ITU Regional Workshop on "Prospects of Smart Water Management (SWM) in Arab Region"
Khartoum-Sudan, 12 December 2017

Standards for SWM integration

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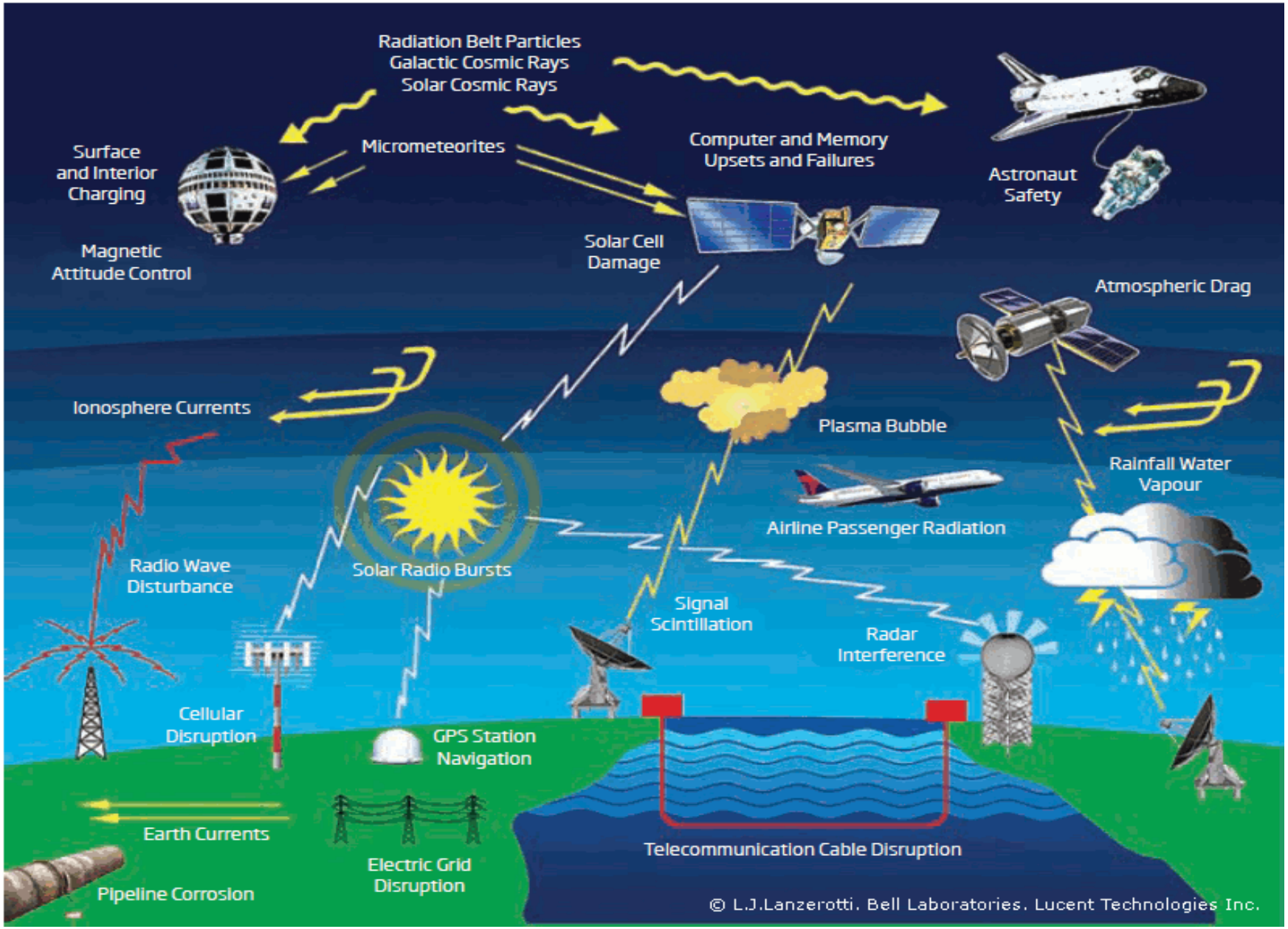
The standardization work carried out by **ITU–R study groups,** have played a key role in the development and utilization of different systems such as:

- **Weather satellites** that can track the progress of natural phenomena such as hurricanes and typhoons;
- **Radar systems** for tracking weather systems such as tornadoes, thunderstorms, and other disasters such as volcanoes and forest fires;
- **Radio-based meteorological** aid systems that collect and process weather data; and Various **radio communication** systems (satellite and terrestrial) that can be used in emergency situations to communicate information concerning different natural and man-made disasters.


