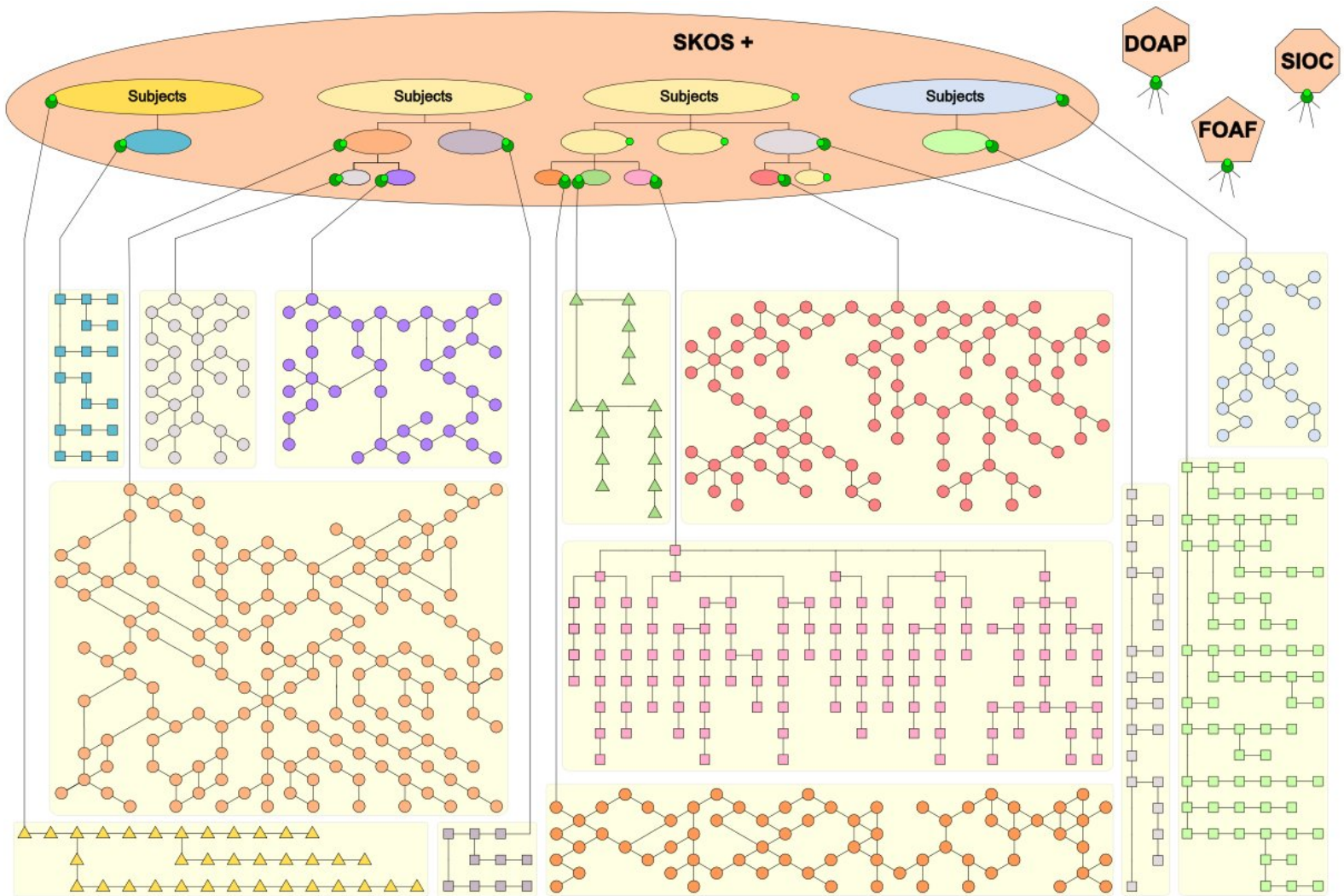
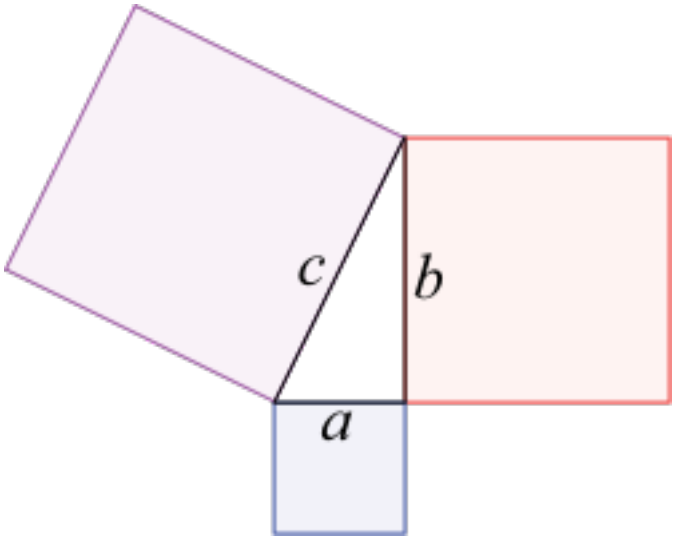
Ontology Across Building, Emergency, and Energy Standards

The problem is adapting to a rapidly changing world that requires efficient communication. Information about the built environment is central to both emergency and energy needs. There will never be a complete coherent model of everything, but a logical framework for a common core can be developed.

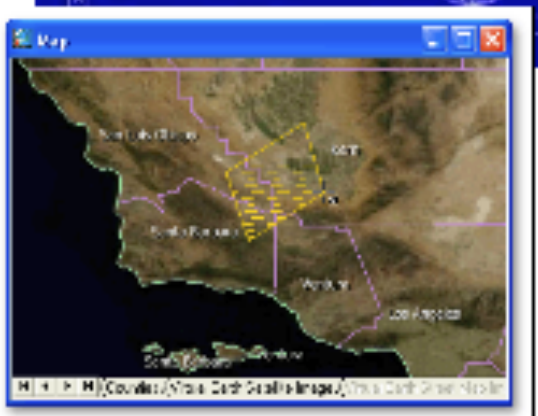


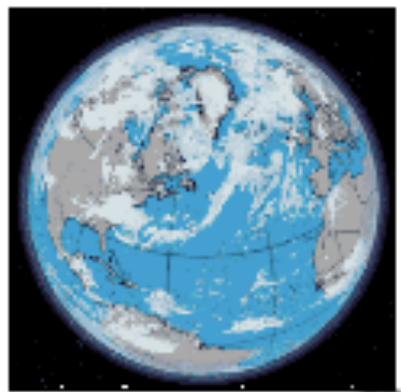
Organizational Structure by Mike Bergman

