movement – and creating value for an entire ecosystem – by guiding communities into the connected future, creating a path for private sector growth, and advancing technology research that’s at the heart of smart city development. Why is this important? Because local governments need to improve quality of life and ensure economic development in their communities, particularly during a time of rapid technological change. Businesses recognize the importance of the emerging market around smart communities and need to find commercial strategies that are repeatable, scalable, and sustainable. And foundations and federal agencies need to channel their institutional aims into efforts ranging from cutting-edge research to practical economic development initiatives that deliver measurable benefits.





As a trusted partner, US Ignite brings this entire smart city ecosystem together, successfully pairing financial investment with technical and organizational expertise. Through the public-private partnership programs we run, US Ignite is a catalyst for communications network advancement, and for innovation in smart city services that are powered by a new generation of technologies. To learn more about US Ignite, please visit their [website](#).

NIST PSCR Overview

Through the use of advanced communication technologies, the public safety community can more effectively carry out their vital mission to protect lives and property – from day-to-day operations to large events and emergencies. To fulfill this vision, the PSCR program acts as an objective technical advisor and laboratory for the public safety community to accelerate the adoption and implementation of only the most critical public safety. To learn more about NIST and PSCR, please visit their [website](#).

PART THREE: SENSIS VISION OF THE IoT DATA AND DATA APPLIANCE

The purpose of this AR IoT-based Challenge is focused on IoT devices, smart buildings, and smart cities that currently collect and monitor tremendous amounts of data. This data will only increase in amount as 5G becomes more publicly available and widespread. This data could provide valuable insight to users but currently is largely unavailable to the public safety community. The ability to quickly separate relevant from non-relevant data and then process the relevant data into useful information for the public safety user needs is necessary to execute mission critical. In order to be efficiently and effectively utilized by public safety officers, the information needs to be timely, actionable, easy to understand, and presented in a manner that supports the specifics of public safety tasks (e.g., noisy, restrictive PPE, cognitive overload, etc.).

The AR-focused participants will create augmented reality interfaces for public safety that will utilize the emulated data in order to improve communication under four scenarios:

1. Flood
2. Mass Transit Accident
3. Wildfire
4. Active Shooter with an IED

The selected vendor shall provide a simulated IoT data based on the defined scenarios and sensor list provided in Appendix A and a data appliance that would simulate realistic, timestamped smart building data and personal area network data streams that would occur during the above four emergency scenarios. The selected vendor shall work along with the Sensis team to configure the data appliance as per the requirements and provide IoT data configuration files. That data appliance will deliver the simulated IoT data created for the AR challenge, as well as simulated IoT data created by IoT challenge contestants in a standard format during the challenge. The data streams generated shall be in a .json format suitable for resetting scenarios and reloading data for multiple rounds in the challenge.

The data appliance shall simulate an end-to-end full stack packet level network simulation to enable testing of the IoT devices in the network serving first responder operations. The data appliance shall be easily configured to add or delete IoT devices either through direct scripting or a well-defined graphical user interface (GUI). The solution shall have different protocol modelling capabilities including that of standard IoT protocols such as

MQTT to study the performance of the devices within the network and the interface integrated within the AR devices.

PART FOUR: SCOPE OF SERVICES

The selected vendor shall provide the following services to enable the Sensis team to build the tool outlined in "*Part 3: SENSIS VISION OF THE IoT DATA AND DATA APPLIANCE*:"

