



OGC SCIRA Public Safety
Interoperability Pilot
Call for Participation (CFP)

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Corrigenda

The following table identifies all corrections that have been applied to this CFP compared to the original release. Minor editorial changes (spelling, grammar, etc.) are not included.

Date	Section
<i>Description</i>	no entries

Clarifications

The following table identifies all clarifications that have been provided in response to questions received from organizations interested in this CFP.

Date	Question and Response
<i>April 11</i>	Is there a connection between the SCIRA Pilot and the St. Louis sensor RFB? Yes, the plan is to leverage trial sensors from the RFB in the Pilot
<i>April 11</i>	Is Android required for a reference SmartHub design or is something like Raspbian allowed? Yes, if a platform such as Raspberry Pi can support the functions and requirements of a SmartHub, a non-Android reference design would be acceptable.
<i>April 11</i>	Is open-source software a requirement for Pilot components? No, the only open-source requirement is for the reference designs, otherwise only open interfaces and formats are required.
<i>April 11</i>	What legacy API's will be addressed and when will they be known? Information about legacy API's designated for use in the Pilot, e.g. VA Beach StormSense, will be available before the Pilot kickoff.
<i>April 11</i>	What are likely to be the key areas in the city for Pilot deployments? The likely localities of interest will be around the T-REX building in downtown St. Louis and around the fire training facility in VA Beach. The extent of these areas will be defined to provide reasonable opportunities to exercise routing and traffic management in response to sensor information on weather conditions and street closures.

Abbreviations

The following table lists all abbreviations used in this CFP.

<i>CFP</i>	Call for Participation
<i>CR</i>	Change Request
<i>DER</i>	Draft Engineering Report
<i>DWG</i>	Domain Working Group
<i>ER</i>	Engineering Report
<i>GPKG</i>	GeoPackage
<i>IP</i>	Innovation Program
<i>OGC</i>	Open Geospatial Consortium
<i>ORM</i>	OGC Reference Model
<i>OWS</i>	OGC Web Services
<i>PA</i>	Participation Agreement
<i>POC</i>	Point of Contact
<i>Q&A</i>	Questions and Answers
<i>RM-ODP</i>	Reference Model for Open Distributed Processing
<i>SOW</i>	Statement of Work
<i>SWG</i>	Standards Working Group
<i>TBD</i>	To Be Determined
<i>TC</i>	OGC Technical Committee
<i>TEM</i>	Technical Evaluation Meeting
<i>TIE</i>	Technology Integration / Technical Interoperability Experiment
<i>URL</i>	Uniform Resource Locator
<i>WFS</i>	Web Feature Service
<i>WPS</i>	Web Processing Service
<i>WG</i>	Working Group (SWG or DWG)

Chapter 1. Introduction

The Open Geospatial Consortium (OGC®) is releasing this **Call for Participation** ("CFP") to solicit proposals for participation in the **SCIRA Public Safety Interoperability Pilot** ("the Initiative"). The goal is to design and prototype interoperable Smart City services in support of public safety incident management and resilience, that leverage OGC Sensor Web Enablement (SWE) standards, Internet of Things (IoT) sensors, geospatial framework data, and SCIRA design patterns for successful and sustainable implementations.



1.1. Background

1.1.1. Purpose of the SCIRA Public Safety Interoperability Pilot

OGC Pilots serve the role of testing and refining standards-based approaches to engineering and developing geospatial information systems. The SCIRA Pilot in particular is intended to prototype advances in public safety and reduction of risk through interoperable sharing of city data and flexible incorporation of inexpensive Web-connected sensors. The Pilot will run across multiple cities to refine elements of interoperable smart city architecture through implementation and testing in functional, 'real world' applications and services. This process of iterative refinement and interactive development will result in a reference architecture that is both feasible and effective for smaller municipalities to adopt. The pilot will also lead to improved deployment guides that reduce the risk that the reference architecture becomes simply 'shelf-ware.' Pilot participants will create prototype applications that help reduce implementation risks and illuminate usage opportunities for key parts of the architecture, while deployment guides updated from the pilot experience will provide to key Smart City staff useful, practical, and actionable direction that is consistent with the reference architecture.

The SCIRA Pilot will conclude with a demonstration intended to establish a reusable example of SCIRA-based deployment by demonstrating capabilities employed for a real-world scenario; the

SCIRA trial deployment will show how cities can reap the benefits of standards-based interoperability. These benefits will be documented in public engineering reports as well as in refinement of the SCIRA architecture itself and accompanying deployment guides

1.1.2. Initiative Context

The Smart City Interoperability Reference Architecture (SCIRA) is a project of the OGC Innovation Program. The project is sponsored by the US Department of Homeland Security (DHS), Science & Technology (S&T). The purpose of the SCIRA project is to advance standards for Smart Safe Cities and develop open, interoperable designs for incorporating Internet of Things (IoT) sensors into city services. SCIRA is providing free deployment guides, reusable design patterns, and other resources that municipalities can use to plan, acquire, and implement standards-based, cost-effective, vendor-agnostic, and future-proof Smart City IT systems and networks using technologies such as Internet of Things (IoT), Sensor Webs, and Geospatial Frameworks.

Lack of consensus on both common terminologies and smart city architectural principles can result in standards that are divergent, even contradictory. Often, they fail to provide sufficient interoperability and scalability of underlying Internet of Things (IoT), and Cyber-Physical Systems (CPS) technologies to provide a suitable foundation for many smart city applications. SCIRA has the objective to research, design, and test a Smart City Interoperability Reference Architecture (SCIRA) as a reusable design toolkit that shows how to integrate commercial proprietary IoT sensors into a common framework for public safety applications at the community level.

1.1.3. Stakeholder Interests and Needs

A clear characteristic of the Smart City enterprise and a significant challenge to the design of supporting information systems is the number and variety of stakeholders who need to be involved. This is even more the case with the SCIRA Pilot, where at least four groups of stakeholders are identified:

- Sponsors include DHS who are committed to using cutting-edge technologies and scientific talent in its quest to make America safer.
 - The DHS S&T Directorate who are tasked with researching and organizing the scientific, engineering, and technological resources of the United States and leveraging these existing resources into technological tools to help protect the homeland.
 - The First Responders Group (FRG) whose mission in particular is to advance the safety and effectiveness of first responders, accomplishing this mission through research, development, testing and evaluation of new and emerging technology.
- Host city stakeholders encompass many roles:
 - City leaders who are responsible for the policy vision and budgetary affordances that make innovation both possible and necessary.
 - Public safety coordinators and supervisors who support consideration of new approaches and practices in service of improved public safety and in support of their personnel on the ground.

- First responders who have jobs to do but who are willing to engage with new possibilities that better position them to handle new and evolving threats.
- Municipal technologists who are found in the middle of most successful smart city initiatives, are both technically savvy and operationally experienced, and who can devise, communicate, and orchestrate ways in which technology and information can help cities work better.
- Pilot participants bring to the table the software and hardware technologies that implement a design for Smart City services because they have a business or research interest to advance the art of the possible and because their engagement provides the opportunity to refine those technologies in a realistic target environment where sustainably sharing information leads to greater value.
- OGC initiative architects and managers work to support and direct the efforts of the other stakeholders in directions that address their interests and needs as well as lead ultimately to development of better OGC standards for those stakeholders to use.

1.1.4. Stakeholder Concepts and Concerns

Concepts and concerns relevant to stakeholders include:



Concept	Description	Concern
<i>Public Safety</i>	Safety for community and personnel from impacts of extreme events and daily occurrences	Safety is the necessary pre-condition for other community quality-of-life benefits
<i>Resilience</i>	Ability to withstand and recover from loss and damage	Inability to recover from adverse events and conditions

Concept	Description	Concern
<i>Partnership</i>	Collaboration between municipal stakeholders for mutual benefit	Neither public entities, private firms, nor academic programs have all the answers
<i>Engagement</i>	Sustained involvement of communities and organizations in collaborative activity	Community and stakeholder engagement critical for data sharing to be effective
<i>Sustainability</i>	Programs and capabilities that adapt and persist into the future	Investment in un-sustainable Smart City capabilities discourages further investment
<i>Measurement</i>	Metric evidence of success and effectiveness	Decisions not based on relevant evidence and data are likely to lead to poor outcomes

Table 1. SCIRA Public Safety Interoperability Pilot Concepts

1.2. OGC Innovation Program

This Pilot is being conducted under the [OGC Innovation Program](#).

The [OGC Innovation Program](#) provides a collaborative agile process for solving geospatial challenges. Organizations (sponsors and technology implementers) come together to solve problems, produce prototypes, develop demonstrations, provide best practices, and advance the future of standards. Since 1999 more than 110 initiatives have been successfully completed. Initiatives range from in-kind interoperability experiments, run by members as part of a working group, to multi-million dollar testbeds with hundreds of participants. Innovation Program initiatives include interoperability testbeds, experiments, pilots, concept development studies, hackathons and plugfests.

1.3. Benefits of Participation

Pilot participants will have the opportunity to work with stakeholders in two different medium-sized cities to connect their technology and expertise with real city needs and to advance a design toolkit that will lower the barriers for other cities to make use of their offerings in a cost-effective and sustainable way.

Chapter 2. Initiative Organization and Execution

2.1. Initiative Policies and Procedures

This Initiative will be conducted under the following OGC Policies and Procedures:

- This Initiative will be conducted in accordance with [OGC Innovation Program Policies and Procedures](#).
- [OGC Principles of Conduct](#) will govern all personal and public Initiative interactions.
- Participants drafting documents for the Initiative are required to allow OGC to copyright and publish documents following the [OGC Intellectual Property Rights Policy](#).

2.2. Initiative Roles

The roles generally played in any OGC Innovation Program initiative include Sponsors, Bidders, Participants, Observers, and the Innovation Program Team ("IP Team"). Explanations of these roles are provided in [Annex: Tips for New Bidders](#).

The IP Team for this Initiative will include an Initiative Director and an Initiative Architect. Unless otherwise stated, the Initiative Director will serve as the primary point of contact (POC) for the OGC.

The Initiative Architect will work with Participants and Sponsors to ensure that Initiative activities and deliverables are properly assigned and accomplished. They are responsible for scope and schedule control, and will provide timely escalation to the Initiative Director regarding any severe issues or risks that happen to arise.

2.3. Types of Deliverables

All activities in this pilot will result in a Deliverable. These Deliverables can take the form of Documents or Implementations.

2.3.1. Documents

Engineering Reports (ER) and **Change Requests** (CR) will be prepared in accordance with OGC published templates. Engineering Reports will be delivered by posting on the (members-only) OGC Pending directory when each is complete and has achieved a satisfactory level of consensus among interested participants, contributors and editors. Engineering Reports are the formal mechanism used to deliver results of the Innovation Program to Sponsors and to the [OGC Standards Program](#) for consideration by way of [Standards Working Groups](#) and [Domain Working Groups](#). NOTE: Participants delivering Engineering Reports should also deliver Change Requests that arise from the documented work.

2.3.2. Implementations

Services, Clients, Datasets and **Tools** will be provided by methods suitable to their types and to stated requirements. For example, services and components (e.g. a Web Processing Service or WPS instance) are delivered by deployment of the service or component for use in the Initiative via an accessible URL. A Client software application or component may be used during the Initiative to exercise services and components to test and demonstrate interoperability; however, it is most often not delivered as a license for follow-on usage. Implementations of services, clients and data instances will be developed and deployed in all threads for integration and interoperability testing in support of the agreed-up thread scenario(s) and technical architecture. The services, clients, and tools may be invoked for cross-thread scenarios in demonstration events.

Developed implementations during the initiative might be closed source or open source. They will all be documented in the final initiative report. Open Source implementations should additionally be documented with:

- Link to a publicly accessible source code repository
- Link to publicly accessible documentation

2.4. Proposals & Proposal Evaluation

Proposals are expected to be short and precisely address the work items a bidder is interested in. A proposal template will be made available. The proposal, including technical and financial details, has a page limit as defined in [Appendix A](#). Details on the proposal submission process are provided in [Appendix A: Proposal Submission Guidelines](#). The proposal evaluation process and criteria are described below.