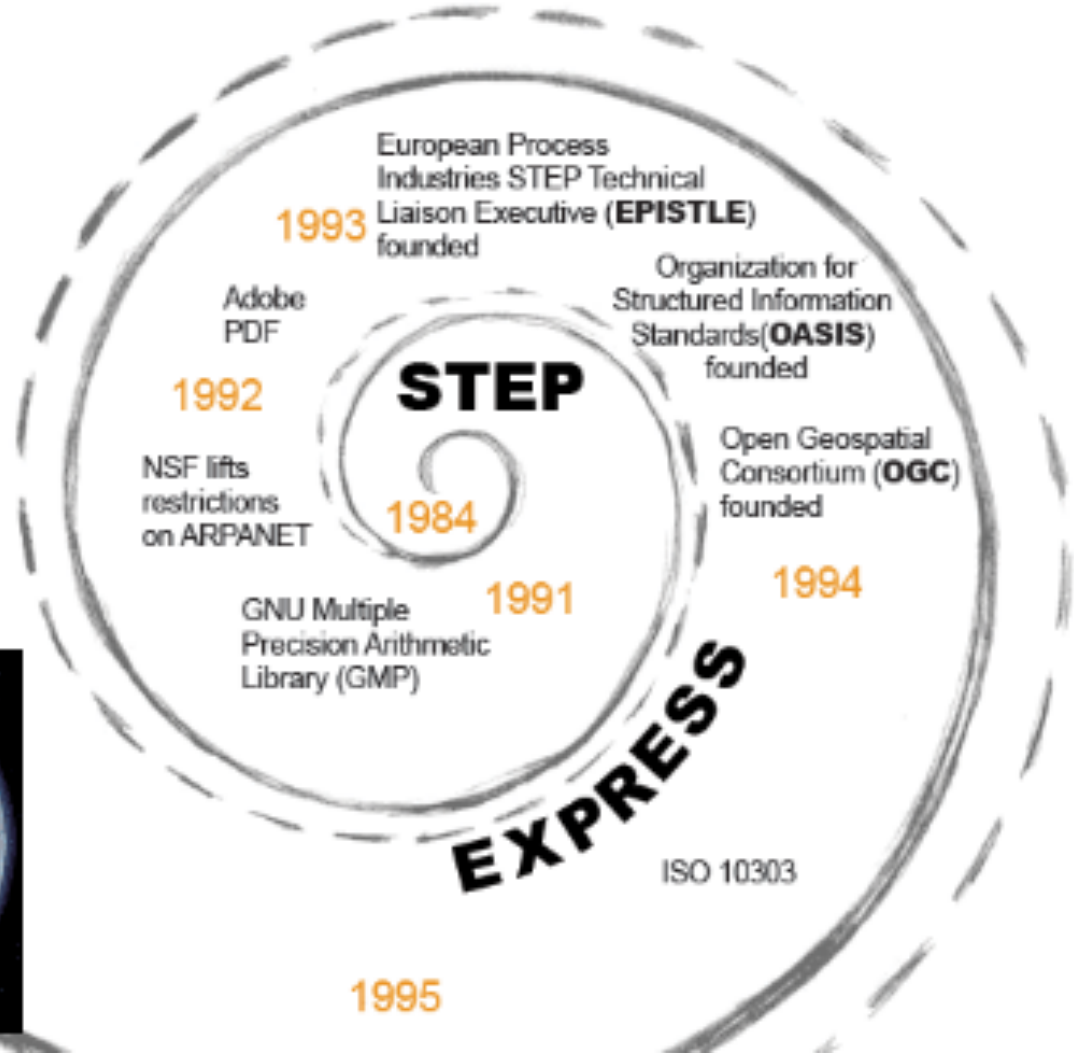


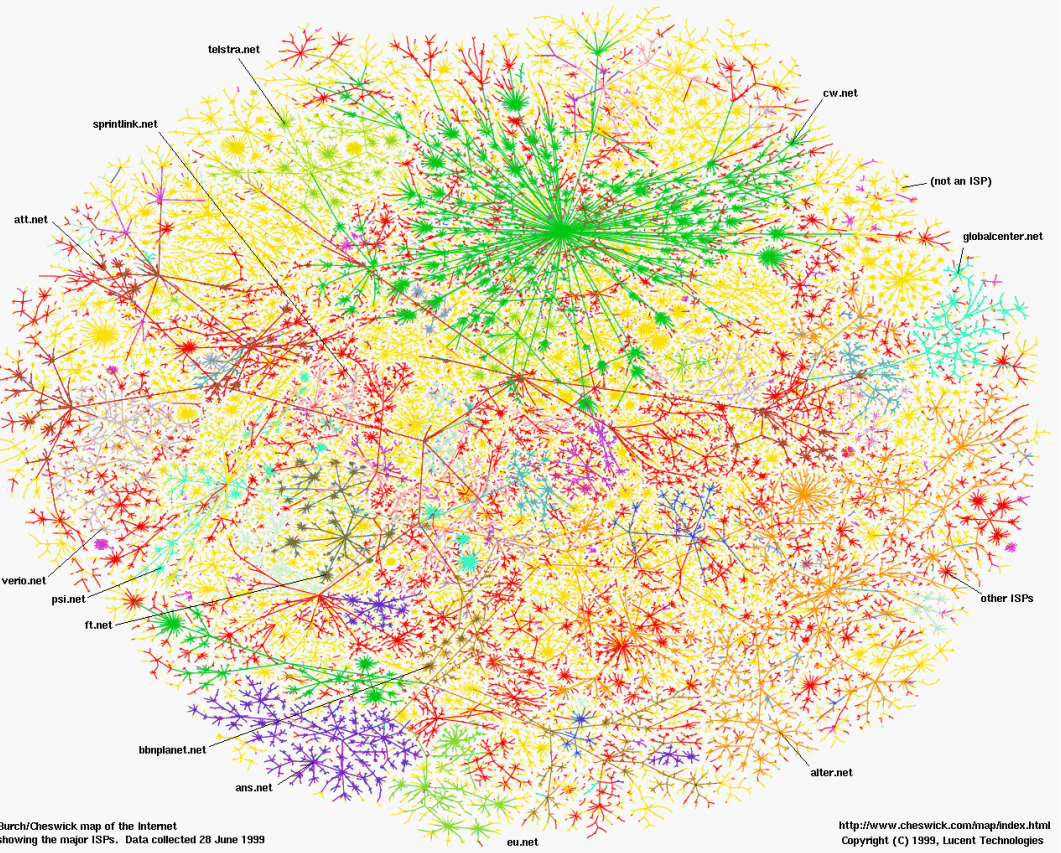
For Ontologies Across Building, Emergency and Energy Standards to work, a number of languages and organizations need to work together as a web service over the internet. Some of those languages and organizations are identified here. The story begins with the development of STEP

The geometry of objects, the geometry of the earth, and the relative locations of objects on the earth all start to become very precise. EPISTLE, OASIS, and OGC are all formed in the same year in response to these new capabilities.

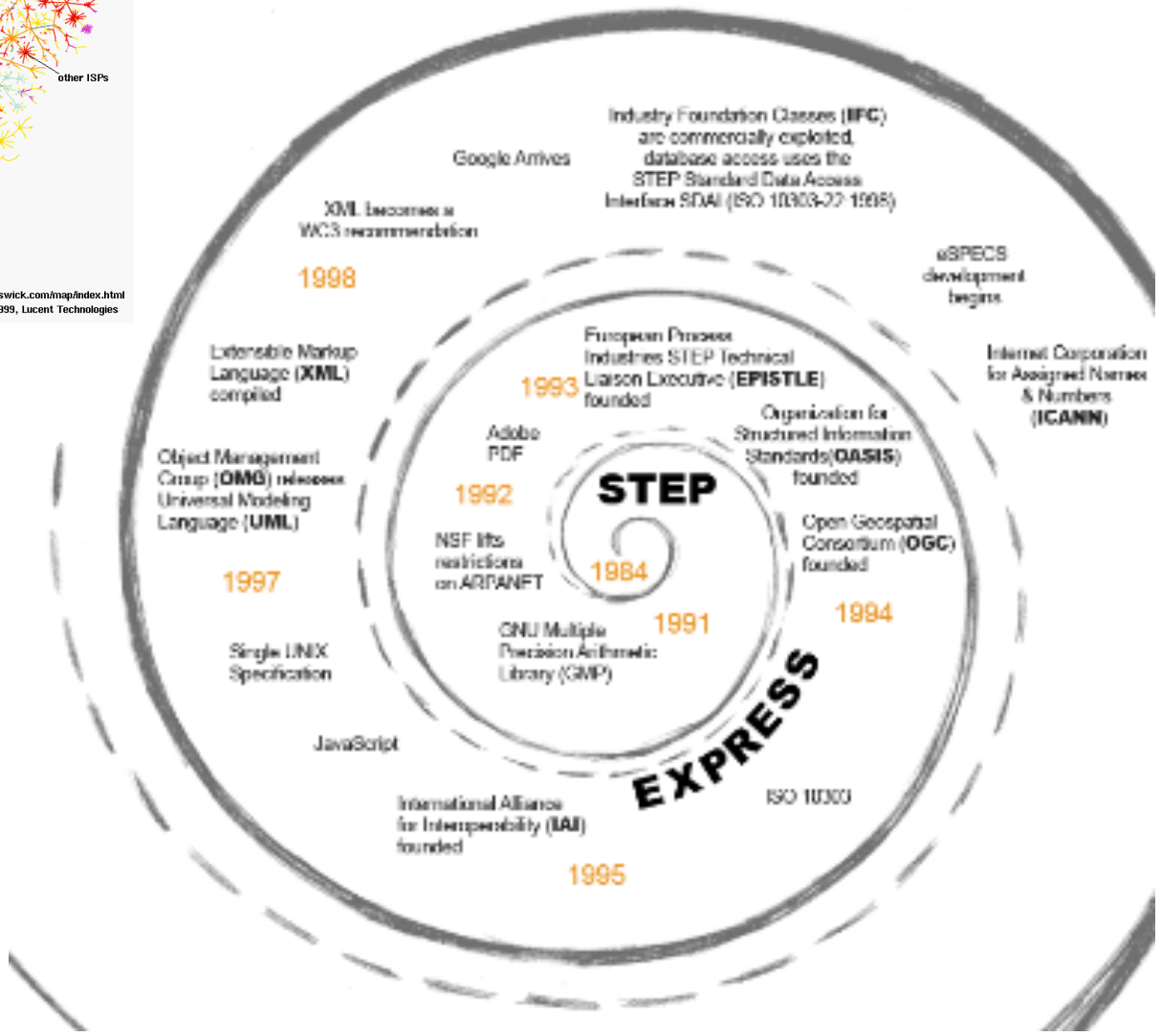








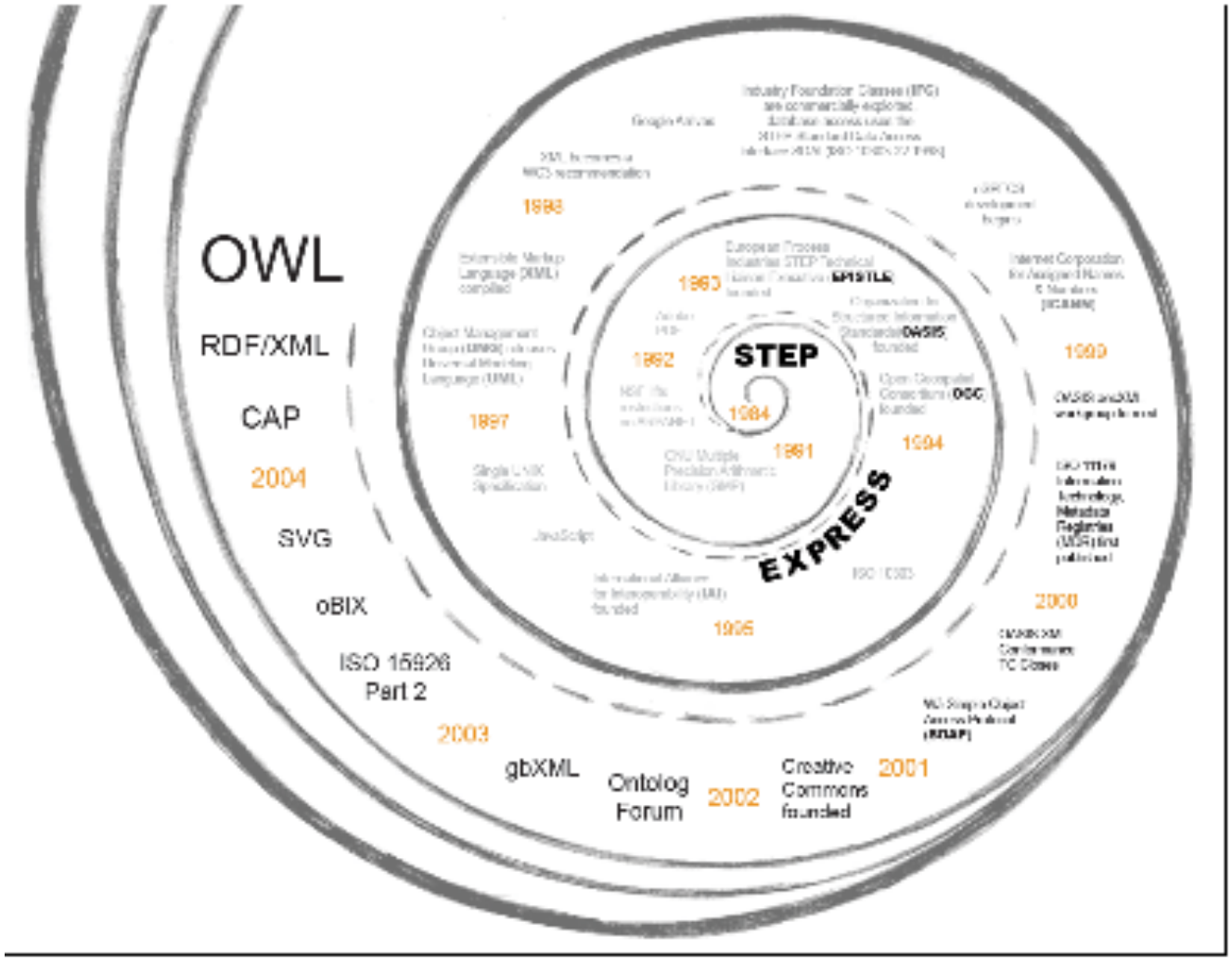
The internet keeps getting bigger. It is becoming more important to know where information belongs in a database or in the world.