1. The vendor shall provide the Sensis team access to its data appliance and the necessary license to operate and share the data streams generated out of the tool for the competitors.
2. The vendor shall provide simulated IoT data based on documented scenarios to support the staged events during the AR challenge.
3. The vendor shall provide a write-up of how the supplied IoT data will support the various tasks and decision points detailed for each scenario:
 - a. <https://www.chariotchallenge.com/active-shooter/>
 - b. <https://www.chariotchallenge.com/flood/>
 - c. <https://www.chariotchallenge.com/mass-transit-accident/>
 - d. <https://www.chariotchallenge.com/wildfire/>
4. The vendor shall provide IoT configuration files and configure the data appliance to create scenarios that would simulate realistic, timestamped data streams that would occur during the emergency scenarios.
5. The data streams generated would be used for judging the competitors of the prize competition; the vendor shall enter into a confidentiality agreement to ensure that the prize competition is conducted in a fair manner.
6. The data streams would be made public after the completion of the prize competition.
7. The vendor shall provide the Sensis team necessary customer and troubleshooting support.
8. The vendor shall provide the Sensis team with necessary documentation that supports the operation and configuration of the data appliance.
9. The vendor shall assist in the deployment of high-quality code that accurately meets the requirements noted in "Part 3: Sensis Vision of the data appliance."
10. The vendor shall perform successful releases without introduction of unexpected problems and have minimal need for emergency/corrective maintenance and to fix the same issue multiple times.
11. The vendor shall provide a dedicated project manager and a technical lead who shall be the point of contact with the Sensis team.
12. The vendor shall support the overall development, testing, validation and deployment of the tool.
13. The vendor shall provide operations and maintenance support to the Sensis team.
14. The vendor may need to assist with the hosting and archiving the generated data streams.
15. The vendor shall ensure transferability of the license and generated data streams after the lease; depending on the proposed solution, an instruction manual or other documentation will be requested to ensure a smooth transition from leaseholder.

PART FIVE: TERM OF CONTRACT

The Sensis team intends to enter into a contract with the winning proposer(s) for an eight-month term beginning May 25, 2020 and ending January 31, 2021.

PART SIX: QUESTIONS AND REQUESTS FOR CLARIFICATIONS

Proposers may submit written questions and requests for clarification regarding the RFP. The questions or requests for clarification must be submitted via e-mail and received by the Sensis team prior to 8:00 p.m. ET April 27, 2020. Please direct any questions or clarifications to rfp.chariotchallenge@sensisagency.com.

PART SEVEN: QUALIFICATIONS AND INSTRUCTIONS FOR SUBMISSION

If your organization would like to respond to this RFP, please send your RFP response to rfp.chariotchallenge@sensisagency.com with a subject line of "RFP: Data Appliance for IoT Network Simulation - Your Organization." Please include the following in your response:

1. **Proposer Information and References**
 - Primary contact information, including name of organization, phone number, email, and main point of contact.
 - A description of your organization. Please include the descriptions of any proposed subcontractors, if applicable.
 - A list of three professional references that the Sensis team can contact – please include the following: a summary of the work provided and how your software was leveraged, the name of organization (if shareable), main point of contact, phone number, and email address.
 - A summary of the qualifications of the project manager and technical lead aligned to the project.
2. **Qualifications and Response to Scope of Services:** Please detail the organization's qualifications to perform the services and meet the requirements outlined in "Part 4: Scope of Services." Additionally, please address how your organization will perform the duties outlined in "Part 4: Scope of Services" and how your organization's product/software will help the Sensis team achieve its tool vision outlined in "Part 3: Sensis Vision of the Data Appliance".
3. **Service Level Agreements:** Please provide some general service level agreements (SLA). The proposed SLAs should include information such as support hours, vendor response times, resolution times, and escalation triggers.
4. **Cost Proposal:** The Sensis team intends to issue a fixed-price contract, to a suitable vendor who demonstrates the capacity to deliver quality scope of services and is the most responsive to the requirements of the RFP. Please note the following:
 - Please provide an organization-fixed price cost proposal showing the associate cost to deliver the services outlined in "Part 4: Scope of Services." The proposal should not exceed \$15,000 in total cost. The cost proposal should include the following components:
 1. Component 1: Fixed costs of the creation of simulated IoT data streams as defined by the four key public safety events. A Task Order related to this component will be issued the first year of the project.
 2. Component 2: Software license for the Sensis team to access the software platform used for delivery of the simulated IoT data created by the proposer and also to support delivery of simulated IoT data by challenge teams. A Task Order related to this component will be issued the first year of the project.
 3. Component 3: The cost for configuration of scenarios and operational and maintenance costs for one year. A Task Order related to this component will be issued the first year of the project.



