Demonstration: Dynamic Sensor Registration and Semantic Processing for ad-hoc MOBile Environments (SemMOB)

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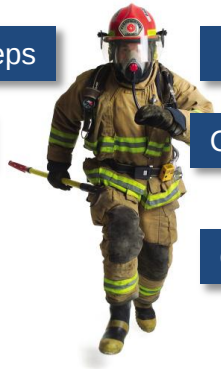
Why Dynamism?

There are a variety of sensors used to monitor vitals of firefighters, location, and poisonous gases.



- Footsteps
- Heart rate
- GPS
- CO
- O_2
- CO_2
- Accelerometer
- Compass

First responders have limited time to analyze sensor (on and around them) observations.

There is a team of them making it further difficult for analysis

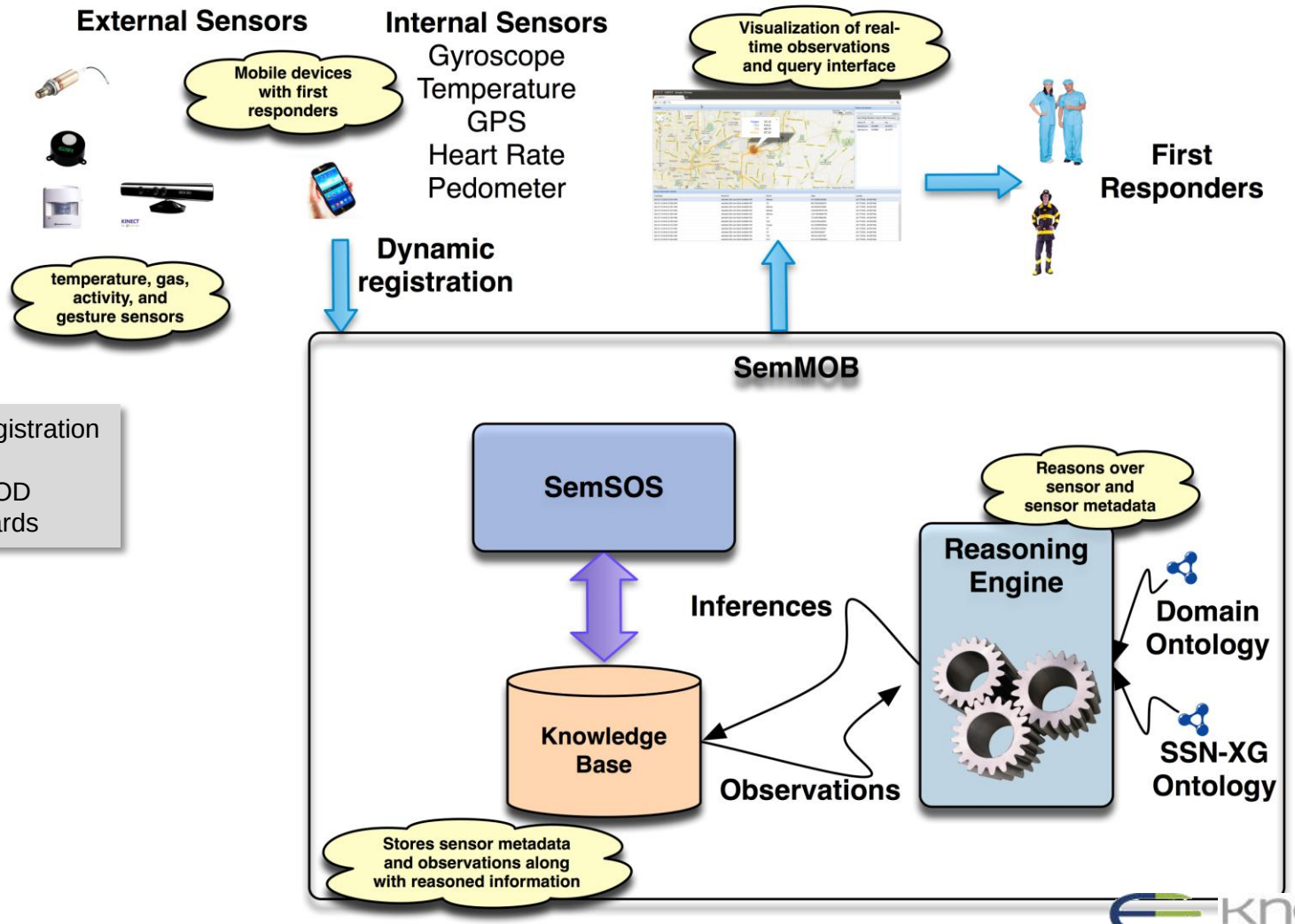
Sensors on each responder provides different view of the event and they need to register dynamically as the firefighters arrive.