Radiation Belt Particles
Galactic Cosmic Rays
Solar Cosmic Rays
Micrometeorites
Surface and Interior Charging
Magnetic Attitude Control
Computer and Memory Upsets and Failures
Solar Cell Damage
Astronaut Safety
Atmospheric Drag
Ionosphere Currents
Plasma Bubble
Rainfall Water Vapour
Airline Passenger Radiation
Radio Wave Disturbance
Solar Radio Bursts
Signal Scintillation
Radar Interference
Cellular Disruption
GPS Station Navigation
Earth Currents
Electric Grid Disruption
Telecommunication Cable Disruption
Pipeline Corrosion
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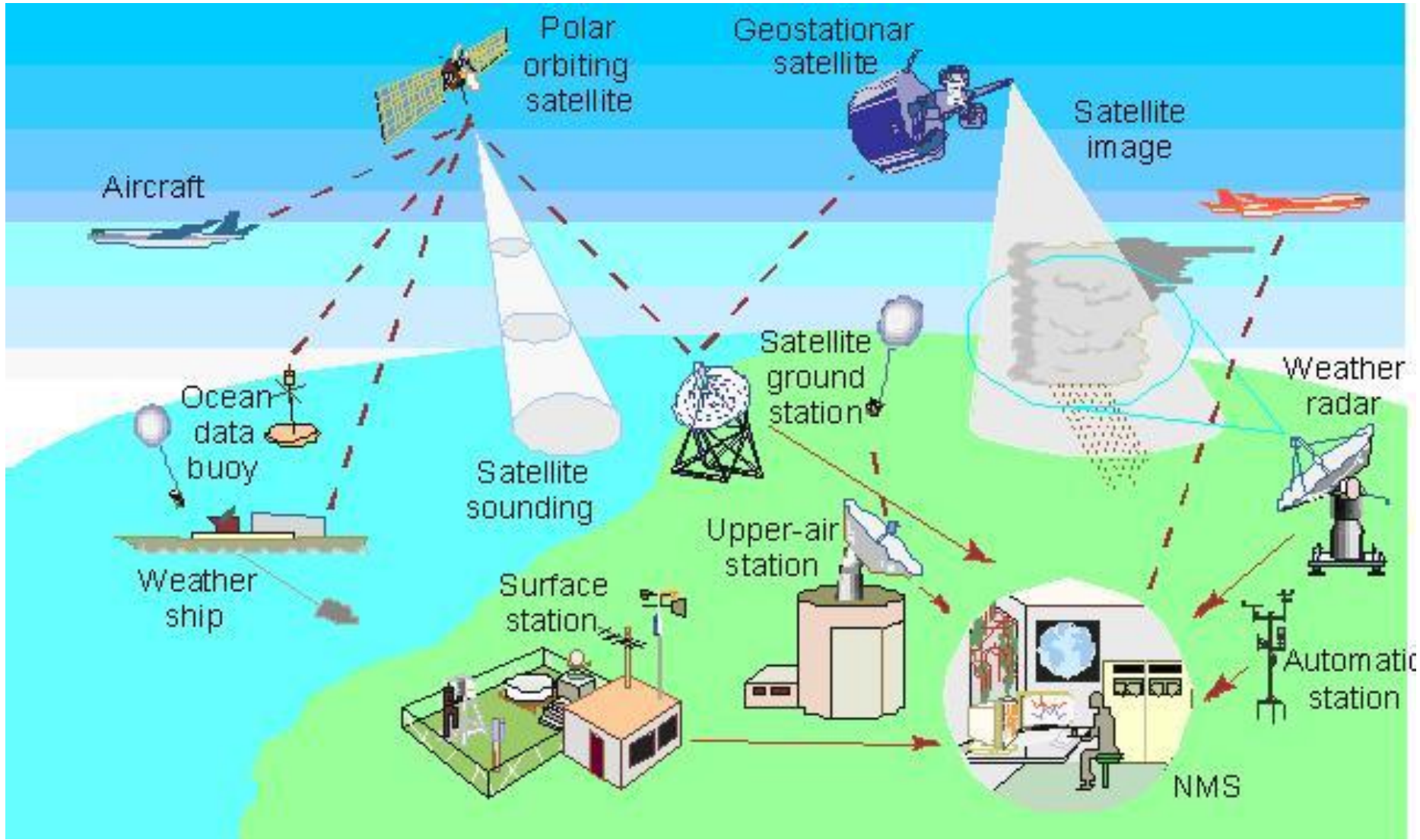
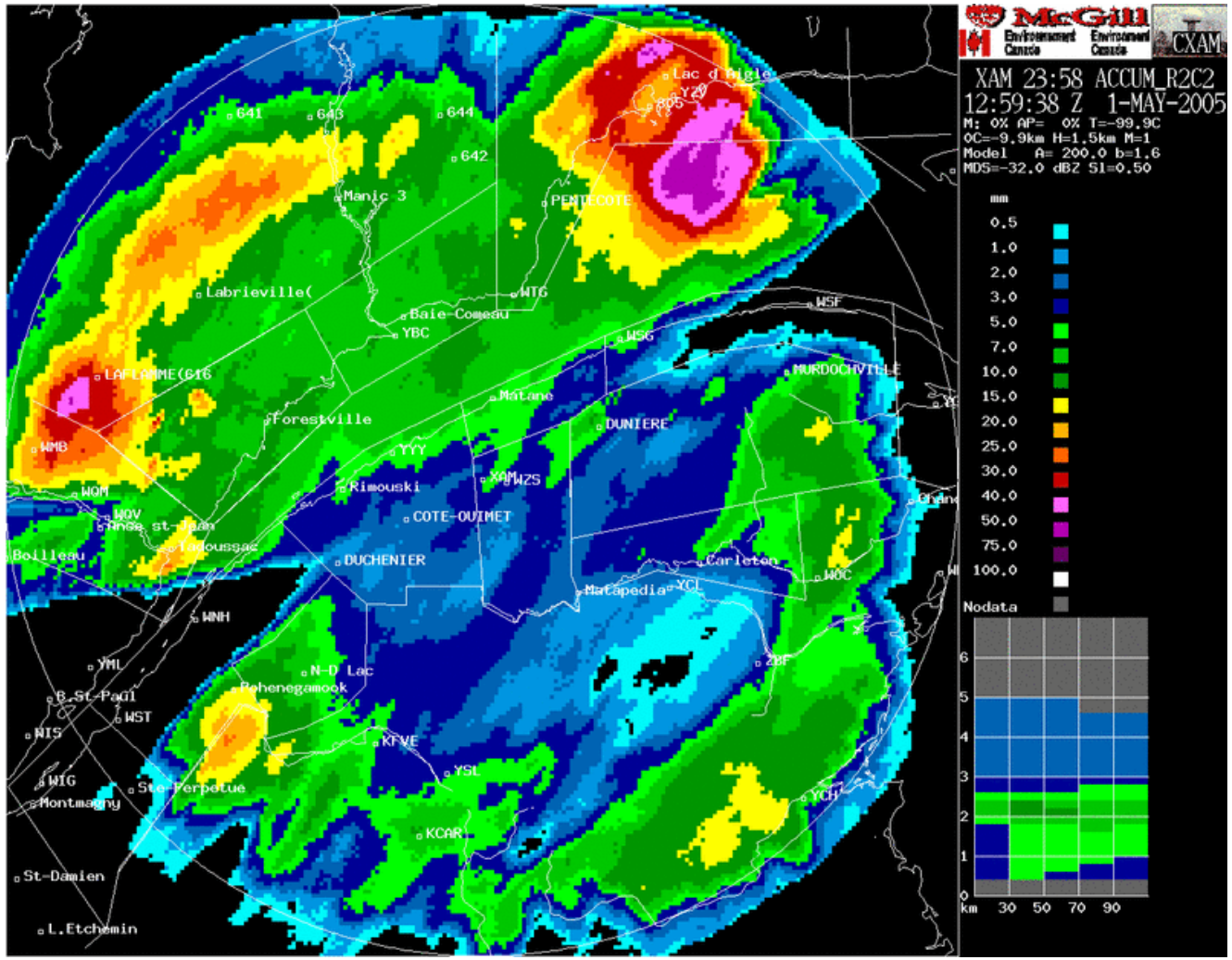
Weather satellites