4. Component 4: Any additional or supplemental costs involved. A Task Order will be issued for this component, if necessary.

- Indicate whether your organization can invoice the Sensis monthly (preferred, but not required).
- Sensis will pay fees supported by evidence of bona fide services rendered. The Sensis team will not enter into a retainer agreement which pays fees in advance to an organization or individual to secure or keep services when required.

Closing Date and Time:

The Sensis team must receive proposals by email no later than **May 4, 2020 at 12:00 p.m. ET**.

Point of Contact:

rfp.chariotchallenge@sensisagency.com

Proposal Preparation Guidelines:

- All proposals must be submitted in writing.
- All proposals must be emailed to the Sensis point of contact listed, rfp.chariotchallenge@sensisagency.com
- Organizations may modify or withdraw proposals prior to the submission deadline.
- Proposals may not be changed after the submission deadline.

Other Considerations:

- After a contract is signed, the Sensis team will pay the organization for travel and other costs associated with serving the Sensis team as a client. The Sensis team will reimburse these costs in accordance with Federal and the Sensis team travel policies.
- The Sensis team may reject any or all proposals, in whole or in part, waive a technicality in any proposal, make awards in a manner deemed in the best interest of the Sensis team and, unless otherwise specified by the organization, accept any item in the proposal. The Sensis team reserves the right to award one or more contracts, if necessary.
- The Sensis team anticipates an eight-month contract.
- Simulated IoT data will be published online in JSON format for public use.



PART EIGHT: TIMELINE FOR EVALUATION AND SELECTION

The Sensis team will review all proposals submitted. If an organization is invited to make a presentation to the Sensis team, the costs for such a presentation will be the responsibility of the organization. The Sensis team plans to select the organization within 30 business days after the submission deadline and reserves the right not to select any organization if conditions change between the time of the RFP release and completion of the review process.

No contractual obligation on behalf of the Sensis team whatsoever shall arise from the RFP process. Additionally, this RFP does not commit the Sensis team to pay any cost incurred in the preparation or submission of any response to the RFP.

The RFP process will proceed according to the following schedule. The target dates are subject to change.

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The proposals will be evaluated based on the following criteria:

1. Knowledge of project requirements as demonstrated under "Part 4: Scope of Services"
2. Capabilities and attributes of the Data Appliance - the configuration methodology to create the scenarios described in "Part 3: Sensis Vision of the Data Appliance."
3. Qualifications and range of experience of the proposed vendor.
4. Project costs and overall value.

After review of the submissions, the Sensis team may request to meet with organizations prior to selecting a vendor.

Please direct any questions to rfp.chariotchallenge@sensisagency.com



CHARIoT Challenge Scenario Use Cases

Appendix A: Sensor Recommendations

Overview

The IoT sensors simulated within the challenge are the primary data source for AR interfaces created by participating teams and a clear understanding of types, data fields, and APIs are critical for development teams. Simulated IoT devices are required to present data in JSON format, in sync with scenario narratives to support incident command decision making and first responder choices and safety. To provide clear support for teams, an array of IoT sensor types should be clearly defined and provide a minimum of five sensor types to offer an effective core understanding of the resources available to construct solutions around. The listed sensors below are recommended examples. To review the four emergency scenarios and corresponding tasks for the Challenge, please visit www.chariotchallenge.com.

