Request for Information on Implementation of Guidance for First Responder Body-worn Sensors

RFI Issuance Date: January 9, 2019
Response Due Date: January 30, 2019

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Abstract

This OGC Request for Information concerns commercial implementation of guidance for first responder body-worn sensor technology that has been developed by the U.S. Department of Homeland Security Science and Technology Directorate (DHS S&T) as part of their Next Generation First Responder (NGFR) Handbook.

One aspect of public safety is to support first responders by keeping them connected to the response effort and aware of any information about themselves and their environment that helps them to stay safe and do their jobs effectively. The SmartHub concept developed in the NGFR Handbook combines both communications and sensors in wearable components that can provide such support in the context of city infrastructure, policies, and practices that enable their functionality. OGC and DHS seek information on whether the current Handbook provides sufficient guidance and a feasible design to support SmartHub devices as vendor offerings, city procurements, deployed responder resources, and sustainable public safety capabilities.

A critical SmartHub design goal has been interoperability at multiple levels based on support for hardware, software, and information sharing standards. The present design provides for interoperability between

1. multiple devices plugged together and worn by the same responder
2. individual SmartHub devices that are connected with other SmartHub devices through a uniform public safety infrastructure
3. distinct cloud computing infrastructure systems provided by individual vendors to support their own SmartHub devices

Information that serves to validate this design approach will answer these questions:

1. Is the present NGFR Handbook sufficient guidance to design and build functional SmartHub products?
2. Are there customers for SmartHub products in the public safety community?
3. Can a SmartHub product be offered commercially with features, quality, and at a price point acceptable to such customers?

Results of the RFI responses will be analyzed and documented, then used to further advance the NGFR Guide. They will also be used to incorporate prototype deployments and use of SmartHub devices within the context of the upcoming OGC SCIRA (Smart City Interoperability Reference Architecture) Pilot activity. The goal of the SCIRA initiative is to develop and validate a design toolkit and related guides for ICT infrastructure and services deployments that improve public safety in small and medium-sized cities. Much of the information feeding such services and requiring infrastructure support comes from networked sensor (IoT) devices such as SmartHubs that have the potential to track many aspects of the urban environment relevant to public safety.

This RFI includes instructions on how organizations can respond and submit questions about the RFI. Responses to the RFI are requested by January 30, 2019.

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1 Introduction

1.1 RFI purpose and scope

This Request for Information (RFI) concerns commercial implementation of guidance for first responder body-worn sensor technology that has been developed by the U.S. Department of Homeland Security Science and Technology Directorate (DHS S&T) as part of their NGFR Handbook.

The OGC Innovation Program utilizes a multi-step methodology in defining an interoperability initiative. Part one of the methodology is to gain better understanding of the current state of a given technology thrust and discover stakeholder insights about the architecture(s) to be used in subsequent initiatives. The RFI responses will be analyzed and documented, and used to incorporate prototype deployments and use of SmartHub devices within the context of the upcoming OGC SCIRA (Smart City Interoperability Reference Architecture) Pilot activity.

Readers of this RFI are encouraged to respond with specific feedback to the guidelines for implementation of first responder technology described in the NGFR Handbook.

1.2 Organizations supporting this RFI

Sponsors:

U.S. Department of Homeland Security, Science and Technology Directorate

Organization managing the RFI:

The **Open Geospatial Consortium** (**OGC**) is an international consortium of more than 500 companies, government agencies, research organizations, and universities participating in a consensus process to develop publicly available geospatial standards. OGC standards support interoperable solutions that "geo-enable" the Web, wireless and location-based services, and mainstream IT. OGC standards empower technology developers to make geospatial information and services accessible and useful with any application that needs to be geospatially enabled.

- OGC Innovation Program Policy and Procedures
  - http://www.opengeospatial.org/ogc/policies/ippp
  - A summary of the OGC IP is provided in document 05-127r8

2 SmartHubs, First Responders, and Public Safety

2.1 Scope of Inquiry

This Request for Information focuses on the guidance for SmartHub devices and infrastructure systems provided in the NGFR Integration Handbook illustrated in the activity reports referenced at the end of this document. Related first responder technologies and scenarios are of interest but not central to this inquiry.