Radar systems for tracking weather systems



tornadoes, thunderstorms

Radio communications

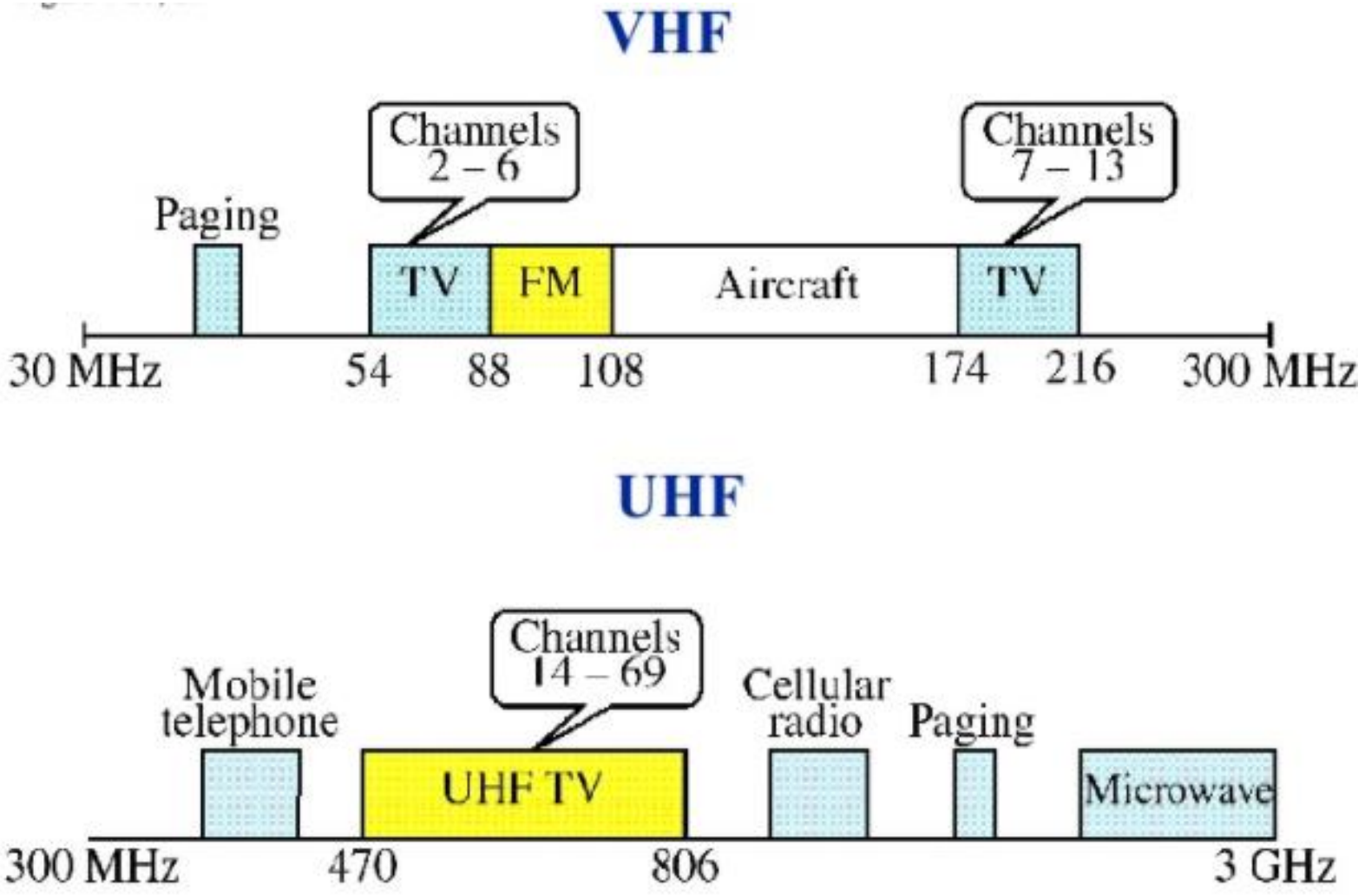
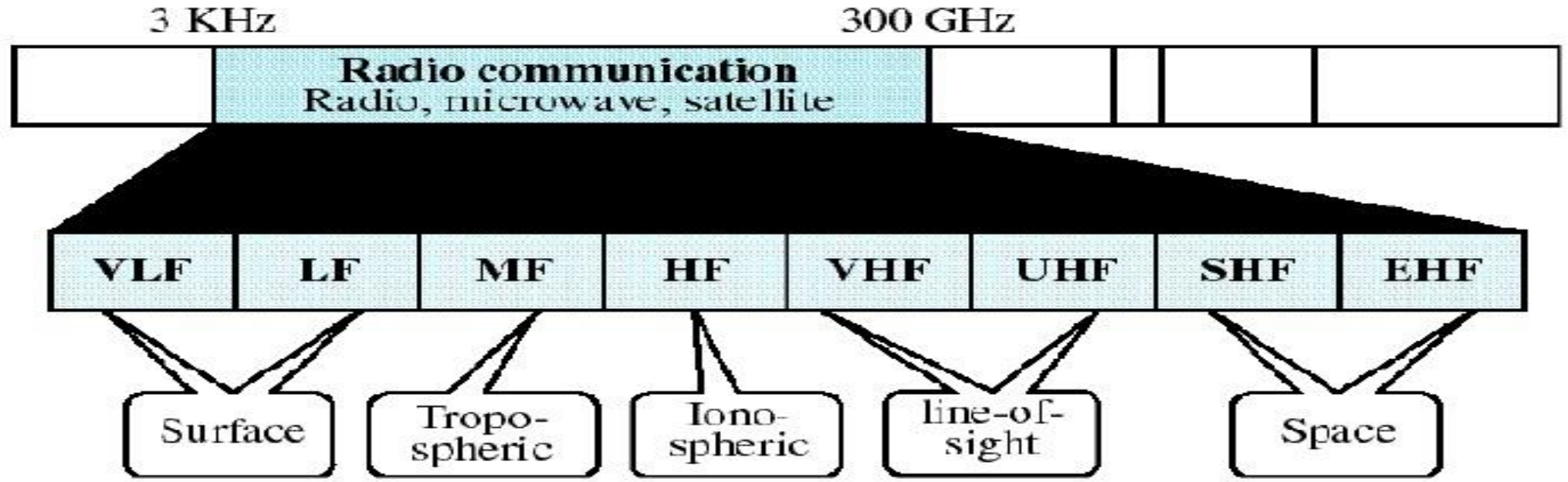


