



NIST



Sensor Standards Harmonization

Kang Lee

**Manufacturing Engineering Laboratory
National Institute of Standards and Technology
United States Department of Commerce**



NIST



National Institute of Standards and Technology (NIST)

Mission: Develop and promote measurement, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life.



Gaithersburg, Maryland

Boulder, Colorado



NIST



Why Sensor Standards Harmonization?

- Many existing standards, emerging standards, or standards being developed in the sensor areas have some degrees of overlapping, similarities, and differences.
- These standards are designed to serve their perspective users.
- If sensor data or information are to be exchanged among different users. The best way to accommodate this situation is to harmonize these standards to achieve the highest degree of interoperability.



NIST



Standards Activities for CBRN Sensors

	DoD	DHS	IEEE	OASIS	OGC
POC Activity	JPEO-CBD	Standards Portfolio S&T Directorate	Sensor Interface Standards	Emergency Interoperability Consortium	Sensor Web Enablement
	Prof. Tom Johnson, NPS	Dr. Bert Coursey, DHS S&T	Mr. Kang Lee, NIST	Ms. Elysa Jones, OASIS	Mr. Sam Bacharach, OGC
Standards	JPM-IS Data CBRN Common Data Model NATO NBC Standards (Allied Tactical Publication 45B) STANAG 5523	ANSI N42.32 ANSI N42.33 ANSI N42.34 ANSI N42.35 ANSI N42.38 ANSI N42.42 ASTM E54 AOAC International	IEEE 1451.0 IEEE 1451.1 IEEE 1451.2 IEEE 1451.3 IEEE 1451.4 IEEE 1451.5 IEEE 1451.6	Common Alerting Protocol Emergency Data Exchange Language	Sensor Observation Services Sensor Planning Service Sensor Alerting Service Geospatial Markup Language Web Feature Services

There are on-going and, in some cases, overlapping efforts to develop CBRN standards within industrial, federal, and international standards organizations. ORNL has invested a significant amount of R&D into implementing, testing, de-conflicting, and harmonizing these efforts to establish an overarching set of working interoperability standards to connect CBRN sensors, detectors, and data to emergency response, homeland security, and defense applications.