Scenario 1: Flood

Scenario: <https://www.chariotchallenge.com/flood/>

Incident Command Tasks

The emergency center's main concern was resident safety; to accomplish this, they prepared to execute the following tasks:

- Establishment of first responder flood rescue teams
- Blockade of already flooded areas
- Identification of victims and rescue assistance
- Notification of residents in harm's way
- Identification and assessment of infrastructure assets at risk (such as city sewers)

Hologram Use Cases

- Enhancing city-level decision-making

- Rapid decision making on road closures/gate closures based on water level data overlaid with floodplain and city view maps
- First responder deployment decision on sending in divers and where to send them for rescue based on hazardous materials in water data and current flows
- Deploying resources and personnel with geographic precision and real-time data flows
- Selecting where to send assets based on drone sensor data locating victims on roof tops
- Decision analysis on sending in divers and where to send in divers for rescue based on hazmat in water data and current flows

First Responder Tasks

The emergency center's main concern was resident safety; to accomplish this, they prepared to execute the following tasks:

- Notifying and evacuating residential and business areas located in potential flooding areas
- Rescuing of those that have been caught in existing flooding
- Creating clearance for driving through water, withstanding force of water
- Forecasting water speed/direction/quality levels
- Mapping hazardous materials

Heads-up Display Use Cases

- Intelligent location and mapping ability using submarine sonar data to avoid large obstacles and hazards
- Advise on depth of water on roadways using water depth sensors
- Notification of incoming rising water using water level, rain, and sewer runoff sensors
- Alerts of water speed using water speed sensors

Recommended Sensor Types:

Sensor Type	Data	# Devices	Msg Rate
Roadway Water Level	geo coordinates, timestamp, water depth in feet	40	1/s
River Water Level	location, timestamp, water level, water speed	20	1/s
Rain Gauge	location, timestamp, period, rainfall accumulation	50	1/m
Water Hazmat	location, timestamp, pH, conductivity, ORP	20	1/s
Simulated drone AI for spotting people	location, timestamp, number of people	5	1/m
Traffic Data	location, road segment, avg mph	100	1/m
Road Closure Sensors	location, road open/closed	5	1/m
Vital Monitoring Sensors	heart rate, oxygen percentage, SOS beacon	50	1/s
Sonar Sensors	location, object identification	1	1/s

Scenario 2: Active ShooterShot

Scenario: <https://www.chariotchallenge.com/active-shooter/>.

Proposed Incident Command Tasks for Scenario:

- Track shooter
- Deploy SWAT personnel
- Track people evacuating
- Monitor evacuation routes
- Overlay other conditions (fire, fire alarms, smoke, etc.)
- Monitor traffic conditions
- Coordinate with computer-aided dispatch (CAD) system data.

- Detect injured individuals
- Detect location of people hiding
- Detect suspicious objects/improvised explosive device (IED)
- Assess building level data (locked doors, alarms, etc.)

Hologram Use Case

- Enhanced resource deployment using local maps and CCTV security cameras to determine ingress/egress point for response
- Building-level disarmament, using power grid, determine if/when to shut off power to building to support responding assets

First Responder Tasks

- Engaging shooter via ingress/egress location points
- Defusing IED
- Preparing for treatment/staging/transport/triage of victims
- Helping people evacuate
- Locating/treating injured victims

Heads Up Displays Use Case

- Geospatial driven victim identification: Correctly identifying number and location of victims and shooters using drone/ball camera feed
- Identifying ingress/egress points to identify appropriate entry point to engage with shooter
- Tactical response decision-making
- Real-Time IED Assessment - evaluation of suspicious package using drone/robot with chemical sensor - determine whether to detonate/etc.
- Track timeline to detect gunshots
- Notification of location of wounded/hiding individual

Recommended Sensor Types:

Sensor Type	Data	# Devices	Msg Rate
Shot Spotter	location, timestamp, shot detected, number of shots, projected shooter location, classification of gunfire	10	1/s
Motion/Occupancy Sensor	location, timestamp, number of people detected	15	1/s
Simulated AI for suspicious Object Detection	location, timestamp, alert	15	1/s
Doorway Status	location, timestamp, locked/unlocked/open/closed	20	1/s
Vital Monitoring Sensors	heart rate, oxygen percentage, SOS beacon, holster/gun drawn detection, shots fired, number of shots	50	1/s
Traffic Data	location, road segment, avg mph	100	1/m