2.2 Elements of SmartHub Systems

2.2.1 Body-worn elements

SmartHub body-worn capabilities are defined in terms of components, which may or may not be separate physical components in a given product.

- Control hub - the “brain” that controls the other components and flow of data between them.
- Comms hub - the component providing wide-area data and voice connections with the outside world.
- Power module - component providing electrical power to the other components.
- Sensor module - component(s) providing one or more sensor devices
- I/O module - user interface device such as a keyboard, touchscreen, headset, etc.

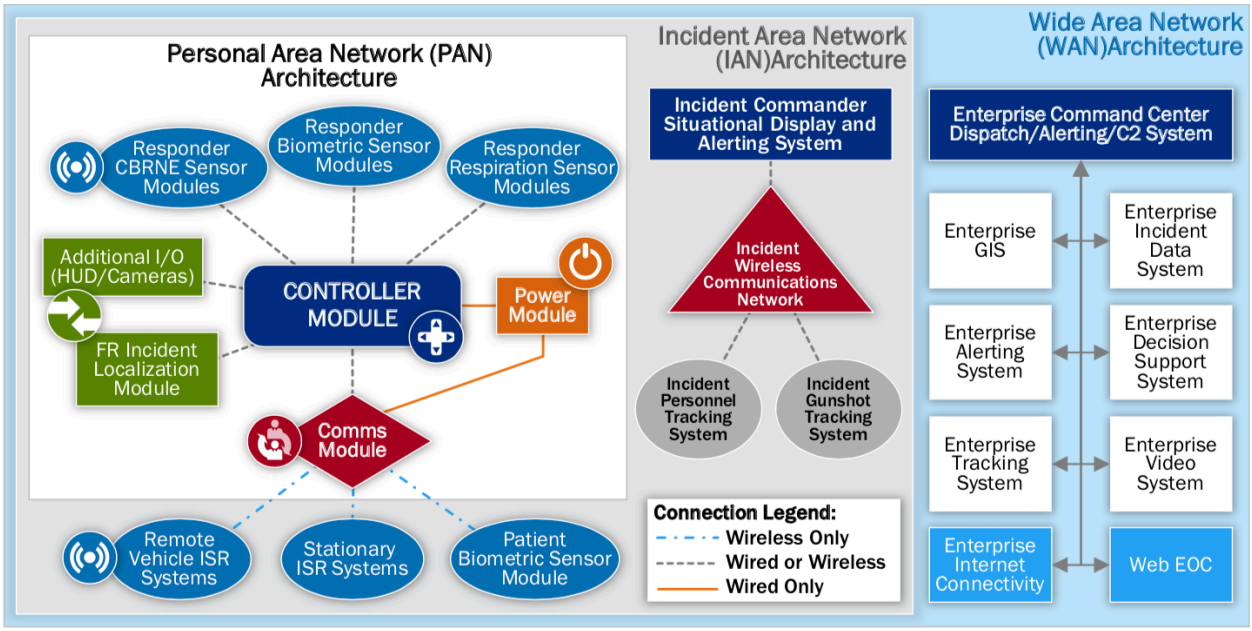

Figure 1: Agency View *from* https://www.dhs.gov/publication/st-frg-ngfr-integration-handbook-version-20

The most common sensors now used by first responders may be bodycams; however, the legal, policy, workforce, and data management issues around these devices complicate any validation of an overall SmartHub design, so body-worn cameras are not central to SCIRA strategies for SmartHub deployment and validation.

2.2.2 Incident-scale elements

Other system elements are deployed to an incident scene, either on a vehicle (car, truck, drone), in a command post, or to other generally fixed locations at the scene. These may include:

- Data nodes and routers to provide local data caching and communications.
- Tracking, video, air quality, weather, CBRN, or other fixed / mobile sensors.
- Workstations for command, tasking, and analysis functions.
- Actuators that control response equipment or trigger additional sensor readings.
- Temporary body-worn sensors for monitoring incident victims, etc.