Courtesy of ORNL



NIST

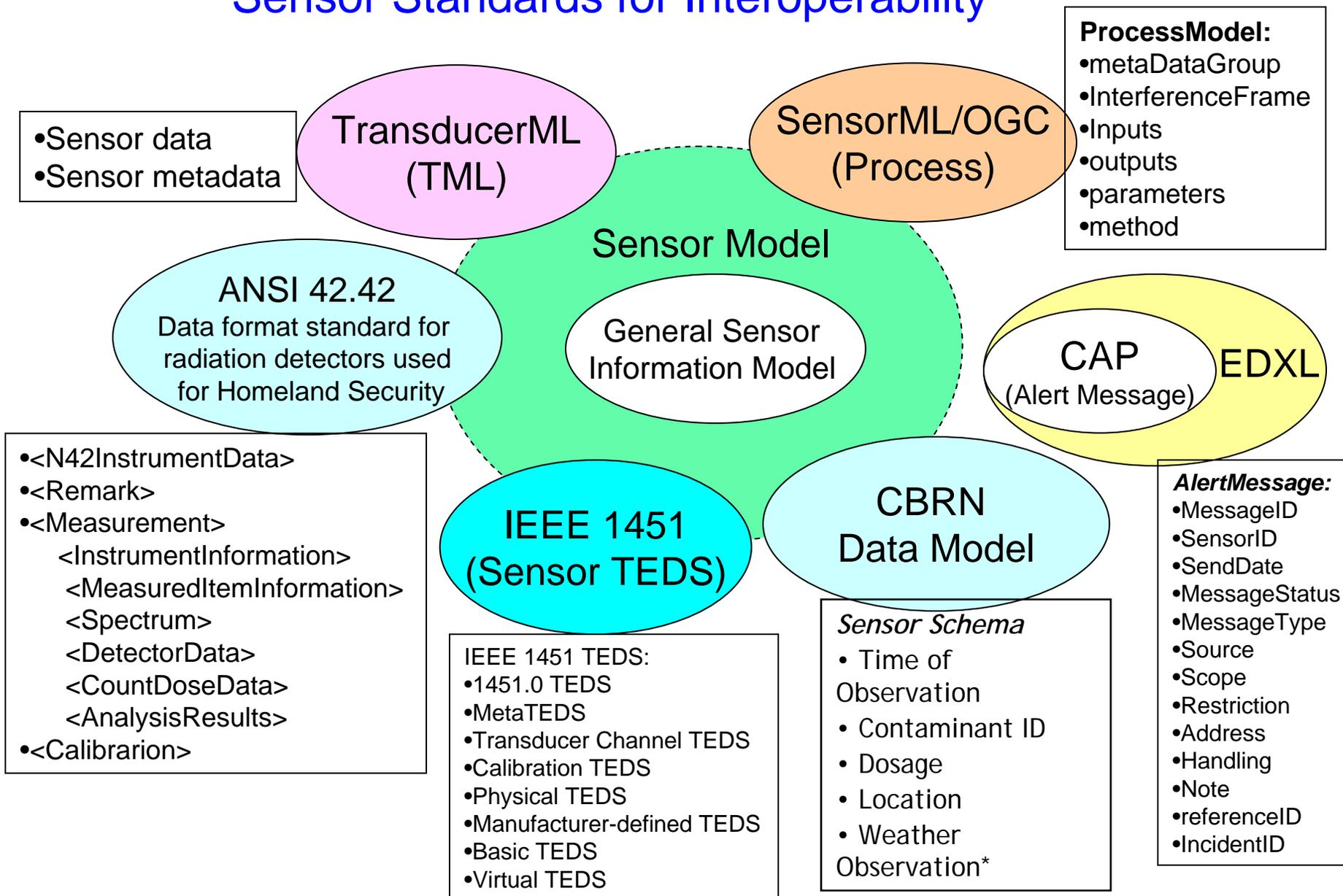


		Developing	Emerging	Mature
Application Interfaces	JAVA			
	.NET			
Web Services for CBRN Networks	Sensor Observation Services			
	Sensor Planning Service			
	Sensor Alerting Service			
	Security Assertion Markup Language			
	WS-Security			
	WS-Policy			
	BPEL			
	JEP-0060 (Pub-Sub)			
	Web Feature Services			
Transport Protocols for CBRN Data	SOAP			
	RSS (CAP over RSS)			
	HTTP (XML and HTML over HTTP)			
	JEP-0127 (CAP over XMPP)			
	SNMP			
	SMTP			
	SMS			
Data Formats and Schema for CBRN Sensors and Alerts	IEEE 1451 Transducer Electronic Data Sheets (TEDS)			
	ANSI 42.42			
	OASIS Common Alerting Protocol			
	OGC SensorML			
	TransducerML			
	DOD Data-model for CBRN			
	Geospatial Markup Language			
EIC EDXL				
Physical Network Interfaces for CBRN Equipment	IEEE 1451			
	USB			
	RS-232			
	IEEE 802.3			
	IEEE 802.11			
	IEEE 802.15.4 (ZigBee)			
	SAFECOM (APCO P.25)			
Methodologies and Performance Standards for CBRNE Sensors and Detectors	ANSI N42.32/33/34/35/38 (Rad)			
	ASTM E54 (Chem)			
	AOAC International (Bio)			
	(DOD/NATO) Allied Tactical Publication 45B			
	NIMS Integration Center			