Figure 7-21

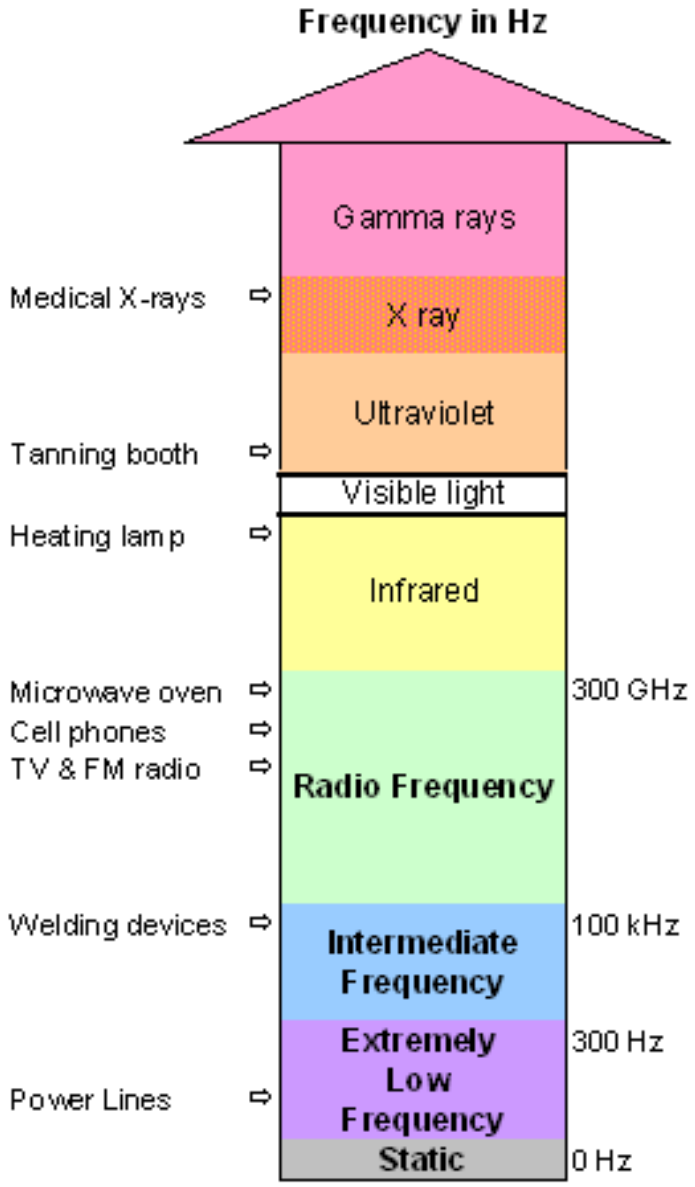
Radio Communication Band

VLF	Very low frequency	VHF	Very high frequency
LF	Low frequency	UHF	Ultra high frequency
MF	Middle frequency	SHF	Super high frequency
HF	High frequency	EHF	Extremely high frequency



WCB/McGraw-Hill

The radiofrequency spectrum is a critical resource for remote sensing used by the **Global Observing System** GOS, additional spectrum was allocated to radiocommunication services involved in environmental observation



Use of Radio Spectrum for Meteorology: Weather, Water and Climate Monitoring and Prediction

Use of Radio Spectrum for Meteorology: Weather, Water and Climate Monitoring and Prediction

Availability September 2017

2017 Publication Notice with Order Form

Timely warning of natural and environmental disasters and accurate climate prediction, in addition to understanding, conservation and efficient management of scarce resources such as biomass, biosphere, mineral resources, water and energy are essential requirements for sustainable economic development. Information about climate, climate change, weather, cryosphere, precipitation, pollution and disasters is a critically important everyday issue for the global community. Radio systems are fundamental to monitoring the climate and to helping countries mitigate and adapt to the effects of climate change, and to address its major challenges. This Handbook provides an overview of the use of radiocommunication systems to monitor the various manifestations of climate change and their impact, as well as the application of ICTs and radiocommunication as a means to reduce global energy

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PUBLICATIONS BY SECTOR

Standards for smart water initiatives

- *Weather Forecasting and Climate Monitoring*
- *Emergency Communications*
- *Consumer Interface for Smart Grids*
- *Smart Metering*
- *GIS Standards*
- *Semantic Sensor Web*
- *Water Mark Up Language (ML) 2.0 Standard and Water Data Transfer Format Standard*

1. Weather Forecasting and Climate Monitoring

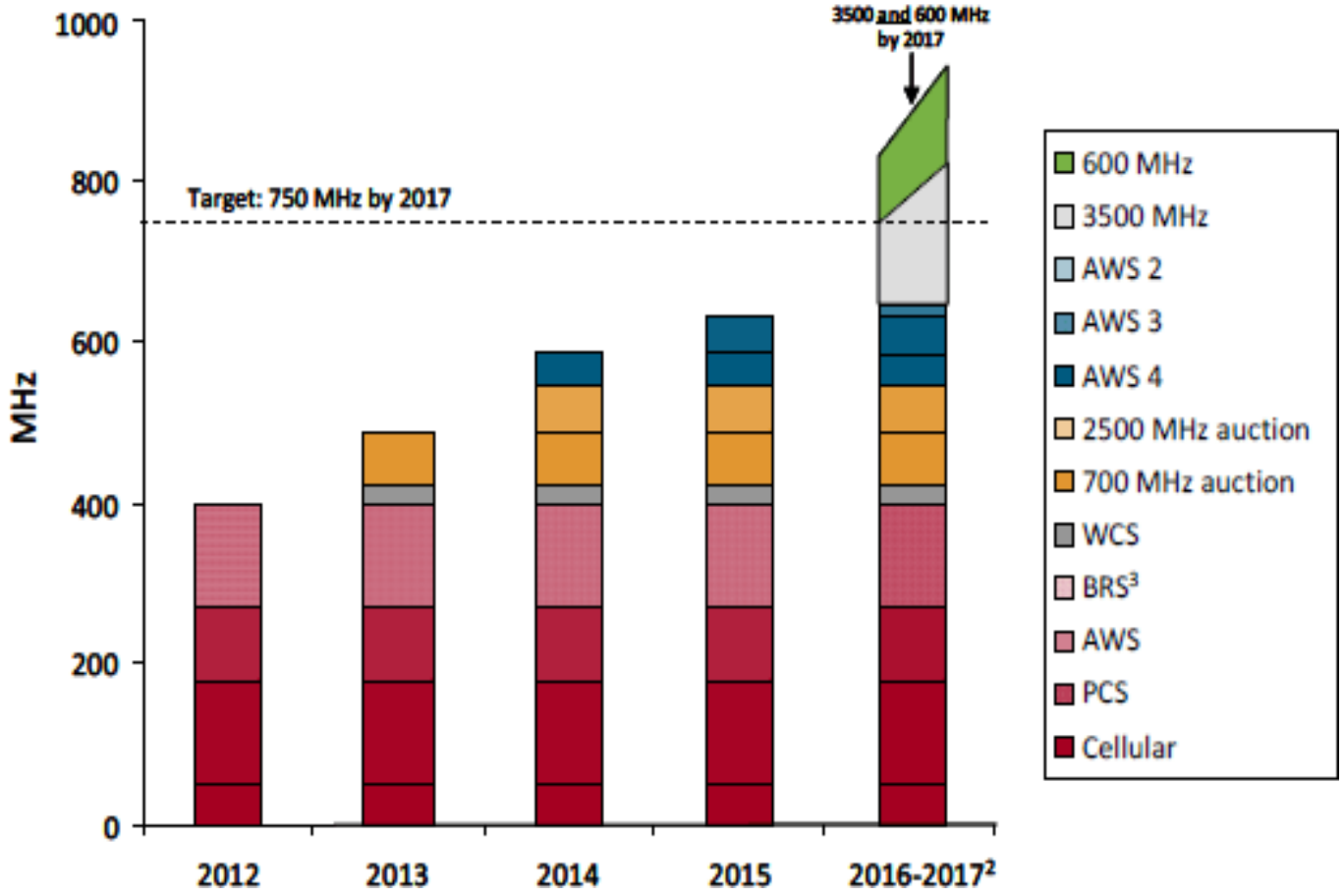
ITUWTDC BUENOS AIRES 2017 9-20 October

Based on the use of satellite and ground-based remote sensors (active and passive) employed by the meteorological satellite, Earth-exploration satellite and meteorological aids radio communication services

CELEBRATING 25 YEARS OF ACHIEVEMENTS ITU-D 1992 2017

1. Weather Forecasting and Climate Monitoring

It is essential that these services have sufficient spectrum and that the frequencies allocated to them remain free of interference.