2.4.1. Evaluation Process

Proposals will be evaluated according to criteria based on three areas: Technical, management, and cost. Each review will commence by analyzing the proposed deliverables in the context of the Sponsor priorities, examining viability in light of the requirements and assessing feasibility against the use cases.

The review team will then create a draft Initiative System Architecture from tentatively selected proposals. This architecture will include the proposed components and relate them to available hardware, software, and data. Any candidate interface and protocol specification received from a Bidder will be included.

At the Technical Evaluation Meeting (TEM), the IP Team will present Sponsors with draft versions of the initiative system architecture and program management approach. The team will also present draft recommendations regarding which parts of which proposals should be offered cost-sharing funding (and at what level). Sponsors will decide whether and how draft recommendations in all these areas should be modified.

Immediately following TEM, the IP Team will begin to notify Bidders of their selection to enter negotiations for potentially becoming initiative Participants. The IP Team will develop for each selected bidder a **Participant Agreement** and a **Statement of Work (SOW)**. The IP Team will also notify bidders of unsuccessful proposals.

2.4.2. Management Criteria

- Adequate, concise descriptions of all proposed activities, including how each activity contributes to the fulfillment of particular requirements and deliverables. To the extent possible, it is recommended that Bidders utilize the language from the CFP itself to help trace these descriptions back to requirements and deliverables.
- Willingness to share information and work in a collaborative environment.
- Contribution toward Sponsor goals of enhancing availability of standards-based offerings in the marketplace.

2.4.3. Technical Criteria

- How well applicable requirements in this CFP are addressed by the proposed solution.
- Proposed solutions can be executed within available resources.
- Proposed solutions support and promote the initiative system architecture and demonstration concept.
- Where applicable, proposed solutions are OGC-compliant.

2.4.4. Cost Criteria

- Cost-share compensation request is reasonable for proposed effort.
- All Participants are required to provide at least some level of in-kind contribution (i.e., activities or deliverables offered that do not request cost-share compensation). As a rough guideline, a proposal should include at least one dollar of in-kind contribution for every dollar of cost-sharing compensation requested. All else being equal, higher levels of in-kind contributions will be considered more favorably during evaluation. Participation may be fully in-kind.

2.5. Reporting

Initiative participant business/contract representatives are required (per the terms of the Participation Agreement contract) to report the progress and status of the participant's work. Detailed requirements for this reporting will be provided during contract negotiation. Initiative accounting requirements (e.g., invoicing) will also be described in the contract.

The IP Team will provide monthly progress reports to Sponsors. Ad hoc notifications may also occasionally be provided for urgent matters. To support this reporting, each Pilot participant must submit (1) a Monthly Technical Progress Report and (2) a Monthly Business Progress Report

by the first working day on or after the 10th of each month. Templates for both of these report types will be provided and must be followed.

The purpose of the Monthly Business Progress Report is to provide initiative management with a quick indicator of project health from the perspective of each Pilot participant. The IP Team will review action item status on a weekly basis with the Initiative participants assigned to complete those actions. Initiative participants must be available for these contacts to be made.

2.6. Master Schedule

Date	Event
March 29 2019	Call for Participation release
April 11 2019	Clarification Webinar
April 26 2019	CFP Responses Due
May 3 2019	Participants Selected
May 10 2019	Participant Agreements
May 14-15 2019	Kickoff Web Conference
May 16-22 2019	Site Meetings
July 12 2019	Design & Development Completion
Sept 20 2019	Deployment & Exercise Completion
Sept 26 2019	Final Demonstration
Oct 18 2019	Engineering Report & Deployment Guides Delivery

Table 2. Schedule

2.7. Miscellaneous

Call for Participation

The CFP consists of stakeholder role descriptions, proposal submission instructions and evaluation criteria, a master schedule and other project management artifacts, sponsor requirements, and an initiative architecture. Responses should include the proposing organization's technical solution, its cost-sharing requests for funding, and its proposed in-kind contributions to the initiative.

Once the original CFP has been published, ongoing authoritative updates and answers to questions can be tracked by monitoring the [CFP Corrigenda Table](#) and the [CFP Clarifications Table](#).

Participant Selection and Agreements:

Bidders may submit questions via timely submission of email(s) to the OGC Technology Desk (techdesk@opengeospatial.org). Question submitters will remain anonymous, and answers will be regularly compiled and published in the CFP Clarifications page.

OGC may also choose to conduct a Bidder's question-and-answer webinar to review the clarifications and invite follow-on questions.

Following the closing date for submission of proposals, OGC will evaluate received proposals, review recommendations with the Sponsor, and negotiate Participation Agreement (PA) contracts, including statements of work (SOWs), with selected Bidders. Participant selection will be complete once PA contracts have been signed with all Participants.

Kick-off: The Kickoff is a face-to-face or virtual meeting where Participants, guided by the Initiative Architect, will refine the Initiative architecture and settle upon specific use cases and interface models to be used as a baseline for prototype component interoperability. Participants will be required to attend the Kickoff, including breakout sessions, and will be expected to use these breakouts to collaborate with other Participants and confirm intended Component Interface Designs.

Regular Teleconference and Interim Meetings After the Kickoff, participants will meet on a frequent basis remotely via web meetings and teleconferences.

Development of Engineering Reports, Change Requests, and Other Document Deliverables: Development of Engineering Reports (ERs), Change Requests (CRs) and other document deliverables will commence during or immediately after Kickoff.

Under the Participation Agreement (PA) contracts to be formed with selected Bidders, ALL Participants will be responsible for contributing content to the ERs. But the ER Editor role will assume the duty of being the primary ER author.

Final Summary Reports, Demonstration Event and Other Stakeholder Meetings: Participant Final Summary Reports will constitute the close of funded activity. Further development work might take place to prepare and refine assets to be shown at the Demonstration Event and other stakeholder meetings.

Assurance of Service Availability: Participants selected to implement service components must maintain availability for a period of no less than six months after the Participant Final Summary Reports milestone. OGC might be willing to entertain exceptions to this requirement on a case-by-case basis.

Chapter 3. Deliverables

The following table summarizes the full set of Initiative deliverables. Technical details as well as descriptions of tasks and requirements can be found in the [Appendix B: Technical Architecture](#).

ID	Description	Tasks	Requirements	Expected Component Number	City-provided Y/N/T BD
D1	First Responder tracking sensor (GPS + IGU + RFID / BLE*)	4, 5, 7, 12	R1, R3, R4, R11, R12, R13	4	TBD
D2	First Responder health sensor	4, 5, 7, 12	R1, R3, R4, R13	4	TBD
D3	First Responder environment sensor	4, 5, 7, 12	R1, R3, R4, R13	4	TBD
D4	First Responder SmartHub	4, 5, 7, 12	R1, R4, R12, R13, R16	4	TBD
D5	First Responder incident SensorHub	4, 5, 7, 12	R1, R4, R13, R16	2	N
D6	Cloud-based SensorHub & Catalog	2, 4, 5, 6, 7, 12, 13	R1, R3, R7, R16	2	N
D7	First Responder heads-up display	5, 7, 12	R1, R3, R4, R5	2	TBD
D8	First Responder sensing and indoor navigation application (health, environment, tracking + IndoorGML navigation)	4, 5, 6, 7, 12	R1, R3, R12	2	TBD
D9	Smart flood sensor +/- SensorHub	5, 7, 12	R1, R2, R15	2	TBD
D10	Smart traffic / road sensor +/- SensorHub	4, 5, 7, 12	R1, R2, R8, R11, R14	2	TBD
D11	Smart weather sensor +/- SensorHub	4, 5, 7, 12	R1, R2, R9, R15	2	TBD
D12	3D dashboard application	4, 5, 6, 7, 12	R1, R2, R10, R11, R14	2	N

ID	Description	Tasks	Requirements	Expected Component Number	City-provided Y/N/T BD
D1 3	Command & communication services	4, 5, 6, 7, 12	R1, R2, R11, R14, R16	2	N
D1 4	Flood & inundation model	4, 5, 6, 7, 12, 13	R1, R2, R15	2	TBD
D1 5	Traffic management & routing model	4, 5, 6, 7, 12, 13	R1, R2, R11, R14	2	TBD
D1 6	Legacy public safety information system adapter	3, 4, 5, 6, 7, 12	R1, R2, R7, R10	2	N
D1 7	Community mobility navigation-alert-sensing app	5, 6, 7, 12, 13	R1, R2, R7, R14	2	N
D1 8	RFID / BLE indoor navigation beacons	3, 4, 5, 6, 7, 12	R1, R2, R12, R13	2	N
D1 9	IndoorGML +/- 3D building model	3, 4, 5, 6, 7, 12	R1, R2, R12, R13	2	TBD
D2 0	3D city model	4, 5, 6, 7, 12, 13	R1, R3	2	TBD
D2 1	Pilot Engineering Report (ER)	8	R1, R2, R7	2	N
D2 2	Reference Smarthub Design	5	R5	2	N
D2 3	SCIRA solution architecture (St. Louis & VA Beach)	2	R1, R2, R3, R6	2	N
D2 4	Smart City architecture comparative analysis	2,8	R6	2	N
D2 5	Pilot video production	11, 12, 13	R1, R2	2	N

Table 3. Summary Deliverables

* Global Positioning System (GPS), Inertial Guidance Unit (IGU), Radio Frequency Identification (RFID), Bluetooth Low Energy (BLE).

Appendix A: Proposal Submission Guidelines

A.1. General Requirements

The following requirements apply to the proposal development process and activities.

- Proposals must be submitted before the appropriate response due date indicated in the [Master Schedule](#).
- Proposing organizations must be an OGC member and familiar with the [OGC Mission, Vision, and Goals](#). Proposals from non-members will be considered, if a completed application for OGC membership or a letter of intent to become a member if selected for funding is submitted prior to or along with the proposal. If you are in doubt about membership, please contact OGC at techdesk@opengeospatial.org.
- Proposals may address selected portions of the initiative requirements as long as the solution ultimately fits into the overall initiative architecture. A single proposal may address multiple requirements and deliverables. To ensure that Sponsor priorities are met, the OGC may negotiate with individual Bidders to drop, add, or change some of the proposed work.
- Participants selected to implement component deliverables will be expected to participate in the full course of interface and component development, Technical Interoperability Experiments, and demonstration support activities throughout Initiative execution.
- In general, a proposed component deliverable based on a product that has earned OGC Certification will be evaluated more favorably than one which has not.
- Participants selected as Editors will also be expected to participate in the full course of activities throughout the Initiative, documenting implementation findings and recommendations and ensuring document delivery.
- Participants should remain aware of the fact that the Initiative components will be developed across many organizations. To maintain interoperability, each Participant should diligently adhere to the latest technical specifications so that other Participants may rely on the anticipated interfaces during the TIEs.
- All Selected Participants (both cost-share and pure in-kind) must attend with at least one technical representative to the Kickoff. Participants are also encouraged to attend at least with one technical representative the Demonstration Event.
- No work facilities will be provided by OGC. Each Participant will be required to perform its PA obligations at its own provided facilities and to interact remotely with other Initiative stakeholders.
- Information submitted in response to this CFP will be accessible to OGC staff members and to Sponsor representatives. This information will remain in the control of these stakeholders and will not be used for any other purpose without prior written consent of the Bidder. Once a Bidder has agreed to become an Initiative Participant, it will be required to release proposal content (excluding financial information) to all Initiative stakeholders. Commercial

confidential information should not be submitted in any proposal (and, in general, should not be disclosed during Initiative execution).

- Bidders will be selected to receive cost sharing funds on the basis of adherence to the requirements (as stated in in the CFP Appendix B Technical Architecture) and the overall quality of their proposal. The general Initiative objective is for the work to inform future OGC standards development with findings and recommendations surrounding potential new specifications. Bidders are asked to formulate a path for producing executable interoperable prototype implementations that meet the stated CFP requirements, and for documenting the findings and recommendations arising from those implementations. Bidders not selected for cost sharing funds are welcome to participate on a purely in-kind bases to address the stated CFP requirements .
- Bidders are advised to avoid attempts to use the Initiative as a platform for introducing new requirements not included in the Appendix B Technical Architecture. Any additional in-kind scope should be offered outside the formal bidding process, where an independent determination can be made as to whether it should be included in Initiative scope or not. Items deemed out-of-scope might still be appropriate for inclusion in a later OGC Innovation Program initiative.
- Each Participant (including pure in-kind Participants) that is assigned to make a deliverable will be required to enter into a Participation Agreement contract ("PA") with the OGC. The reason this requirement applies to pure in-kind Participants is that other Participants will be relying upon their delivery to show component interoperability. Each PA will include a statement of work ("SOW") identifying Participant roles and responsibilities.