Fire fighters need to combine prior knowledge of fires and its behavior, extinguishers, and floor plan of the building for rescue strategy and operations.

Semantic Web allow us to describe the domain, sensors, and first responders -- apply reasoning techniques to derive actionable insights

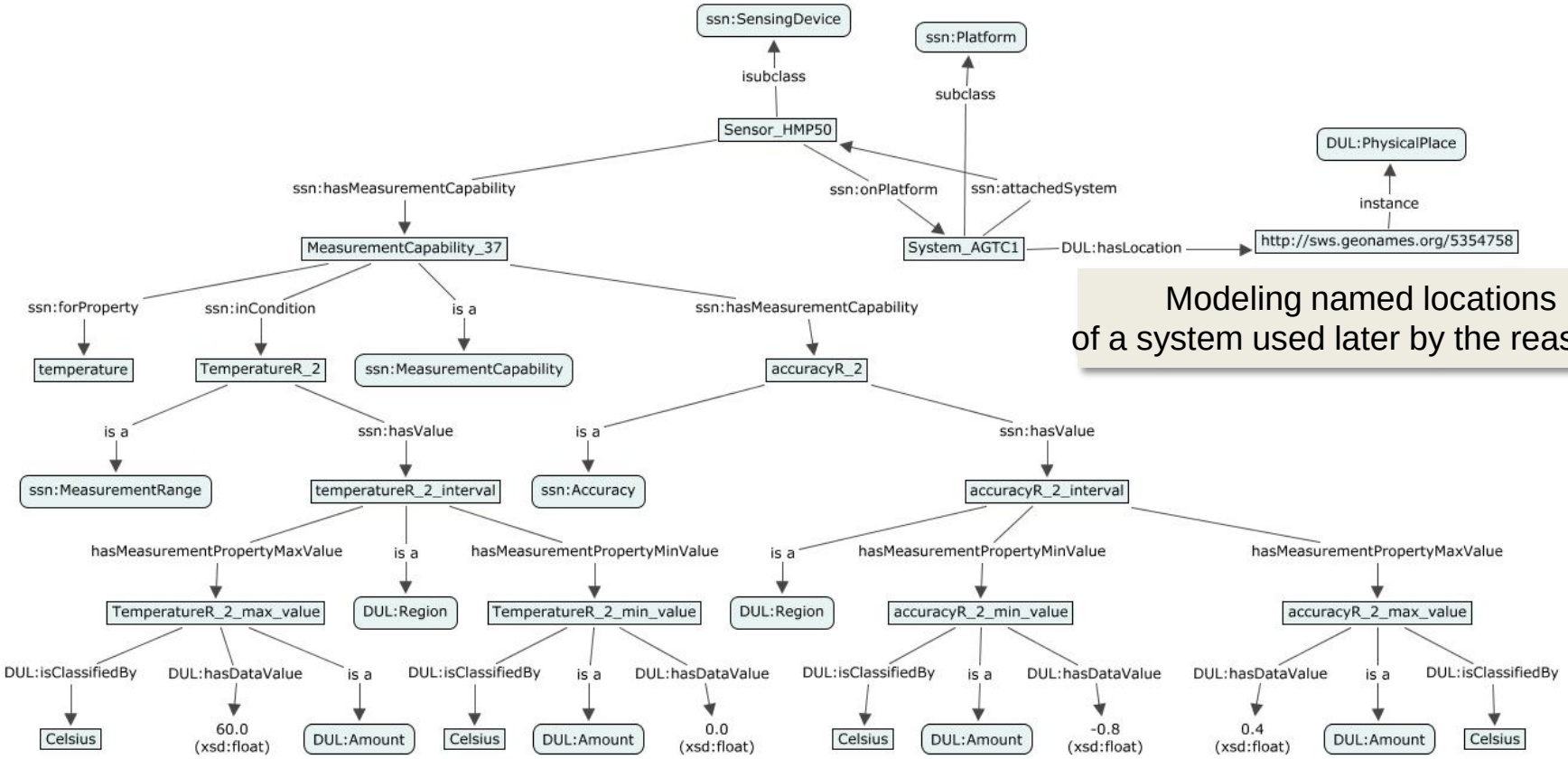
http://affiliatemarketerstoolbox.net/onfire/