2. Emergency Communications

Bags

2. Emergency Communications

ITU approves international standards for development and

operation of emergency telecommunication systems, provides guidelines (e.g. Handbook on Emergency

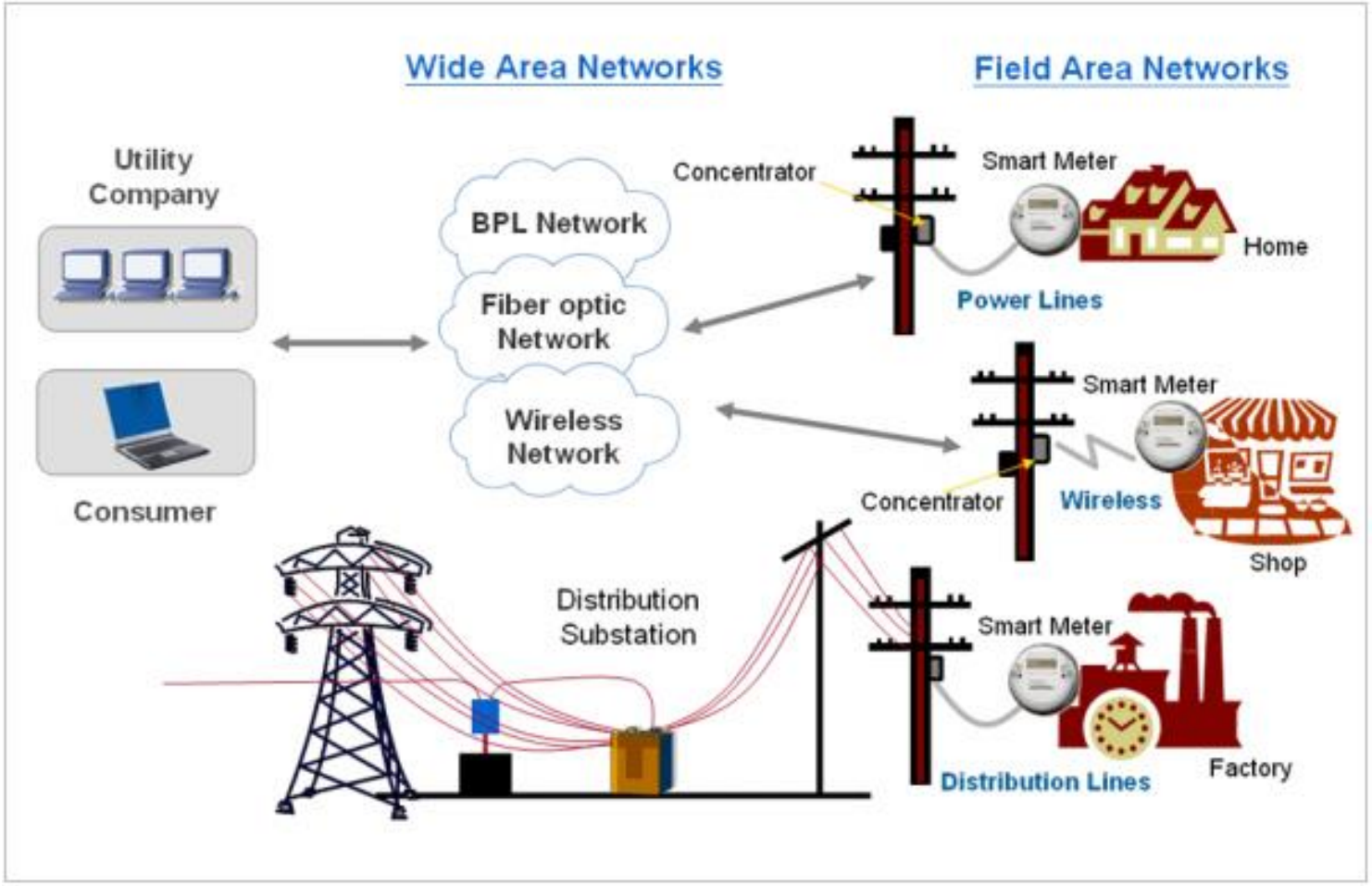
Telecommunications

http://www.itu.int/publ/D-HDB-HET-2004/en
http://www.itu.int/emergencytelecoms/index.html

3. Consumer Interface for Smart Grids

ITUWTDC BUENOS AIRES 2017 9-20 October

At the level of ITU's Telecommunication Standardization Sector (ITU-T), Study Group 15 has developed home networking specifications under the ITU-T G.hnem banner for smart grid products. G.hnem is the new project "Home Networking Aspects of Energy Management"



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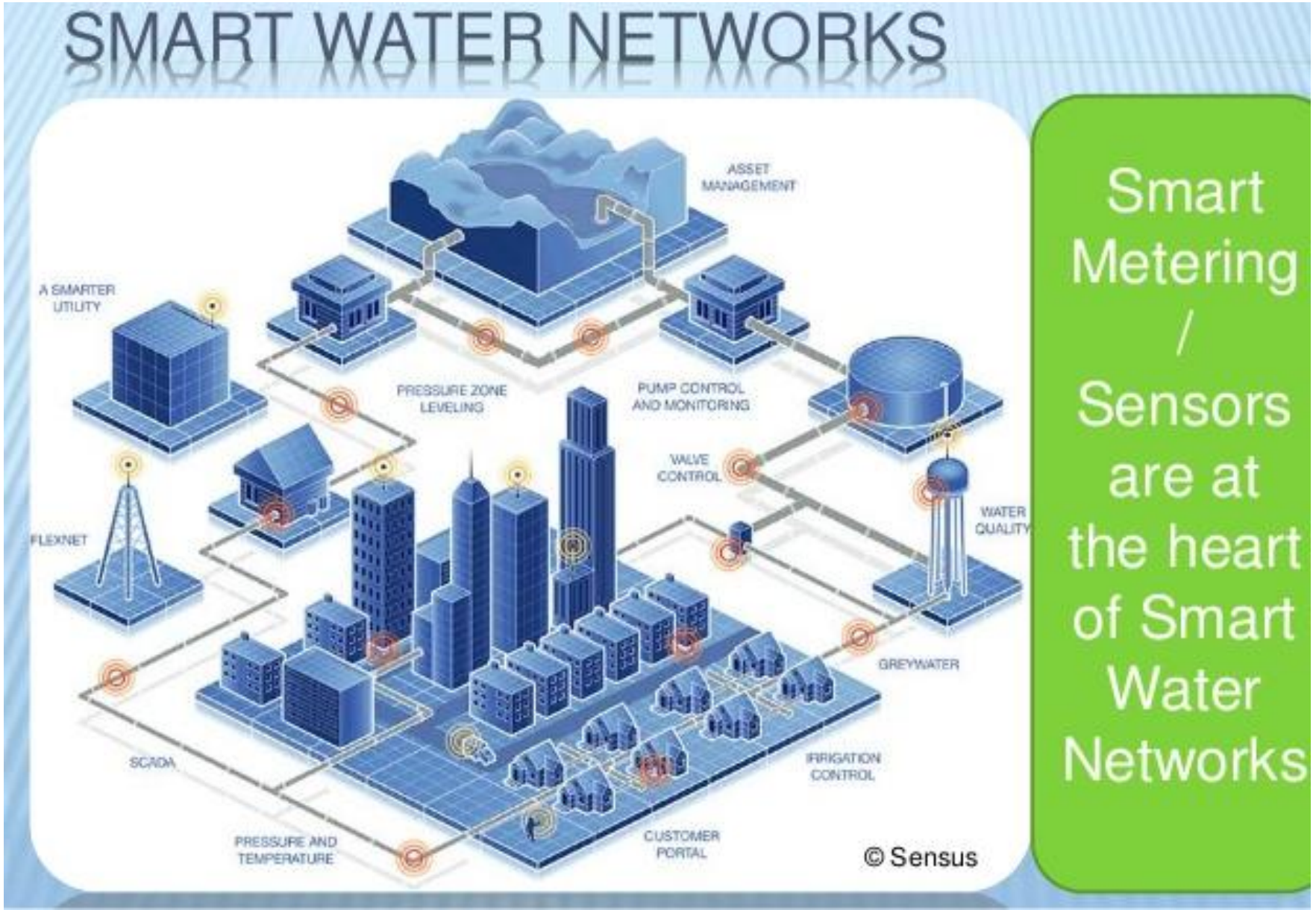
4. Smart Metering