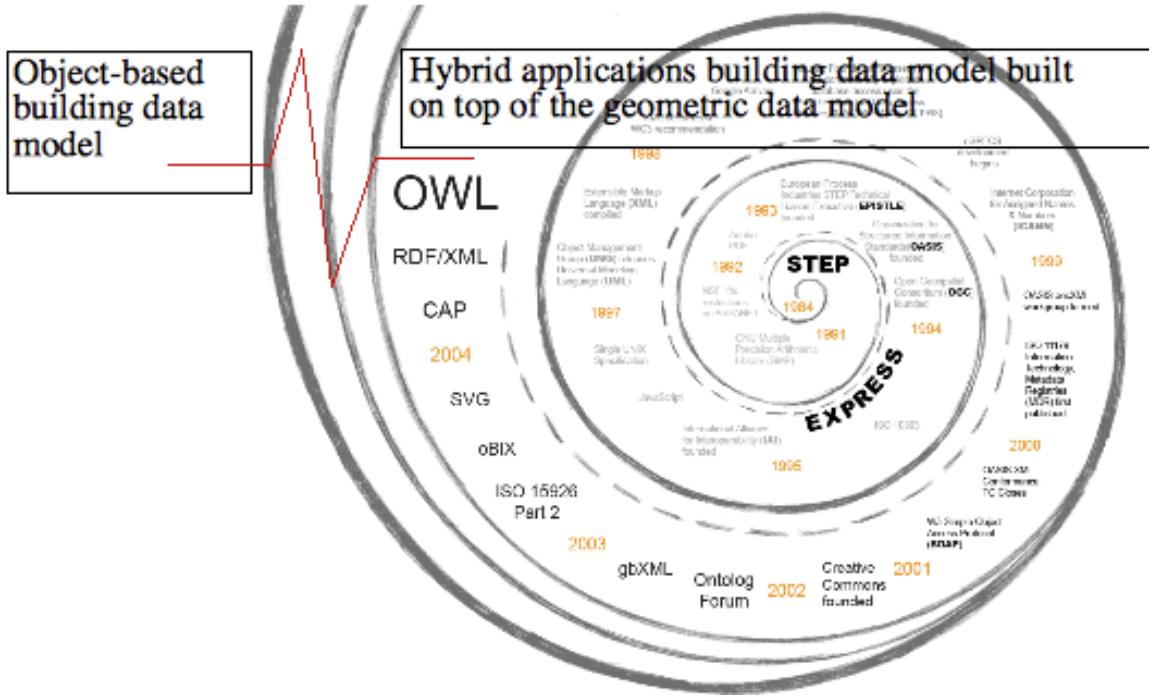
Building Information Modeling vendors are certified to comply with the Industry Foundation Classes. The STEP Standard Data Access Interface enables BIM databases to talk to other databases like never before.

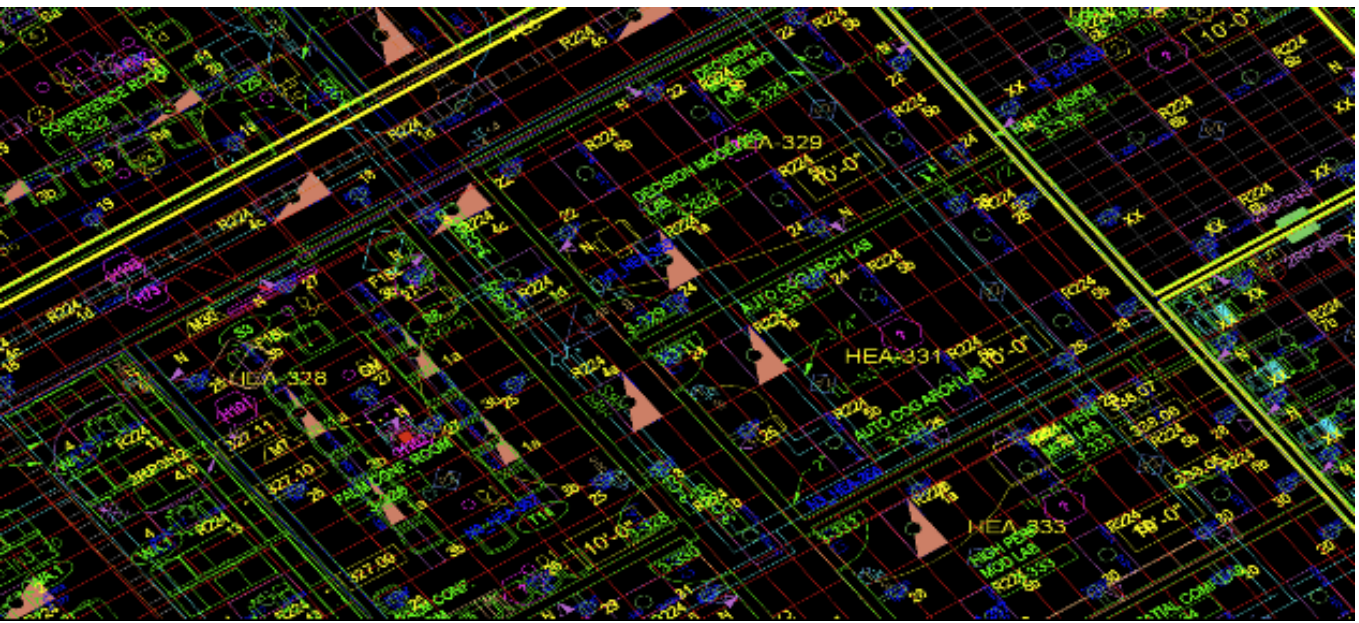
Metadata starts to be standardized. Open communities of practice explode, Creative Commons is born, Ontolog convenes, gbXML goes online.

oBIX, SVG, CAP, RDF/XML rapidly emerge, until finally we reach OWL



Everything seems to be working together fairly well, but Building Information is having interoperability problems. There is a schism

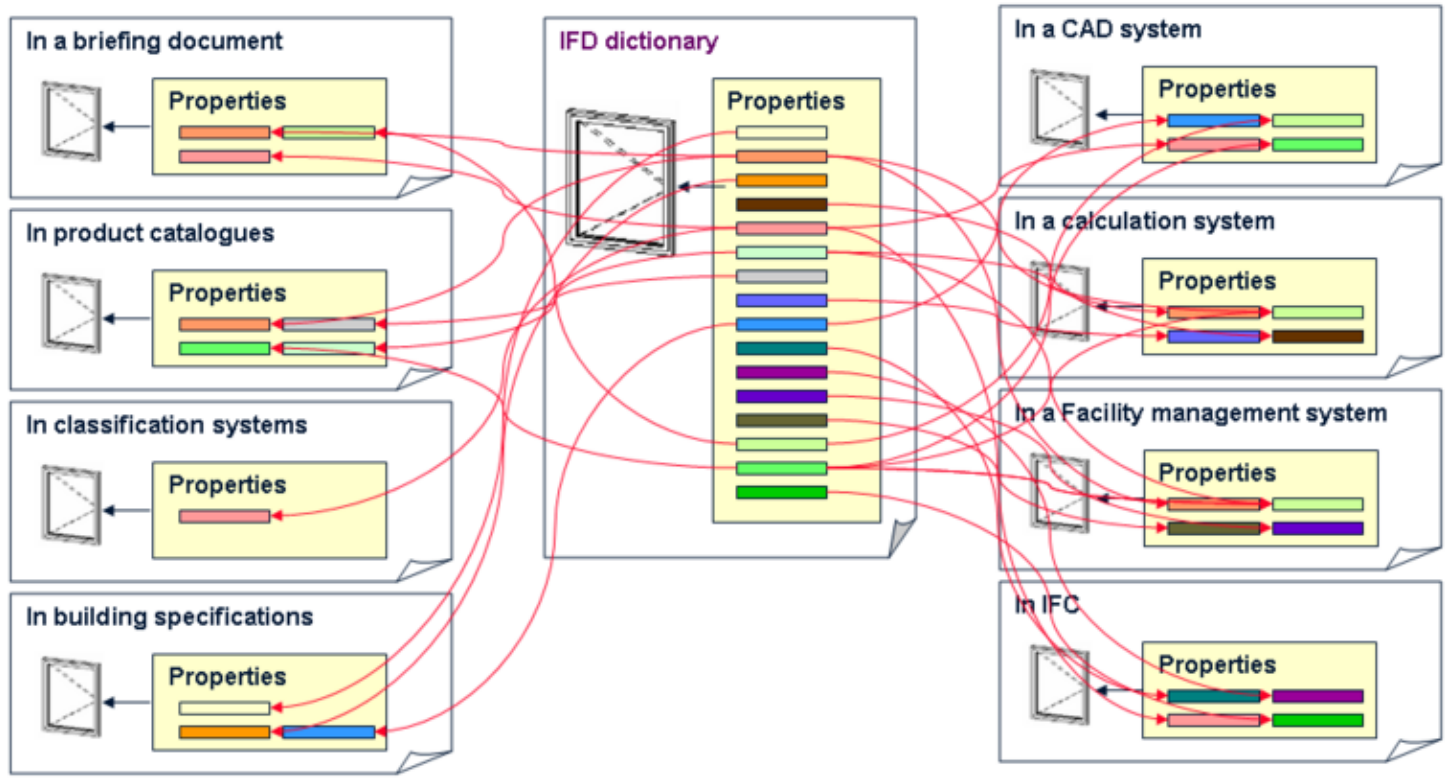


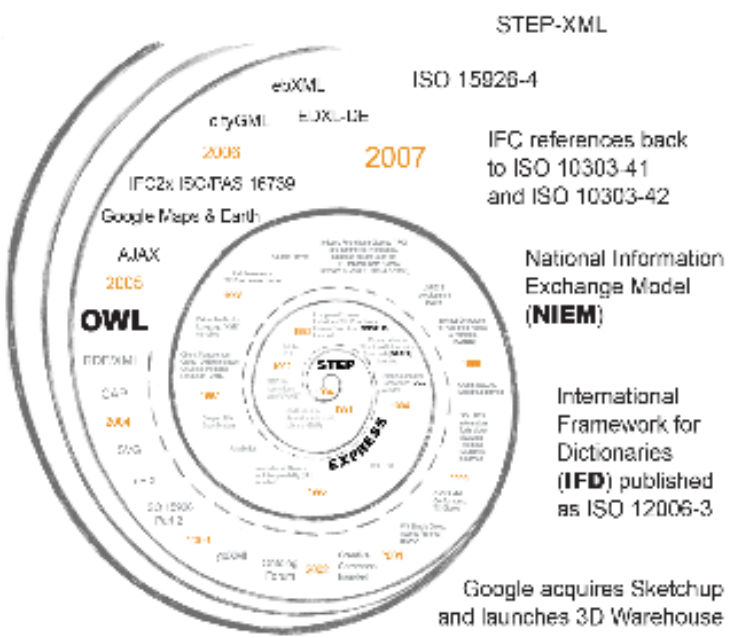


Unlike geospatial data, building data does not have a common point of origin.

