

including testbeds, interoperability experiments, plugfests and pilot projects – in order to fast-track the introduction of specific industry requirements into the formal standards development process. Sponsors set the goals based on real-world use cases. Participants work to meet those goals. The initiatives are followed closely by the OGC Technical Committee working groups focused on topics such as 3D urban models, workflow, security, disaster management and semantics.

A new OGC initiative has begun formulating an initial concept architecture for a spatially enabled Mobile Internet (and Internet of Things), based on high priority use cases. This activity is likely to result in the establishment of a testbed, for which a Call for Sponsors will be issued. To express your interest or support of this initiative, please contact:

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Visit the OGC website at <http://www.opengeospatial.org/contact>.

**View a demonstration**

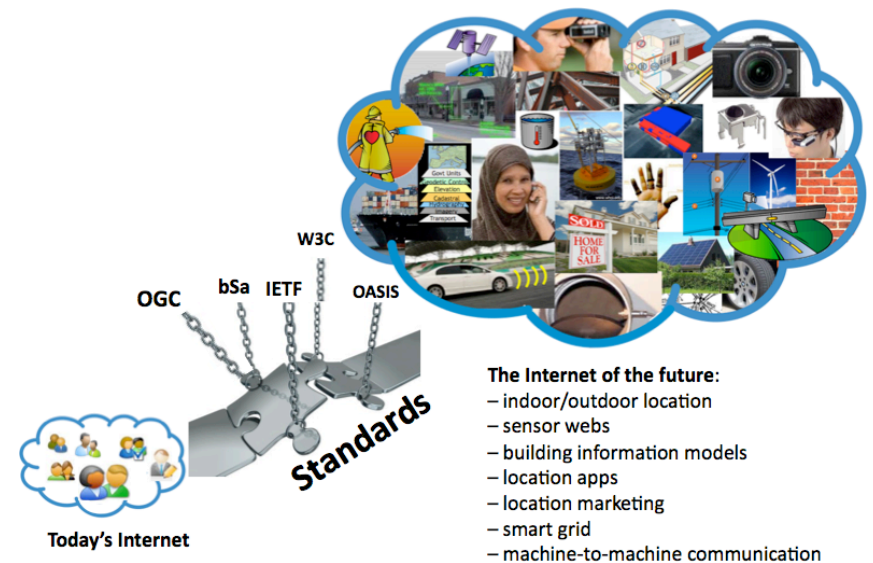
Videos of the most recent OGC Web Services Testbeds can be found at <http://www.opengeospatial.org/resource/demos>.

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**"Internet of Things" needs indoor/outdoor location standards**

A next phase of the Internet is emerging and it has research names like the Internet of Things and Pervasive Computing. Companies are introducing marketing concepts for planetary-scale sensing networks that involve Building Information Models (BIM), smart grid, sensor webs, ubiquitous cities, 4D, city models, machine-to-machine communication and Augmented Reality (AR). In all of these technology domains, market development depends on fluid communication between systems that provide or need to use both indoor and outdoor location information.



*Connecting the open Internet to an open "Internet of Things" requires collaboration among multiple standards development organizations whose standards address indoor space and outdoor space.*

This next phase of the Internet needs a common language to enable communication about things *and between things*. Open standards – TCP/IP, HTTP, HTML, XML etc. – enable the Internet and the Web, but we don't yet have all we need to connect the Web to the real world. Non-standard encodings associated with new indoor location technologies, social network location schemes, and proprietary design interfaces and encodings for the built environment seriously diminish the possibilities inherent in this next Internet phase.

**Much of the work has been done.**

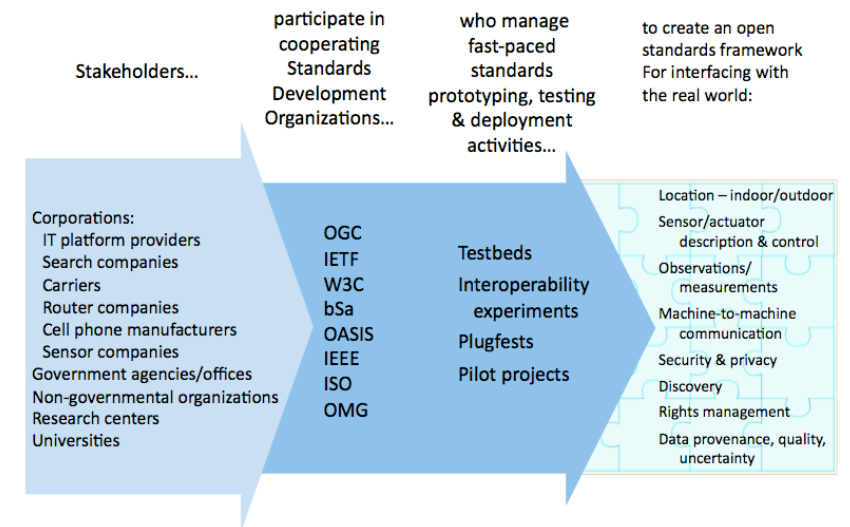
All things exist in space and time. The Internet of Things thus requires a framework of open standards for information exchange and "loose coupling" among dissimilar Internet nodes that may be environment sensors, RFID tracking, smart phone sensors or users reporting location. The Open Geospatial Consortium (OGC), often working with other standards development organizations, has already provided many of the standards that will make up this framework:

- The OGC has developed a comprehensive and widely implemented set of location interface and encoding standards for geographic information systems (GIS), sensors webs, database software, and systems for Earth imaging, navigation and location services. The Google Map/Google Earth API, KML, is now an open OGC standard. A candidate OGC standard, Open GeoSMS, provides a common way of tagging SMS messages with location. A number of wireless infrastructure providers implement the OGC Open Location Services (OpenLS) Interface Standard. City Geography Markup Language (CityGML), an OGC standard for 3D urban modelling, helps make the indoor/outdoor connection.
- The Internet Engineering Task Force (IETF) Presence Information Description Format Location Object extension (PIDF-LO) specifies how to encode both the existence of a device on a network and the device's location information for emergency response purposes. A lightweight profile of the OGC Geography Markup Language (GML) is the mandatory location format for PIDF implementations supporting the "GeoPRIV" (privacy) element of PIDF-LO. A related draft DHCP document describes how Internet devices would opt to provide a GML-encoded location during the DHCP handshake that gives the device its IP address.
- The World Wide Web Consortium (W3C) is defining "Points of Interest" (POIs) and a geolocation specification.

- The buildingSmart alliance is working with the OGC on BIM standards to bring AEC information to broader application.
- IEEE "smart sensor" standards work with OGC Sensor Web Enablement standards.
- Standards from OASIS, IEEE, OGC and many other organizations form parts of the US National Institute of Standards and Technology (NIST) Smart Grid framework.

All of these standards give shape to the Internet of Things, but more work remains.

**What to do next**



The OGC has alliance partnerships with all of the standards organizations mentioned above and with the Open Standards Consortium for Real Estate (OSCRE), the Open Mobile Alliance (OMA), the Web3D Consortium and other industry organizations. To advance a comprehensive framework of standards for the future Internet, the OGC seeks to explore new projects with these organizations and with companies and agencies interested in building this critical standards infrastructure.

The OGC Interoperability Program runs rapid prototyping activities –