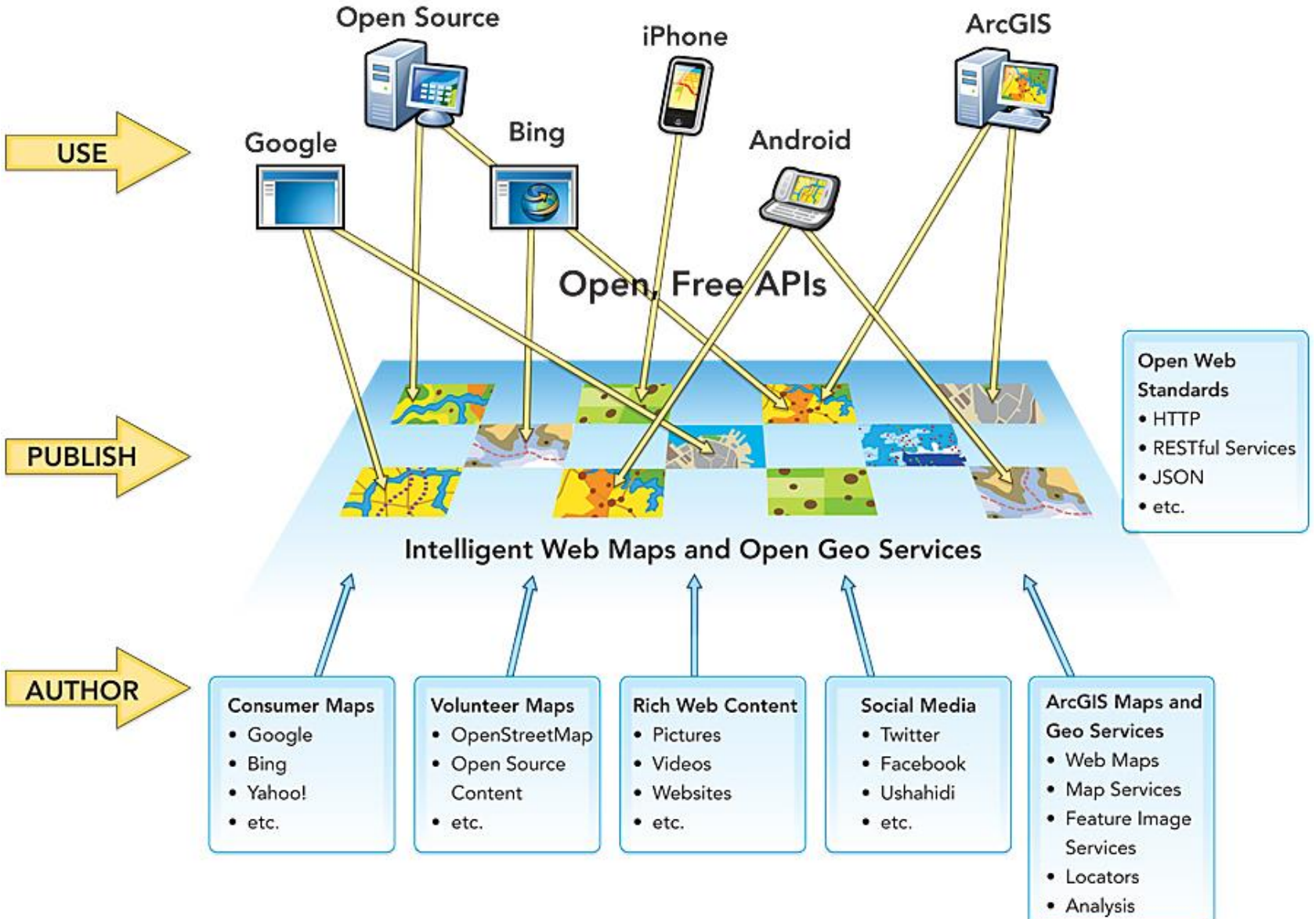
Smart Metering / Sensors are at the heart of Smart Water Networks

4. Smart Metering

[artists impression]

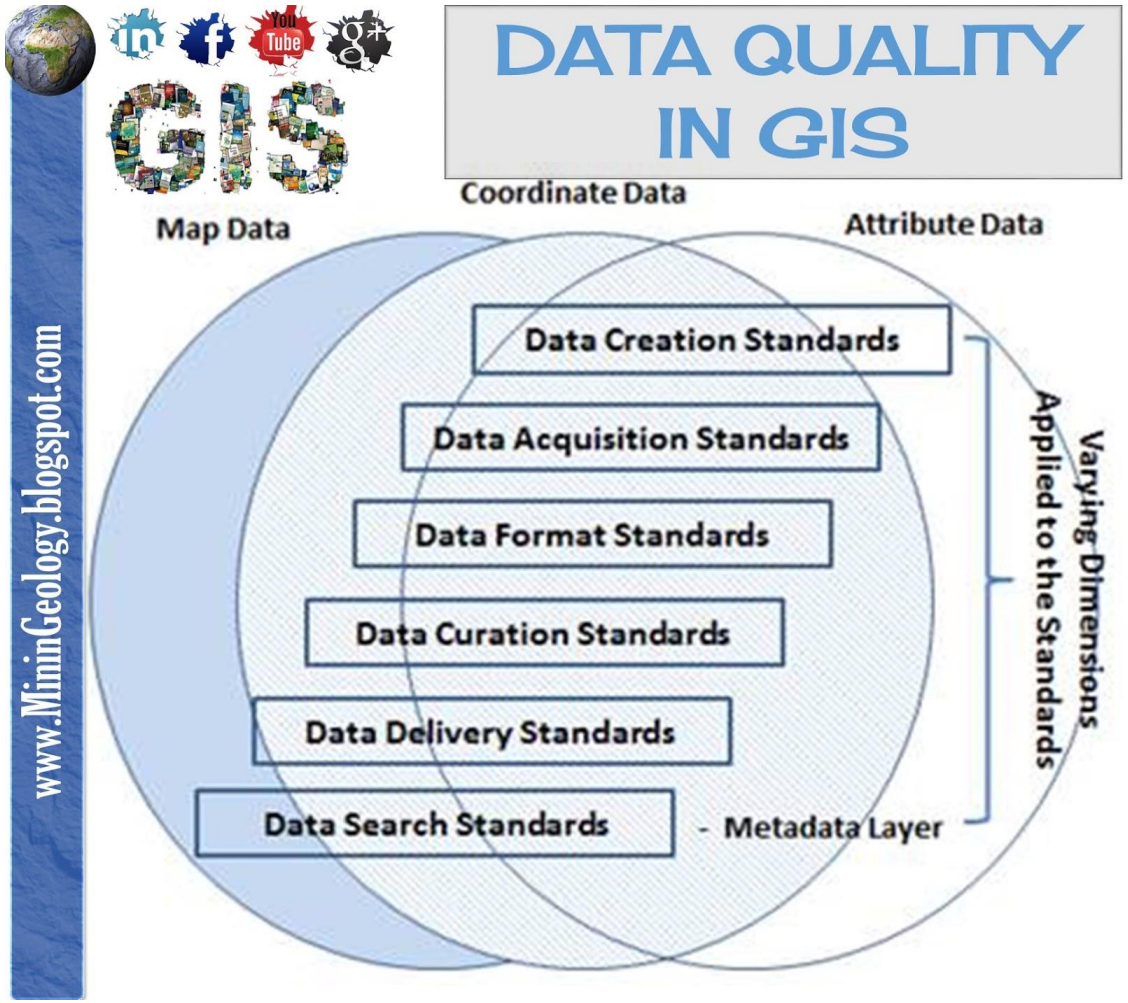
http://www.figawa.de/,
http://www.knx.org,
http://www.zvei.org/en/homepage/