Multi-layer, multi-participant collaboration faces tremendous issues of alignment and scale

Handling geometry is part of the problem



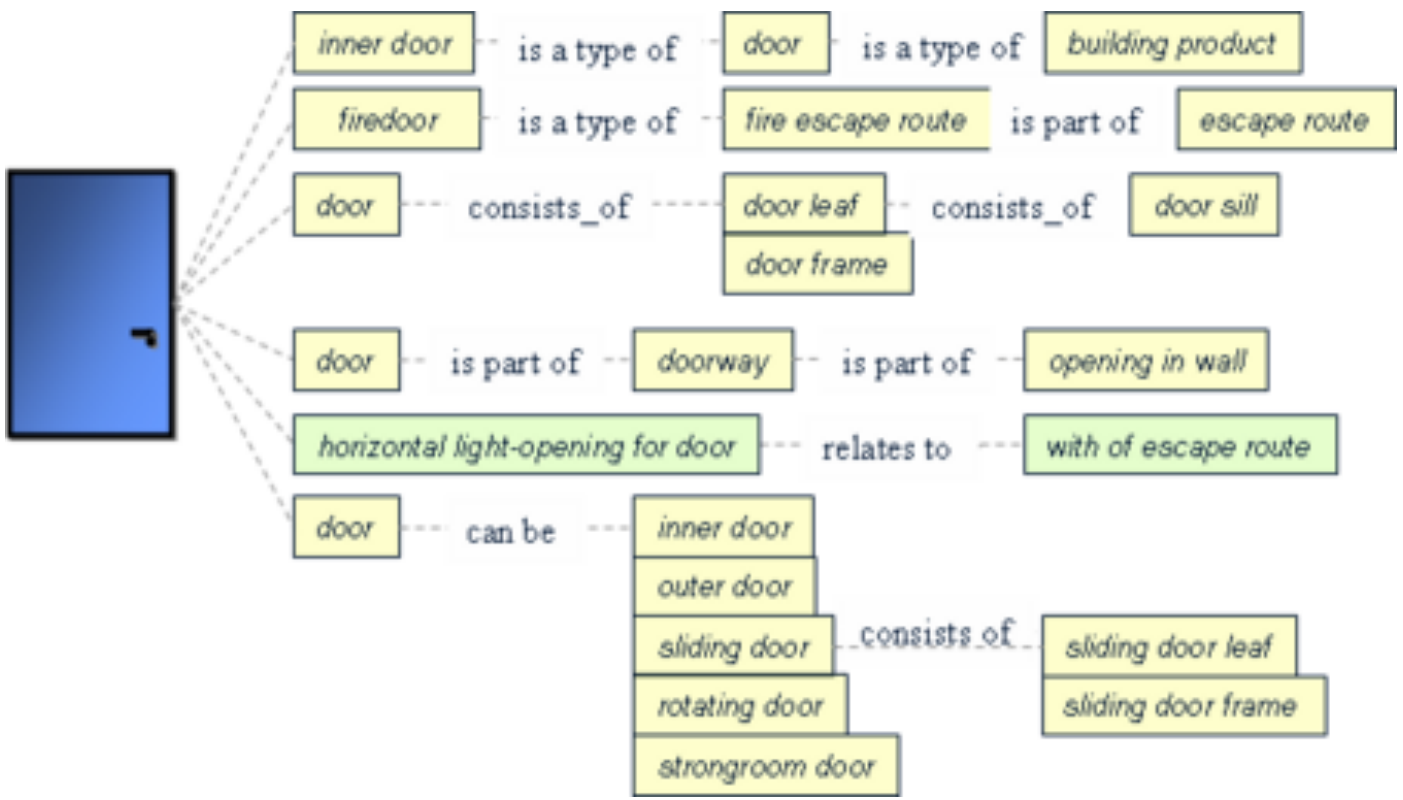


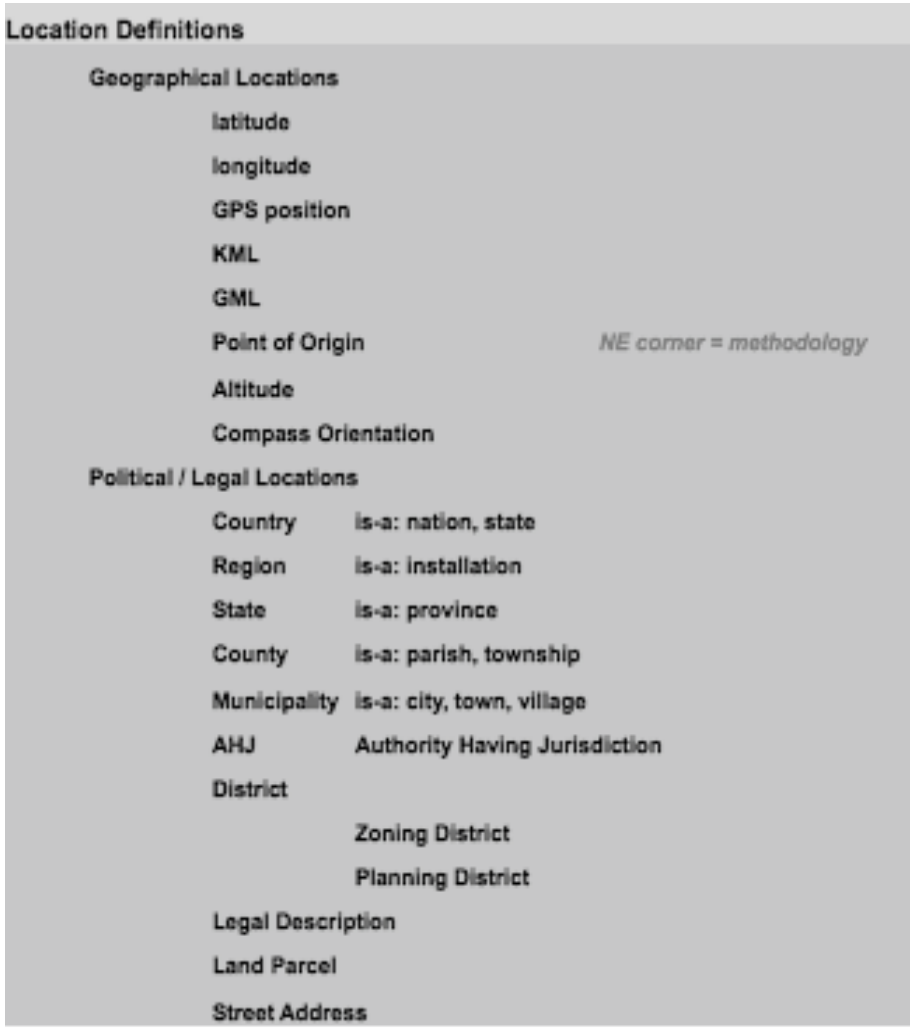
The IFC's are frozen, vendors continue to develop their systems, the least common denominator is the only meeting ground.

To avoid duplication the IFCs reference STEP 41 and 42 for shape representation.

The IFD is standardized, a concept can exist only once! There are no duplicates!

Which brings us to today, when the IFD will be 2 years old on April 17. buildingSMART and others are working diligently on quality control and the accurate population of this shared resource.
IFD and EPISTLE share much of the same ideas and have the same core structure, the initiatives are different. IFD only talks about types of things. EPISTLE will also store instances or individuals. To cover the same functionality as EPISTLE , IFD relies on the IFC standard.





Because there is so little time and so much to do - what shall be populated first? What can the most people agree on? What are the most logical elements to fill the top level?

An example of collaboration and prioritizing is shown for OmniClass Table 49, Properties. Wherein the location properties will be hammered out with OGC in a few phone calls.

Both developers and practitioners can use these classifications and appropriate terminology.