2.2.3 City-scale elements

Larger scale system elements support provisioning of SmartHub devices and management of information being exchanged with devices and supporting elements:

- System procurement.
- Device provisioning, configuration, training, and maintenance.
- SmartHub data storage, retrieval, discovery, security, and analysis.
- Interfaces to dispatch, 911, command, tracking, and other city sensing systems.
- Applications and/or API's (Application Programming Interfaces) for use by commanders, analysts, city officials, mutual aid organizations at regional, state, and federal levels.
- Geospatial and IoT data framework and analytical capability.

2.3 SmartHub Interoperability Considerations

Experience clearly shows that one-vendor, stove-piped information systems are difficult to sustain and evolve, difficult to scale, and particularly difficult to connect with other systems in order to derive greater value from the information they collect and manage. Interoperability is the quality both of systems being able to connect into larger enterprises (i.e. systems of systems), and of systems being able to interchange information between vendors, platforms, and technologies as needed to progress and adapt. Standards are the agreements that allow systems to interoperate without the need to build expensive, ad hoc, bilateral alignments and connections between every pair of systems. The SCIRA toolkit provides patterns and other design elements to begin with interoperability as an integral design criterion rather than an afterthought.

System interoperability typically needs to be enabled at multiple levels and scales, although critical points of system interaction may yield the greatest extent of information sharing for the effort of altering existing systems. Three specific levels of SmartHub interoperability have been described:

1. **Component-level interoperability** supports interchangeability of body-worn component through standard interfaces and information encodings that extend to specification of the physical connections between components. For example, an interoperable power module from one vendor should work in a "plug-and-play" fashion with a Control Hub from any other SmartHub vendor, not only providing power to the entire system, but also exchanging power

reserve and configuration information with the Control Hub. This requires detailed standard specification not only of the interface for power information exchange, but agreement down to the physical interface (e.g. USB-C).

2. **Node-level interoperability** considers how a SmartHub connects and communicates with systems beyond the wearer, regardless of how the SmartHub components themselves are structured. These are the data schemas, transport / communication layers, and interaction patterns that enable any SmartHub to work with any other SmartHub and with any conforming infrastructure at the incident or city level. A limited extent of interoperability might specify the interfaces to a SmartHub-specific node system that in turn mediates interaction with other city systems. A more general extent would implement standards such as SensorThings API, MQTT, and others that enable SmartHubs to communicate with many other systems without prior bilateral configuration.

3. **System-level interoperability** addresses the situation where distinct SmartHubs and even distinct SmartHub components as worn by first responders are connected to distinct, possibly vendor-proprietary communications and computing infrastructure systems (e.g. platforms) and considers how resulting information streams may be shared between those systems through interface and data model standards.

Level 1 interoperability clearly delves deeply into how a specific SmartHub product may be designed and developed, rather than how it may participate in SCIRA-conformant Smart City systems. Level 2 interoperability examines the feasibility of integrating SmartHub devices into existing public safety systems; however, they may be configured or implemented internally. Level 3 interoperability considers how to enable a minimum level of interoperability between existing systems that already support SmartHub-type devices.

2.4 Public Safety Stakeholders in SmartHub Validation

The focus here is on responses from current and potential SmartHub product vendors, but it should be recognized that responses from other stakeholders will also bear on vendor planning.

2.4.1 Vendor validation

Initial information is needed from vendors on what SmartHub products they would consider offering, in order that city customers might have the possibility of procuring and deploying them in a prototype activity such as the SCIRA Pilot. Questions to be addressed by vendors include:

1. What wearable sensor, comms, and/or infrastructure technology would make viable products, product suites, or product lines for first responders?
2. Does the NGFR Handbook provide useful information for developing products such as SmartHub devices and/or components?
3. How could the Handbook be improved to support development of interoperable SmartHub products?
4. What questions or concerns would need to be addressed in order for your firm to offer SmartHub products?