5. GIS Standards



GIS Standards support interoperable solutions that "geo-enable" the Web, wireless and location-based services, and mainstream IT.

5. GIS Standards



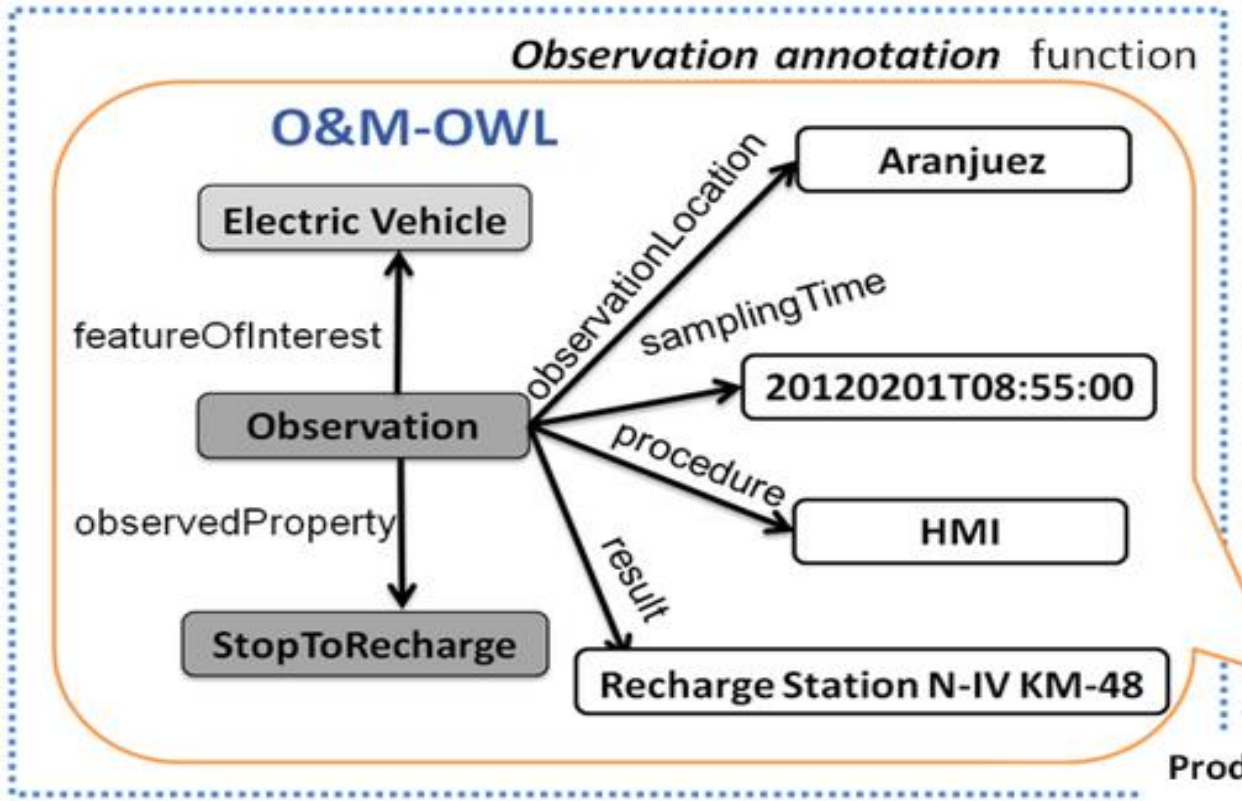
These standards enable developers to make geospatial information and services- The concept for collection, information extraction, storage, dissemination, and exploitation of geodetic, geomagnetic, imagery (both commercial and national source), gravimetric, aeronautical, topographic, hydrographic, littoral, cultural, and toponymic data accurately referenced to a accessible and useful with any application that needs to be geospatially enabled