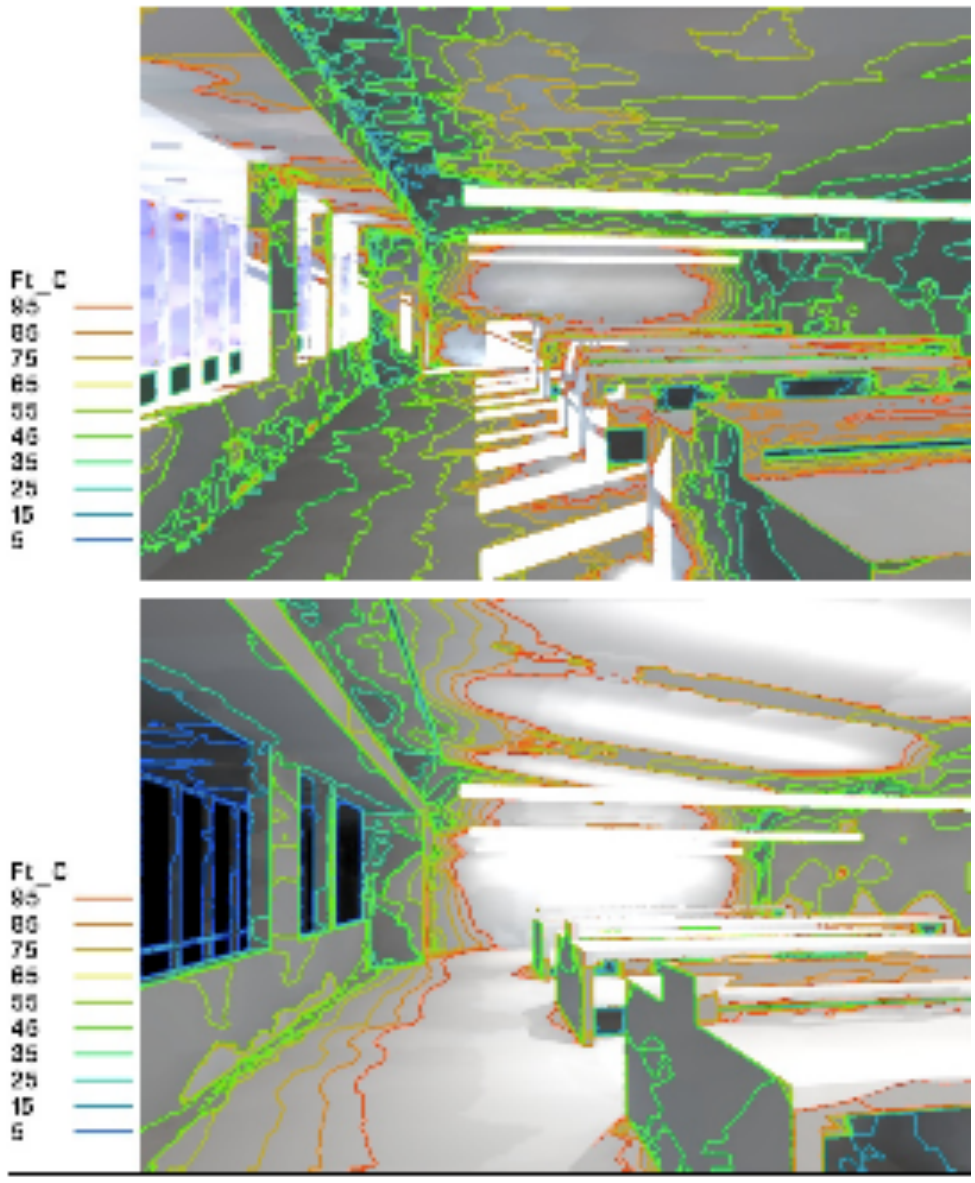
The issue today is modularity. A set of tools and rules is needed for cross-domain information exchange and representation. Activities that have been happening in parallel need to be able to converge in a controlled fashion.

Building standards should integrate with emergency standards BEFORE energy standards because NFPA, OSHA, NEMA and others almost agree on the names of things and the short list of important items to show.

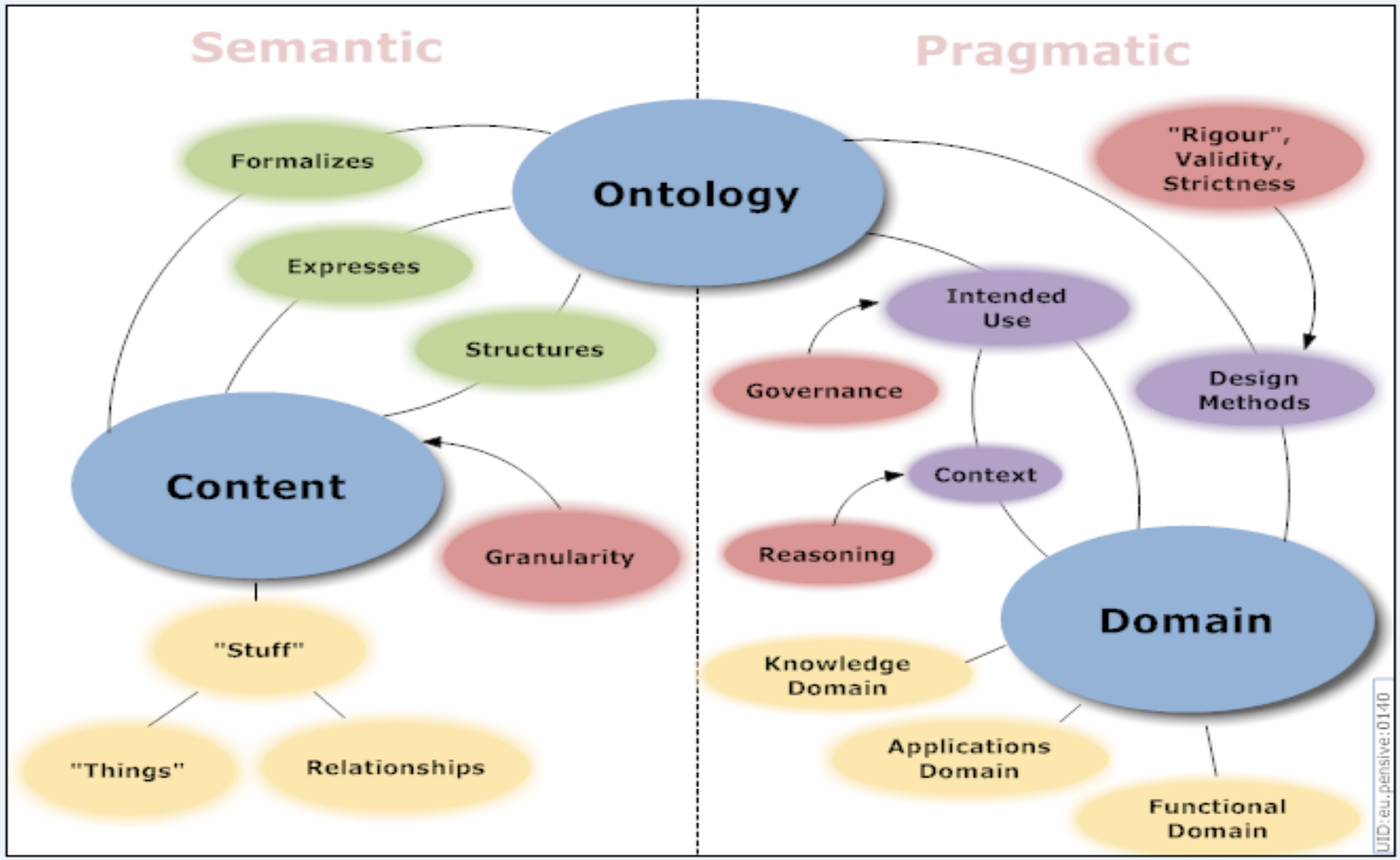
The geometry of energy is too organic to start with first.

Information needs for emergencies are more consistent.

Lessons learned can be applied to temperature measurements and regional differences with greater efficiency using the tools and rules needed for emergency standards.

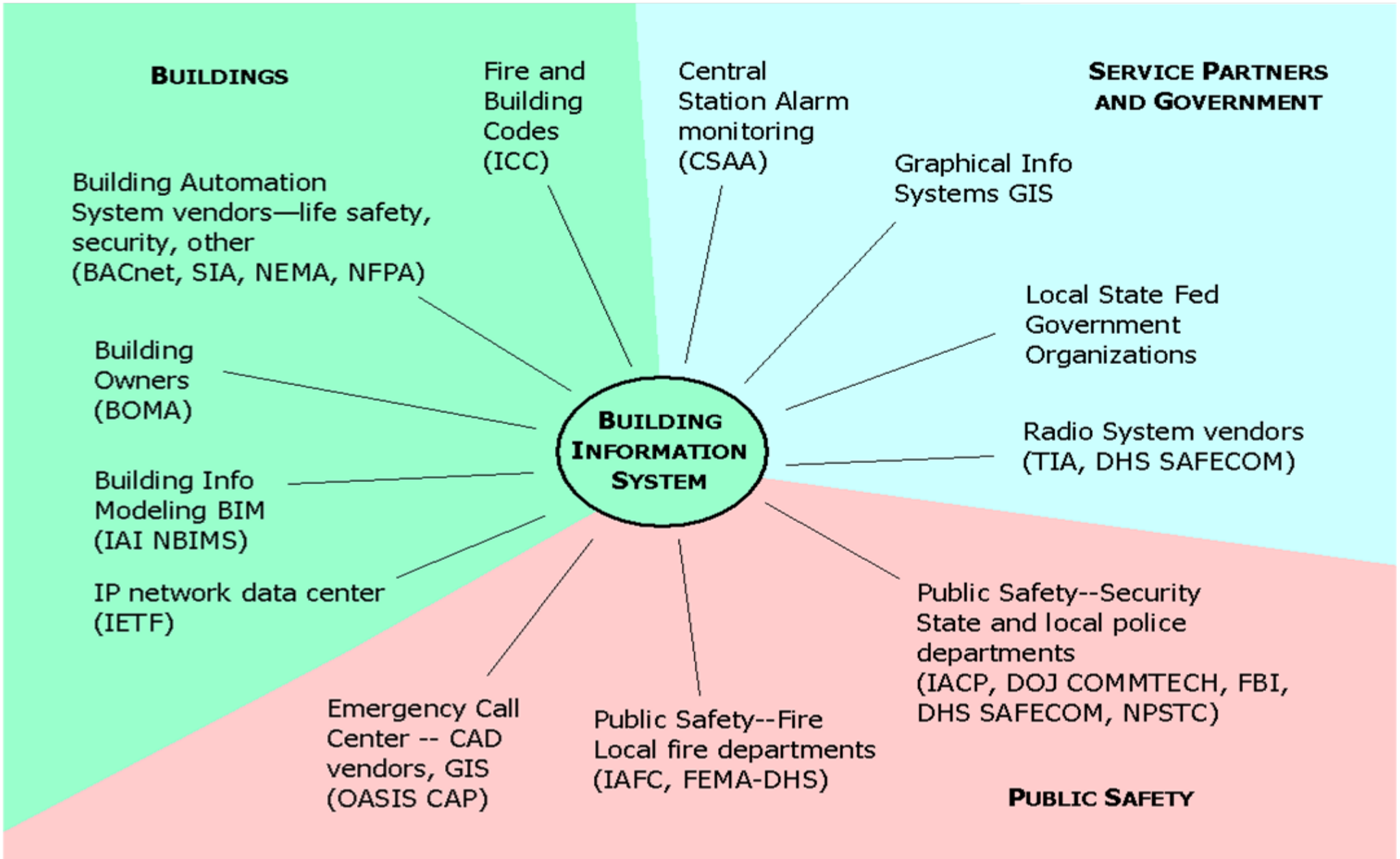


Making the business case for a common ontology evolving from prior disparate efforts catalyzed by math and geometry. Who are the people that need to be involved?



Standards already float across the semantic and pragmatic boundaries, the challenge today is to formalize in an ontology.