Courtesy of ORNL



Sensor Standards for Interoperability

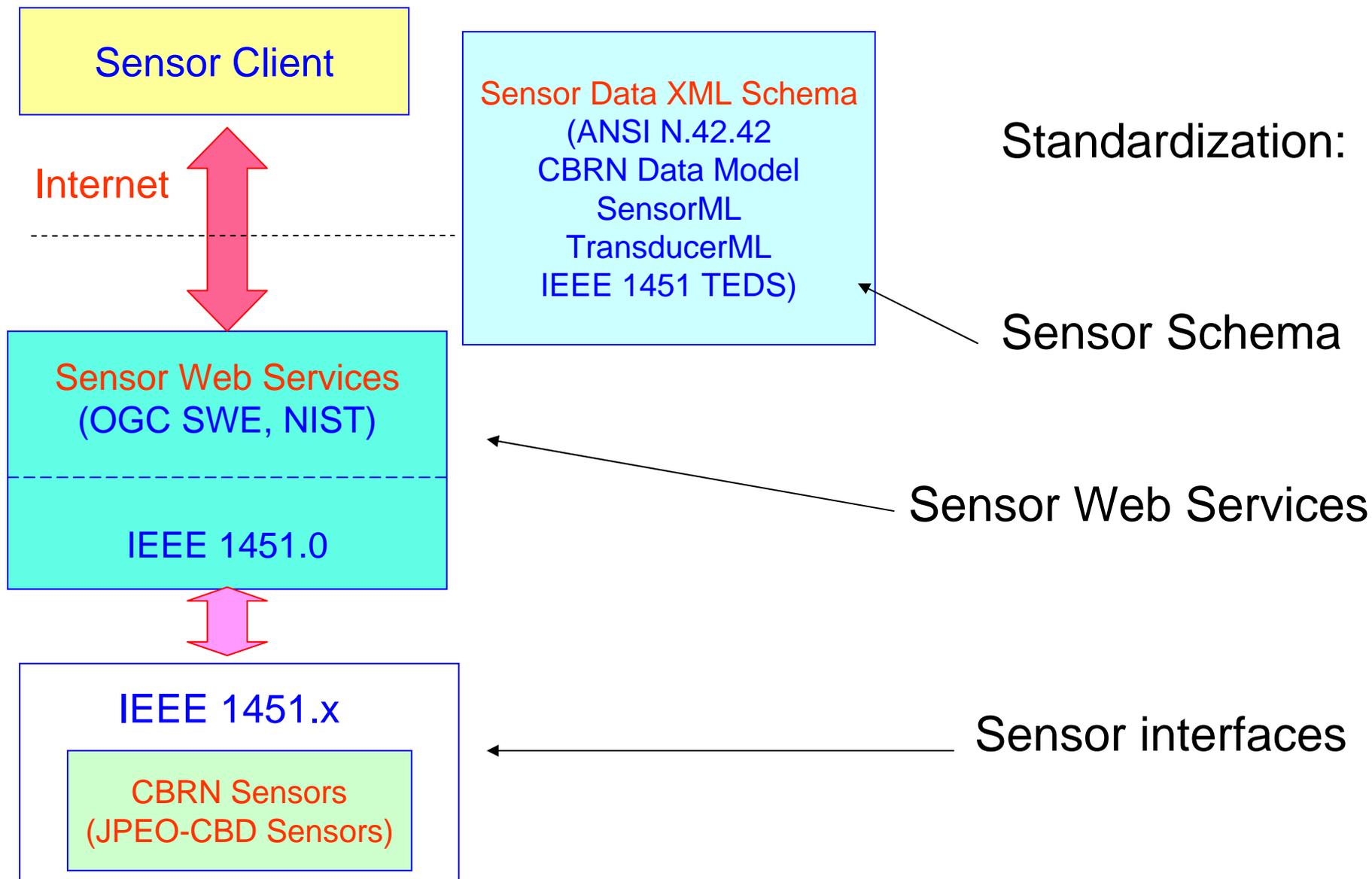




NIST



Harmonization of Sensor Standards





NIST



Results of First Workshop on Sensor Standards Harmonization (1)

- The First Sensor Standards Harmonization Workshop was held on Dec 13, 2005 at NIST.
- The positive feedback about the workshop: “timely”, “wealth of information”
- CBRN Data Model – to create net-ready sensors by developing a common configuration of sensor and sensor data.
- OGC Sensor Web Enablement (SWE), SensorML, TransducerML
 - Some similarity between the CBRN data model and SensorML
- IEEE 1451 Smart Transducer Interface Standards
 - Low level physical sensor interfaces adopted by CBRN and SWE
 - Collaboration with OGC to advance open standards to enable transducer interconnection, discovery, access, integration, and usage within and across systems, networks, and enterprises,
- OASIS EDXL – Emergency Data Exchange Language
- OASIS CAP – Common Alert Protocol
 - Need better understand of the interworking of the two OASIS standards.
- ORNL has developed a SensorNet architecture and implemented SensorNet with IEEE 1451-based sensors and SWE in Fort Bragg, NC. SensorNet is scaleable.



NIST



Results of First Workshop on Sensor Standards Harmonization (2)

- Many of the envisioned sensors are still under development and data requirements will continue to evolve.
- This meeting has provided sponsors and stakeholders detailed understanding of how all the standards efforts fit and work together, where are the inconsistencies, overlap, and relevance to their mission.
- More meetings like this are needed to further the harmonization effort.
- It was unanimous that a Sensor Standards Harmonization Working Group should be formed and NIST should take the lead to hold quarterly working group meeting.
- Kang Lee was asked to chair the working group and coordinate the harmonization effort.
- The next meeting was scheduled to be held on March 14, 2006 at NIST.