A.2. What to Submit

The two documents that shall be submitted, with their respective templates are as follows: 1. Technical Proposal: https://portal.opengeospatial.org/files/?artifact_id=82493 2. Cost Proposal: https://portal.opengeospatial.org/files/?artifact_id=82494

A **Technical Proposal** should be based on the **Response Template** and must include the following:

- Cover page
- Overview (Not to exceed one page)
- Proposed contribution (Basis for Technical Evaluation; not to exceed 1 page per work item)
- Understanding of interoperability issues, understanding of technical requirements and architecture, and potential enhancements to OGC and related industry architectures and standards
- Recommendations to enhance Information Interoperability through industry-proven best practices, or modifications to the software architecture defined in **Appendix B: Technical Architecture**
- If applicable, knowledge of and access to geospatial data sets by providing references to

data sets or data services

The Cost Proposal should be based on the two worksheets contained in the [Cost Proposal Template](#) and must include the following:

- Completed Pilot Cost-Sharing Funds Request Form
- Completed Pilot In-Kind Contribution Declaration Form

Additional instructions are contained in the templates themselves.

A.3. How to Transmit the Response

Guidelines:

- Proposals shall be submitted to the OGC Technology Desk (techdesk@opengeospatial.org).
- The format of the technical proposal shall be Microsoft Word or Portable Document Format (PDF).
- The format of the cost proposal is a Microsoft Excel Spreadsheet.
- Proposals must be submitted before the appropriate response due date indicated in the [Master Schedule](#).

A.4. Questions and Clarifications

Once the original CFP has been published, ongoing authoritative updates and answers to questions can be tracked by monitoring this CFP.

Bidders may submit questions via timely submission of email(s) to the OGC Technology Desk. Question submitters will remain anonymous, and answers will be regularly compiled and published in the [CFP clarifications table](#).

OGC may also choose to conduct a Bidder's question-and-answer webinar to review the clarifications and invite follow-on questions.

Update to this CFP including questions and clarifications will be posted to the original URL of this CFP.

Appendix B: Technical Architecture

This appendix describes the technical architecture of the Initiative. It includes a description of the OGC baseline, describes the Initiative organization, lays out initial architectural viewpoints, and identifies all requirements and corresponding work items to be addressed in the course of the Initiative.

B.1. Baseline Architecture

B.1.1. OGC Reference Model

The [OGC Reference Model \(ORM\)](#) version 2.1, provides an architecture framework for the ongoing work of the OGC. Further, the ORM provides a framework for the OGC Standards Baseline. The OGC Standards Baseline consists of the member-approved Implementation/Abstract Specifications as well as for a number of candidate specifications that are currently in progress.

The structure of the ORM is based on the Reference Model for Open Distributed Processing (RM-ODP), also identified as ISO 10746. This is a multiple-perspective approach well suited to describing complex information systems.

The ORM is a living document that is revised on a regular basis to continually and accurately reflect the ongoing work of the Consortium. Bidders are encouraged to learn and understand the concepts that are presented in the ORM.

This appendix refers to the RM-ODP approach and will provide information on some of the viewpoints, in particular the Enterprise Viewpoint, which is used here to provide a general characterization of work items in the context of the OGC Standards portfolio and standardization process, i.e. the enterprise perspective of an OGC initiative participant.

The Information Viewpoint considers the information models and encodings that will make up the content of the information exchanges and supporting services to be extended or developed to support this initiative. Here, we mainly refer to the OGC Standards Baseline, see section [Standards Baseline](#).

The Computational Viewpoint is concerned with the functional decomposition of the system into a set of objects that interact at interfaces – enabling system distribution across a network of service providers and consumers. It captures component and interface details without regard to distribution and describes an interaction framework including application objects, service support objects and infrastructure objects. The development of the computational viewpoint is one of the first tasks of the Pilot, usually addressed at the Kickoff.

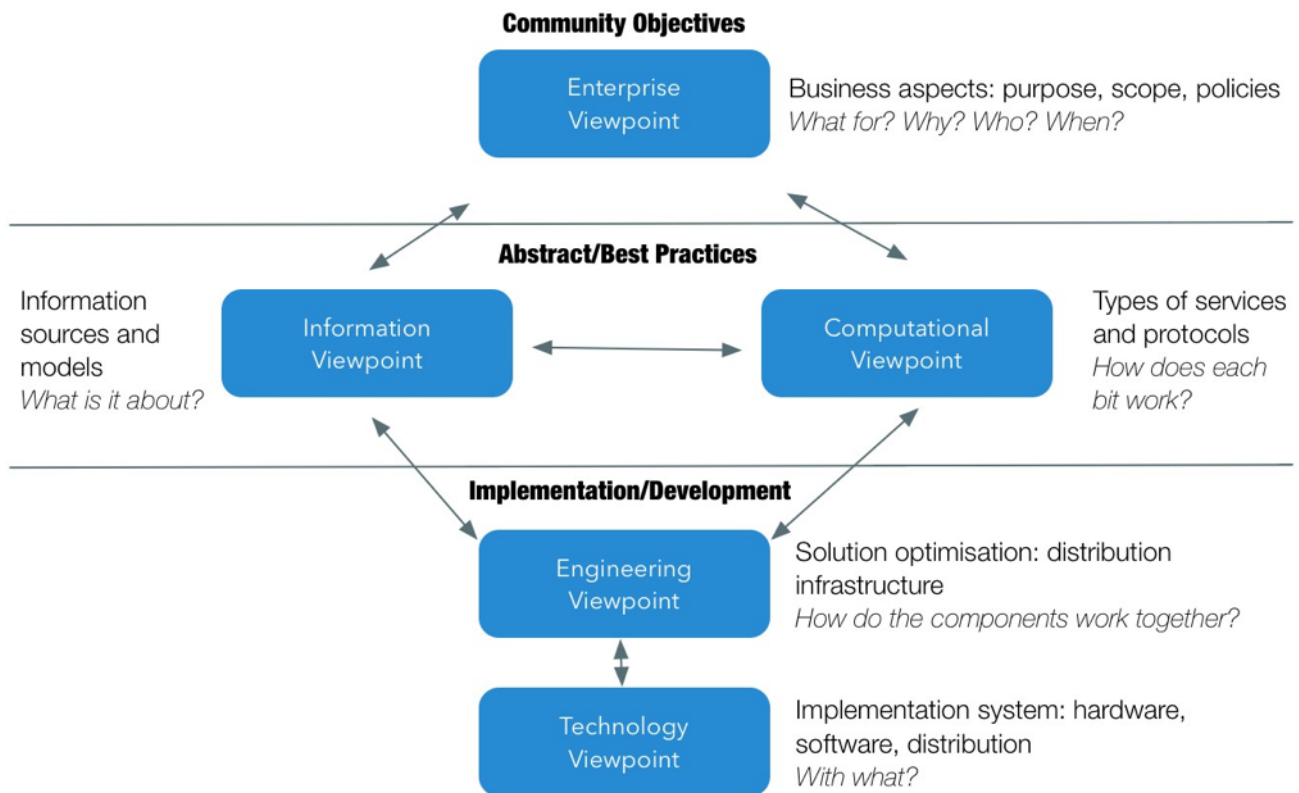


Figure 1. Reference Model for Open Distributed Computing

The Engineering Viewpoint is concerned with the infrastructure required to support system distribution. It focuses on the mechanisms and functions required to:

- a. support distributed interaction between objects in the system,
- b. hide the complexities of those interactions, and
- c. accomplish the tasks for which the system is intended.

It exposes the distributed nature of the system, describing the infrastructure, mechanisms and functions for object distribution, distribution transparency and constraints, bindings and interactions. The engineering viewpoint will be developed and tested during the Initiative, usually by means of Technology Interchange Experiments (TIE's), where Participants define the communication infrastructure and assign elements from the computational viewpoint to physical machines used for demonstrating Initiative results.

The Technology Viewpoint is concerned with the realized physical components, technologies, and operational characteristics that comprise deployed initiative systems. This viewpoint typically represents the system components as they have been built and connected during the initiative and forms part of the initiative record captured in demonstrations, videos, and engineering reports.

B.1.2. OGC Standards Baseline

The **OGC Standards Baseline** is the complete set of member approved **Abstract Specifications, Standards** including **Profiles** and **Extensions**, and **Community Standards**.

OGC standards are technical documents that detail interfaces or encodings. Software developers use these documents to build open interfaces and encodings into their products and services. Standards are the main "products" of the Open Geospatial Consortium and are developed by the membership to address specific interoperability challenges. Ideally, when OGC standards are implemented in products or online services by two different software engineers working independently, the resulting components plug and play, that is, they work together without further debugging. OGC standards and supporting documents are available to the public at no cost. OGC Web Services (OWS) are OGC standards created for use in World Wide Web applications. For this Initiative, it is emphasized that all participants will have access to the latest versions of all standards and related engineering reports.

Any Schemas (xsd, xslt, etc.) that support an approved OGC standard can be found in the official [OGC Schema Repository](#).

The [OGC Testing Facility](#) Web page provides online executable tests for some OGC standards. The facility helps organizations to better implement service interfaces, encodings and clients that adhere to OGC standards.

B.1.3. OGC Best Practices and Discussion Papers

OGC also maintains other documents relevant to Innovation Program initiatives, including [Engineering Reports](#), [Best Practice Documents](#), [Discussion Papers](#), and [White Papers](#).

B.2. Pilot Requirements

Specific requirements to be addressed by the SCIRA Public Safety Interoperability Pilot are compiled in the table below, then referenced in the deliverable descriptions that follow.

Requirement	Description	Sponsor
R1	Demonstrate the capability to enable risk mitigation based on an interoperable architecture approach.	DHS
R2	Establish a reusable example of SCIRA-based deployment by demonstrating capabilities employed for a real- world scenario and show how cities can reap the benefits of standards-based interoperability	DHS
R3	Refine SCIRA implementation guidance and Deployment Guides based on Pilot implementation findings	DHS
R4	Incorporate guidance from the NGFR Integration Handbook into Pilot components	DHS
R5	Develop and prototype reference SmartHub designs to compliment NGFR Integration Handbook	DHS
R6	Comparative analysis between an operational Smart City’s architecture implementation and SCIRA Implementation Guide architectural elements	DHS
R7	Establish collaborations with small / medium sized cities to test and measure benefits of interoperable Smart City information systems	DHS

Requirement	Description	Sponsor
R8	Leverage traffic sensors, cameras, and other sensors made available as part of Request for Bids (RFB)	St. Louis
R9	Sensing and prediction of extreme winter weather conditions	St. Louis
R10	Dashboard application with an interactive common operation picture based 3D city model	St. Louis
R11	Routing of police, fire, emergency medical services (EMS) units to an event incorporating traffic and street closures	St. Louis
R12	Building indoor navigation by firefighters using an IndoorGML-based building model	St. Louis, VA Beach
R13	Health, environment, and tracking (position and route to help) for a firefighter	St. Louis, VA Beach
R14	Public evacuation planning and execution using real time congestion & closure sensing, models, and mobile applications	St. Louis, VA Beach
R15	Sensing and prediction of storm inundation	VA Beach
R16	Enable incident command posts to exchange sensor data with firefighters and other first responders, serve as an intermediate hub for incident information and command-control	VA Beach

Table 4. Requirements

B.3. Pilot Organization

The SCIRA Public Safety Interoperability Pilot will be organized into the following tasks, specific units of work with defined results and defined or implicit interdependencies