SemMOB Architecture



Dynamic registration
Reasoning
Leverage LOD
SOS standards

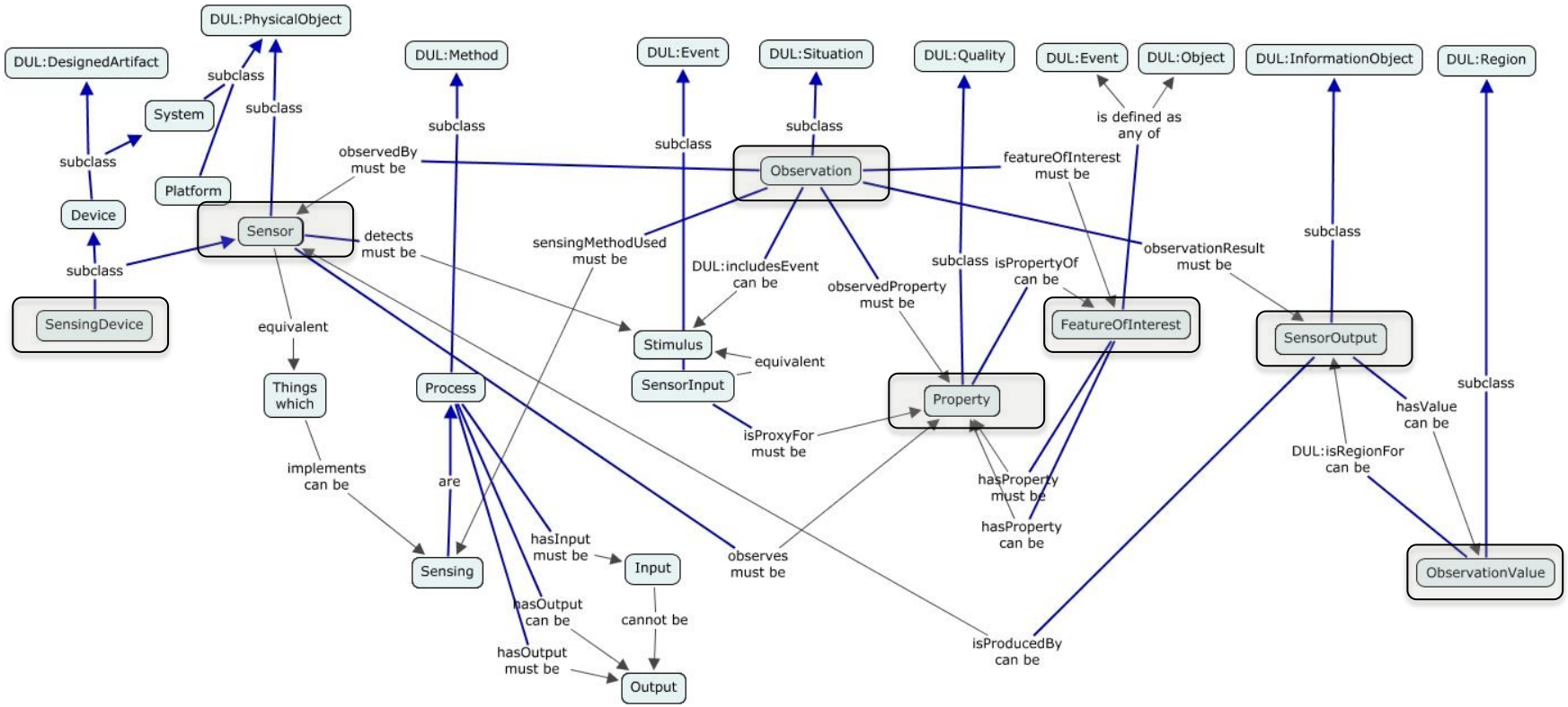
Modeling Sensors



Modeling named locations of a system used later by the reasoner.