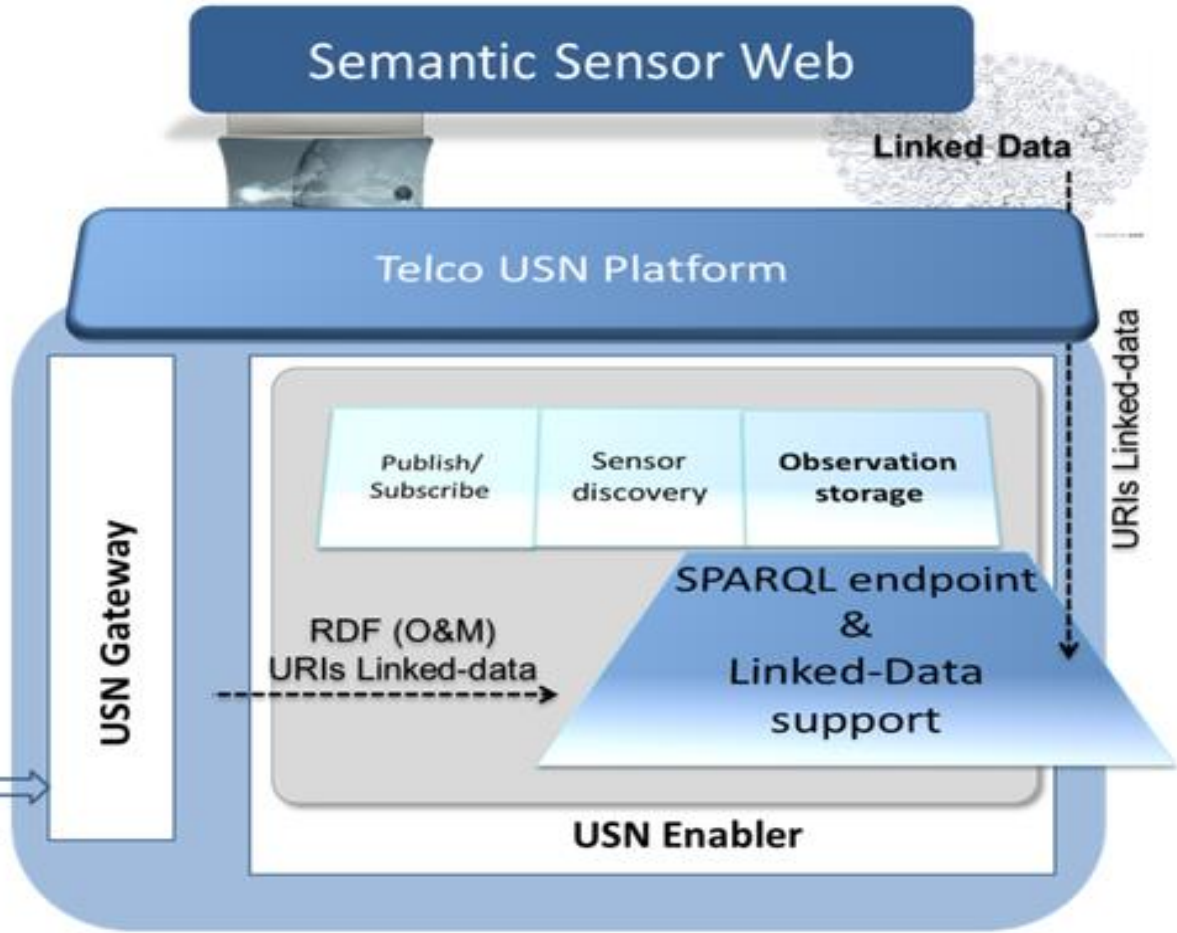
http://www.opengeospatial.org/
http://www.opengeospatial.org/standards/gmljp2

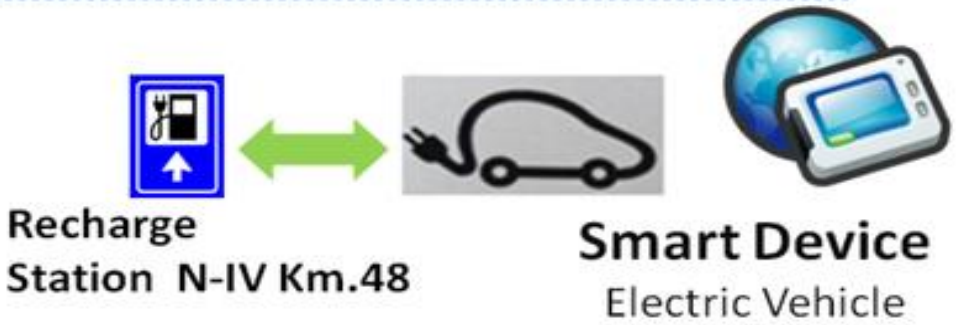
6. Semantic Sensor Web

Open Geospatial Consortium (OGC) recently established Sensor Web Enablement (SWE) by developing a number of specifications related to sensors, sensor data models, and sensor Web services that will enable sensors to be accessible and controllable via the Web

Observations and Measurements (**O&M**)







Ubiquitous Sensor Network

7. Water Mark Up Language (ML) 2.0 Standard

- The OGC hydrology domain working group is currently looking into developing a new specification referred to as Water ML 2.0 as an international standard that can be used worldwide for data transfer concerning information and observations related to water.
- Water ML 2.0 will be an XML schema for time series observations, at specific locations, about climate, river flow and water quality amongst others to streamline data collection and reporting worldwide.
- Water ML 2.0 will incorporate the semantic web enablement and GML standards of OGC.
- Water ML 2.0 will provide a standard encoding for data transfer to support the input and update of data into databases, standard data delivery interfaces from databases and applications and the development of applications with a standard data import/export mechanism.

7. Water Data Transfer Format Standard

- ✓ The Water Data Transfer Format (WDTF) Standard project is a key component of the Water Information Research and Development Alliance (WIRADA) in Australia37.
- ✓ This project aims to develop and define data transfer standards and procedures for the Australian Bureau of Meteorology to input from existing water data providers, and subsequently for the Bureau to publish for water data users, including decision makers.
- ✓ WDTF is an interim data encoding standard based on the OGC Observation and Measurements (O&M)
- ✓ standard data encoding and is closely linked to Australian statutory requirements and regulations for exchanging water information.

Water Information Research and Development Alliance 2008–16

The Water Information Research and Development Alliance (WIRADA) is a research partnership between the Bureau of Meteorology and CSIRO. It delivers the innovation required to develop national water information products and tools. WIRADA brings together CSIRO's expertise in water and information sciences and the Bureau's operational role in hydrological analysis and prediction. Together the partners have invested over $65 million in 28 projects to improve Australia's water information. To further build on WIRADA successes, the Research Collaboration Agreement has been extended by the Management Committee for a further year to 30 June 2017.

WIRADA achievements

Key advances have been made that allow the nation to better assess the current state and future availability of our water resources, and to share its water data. Through WIRADA, a broad range of products and services are being developed or supported through new science. These products and services deliver national water information to the public and assist specialist users in policy, planning and water management. WIRADA achievements include:

- over 650 publications including 100 journal articles, 400 conference papers and 150 reports
- new national and international standards and tools to allow water information to be consistently managed, shared and made comparable
- research that has led to operational products and services which provide 'environmental intelligence' on our water resources
- WIRADA Achievements 2008–16

Water Information Research and Development Alliance 2008–16

- WIRADA governance
- Innovation & Projects
- Products and achievements
- Publications

Water Information Products and Tools

- Geofabric
- Seasonal streamflow forecasts
- 7-daystreamflow forecasts
- Landscape Water Balance
- Monthly water update
- Water in Australia
- Water DataOnline
- National Water Account
- WDTF
- WaterML2.0

Conclusion

- The use of sensor networks and Internet communications combined with GIS tools will be having an important role in the future and can be very beneficial to government authorities in not only efficiently managing the water distribution network but also in water quality management, agriculture and landscaping sectors where it can reduce water consumption and wastage.

Conclusion *continue*

- Smart metering technologies will play an important role in measuring water consumption in real time, identifying leaks at the consumer level and at the same time getting consumers more conscious about their water usage.

Conclusion *continue*

The scope of ITU-T Focus Group on Smart Grid could be extended to include water metering technologies in the future. With developments in plug and play sensors, semantic sensor web, the geoweb, geographical 3D modeling and mobile communications, this field has a lot of potential to offer to water authorities for the future and could be new areas of standardization work for ITU-T Study Group 16 in the future in collaboration with other standards bodies such as the OGC, W3C and IEEE.

Thank You