Task	Description	Track	Timing	Result
T1: Kickoff meeting	Webconference for all sponsors and participants to flesh out details of prototype components, systems, and workflows	Design & Documentation	Pilot start	Detailed technical plan and scenario workflows
T2: Solution architecture	Documentation of a solution architecture for each host city following SCIRA design patterns	Design & Documentation	May - July	Documentation and consensus on pilot solution architecture
T3: Site meetings	On-site meetings in each host city between key participants and city stakeholders	Outreach & Coordination	May - July	Familiarity with pilot scope and goals; consensus on collaboration arrangements

Task	Description	Track	Timing	Result
T4: Workplans	Plans for collaboration between participants and stakeholders in each city	Outreach & Coordination	May - July	Documentation of joint activities and responsibilities
T5: Component development	Design, development, and testing of prototype components and systems to be deployed in the pilot	Implementation & Demonstration	May - July	Functioning prototype components and systems
T6: Dataset preparation	Preparation of datasets and datasources to be used in component testing and pilot scenarios	Implementation & Demonstration	May - June	System-ready datasets and data sources
T7: Component deployment	Deployment of pilot components into prototype systems and pilot exercise locations for evaluation and exercise execution	Implementation & Demonstration	June - July	Distributed and on-site elements of pilot capabilities functionally tested and positioned for on-site evaluation
T8: ER Development	Contributions to, and compilation of a pilot summary engineering report	Design & Documentation	July - Sept	Complete ER ready for review and publication
T9: SCIRA Guides update	Revision of SCIRA deployment guides based on pilot planning and execution experience	Design & Documentation	July - Sept	Revised SCIRA Deployment Guides ready for review and publication
T10: Demo planning	Development of detailed scripts for on-site exercises of pilot systems and an off-site compilation demonstration	Outreach & Coordination	July - Aug	Detailed scripts ready for execution
T11: Video production	Production of a short (10 min) video from exercise recordings, interviews with participants and stakeholders, and other relevant material	Outreach & Coordination	July - Sept	Completed video
T12: On-site exercises	Execution of on-site activities simulating pilot scenario workflows	Implementation & Demonstration	July - Sept	Completed and recorded exercises
T13: Final demo	Off-site demonstration event combining live narration and system demonstrations with recordings of on-site exercises	Implementation & Demonstration	Sept	Completed final demo

Table 5. Pilot Activities

B.4. Pilot Architecture and Deliverables

The SCIRA Public Safety Interoperability Pilot involves the following additions to the Baseline Architecture.

B.4.1. SCIRA Public Safety Interoperability Pilot Scenarios

The following scenarios will guide Pilot design and prototyping.

Storm Scenario



Figure 2. Severe winter storm in St. Louis

Activity	Actors	Description	Result
		Extreme weather event, a severe winter storm, brings wind, snow, ice, and well-below-freezing temperatures to the city on top of extremely inclement winter weather. Consequences of impassable streets, icy bridges and overpasses, and accidents cause traffic blockage and congestion for both the public and for public safety also complicating snow emergency routes. The severe weather poses extreme risks of exposure for first responders, the public, and specifically vulnerable populations, as well as a higher difficulty of response to fires and other incidents. Sensor, first responder and citizen information go into supporting response and evacuation events with real-time routing and traffic management through both a 3D dashboard and mobile apps. The extreme weather also puts a strain on the delivery of city services and other infrastructure, including the electrical heating systems in downtown buildings.	

Activity	Actors	Description	Result
Building Response	First responders, commanders, dispatchers, building occupants, utility workers, public	The strain on heating systems leads to a basement transformer fire and related effects in a downtown building. First responders including police, fire and EMS are directed towards the building by the safest and most rapid routes while avoiding uncleared roads, icy roads, road closures and accidents. Responders use indoor navigation and sensors to clear the building and shut down systems affected by transformer incident, using body-worn sensors to keep themselves safe, navigate the indoor space, and detect infrared hot spots to avoid.	Building is cleared, fire under control
Snow response	Streets department personnel, dispatchers, public safety officers, public	The City through the streets department needs to provide and maintain snow emergency routes for use by the community that must travel during the event. (Optional) air monitoring around the building and 3D prediction of down-wind impacts are used to inform the public and direct them around / away from health hazards of possibly toxic emissions from the transformer fire.	Traffic continues safely and with minimum congestion
Health response	First responders, health department personnel, community partners, vulnerable communities, public	The City needs to identify and provide outreach to vulnerable populations and get them access to City services safely using community partners, police, EMS, and Health Department personnel. Personnel face the same challenges with access, routing and safety.	Vulnerable populations stay safe during extreme weather

Table 6. Winter Storm Response Scenario (St. Louis)

Flood Scenario



Figure 3. Illustration of flood potential in Virginia Beach area

Activity	Actors	Description	Result
		<p>A coastal storm brings high winds and flooding threats. Models predict flooding extents, sensors monitor inundation trends, and community members report both inundation extent and impacts. Inundation and winds cause risk to the public, difficulty of transportation around flooded areas, and secondary consequences of infrastructure damage and outages. Sensor, first responder and citizen information go into supporting response and evacuation events with real-time routing and traffic management through both a 3D dashboard and mobile apps. Inundation leads to basement flooding, while cold weather puts strain on electrical components and other infrastructure. These in turn lead to a basement transformer fire and related effects in a downtown building.</p>	

Activity	Actors	Description	Result
Building Response	First responders, commanders, dispatchers, building occupants, utility workers, public	<p>First responders are directed towards the building by the safest and most rapid routes, while the community are evacuated or diverted away from the area with a minimum of congestion. Responders use indoor navigation and sensors to clear the building and shut down systems affected by transformer incident, using body-worn sensors to keep themselves safe, navigate the indoor space, and detect infrared hot spots to avoid.</p> <p>(Optional) air monitoring around the building and 3D prediction of down-wind impacts are used to inform the public and direct them around / away from health hazards of possibly toxic emissions from the transformer fire.</p>	Building cleared and secured
Flood Response	Streets department personnel, dispatchers, public safety officers, public	The City through the streets department needs to provide and maintain emergency routes safe from flooding for use by the community that must travel or evacuate during the event.	Community is able to travel safely and with minimum delay

Table 7. Flood Inundation Response Scenario (VA Beach)

B.4.2. Information Models and Schemas

There are no defined pilot model deliverables; however any models and/or schemas to be created or refined in the course of the Initiative will be considered during the kickoff.

B.4.3. Computational Interfaces and Components

Interface and/or component specifications to be created or refined in the course of the Initiative.

Operation / Resource	Description	Parameters
SensorHubs are OGC-conformant nodes in resilient sensing and incident response networks. They act as clients, servers, caches, and registries to facilitate the flow of information to and from sensors and users at the network edge. Further details can be found in the IMIS IoT series of engineering reports.		
SOS (Sensor Observation Service)	Provide or consume sensor information and observations	As specified
STA (Sensor Things API)	Publish or subscribe to sensor observations and tasking	As specified

Operation / Resource	Description	Parameters
CSW (Catalog Service for the Web)	Register sensors and SmartHub nodes, publish cascading metadata records, provide cascading search capability	As specified

Table 8. SensorHub

B.5. Engineering Overview

The initiative components and systems to be prototyped are illustrated and described here.

B.5.1. Engineering Overview

An overview of the systems to be developed is as follows:

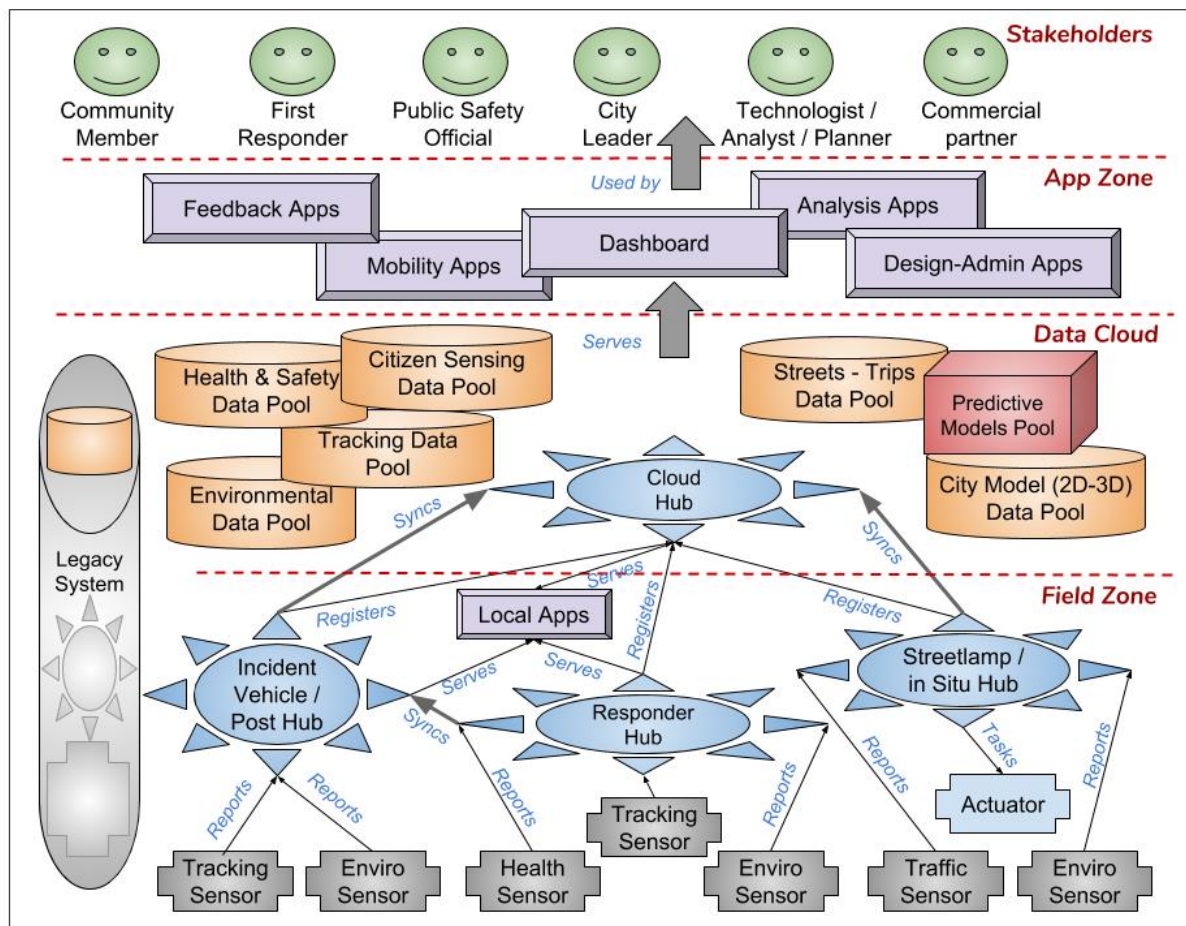


Figure 4. Pilot systems overview

Pilot systems are roughly divided into 4 segments:

- Stakeholders - Those who set up, oversee, provide data to, and/or make use of applications provided by the prototype systems
- App Zone - Applications, whether desktop, mobile, or browser-based, that are provisioned by system data and services

- Data Cloud - Storage and processing services that maintain an array of data "pools" accessible by the "cloud hub" ensemble of OGC Web services
- Field Zone - Mobile, in-situ, and incident nodes that form a data & communications constellation reporting sensor measurements from various sensors and sensor platforms up towards the Data Cloud and provisioning local applications for first responders, commanders, and other field personnel.

The overall prototype system has been divided into 6 individual systems that share some components but deliver distinct sets of functionality.

B.5.2. SmartHub System

SmartHub systems center around supporting, accessing, and connecting body-worn sensors with personal applications, as well as incident scene and Emergency Operations Center information resources. Further background on SmartHub systems is found in the [NGFR Integration Handbook](#).