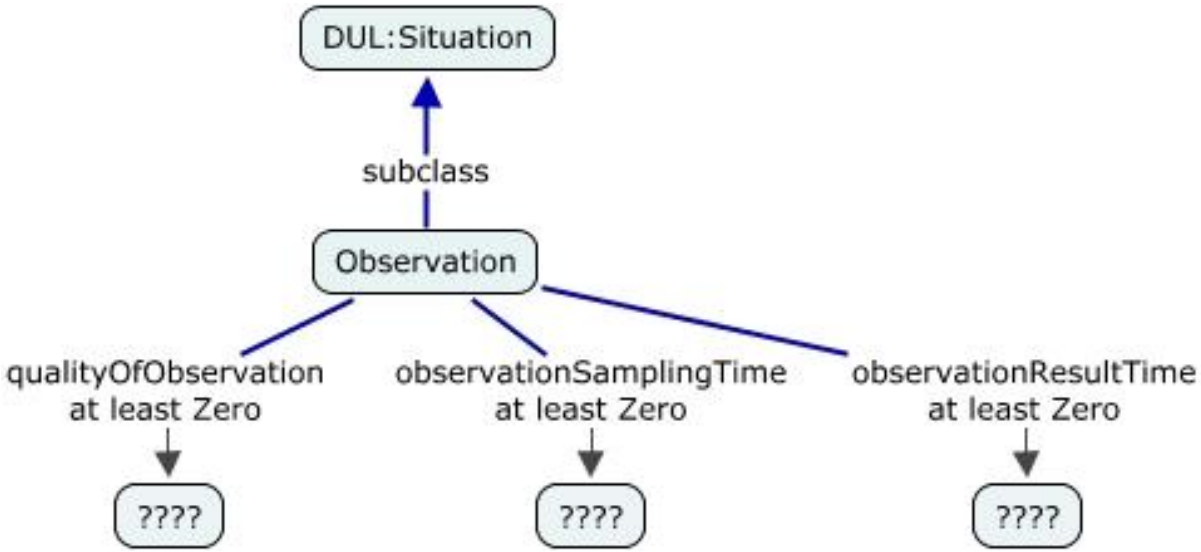
Modeling accuracy of sensors

SSN XG Model Depicting Basic Sensor Modeling Concepts



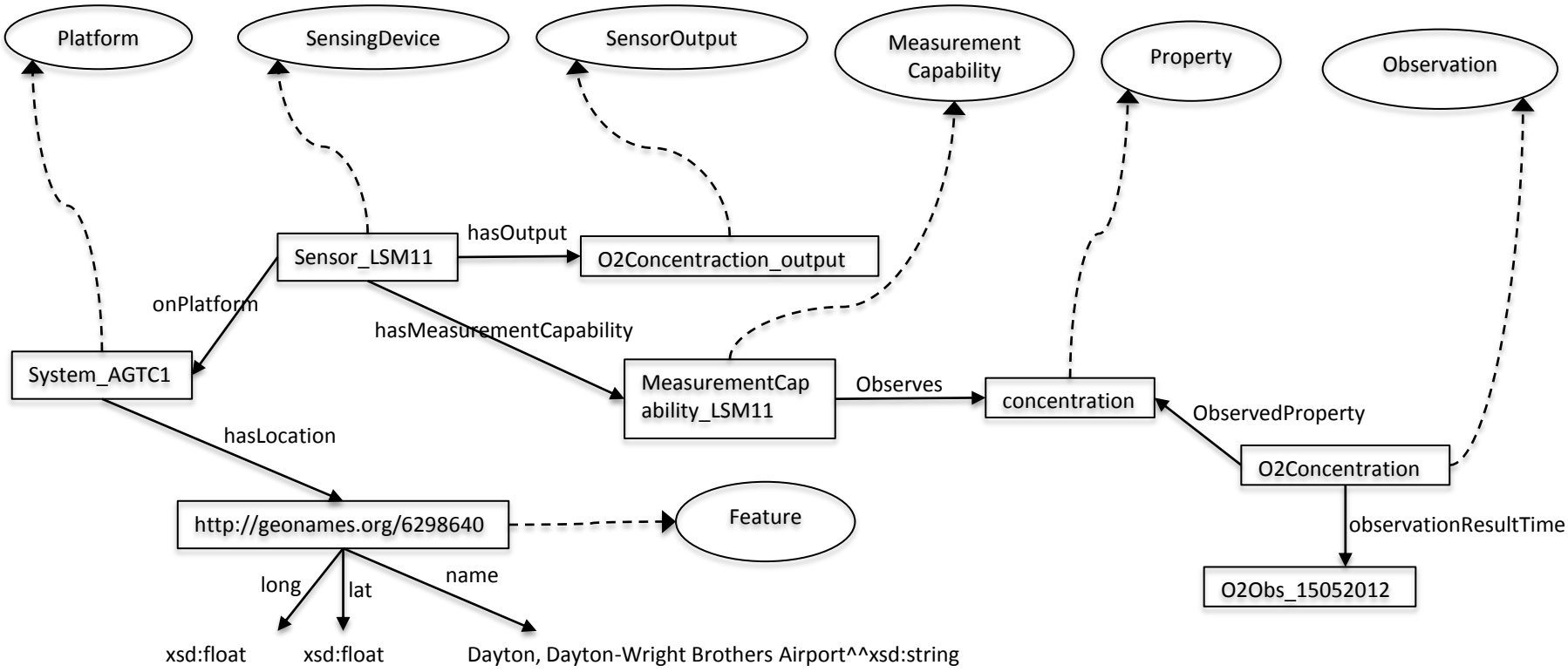
http://www.w3.org/2005/Incubator/ssn/wiki/Report_Work_on_the_SSN_ontology

SSN XG Concepts for Modeling Observation Time