Scenario 3: Wildfire

Scenario: <https://www.chariotchallenge.com/wildfire/>

Incident Command Tasks

- Identify victims or assets at risk
- Identify water resources/foam resources
- Track resources (e.g., personnel movement)
- Receive updated temperature scans
- Vehicle locator, command, basecamps, etc.
- Establish geographic knowledge of area
- Establish neighborhood-level understanding of # of residents and # of businesses in at-risk areas

Hologram Use Case

- Visualizing and forecasting speed, intensity, and direction of fire
- Visualizing and forecasting areas to evacuate based on wildfire models
- Deploying wildfire personnel to target areas
- Indicating to air tankers, optimal area to drop water and fire retardant

First Responder Tasks

- Containing fire
- Establishing trench lines
- Evacuating victims
- Maintaining safety of other fire personnel and team members
- Identifying safe locations

Heads Up Displays Use Case

- Assessing dry/dangerous conditions using drone footage
- Conducting thermal mapping of environment using environmental data
- Tracking windspeed and wind direction
- Tracking movement of people
- Evaluating dangerous air conditions (smoke/toxins) using air quality sensors
- Overlaying infrastructure maps to identify and prevent damage
- Feeding information from command interfaces for first responder coordination
- Overlaying 3D mapping and navigation information

Recommended Sensor Types:

Sensor Type	Data	# Devices	Msg Rate
Simulated drone AI thermal detection	location, timestamp, thermal threshold, centerpoint, radius	5	1/s
Simulated drone AI data alert for people	location, timestamp, number of people, centerpoint	5	1/s

Simulated drone AI data alert for objects	vehicles, houses, location, timestamp (assumed PII has been removed)	5	1/s
Anemometer	location, timestamp, wind direction/velocity, humidity	20	1/s
Air Quality	location, timestamp, PPM levels VOC, CO2, CO, Particulants	20	1/s
Traffic Data	location, road segment, avg mph	100	1/m
Vital Monitoring Sensors (First Responder)	heart rate, oxygen percentage, SOS beacon, holster/gun drawn detection, shots fired, number of shots, position	50	1/s

Scenario 4: Mass Transit Accident

Scenario: <https://www.chariotchallenge.com/mass-transit-accident/>

Incident Command Tasks

- Identifying location of metro cars, number of passengers in cars
- Identifying and leveraging CCTV security cameras streams in cars or metro terminal
- Track first responders in the field
- Assessing infrastructure and integrity of physical structures
- Viewing live situations and advising/drawing feedback to inform first responders

Hologram Use Case

- Visualizing underground pathways for pre-incident planning
- Collecting and analyzing real-time environmental data using air quality and smoke sensors
- Mapping optimal navigation routes for first responders

First Responder Tasks

- Identifying if downed lines or 3rd Rail is safe
- Identifying and mitigating risks such as smoke or fire
- Locating and evacuating victims
- Identify critical victims
- Identifying damage to critical infrastructure

Heads Up Display Use Case

- Tracking air quality and smoke levels in real-time
- Collecting and showcasing real-time information on status of victims and metro crash
- Receiving navigation guidance and information to traverse through dark tunnels

Recommended Sensors Types:

Sensor Type	Data	# Devices	Msg Rate
Voltage Detection Sensor	location, timestamp, voltage level detected	20	4/s
Radiation Detector - Dosimeter	timestamp, location, microroentgen	5	2/s
Air Quality/VOC sensor	location, timestamp, levels of VOC/CO2/CO	20	1/s
Simulated AI for CCTV analytics	location, timestamp, vehicle detected	1	1/s
Simulated AI ground drone alert for casualty	distance, bearing, timestamp, person detected	1	1/s
Fire/Smoke Detector	Location, timestamp, temperature, o2/co level	20	1/s
Traffic Data	location, road segment, avg mph	100	1/m

Vital Monitoring Sensors (First Responder)	heart rate, oxygen percentage, SOS beacon	50	1/s
Vital Monitoring Sensors (victim)	heart rate, blood pressure, oxygen percentage	100	1/s
Train Motion/Occupancy Sensors	location, timestamp, number of people detected	10	1/s