The wiring of a SmartHub system is shown below:

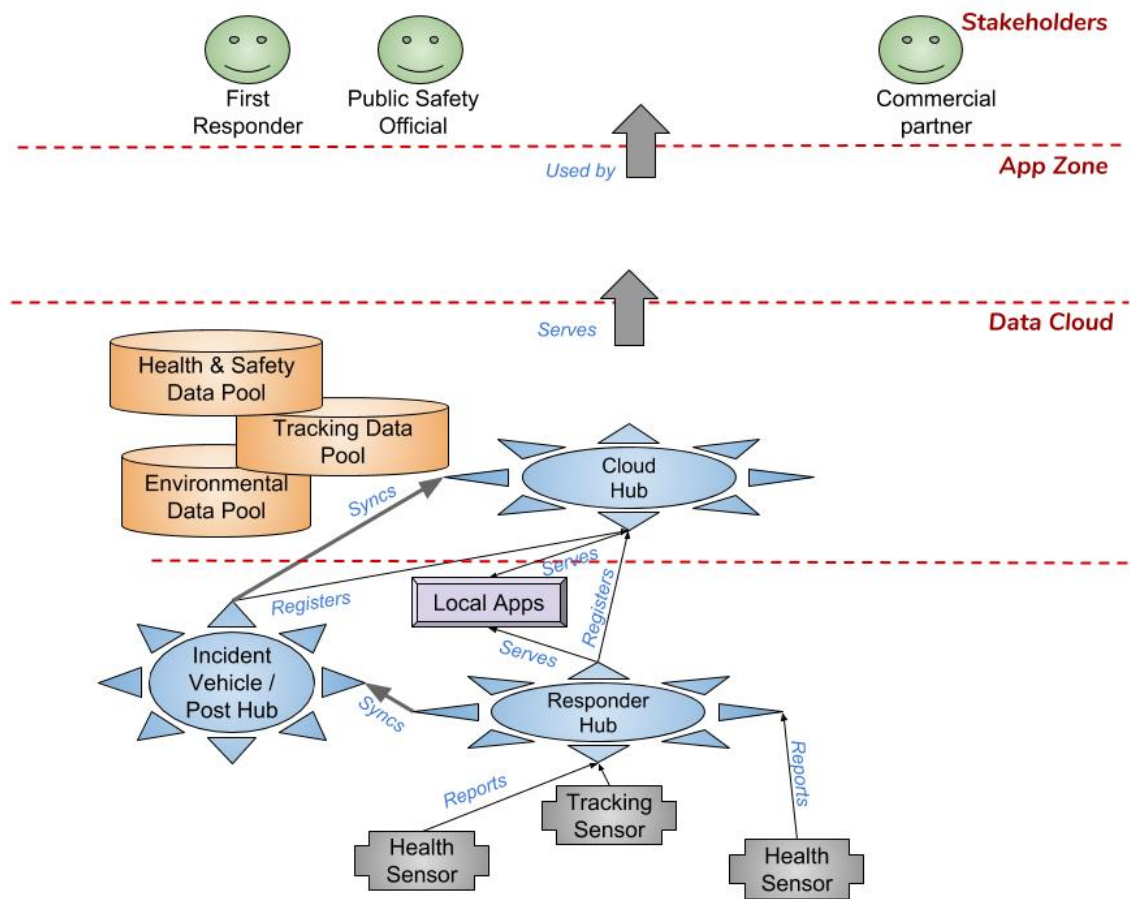


Figure 5. SmartHub system overview

and includes the following components

- **Tracking Sensors**

- Health Sensors
- Environmental Sensors
- SmartHub
- Incident SensorHub
- Cloud SensorHub
- I/O device(s)
- Local apps

B.5.3. Command Communication System

The Command Communication system establishes communications, a common operating picture, and tasking between first responders, incident commanders, city personnel, and city leaders. The structure of a command communication system is summarized in the following wiring diagram:

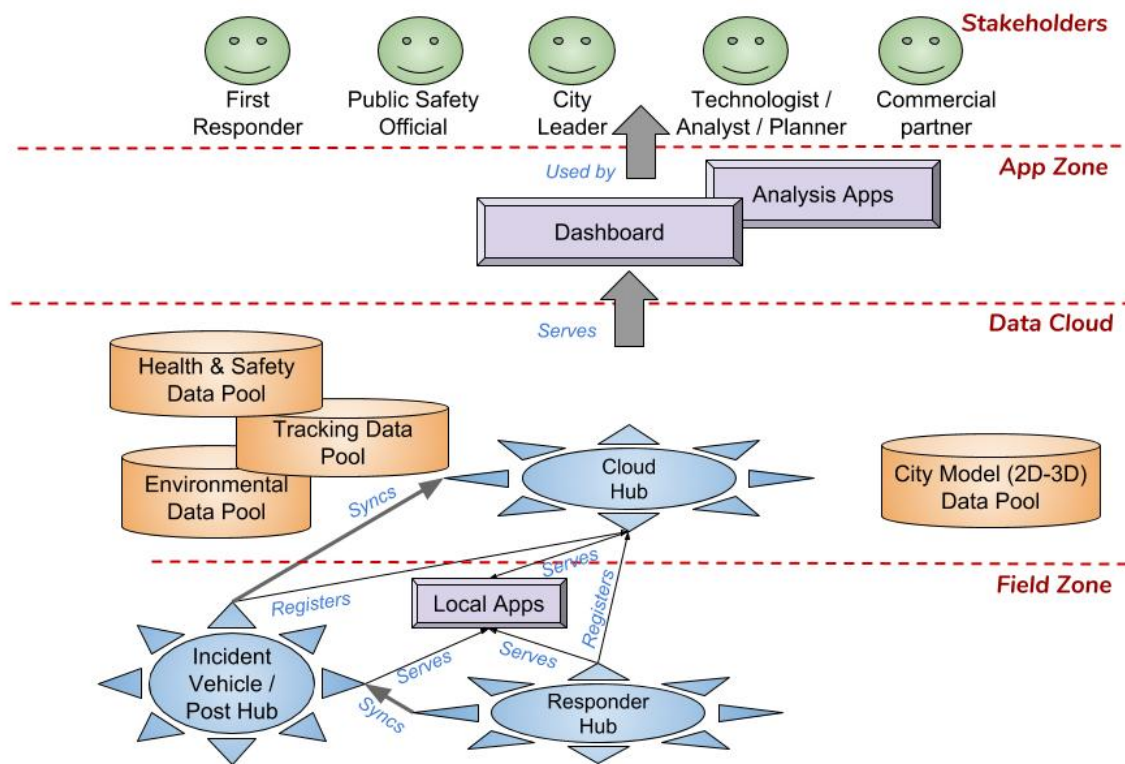


Figure 6. Command communication system overview

and includes the following components

- SmartHub
- Incident SensorHub

- Cloud SensorHub
- I/O device(s)
- Local sensing apps
- 3D Dashboard app
- Command & communication services

B.5.4. Indoor Navigation System

The Indoor Navigation system enables first responders to navigate and be tracked inside of a building in the absence of GPS reception. System components are summarized in the following wiring diagram:

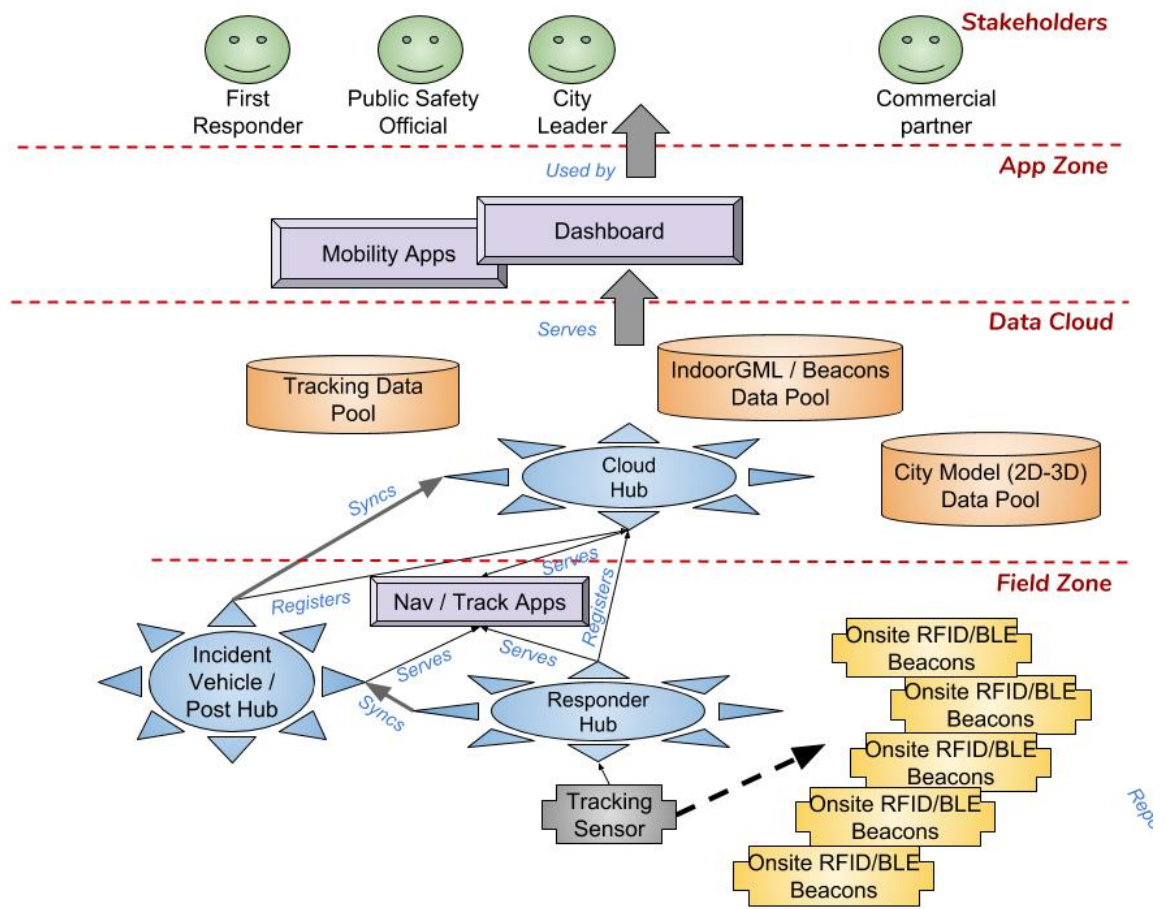


Figure 7. Indoor Navigation system overview

and include the following components

- Tracking Sensors
- SmartHub
- Incident SensorHub
- Cloud SensorHub
- I/O device(s)

- Local navigation apps
- RFID / BLE beacon network
- IndoorGML building network

B.5.5. Street Navigation System

The Street Navigation system is summarized in the following wiring diagram:

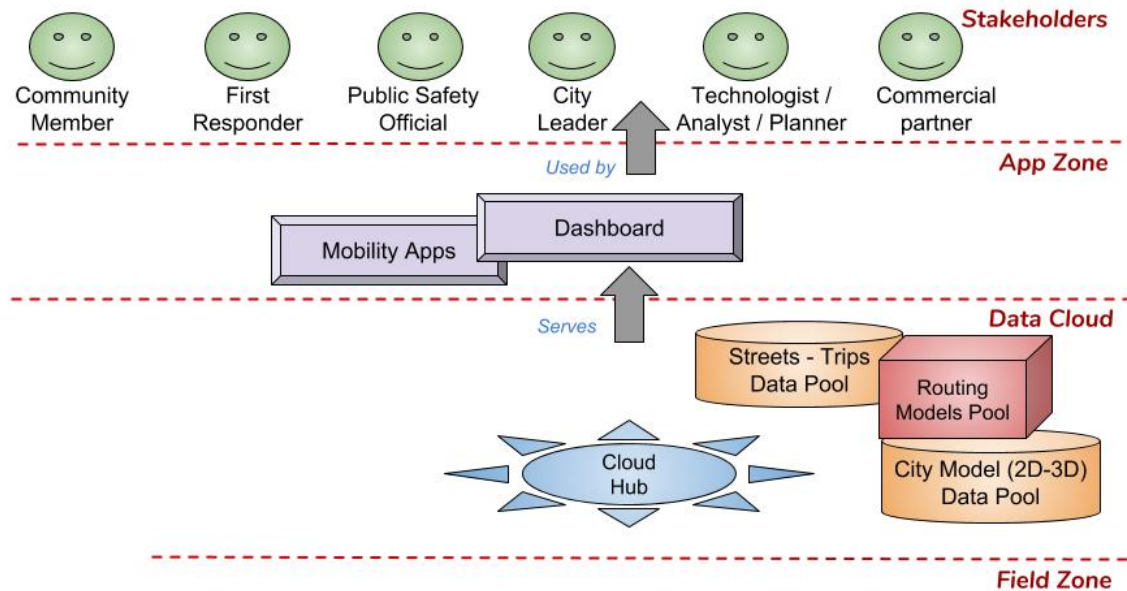


Figure 8. Street Navigation system overview

and includes the following components

- Cloud SensorHub
- 3D Dashboard app
- Traffic management & routing model
- Community mobility navigation & alert & sensing app
- 3D city model