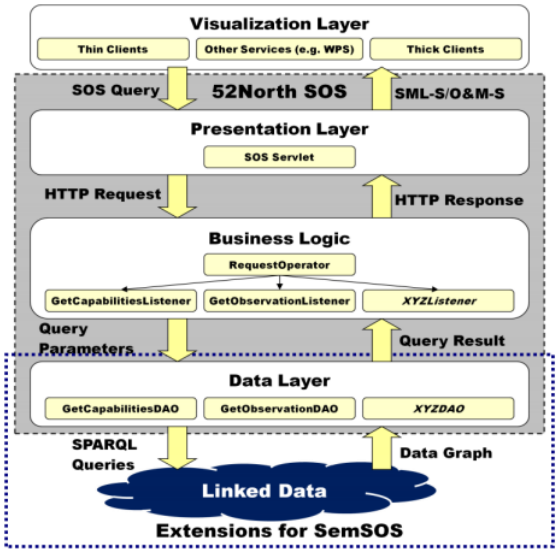
Modeling observation time

SemMOB: Sensor Model



Leveraging Mobile Devices using SemSOS

Mobile applications for data collection and reporting

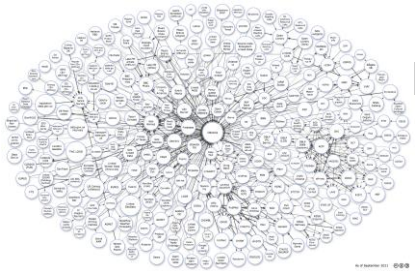


Abstractions that are intuitive to decision makers and first responders.