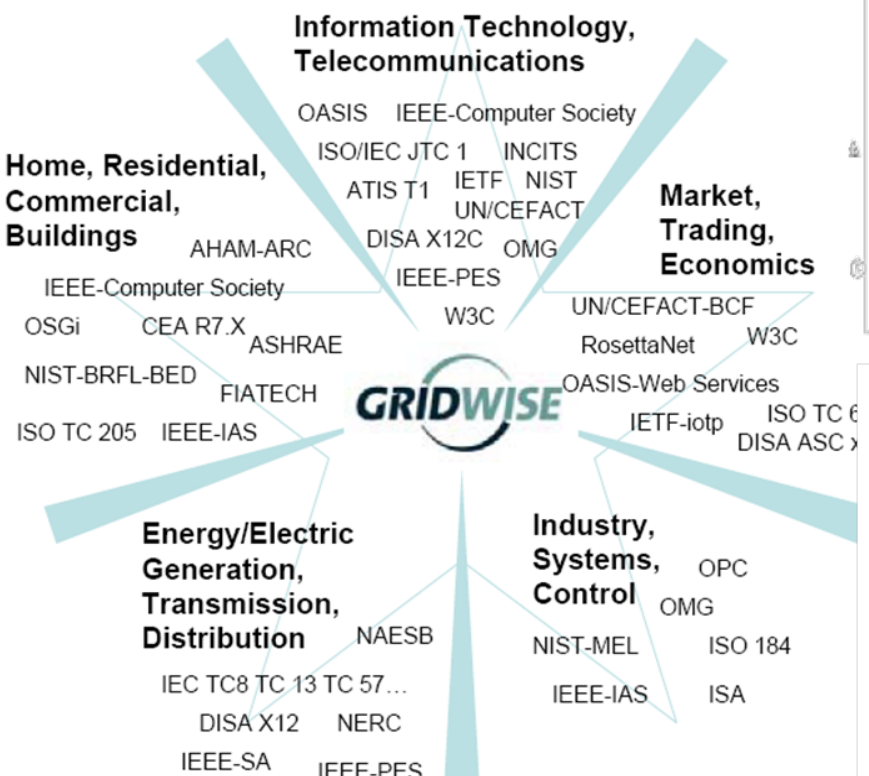
NIST's "Building Infomation Exchange for First Responders" project has cross-domain stakeholders.



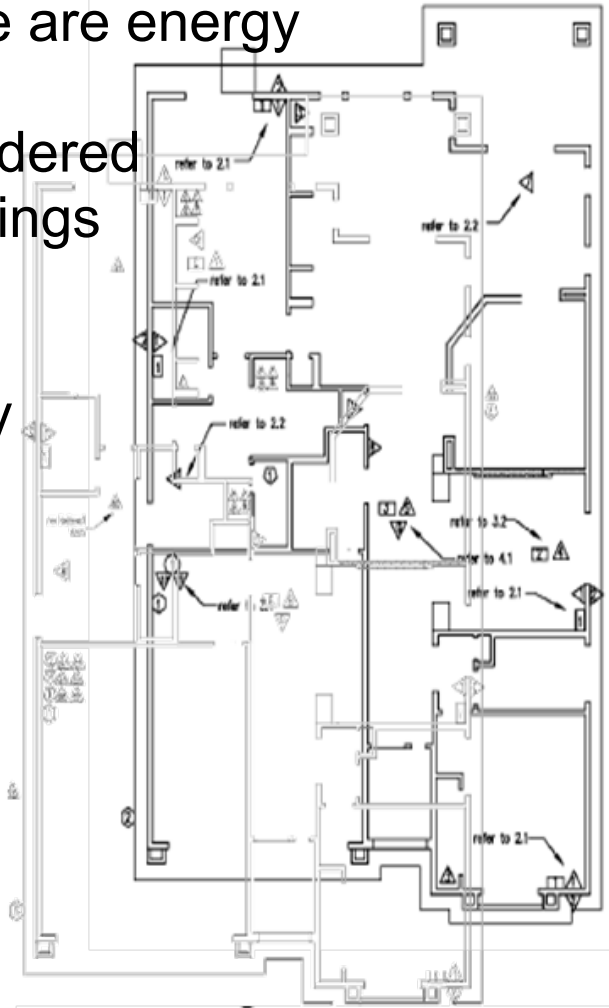
Source: Holmberg, Opening slides for the Building Information Exchange with First Responders Workshop October 15-16, 2008, "Holmberg BIEFR Workshop Oct08.ppt"

As in Emergency Response, there are energy cross-domain stakeholders . The "Smart Energy Grid" can be considered as both distributing power to buildings AND though-out buildings.

Reasoning over building geometry is key for many decision-support tasks in Energy Services.



Source: Bosquet, M.L., "GridWise Standards Mapping Overview", Pacific Northwest National Laboratory," March, 2004.



Monitoring Sensors:

Temperatures:

- Exterior walls - 4 locations
- Attic air - 2 locations
- Room air - 2 locations
- Supply air - 2 locations
- Water heaters - hot and cold water.
- Slab (Baseline) - 3 locations
- Slab and pad (ZEH) - 4 locations at various depths
- Exterior soil temperature (ZEH)
- Freus AC water sump (ZEH)
- AC hydronic heating coil water (ZEH)
- PV plate temperatures - 2 locations (ZEH)
- Ambient air

"Baseline" Floor Plan

Heat Flux:

- Inside surface of exterior walls - 4 locations
- Ceiling surfaces - 2 locations

Hot Water Energy Flow:

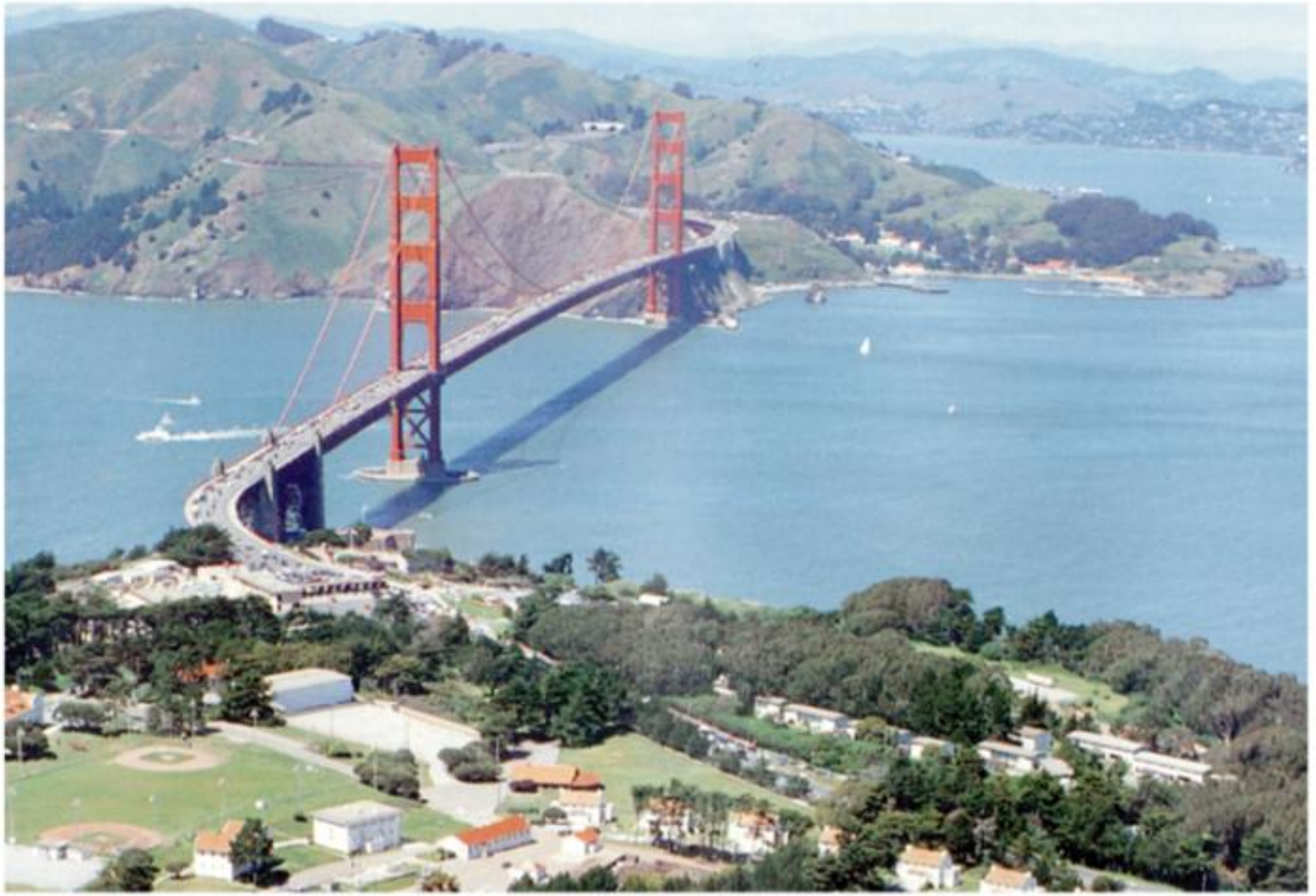
- Water meter for water heaters
- Water meter for solar water heater (ZEH)
- Hydronic heating coil (ZEH)

Water Consumption:

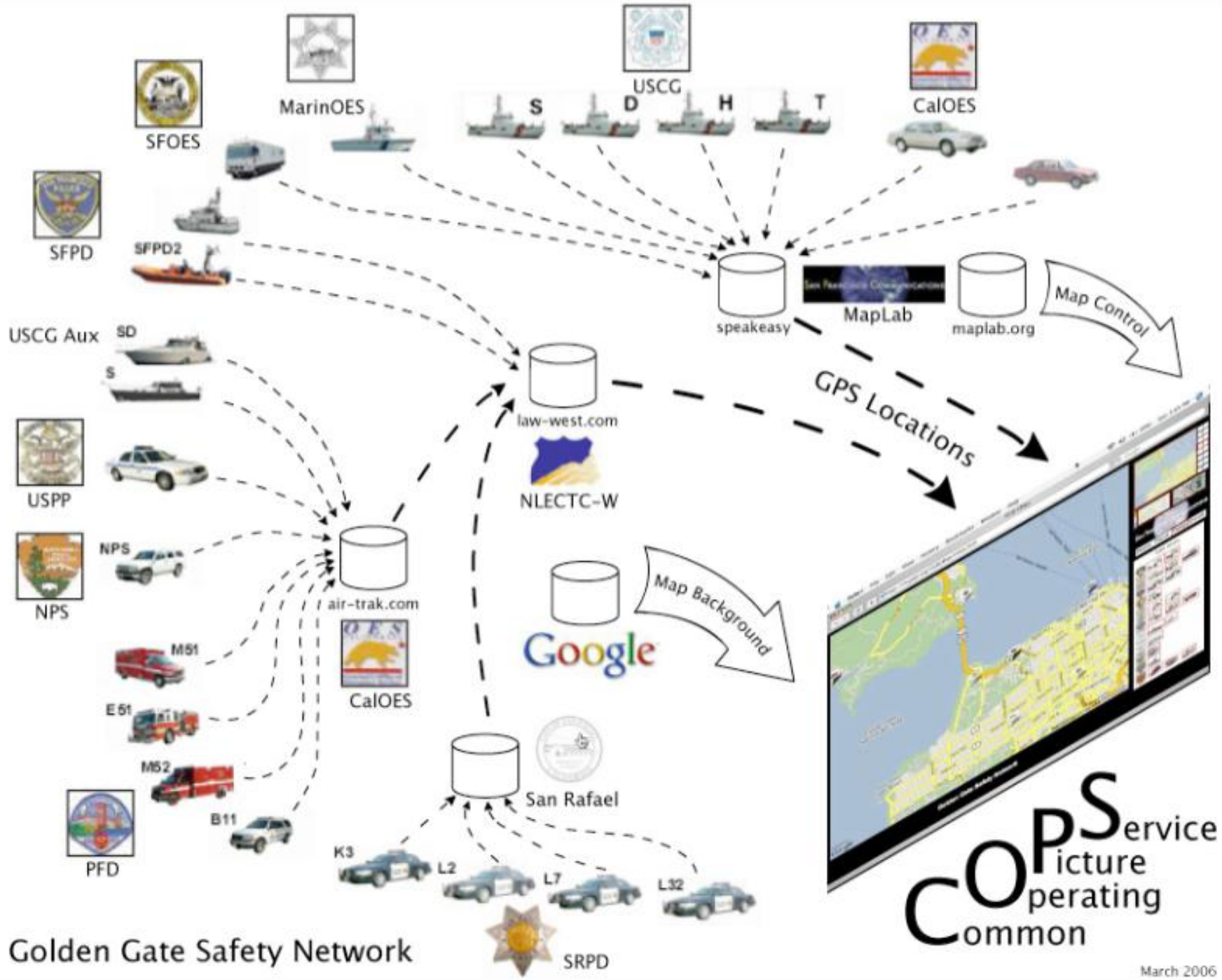
- Whole house pulse meter
- Hot water
- Freus air conditioner water meter (ZEH)

ZEH Floor Plan

Source: Boehm, Robert, "UNLV Zero or Near-Zero Energy House Proje in Las Vegas", presented at CERL: Net-Zero Energy for Communities workshop, February 3, 2009.



Golden Gate Safety Network


SFOES
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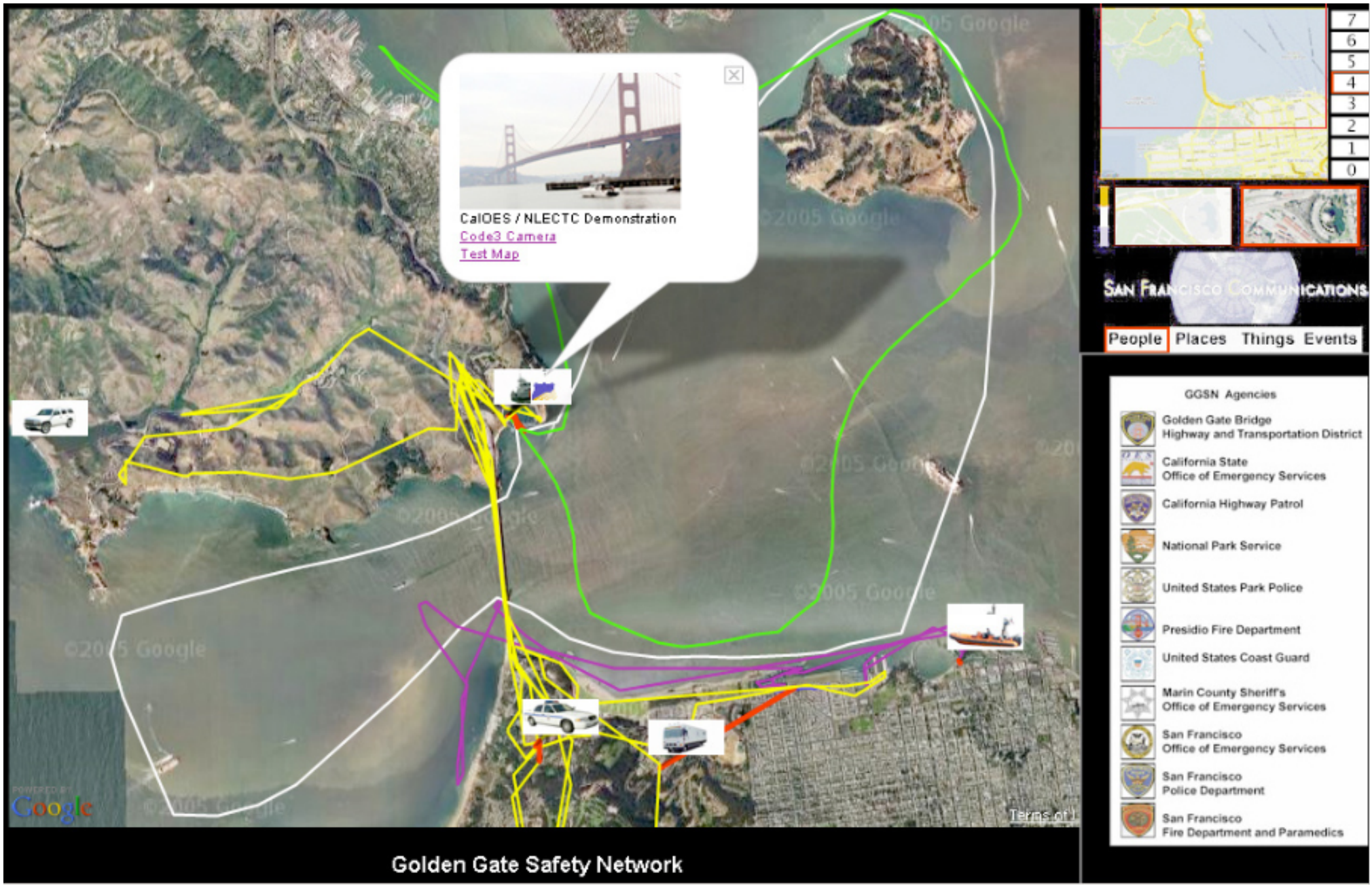
SFPD
SFPD2
speakeasy
MapLab
maplab.org
Map Control
USCG Aux
SD
S
GPS Locations
law-west.com
NLECTC-W
USPP
NPS
air-trak.com
CalOES
Google
Map Background
M51
E51
M52
B11
PFD
San Rafael
K3
L2
L7
L32
SRPD
Golden Gate Safety Network
COPS
Service
Picture
Operating
Common
March 2006

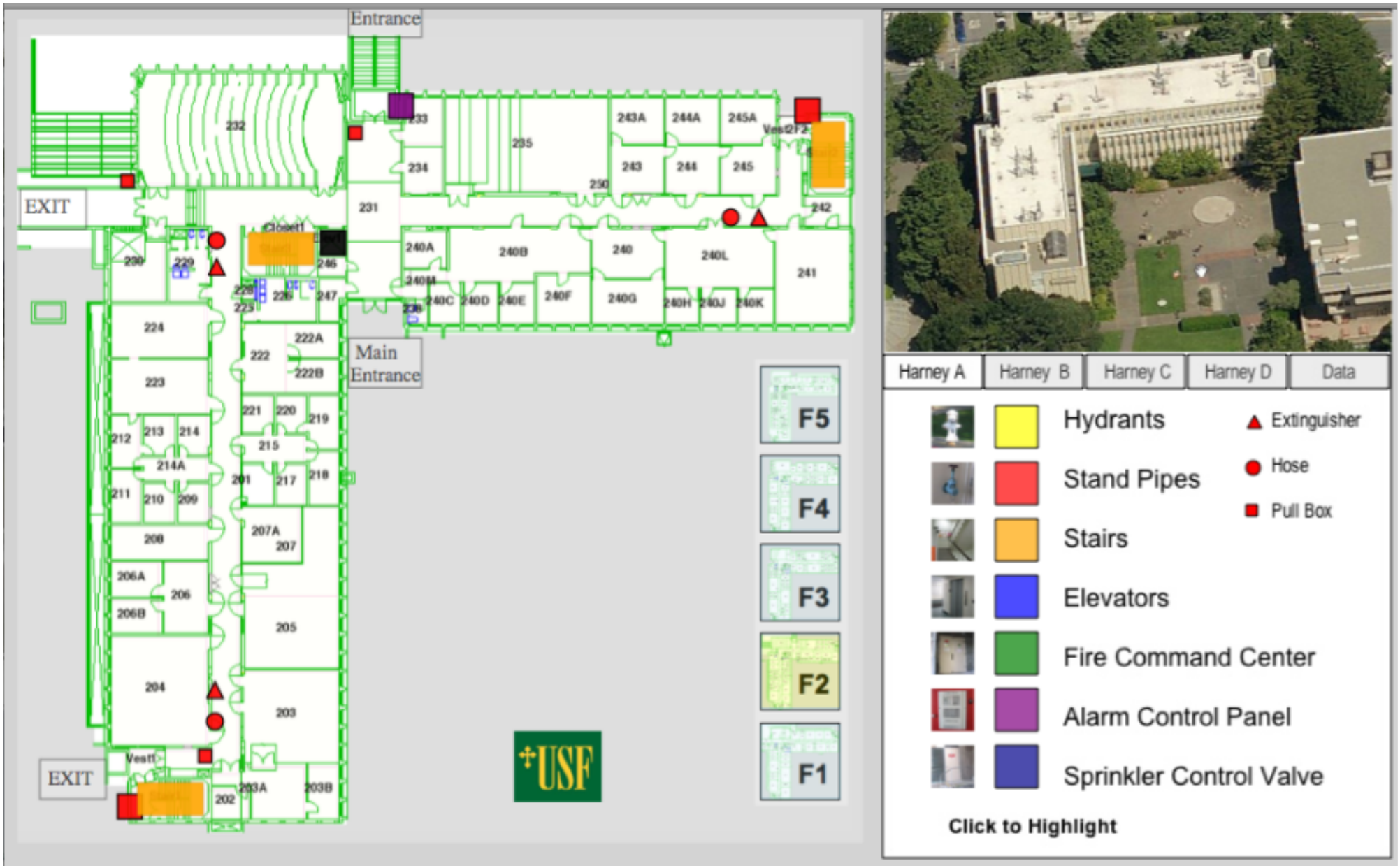
Buildings do not live in a vacuum. Current representations of the larger built environoment are not standardized, this work moves towards formal representation and exchange