B.5.6. Flood Sensing System

The Flood Sensing system provides both predicted and actual flood inundation regions and street

blockages, summarized in the following wiring diagram:

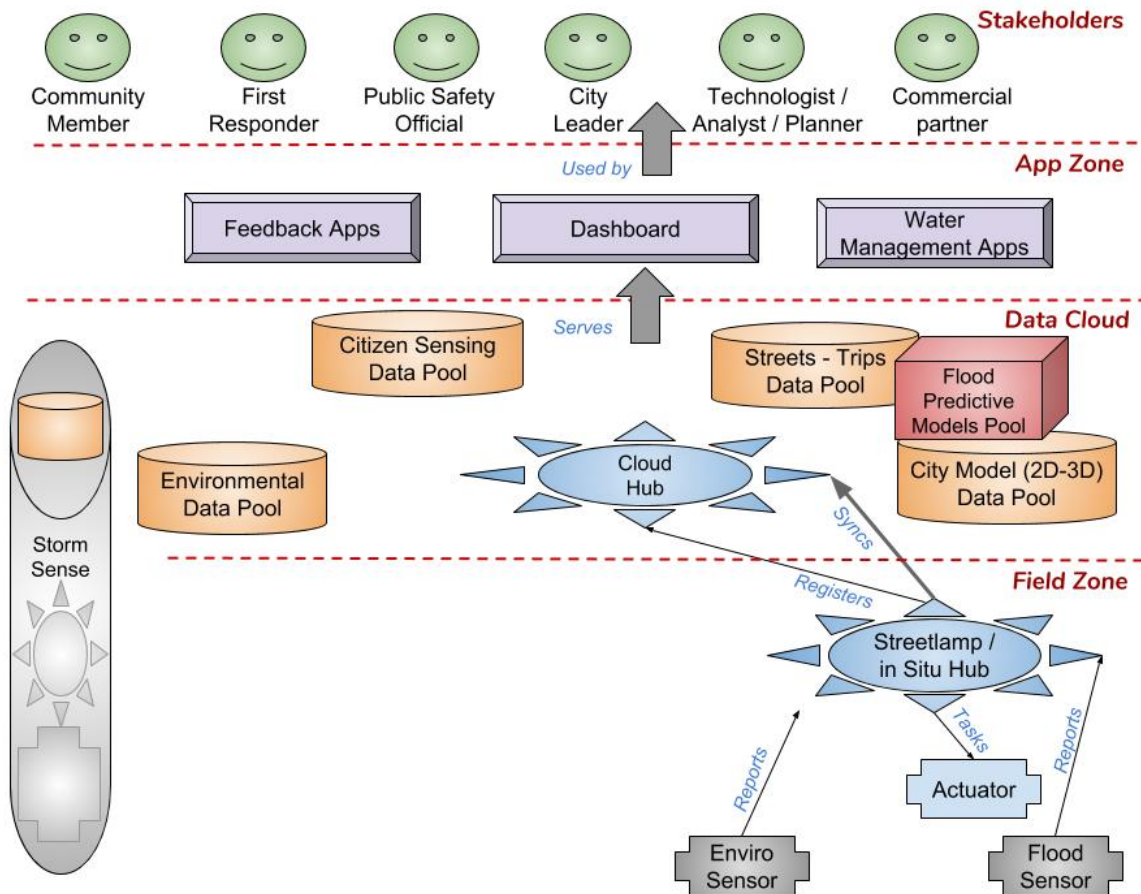


Figure 9. Flood Sensing system overview

and including the following components

- Cloud SensorHub
- Smart flood sensor +/- SensorHub
- 3D Dashboard app
- Flood & inundation model
- Legacy public safety information system adapter (e.g. for StormSense)
- 3D city model
- Flood & inundation model
- Community mobility navigation & alert & sensing app
- 3D city model

B.5.7. Road Sensing System

The Road Sensing system provides road condition and traffic awareness for traffic monitoring and as input to response or evacuation routing. It is summarized in the following wiring diagram:

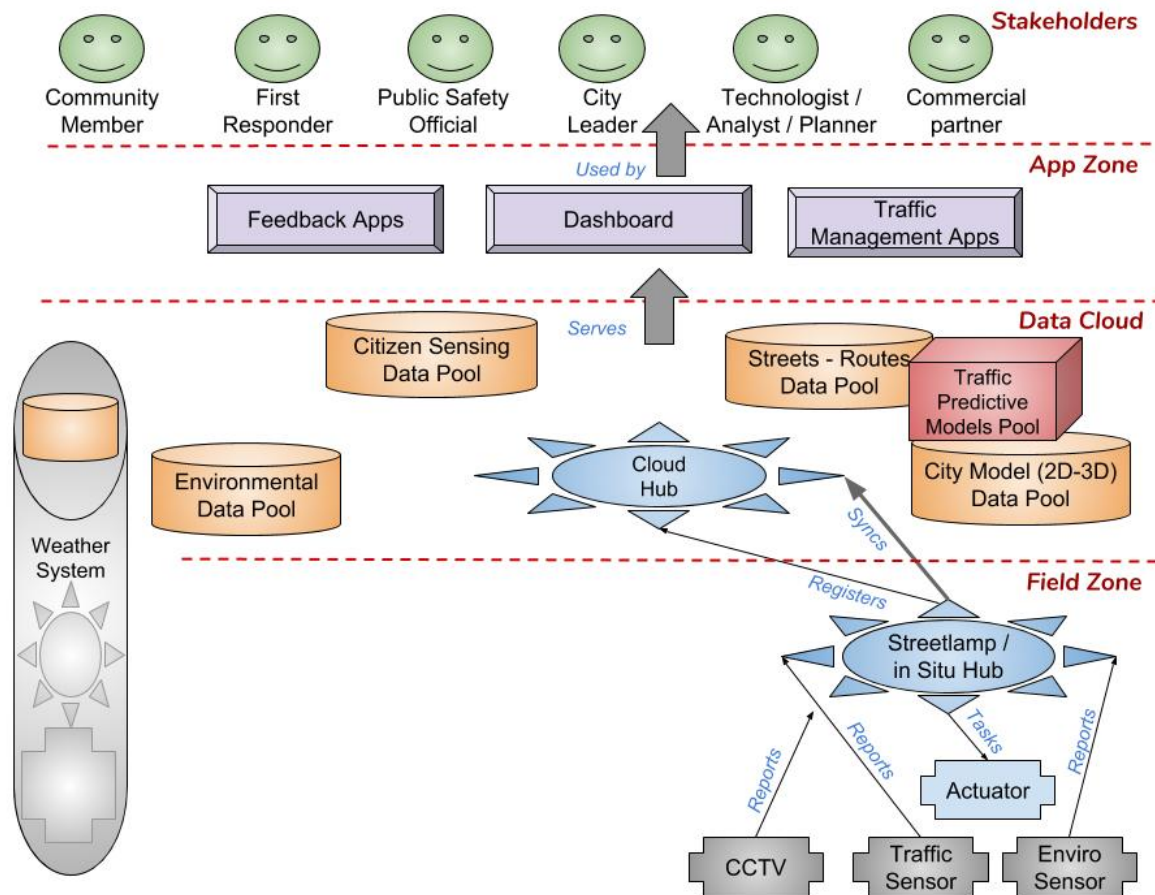


Figure 10. Road Sensing system overview

and includes the following components

- Cloud SensorHub
- Smart traffic / road sensor +/- SensorHub
- Smart weather sensor +/- SensorHub
- 3D Dashboard app
- Community mobility navigation & alert & sensing app
- 3D city model

B.6. Deliverable Components and Documents

B.6.1. D1: First Responder Tracking Sensor

Deliverable Description

Composite or ensemble sensor providing GPS, IGU, and RFID/BLE beacon location tracking in both indoor and outdoor environments. May be implemented as a smart sensor with Sensor Things API client interface, or integrated into a proposed SmartHub or Incident SensorHub. May be actuated (e.g. through STA Tasking) and/or have a configurable tracking rate / interval.

Initiative Roles

- Results from Tasks 4, 5, 7, 12
- Is deployed in the Building Response Scenarios
- Is a component of the SmartHub System
- Addresses requirements R1, R3, R4, R11, R12, R13

Deliverable	Relation
SmartHub	A Tracking Sensor registers itself with a SmartHub and sends it location information
SensorHub	A (vehicular) Tracking Sensor registers itself with an Incident SensorHub and sends it location information

Table 9. Related Deliverables

B.6.2. D2: First Responder Health Sensor

Deliverable Description

Composite or ensemble sensor providing responder health metrics (heart rate, skin response, temperature, movement activity, etc.). May be implemented as a smart sensor with Sensor Things API (STA) client interface, or integrated into a proposed SmartHub

Initiative Roles

- Results from Tasks 4, 5, 7, 12
- Is deployed in the Building Response Scenario
- Is a component of the SmartHub System
- Addresses requirements R1, R3, R4, R13

Deliverable	Relation
SmartHub	A Health Sensor registers itself with a SmartHub and sends it health information

Table 10. Related Deliverables

B.6.3. D3: First Responder Environment Sensor

Deliverable Description

Composite or ensemble sensor providing environmental information such as temperature, air quality (CO, CO₂, ozone, particulates), weather (vehicular), and so on. May be implemented as a smart sensor with Sensor Things API (STA) client interface, or integrated into a proposed SmartHub

Initiative Roles

- Results from Tasks 4, 5, 7, 12
- Is deployed in the Building Response Scenario

- Is a component of the **SmartHub System**
- Addresses requirements **R1, R3, R4, R13**

Deliverable	Relation
SmartHub	An Environment Sensor registers itself with a SmartHub and sends it environmental information
SensorHub	A (vehicular) Environment Sensor registers itself with an Incident SensorHub and sends it environmental information

Table 11. Related Deliverables

B.6.4. D4: First Responder SmartHub

Deliverable Description

Bespoke or phone / tablet based body-worn sensor hub device supporting connection of multiple body-worn sensor devices, multiple I/O devices, data +/- voice communications, exchange of sensor and other incident data with incident / cloud SensorHub nodes, and multiple applications for responder use.

Initiative Roles

- Results from Tasks **4, 5, 7, 12**
- Is deployed in the **Building Response Scenario**
- Is a component of the **SmartHub System, Command Communication System**
- Addresses requirements **R1, R4, R12, R13, R16**

Deliverable	Relation
Incident SensorHub, Cloud SensorHub	A SmartHub registers itself with one or more upstream SensorHubs and exchanges a variety of information over STA, SOS, CSW, and other OGC interfaces.
Heads-up Display	A Heads-up Display connects to a SmartHub and displays information / imagery / experiences to support responder decision making.

Table 12. Related Deliverables

B.6.5. D5: First Responder Incident SensorHub

Deliverable Description

An Incident SensorHub node is positioned either in a response vehicle or incident command post. It provides caching and exchange of sensor information with associated SmartHubs and Cloud SensorHubs, supports SmartHub connectivity and incident-specific sensors such as vehicle trackers or on-scene weather sensors.

Initiative Roles

- Results from Tasks **4, 5, 7, 12**

- Is deployed in the **Building Response Scenario**
- Is a component of the **SmartHub System, Command Communication System** a
- Addresses requirements **R1, R4, R13, R16**

Deliverable	Relation
SmartHub	A SmartHub registers itself with an Incident SensorHub and exchanges a variety of sensor and other information.
Cloud SensorHub	An Incident SensorHub registers itself with a Cloud SensorHub and exchanges a variety of sensor and other information

Table 13. Related Deliverables

B.6.6. D6: Cloud-based SensorHub & Catalog

Deliverable Description

A Cloud SensorHub registers and provides OGC interface data access to Incident SensorHubs and SmartHubs, other data pools, and model processing capabilities as well as legacy data zone systems equipped with their own OGC interfaces.