Raw sensor observations

SemSOS: Semantic analysis and reasoning over sensor observations

GeoNames



Linked Open Data

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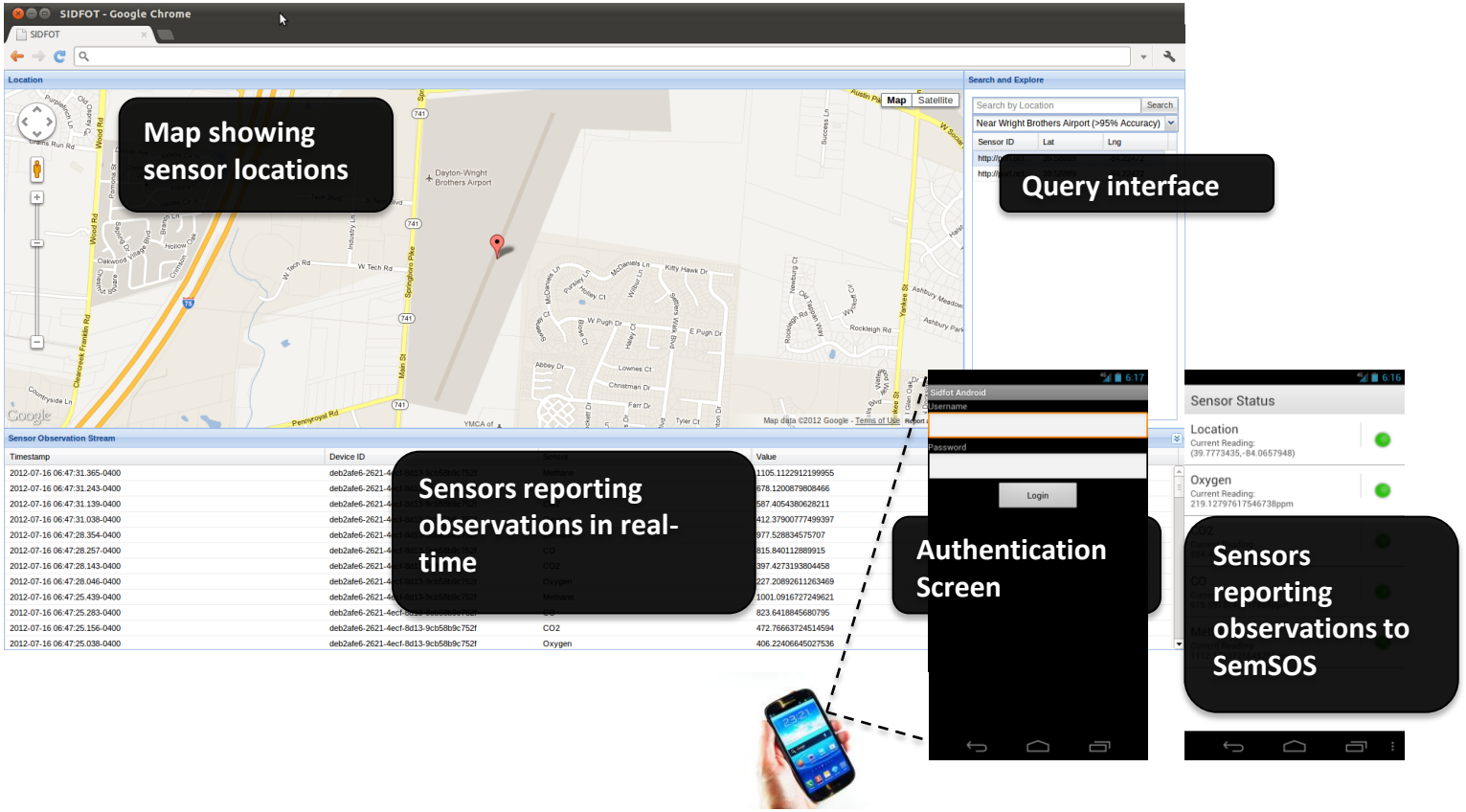
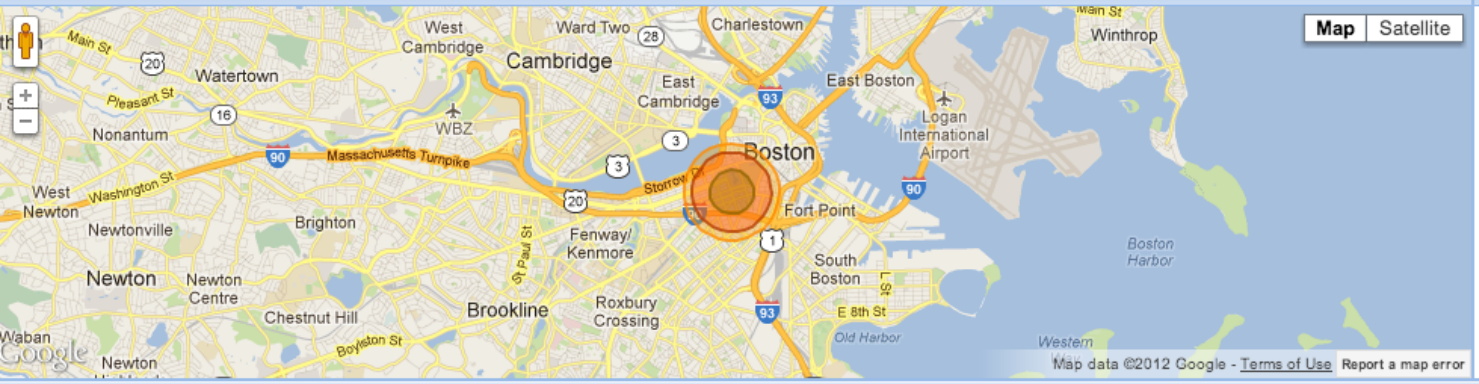
SemMOB Visualization