2.4.2 City validation

Validation by cities such as those hosting the SCIRA Pilot puts them in a middle position between SmartHub vendors and responders who might make use of the devices. Given some assurance that both devices and supporting systems could be procured, city officials would then need to validate both the costs of deployment and the benefits that might accrue. Questions to be addressed by cities include:

1. What needs would be served by adoption of SmartHub devices and supporting infrastructure?
2. What would total cost of ownership would justify such adoption?
3. What types of SmartHub products would be most compatible with existing city infrastructure and practices?

2.4.3 Responder validation

First responders have critical, and risky jobs to do that typically have narrow windows for technologies that improve their performance and safety without unduly complicating their practices. Feedback from responders on SmartHub concepts and Handbook guidance regarding their use is critical to determine whether such products could involve their time and attention in a safe and effective manner. Questions to be addressed by responders include:

1. What SmartHub devices would fit with existing responder equipment and practices?
2. What policies and procedures would maximize the benefits and minimize the burdens of using such products?
3. How (if at all) does interoperability between devices, systems, and organizations matter for responders to do their jobs?

2.4.4 Public safety validation

Ultimately all SmartHub stakeholders will want to close the loop and determine how the devices can improve public safety, so that the public will support them, responders will accept their use, cities will move to procure them, and vendors will make plans to produce them. This dovetails with an important facet of the SCIRA Pilot, to define and compute indicators of Smart City capability success that incorporate metrics determined from the Pilot activities as well as feedback from a full range of participants and observers. Questions to be addressed by public safety stakeholders include:

1. What degrees and types of experimentation with SmartHub devices are a worthwhile investment in new capabilities?
2. What metrics should be used to measure cost-effective improvements in public safety from SmartHub product adoption?
3. What characteristics of partnerships with SmartHub vendors would lead to decreased administrative risk without compromising independence?

3 Responding to this RFI

3.1 Who can apply

This RFI is open to the general public. It is open to all organizations with an interest in public safety, first responder technology, and emergency response capabilities.

3.2 General terms and conditions

Responses to this RFI will be distributed to members of the organizations listed in section 1.2. Submissions will remain in the control of this group and will be used for the purposes identified in this RFI. A summary of the RFI Responses along with excerpts of some RFI responses may be made public. If you wish to submit proprietary information, contact (techdesk@opengeospatial.org) in advance of sending the response.

3.3 How to transmit a response

Send your response electronically to the OGC Technology Desk (techdesk@opengeospatial.org) by the submission deadline. Microsoft® Word format is preferred, however, Rich Text Format, or Adobe Portable Document Format® (PDF) are acceptable.

3.4 RFI response outline

Responses to this RFI are urged to use this outline:

1. Stakeholder viewpoint and public safety use cases represented in the response
2. Description of products and technology relevant to SmartHub commercialization
3. Responses to the three validation questions:
    a. Is the present NGFR Handbook sufficient guidance to design and build functional SmartHub products?
    b. Are there customers for SmartHub products in the public safety community?
    c. Can a SmartHub product be offered commercially with features, quality, and at a price point acceptable to such customers?
4. Suggestions for any improvements to the approach or details conveyed by the Handbook that would improve its fitness for purpose.

Respondents are free to add any additional topic they think is appropriate.

3.5 Questions and clarifications

Questions and requests for clarification should be sent to techdesk@opengeospatial.org.

3.6 Reimbursements

The organizations issuing this RFI will not reimburse submitters for any costs incurred in connection with preparing responses to this RFI. Cost share opportunities may arise from the future phases of the project as described in the abstract of this document.

3.7 Schedule

Responses to this RFI are requested by or before January 30, 2019.

4 Reference Documents and Resources

NGFR Integration Handbook	https://www.dhs.gov/science-and-technology/ngfr/handbook
SCIRA Pilot	https://scira.ogc.org/
IMIS IoT Pilot	https://www.opengeospatial.org/projects/initiatives/imisiot
Grant County Technology Experiment	https://www.dhs.gov/publication/st-frg-grant-county-dhs-st-ngfr-apex-program-techex-after-action-report
Harris County Technology Experiment	https://www.dhs.gov/publication/st-frg-2018-ngfr-harris-county-operational-experimentation-fact-sheet