Initiative Roles

- Results from Tasks **2, 4, 5, 6, 7, 12, 13**
- Is deployed in the **Building Response Scenario**
- Is a component of the **every System**,
- Addresses requirements **R1, R3, R7, R16**

Deliverable	Relation
SmartHub	A SmartHub registers itself with a Cloud SensorHub and exchanges responder information
Incident SensorHub	An Incident SensorHub registers itself with a Cloud SensorHub and exchanges responder information
3D Dashboard	A 3D Dashboard application is provisioned by data and model outputs accessed through the Cloud SensorHub
Flood & inundation model	The Cloud SensorHub mediates requests to the model component
Traffic management & routing model	The Cloud SensorHub mediates requests to the model component
Legacy adapter	The Cloud SensorHub mediates requests to the legacy adapter

Table 14. Related Deliverables

B.6.7. D7: First Responder heads-up display (HUD)

Deliverable Description

A First Responder HUD is a distinct wearable device or face mask integration that connects with a SmartHub (e.g. USB) and displays data, imagery, and/or experiences to support responder decision

making.

Initiative Roles

- Results from Tasks 5, 7, 12
- Is deployed in the Building Response Scenario
- Is a component of the SmartHub System
- Addresses requirements R1, R3, R4, R5

Deliverable	Relation
SmartHub	HUD serves as a display device for a SmartHub

Table 15. Related Deliverables

B.6.8. D8: First Responder indoor navigation application

Deliverable Description

A SmartHub supported application leveraging a Tracking Sensor, RFID/BLE beacon network, IndoorGML route network, and optionally cloud-based routing support to locate and direct first responders in appropriately equipped and mapped indoor building environments.

Initiative Roles

- Results from Tasks 4, 5, 6, 7, 12
- Is deployed in the Building Response Scenario
- Is a component of the Indoor Navigation System
- Addresses requirements R1, R3, R12

Deliverable	Relation
SmartHub	Indoor navigation application runs on a SmartHub or connected device and utilizes tracking sensor data
Beacons	Indoor navigation application relies on detection and interpretation of installed and located RFID / BLE beacons
IndoorGML model	Indoor navigation application relies on a building indoor routing network

Table 16. Related Deliverables

B.6.9. D9: Smart flood sensor

Deliverable Description

In-situ flood / inundation sensor providing water depth and velocity, either configured as a smart sensor (STA client) or integrated on a SensorHub compatible (e.g. smart lamp post) platform, with task-able and/or configurable measurement actuation.

Initiative Roles

- Results from Tasks 5, 7, 12
- Is deployed in the Flood Response Scenario
- Is a component of the Flood Sense System
- Addresses requirements R1, R2, R15

Deliverable	Relation
Cloud SensorHub	A Smart flood sensor registers itself through an associated or integrated SensorHub with a Cloud SensorHub and sends it sensor observations
Flood & inundation model	A Smart flood sensor provides sensor observations as input data to the model

Table 17. Related Deliverables

B.6.10. D10: Smart traffic / road sensor

Deliverable Description

In situ sensor package for vehicle and/or pedestrian traffic density / speed and road surface appearance / condition, either configured as a smart sensor (STA client) or integrated on a SensorHub platform, with taskable and/or configurable measurement actuation.

Initiative Roles

- Results from Tasks 4, 5, 7, 12
- Is deployed in the Snow Response Scenario
- Is a component of the Road Sense System
- Addresses requirements R1, R2, R8, R11, R14

Deliverable	Relation
Cloud SensorHub	A Smart road sensor registers itself through an associated or integrated SensorHub with a Cloud SensorHub and sends it sensor observations
Traffic & routing model	A Smart traffic / road sensor provides sensor observations as input data to the model

Table 18. Related Deliverables

B.6.11. D11: Smart weather sensor

Deliverable Description

In situ or relocatable weather station sensor package for weather conditions (temperature, humidity, wind speed/direction, visibility, precipitation), either configured as a smart sensor (STA client) or integrated on a SensorHub platform, with taskable and/or configurable measurement actuation.

Initiative Roles

- Results from Tasks 4, 5, 7, 12

- Is deployed in the **Flood, Snow Response Scenarios**
- Is a component of the **Flood, Road Sense System**
- Addresses requirements **R1, R2, R9, R15**

Deliverable	Relation
Cloud SensorHub	A Smart flood sensor registers itself through an associated or integrated SensorHub with a Cloud SensorHub and sends it sensor observations
Flood & inundation model	A Smart flood sensor provides sensor observations as input data to the model
Traffic & routing model	A Smart weather sensor provides sensor observations as input data to the model

Table 19. Related Deliverables

B.6.12. D12: 3D dashboard application

Deliverable Description

Desktop visualization / analysis application that utilizes a 3D city model in **GLTF / 3DTiles** and/or **I3S** format to portray a common operating picture for incident management. The 3D Dashboard works with sensor, traffic, incident, resource, and population information provisioned through a Cloud SensorHub and OGC conformant legacy systems (+/- system adapters).

Initiative Roles

- Results from Tasks **4, 5, 6, 7, 12**
- Is deployed in the **Flood, Storm, Health Response Scenarios**
- Is a component of the **Command Communications, Road Sense Systems**
- Addresses requirements **R1, R2, R10, R11, R14**

Deliverable	Relation
Cloud SensorHub	A 3D Dashboard is provisioned with data and model outputs through a Cloud SensorHub
Command & communication system	A 3D Dashboard application includes DCCS support
Flood & inundation model	A 3D Dashboard application is a model client
Traffic & routing model	A 3D Dashboard application is a model client

Table 20. Related Deliverables

B.6.13. D13: Command & communication system

Deliverable Description

Distributed command and communication system (DCCS) for messaging, alerting, tracking, and tasking among incident management personnel, city leaders, and community members. The DCCS will interoperate with / leverage SmartHubs, SensorHubs, and the 3D Dashboard, as well as provide

mobility app support (phone, tablet, browser).

Initiative Roles

- Results from Tasks [4](#), [5](#), [6](#), [7](#), [12](#)
- Is deployed in the [Every Scenario](#)
- Is a component of the [SmartHub, Command & communication Systems](#)
- Addresses requirements [R1](#), [R2](#), [R11](#), [R14](#), [R16](#)

Deliverable	Relation
SmartHub	DCCS runs on SmartHub
Cloud SensorHub	DCCS is provisioned by a Cloud SensorHub
3D Dashboard	DCCS runs on 3D dashboard client

Table 21. Related Deliverables

B.6.14. D14: Flood & inundation model

Deliverable Description

Component that leverages sensor observations, weather predictions, and 2.5 / 3D landscape data to make on-going predictions of timing, extent, and severity of stream flooding and land surface inundation, especially for use in determining street closures for navigation and traffic management. Provides an OGC compatible interface (SOS, STA, WPS) and interoperates with Cloud SensorHubs.

Initiative Roles

- Results from Tasks [4](#), [5](#), [6](#), [7](#), [12](#), [13](#)
- Is deployed in the [Flood Response Scenario](#)
- Is a component of the [Flood Sense System](#)
- Addresses requirements [R1](#), [R2](#), [R15](#)

Deliverable	Relation
Cloud SensorHub	Flood &inundation models is provisioned and mediated by a Cloud SensorHub
3D Dashboard	Model client part of the Dashboard

Table 22. Related Deliverables

B.6.15. D15: Traffic management & routing model

Deliverable Description

Component that leverages street / path networks, as well as closure, congestion, and public safety related zone data to compute optimal vehicle and pedestrian routes for one or more responder, city personnel, or community travelers. Provides an OGC compatible interface (e.g. WPS) and interoperates with Cloud SensorHubs.

Initiative Roles

- Results from Tasks 4, 5, 6, 7, 12, 13
- Is deployed in the Every Scenario
- Is a component of the Road Sense System
- Addresses requirements R1, R2, R11, R14

Deliverable	Relation
Cloud SensorHub	Models is provisioned and mediated by a Cloud SensorHub
3D Dashboard	Model client part of the Dashboard

Table 23. Related Deliverables

B.6.16. D16: Legacy public safety information system adapter

Deliverable Description

Component that mediates between the data store tier of an existing public safety information system and Cloud SensorHubs by providing an OGC compatible façade such as SOS, STA, WFS, etc.

Initiative Roles

- Results from Tasks 3, 4, 5, 6, 7, 12
- Is deployed in the Every Scenario
- Is a component of the Road Sense, Flood Sense, Command Communication, Street Navigation Systems
- Addresses requirements R1, R2, R7, R10

Deliverable	Relation
Cloud SensorHub	Legacy adapter is registered and mediated by a Cloud SensorHub

Table 24. Related Deliverables

B.6.17. D17: Community mobility navigation & alert & sensing app

Deliverable Description

Smartphone +/- table application or app ensemble (could be browser based) that provides incident - aware trip navigation for incident avoidance or evacuation, supports location and community - aware alerts, and enables community members to provide their own observations of multiple categories ambient situations and conditions such as incident occurrences, flooding, etc. Optionally supports community contribution (opt-in) of observations from smartphone sensors. Should provide multiple privacy options (identified, anonymous, randomized, etc.)

Initiative Roles

- Results from Tasks 5, 6, 7, 12, 13

- Is deployed in the **Every Scenario**
- Is a component of the **Road Sense, Flood Sense, Command Communication, Street Navigation Systems**
- Addresses requirements **R1, R2, R7, R14**

Deliverable	Relation
Cloud SensorHub	Community app is provisioned and mediated by a Cloud SensorHub

Table 25. Related Deliverables

B.6.18. D18: RFID / BLE indoor navigation beacons

Deliverable Description

Active beacon devices of sufficient number and range that prepare one or more buildings in each host city to support indoor tracking of suitably equipped first responders at 5m or better accuracy. Beacon network is to be installed and integrated with an IndoorGML routing network for each building.

Initiative Roles

- Results from Tasks **3, 4, 5, 6, 7, 12**
- Is deployed in the **Building Response Scenario**
- Is a component of the **Indoor Navigation System**
- Addresses requirements **R1, R2, R12, R13**

Deliverable	Relation
Tracking Sensor	A Tracking Sensor derives location from reading beacon identities and signal strengths
Indoor navigation app	SmartHub hosted navigation application relies on Indoor routing model

Table 26. Related Deliverables

B.6.19. D19: IndoorGML +/- 3D building model

Deliverable Description

Creation and provision of a building model encoded in IndoorGML that represents the navigable space network of each designated building. Model to be suitable for prototype tracking and routing of first responders. Optional provision of a 3D building model for visualization purposes.

Initiative Roles

- Results from Tasks **3, 4, 5, 6, 7, 12**
- Is deployed in the **Building Response Scenario**
- Is a component of the **Indoor Navigation System**
- Addresses requirements **R1, R2, R12, R13**

Deliverable	Relation
Indoor navigation app	SmartHub hosted navigation application relies on Indoor routing model

Table 27. Related Deliverables

B.6.20. D20: 3D city model

Deliverable Description

Creation, transformation, and/or provision of a 3D city model covering a suitable region of each host city greater than 4 sq km for pilot scenario purposes. Model and encoding must be compatible with the selected 3D Dashboard application.

Initiative Roles

- Results from Tasks 4, 5, 6, 7, 12, 13
- Is deployed in the Flood, Road, Health Response Scenarios
- Is a component of the Command communication, Road Sense, Flood Sense, Street Navigation Systems
- Addresses requirements R1, R3

Deliverable	Relation
Cloud SensorHub	Cloud SensorHub provisions the 3D city model
3D Dashboard	3D city model forms basis of Dashboard visualization

Table 28. Related Deliverables

B.6.21. D21: Pilot ER

Deliverable Description

The Engineering Report deliverable comprises two roles. The principal role, ER Editor, is responsible for structuring the ER, delegating and scheduling contributions from other participants, then compiling and editing the complete document. The associate role, ER Contributor, is a participant who develops and contributes components of the ER under the supervision of the ER Editor that correspond to the participant's own agreed deliverables.