Interactive Floor Plans

http://maplab.org/harney1

(+ password)

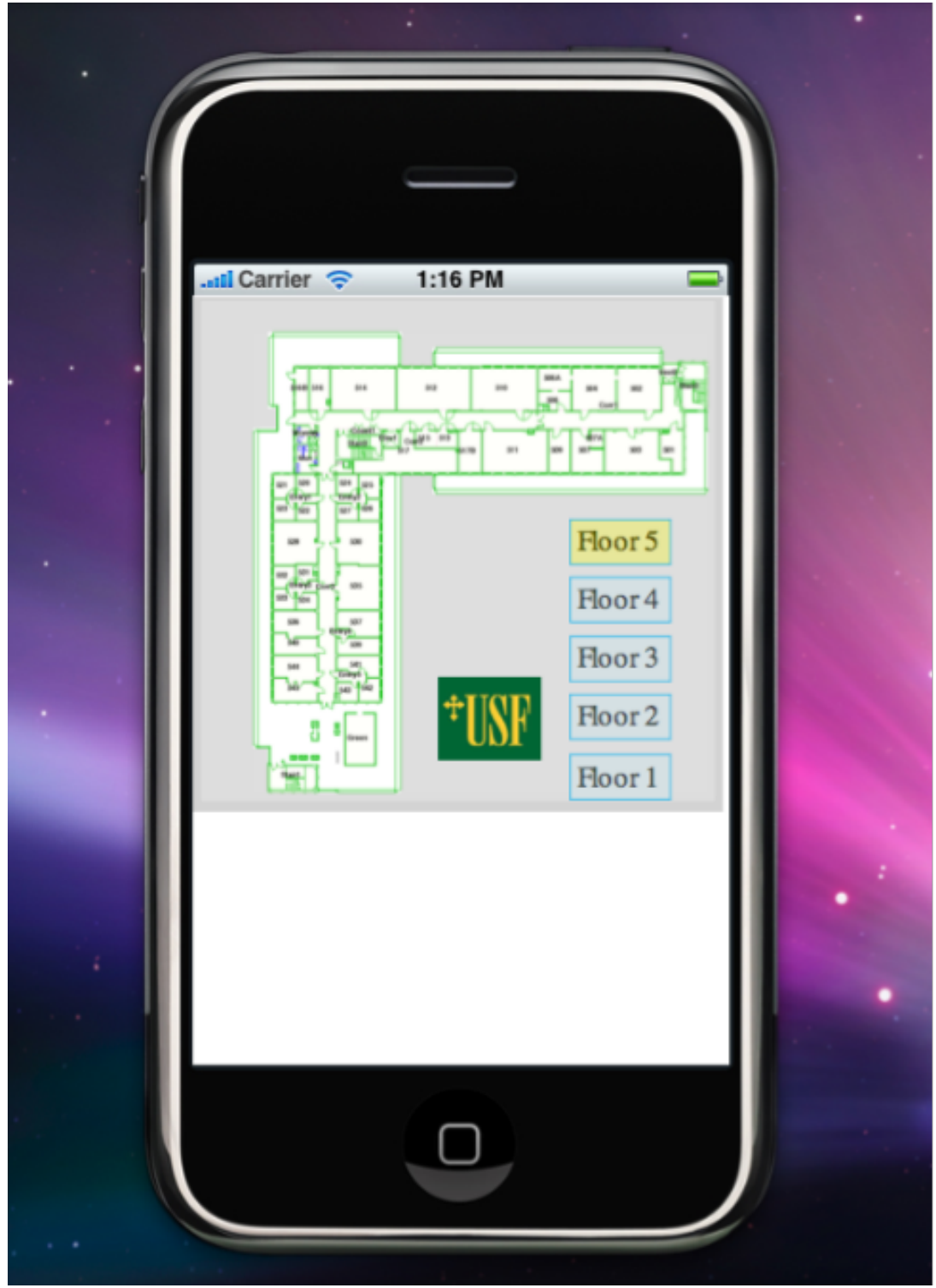


Building Models are too big to exchange quickly

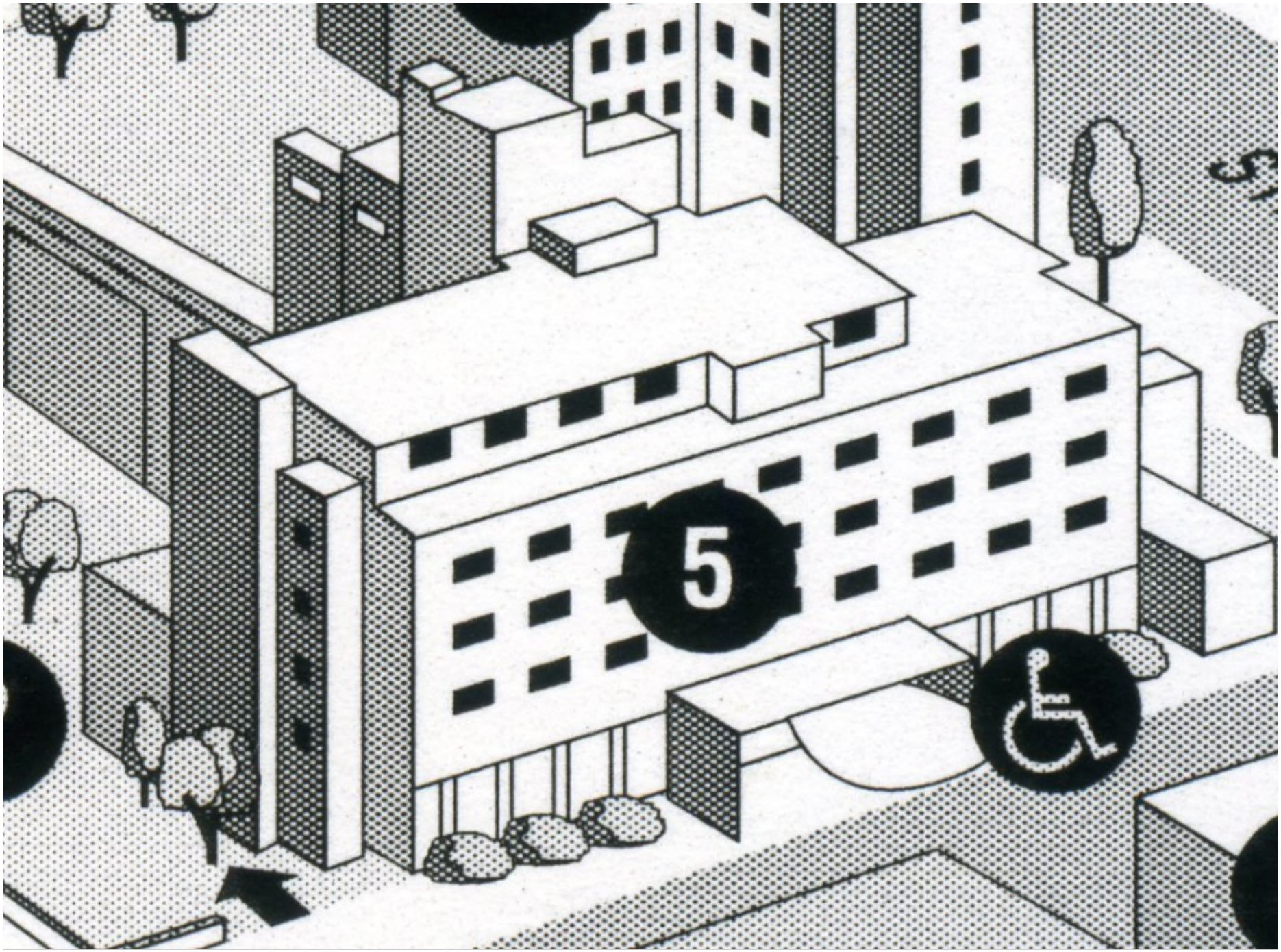
Extract only those elements needed

Lightweight
Standalone
Interoperable

To query floorplans and other building drawings



Its not about style, but which information is most relevant and shown first, then a stragetic order to drill down as more information is needed.



Static Data (1S69)

- Building Information (1SS0)
  - Address (1SS1)
-
- Compass directions and Building side labels (A
  - Name (if different than address) (1SS3
  - Keybox Location (1SS4)
    - *Disambiguation: Rapid Entry Syst*
  -
  - Commissioning Date (1SS6)
  - Construction Type (1SS7)
  - Structural Features (1SS8)
    - Stories (1SS9)
      - Above Ground (1SSA)
      - Below Ground or Number E
      - Sprinklered / Not Sprinklere
- Occupant Information (1SSD)
  - Occupancy Type (1RJ3)
  - Number Occupants (day/night) (1RJ4)
  - Use Group(s) (1SSE)
- Contact Information (1R7N)
  - Building Owner (1SSF)
  - Facility Manager (1SSG)
  - Building Engineer (1SSH)
  - HVAC Contact (1SSI)
  - Gas Company Contact (1SSJ)
  - Power Company Contact (1SSK)
  - Water Department Emergency Contact
  - State Hazardous Materials Duty Officer
  - *Central Service Agency (CSA) contact*
  - Room Phone Numbers: Assigned to the chooses to do so. Room phone numbers

Open Floor Plan Display

Project Prospectus

Presented by

SFC MapLab Project

Golden Gate Safety Network

and

Building Service Performance Project

Ontolog Forum

February 2009

An ideal team requires expertise and understanding in:

- Building Information Modeling (BIM)
- Geographic Information Systems (GIS)
- OWL, EXPRESS, CAP, BACNET...
- Emergency Response
- Energy Processes and Codes
- Efficient Data Exchange
- Ontology Engineering
- Ontology Management
- Policy, Implementation, and Adoption

http://ontolog.cim3.net/cgi-bin/wiki.pl?BuildingServicePerformance