Location



Search and Explore

Search by Location | Search

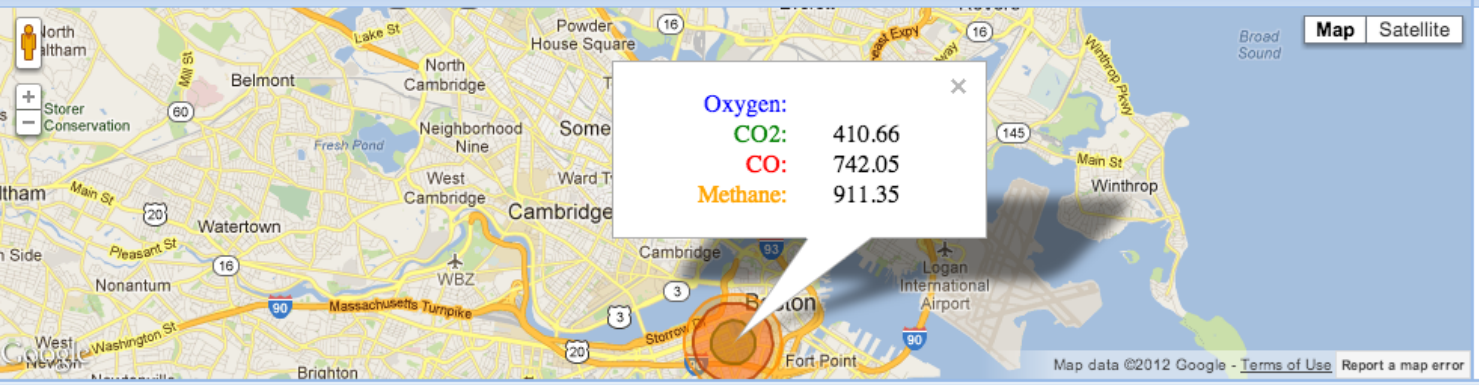
All sensors registered in SemSOS

Sensor ID	Lat	Lng

Sensor Observation Stream

Timestamp	Device ID	Sensor	Value	Location

Location



Search and Explore

Search by Location | Search

All Temperature Sensors

Sensor ID	Lat	Lng

Sensor Observation Stream

Timestamp	Device ID	Sensor	Value	Location
2012-11-12 08:00:37.412-0500	f9f8fc6a-75c9-4ada-af17-8333610137b6	Methane	911.3488523703251	(42.35148625, -71.07042788)
2012-11-12 08:00:34.411-0500	f9f8fc6a-75c9-4ada-af17-8333610137b6	Methane	1124.0943607079546	(42.35148605, -71.07042791)
2012-11-12 08:00:31.395-0500	f9f8fc6a-75c9-4ada-af17-8333610137b6	Methane	1092.0348967208697	(42.35148598, -71.07042792)
2012-11-12 08:00:28.409-0500	f9f8fc6a-75c9-4ada-af17-8333610137b6	Methane	912.1055566249339	(42.35148586, -71.07042796)
2012-11-12 08:00:25.432-0500	f9f8fc6a-75c9-4ada-af17-8333610137b6	Methane	1113.0076315809317	(42.35148579, -71.07042796)
2012-11-12 08:00:22.409-0500	f9f8fc6a-75c9-4ada-af17-8333610137b6	Methane	1042.0342470531825	(42.35148589, -71.07042793)
2012-11-12 08:00:16.743-0500	f9f8fc6a-75c9-4ada-af17-8333610137b6	Methane	919.3807687389884	(42.35148586, -71.07042789)
2012-11-12 08:00:13.407-0500	f9f8fc6a-75c9-4ada-af17-8333610137b6	Methane	928.609639510204	(42.35148583, -71.07042782)
2012-11-12 08:00:10.439-0500	f9f8fc6a-75c9-4ada-af17-8333610137b6	Methane	1065.7273500201775	(42.3514854, -71.07042746)
2012-11-12 08:00:04.439-0500	f9f8fc6a-75c9-4ada-af17-8333610137b6	Methane	1062.552467157857	(42.35148511, -71.07042739)
2012-11-12 08:00:01.397-0500	f9f8fc6a-75c9-4ada-af17-8333610137b6	Methane	1012.4136321274365	(42.35148511, -71.07042735)
2012-11-12 07:59:59.082-0500	f9f8fc6a-75c9-4ada-af17-8333610137b6	Methane	998.7694794934841	(42.35148517, -71.07042731)

demo.flv
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Show All

References

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http://www.w3.org/2005/Incubator/ssn/wiki/SSN
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[2] Masolo, C., Borgo, S., Gangemi, A., Guarino, N., Oltramari, A., Schneider, L., WonderWeb Deliverable D17. The WonderWeb Library of Foundational Ontologies and the DOLCE ontology, Preliminary Report (ver. 2.0, 15-08-2002).

[3]http://www.w3.org/2005/Incubator/ssn/wiki/Sensor_Discovery_on_Linked_Data

[4] Cory Henson, Josh Pschorr,Amit Sheth, Krishnaprasad Thirunarayan, 'SemSOS: Semantic Sensor Observation Service', In Proceedings of the 2009 International Symposium on Collaborative Technologies and Systems (CTS 2009), Baltimore, MD, May 18-22, 2009.

[5] GeoNames web service and ontology: http://www.geonames.org/ontology/documentation.html

[6] RDF triple stores: OpenRDF Sesame (http://www.openrdf.org/) and Virtuoso open source edition (http://virtuoso.openlinksw.com/).