Initiative Roles

- Results from Task 8
- Is deployed in No Scenario
- Is a component of the No System
- Addresses requirements R1, R2, R7

Deliverable	Relation
Every other deliverable	Is documented in the ER

Table 29. Related Deliverables

B.6.22. D22: Reference Smarthub Design

Deliverable Description

A detailed design, ideally with associated open-source code, for implementation of a functional SmartHub on an Android-based smartphone or tablet platform. Optional deliverable is a detailed design, ideally with associated open-source code, for a functional wireless or USB Smart Sensor (STA MQTT client-equipped sensor device) on a **Zephyr-based** single-board computer platform such as **Arduino 101**.

Initiative Roles

- Results from Tasks **5**
- Is deployed in **No Scenario**
- Is a component of **No System**
- Addresses requirements **R5**

Deliverable	Relation
SmartHub	Documented and (optionally) implemented SmartHub design

Table 30. Related Deliverables

B.6.23. D23: SCIRA solution architecture

Deliverable Description

Development and delivery of a solution architecture document for each host city that is based on SCIRA design patterns and viewpoints, makes use of Unified Modeling Language (UML) for graphical representation, and describes the combination of legacy and prototype systems that has been designed and implemented for the purposes of this initiative. Intended to test the usefulness of the SCIRA design toolkit as well as inform revision and update of the SCIRA Deployment Guides.

Initiative Roles

- Results from Tasks **2**
- Is deployed in **No Scenario**
- Is a component of **No System**
- Addresses requirements **R1, R2, R3, R6**

Deliverable	Relation
Comparative Analysis	Component of the comparative analysis

Table 31. Related Deliverables

B.6.24. D24: Smart City architecture comparative analysis

Deliverable Description

Execution and report of a comparative analysis that examines the Smart City architectures implemented and documented for each host city with respect to the already implemented and documented architecture of a third city to be selected for the purposes of this deliverable.

Initiative Roles

- Results from Tasks **2, 8**
- Is deployed in **No Scenario**
- Is a component of **No System**
- Addresses requirements **R6**

Deliverable	Relation
Solution Architecture	Components of the Comparative Analysis

Table 32. Related Deliverables

B.6.25. D25: Pilot video production

Deliverable Description

Capture of content and production of a short (10min) video suitable for introducing a general audience to the goals, activities, and outcomes of this initiative. The video may include recorded and visual content contributed by participants and stakeholders as well as stakeholder interviews and relevant animated or static graphical content.

Initiative Roles

- Results from Tasks **11, 12, 13**
- Is deployed in **No Scenario**
- Is a component of **No System**
- Addresses requirements **R1, R2**

Deliverable	Relation
Every deliverable	Shown or mentioned in the video as appropriate

Table 33. Related Deliverables

B.7. Summary Deliverables

ID	Description	Tasks	Requirements	Expected Component Number	City-provided Y/N/TBD
D1	First Responder tracking sensor (GPS + IGU + RFID / BLE)	4, 5, 7, 12	R1, R3, R4, R11, R12, R13	4	TBD
D2	First Responder health sensor	4, 5, 7, 12	R1, R3, R4, R13	4	TBD
D3	First Responder environment sensor	4, 5, 7, 12	R1, R3, R4, R13	4	TBD
D4	First Responder SmartHub	4, 5, 7, 12	R1, R4, R12, R13, R16	4	TBD
D5	First Responder incident SensorHub	4, 5, 7, 12	R1, R4, R13, R16	2	N
D6	Cloud-based SensorHub & Catalog	2, 4, 5, 6, 7, 12, 13	R1, R3, R7, R16	2	N
D7	First Responder heads-up display	5, 7, 12	R1, R3, R4, R5	2	TBD
D8	First Responder sensing and indoor navigation application (health, environment, tracking + IndoorGML navigation)	4, 5, 6, 7, 12	R1, R3, R12	2	TBD
D9	Smart flood sensor +/- SensorHub	5, 7, 12	R1, R2, R15	2	TBD
D10	Smart traffic / road sensor +/- SensorHub	4, 5, 7, 12	R1, R2, R8, R11, R14	2	TBD
D11	Smart weather sensor +/- SensorHub	4, 5, 7, 12	R1, R2, R9, R15	2	TBD
D12	3D dashboard application	4, 5, 6, 7, 12	R1, R2, R10, R11, R14	2	N
D13	Command & communication services	4, 5, 6, 7, 12	R1, R2, R11, R14, R16	2	N
D14	Flood & inundation model	4, 5, 6, 7, 12, 13	R1, R2, R15	2	TBD
D15	Traffic management & routing model	4, 5, 6, 7, 12, 13	R1, R2, R11, R14	2	TBD

ID	Description	Tasks	Requirements	Expected Component Number	City-provided Y/N/TBD
D16	Legacy public safety information system adapter	3, 4, 5, 6, 7, 12	R1, R2, R7, R10	2	N
D17	Community mobility navigation-alert-sensing app	5, 6, 7, 12, 13	R1, R2, R7, R14	2	N
D18	RFID / BLE indoor navigation beacons	3, 4, 5, 6, 7, 12	R1, R2, R12, R13	2	N
D19	IndoorGML +/- 3D building model	3, 4, 5, 6, 7, 12	R1, R2, R12, R13	2	TBD
D20	3D city model	4, 5, 6, 7, 12, 13	R1, R3	2	TBD
D21	Pilot Engineering Report (ER)	8	R1, R2, R7	2	N
D22	Reference Smarthub Design	5	R5	2	N
D23	SCIRA solution architecture (St. Louis & VA Beach)	2	R1, R2, R3, R6	2	N
D24	Smart City architecture comparative analysis	2,8	R6	2	N
D25	Pilot video production	11, 12, 13	R1, R2	2	N

Table 34. Summary Deliverables

* Global Positioning System (GPS), Inertial Guidance Unit (IGU), Radio Frequency Identification (RFID), Bluetooth Low Energy (BLE).

B.8. Data

Datasets and data sources required for execution and demonstration of the Pilot will be provided as described below. The data may be accessible through OGC Web Services or as files. Files may also be provided to the Initiative participants so that the participants can serve the data via OGC Web Services.

Dataset	Source	Datatypes	Encodings or Formats	Access
St. Louis, MO Geodata	City of St. Louis, etc.	Various	Various	St. Louis Open Data St. Louis Open GIS Data

Dataset	Source	Datatypes	Encodings or Formats	Access
Virginia Beach Geodata	City of Virginia Beach, etc.	Various	Various	VA Beach Open Data VA Beach Open GIS Data

Table 35. Pilot Data

Appendix C: Tips for new bidders

Bidders who are new to OGC initiatives are encouraged to review the following tips:

- *Bidders* are organizations or individuals who submit proposals in response to this CFP. A Bidder selected to participate will become a *Participant* through the execution of a Participation Agreement contract with OGC.
- Most Bidders are expected to propose a combination of cost-sharing request and in-kind contribution (though solely in-kind contributions are also welcomed).
- Cost-share funding of components is typically on the order of \$5,000 - \$15,000 USD per component. Some of the components have partially been implemented by vendors. Funding is intended for assisting participants to participate in the discussion while advancing their existing tools. It is expected to be matched by in-kind contributions.
- In general, the term "activity" describes work to be performed in an initiative, and the term "deliverable" describes artifacts to be developed and delivered for inspection and use.
- The roles typically played in an OGC Innovation Program initiative are defined in the [OGC Innovation Program Policies and Procedures](#), from which the following definitions are derived and extended:
 - *Sponsors* are OGC member organizations that contribute financial resources to support initiative requirements for rapid development, implementation, and delivery of proven candidate specifications to the OGC Standards Program. These requirements lead directly to the activities and deliverables that make up each initiative. Sponsor representatives serve as "customers" during initiative execution, helping to ensure that requirements are being addressed and broader OGC interests are being served.
 - *Participants* are selected OGC member organizations that generate empirical information during an initiative through the definition of interfaces, implementation of prototype components, and the documentation of findings and recommendations in Engineering Reports, Change Requests and other artifacts. They may receive cost-share funding, but contribute at least some of their efforts as in-kind contributions. Participant organizations assign business and technical representatives to represent their interests throughout initiative execution.
 - *Observers* are individuals from OGC member organizations that have agreed to OGC intellectual property requirements in exchange for the privilege to access initiative communications and intermediate work products. They may contribute recommendations and comments, but the IP Team has the authority to table any of these contributions if there's a risk of interfering with any primary initiative activities.
 - The *Innovation Program Team (IP Team)* is the management team that oversees and coordinates the initiative. This team is comprised of OGC staff, representatives from other OGC member organizations, and OGC consultants. The IP Team communicates with Sponsors, Participants, and other stakeholders during initiative execution, provides initiative scope and schedule control, and assists stakeholders in understanding OGC policies and procedures.

- The term *Stakeholders* is a generic label that encompasses all initiative actors, including representatives of Sponsors, Participants, and Observers, as well as the IP Team. Initiative-wide email broadcasts will often be addressed to "Stakeholders".
 - *Suppliers* are organizations (not necessarily OGC members) who have offered to supply specialized resources such as capital or cloud credits, but do not otherwise participate in an initiative. OGC's role is to assist in identifying an initial alignment of interests and performing introductions between potential consumers and suppliers. Discussions and arrangements are then made directly between those parties.
- Non-OGC member organizations must become members in order to be selected as Participants. Non-members are welcome to submit initiative proposals as long as the proposal is accompanied by a letter of intent to become members if selected for participation.
 - Any individual wishing to gain access to an initiative's intermediate work products in a private area of the Portal (or attend private working meetings / telecons) must be a member-approved user of the OGC Portal system. Intermediate work products that are intended to be shared publicly will be made available (e.g. as draft ER content) in a public GitHub repository.
 - Individuals from any OGC member organization not an initiative Sponsor or Participant may still (as a benefit of membership) quietly observe all initiative activities by registering as an initiative Observer.
 - Prior initiative participation is not a direct bid evaluation criterion. However, prior participation could accelerate and deepen a Bidder's understanding of the information presented in the CFP, thereby improving their ability to submit a competitive response.
 - All else being equal, preference will be given to proposals that include a larger proportion of in-kind contributions.
 - All else being equal, preference will be given to proposed components that are certified OGC-compliant.
 - All else being equal, a proposal addressing all of a deliverable's requirements will be favored over one addressing only a subset. Each Bidder is at liberty to determine its own proposal, of course. But if a Bidder does choose to propose only a subset for any particular deliverable, the proposal should prominently and unambiguously state precisely what subset of the deliverable requirements are being addressed.
 - The Sponsor(s) will be given an opportunity to review selection results and offer advice, but ultimately the Participation Agreement (PA) contracts will be formed bilaterally between OGC and each Participant organization. No multilateral contracts will be formed. Beyond this, there are no restrictions regarding how a Participant chooses to accomplish its deliverable obligations so long as the Participant's obligations are met in a timely manner (e.g., with or without contributions from third party subcontractors).
 - In general, only one organization will be selected to receive cost-share funding per deliverable component or document, and that organization will become the Assigned Participant upon which other Participants will rely for delivery. Optional in-kind contributions may be made provided that they don't disrupt reliable delivery of required contributions from Assigned Participants.

- A Bidder may propose against any or all deliverables. Participants in past initiatives have often been assigned to make only a single deliverable. It would be theoretically possible for a single organization to be selected for all available deliverables, but that would typically run counter to IP initiative objectives of determining and solving interoperability issues between systems, platforms, and organizations.
- Participant Agreements will generally not require delivery of component source code to OGC.
 - Component delivery typically consists of component participation in initiative activities (e.g. as installed on a Participant computing resource), as well as the corresponding documentation of findings, recommendations, and technical artifacts as contributions to the initiative Engineering Report(s).
 - In some cases, a Participant Agreement may expressly require an open-source component to be developed, per Sponsor requirement and/or Bidder proposal. In such cases the component source code should be made publicly discoverable and accessible, with documentation, under an appropriate open-source license, independently of the initiative, following or in the course of development.
- Results of other recent OGC initiatives can be found in the [OGC Public Engineering Report Repository](#).
- A Bidders Q&A Webinar will likely be conducted soon after CFP issuance. The webinar will be open to the public, but prior registration will be required.