

Knowledge On-Demand

Moving from data
access to answering
questions

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Knowledge On-Demand
Environments are about
answering questions
in real-time

^
near

Smart Phone is our ubiquitous connection to the real world

3.6 Billion unique users¹

50% uptake = global average

Potential to leapfrog fixed-line technology



1. <https://www.statista.com/topics>

Next Generation Systems



Answers to questions NOT access to data

Questions and Answers

Questions unpredictable

Leave the data where it is
and let the analytics do the
work

Should we
evacuate now



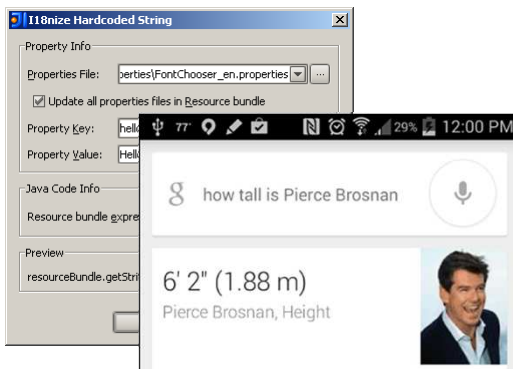
Is this land likely
to be flooded



How much land was
cleared illegally in
last 5 years



Current Situation Hardcoded Analytics



Future Situation Knowledge Inferencing

How long before
the fire reaches
my property



Knowledge On-demand
requires a rethink and
redesign in the way data and
supporting services are
structured

The Traditional Query Process



Query

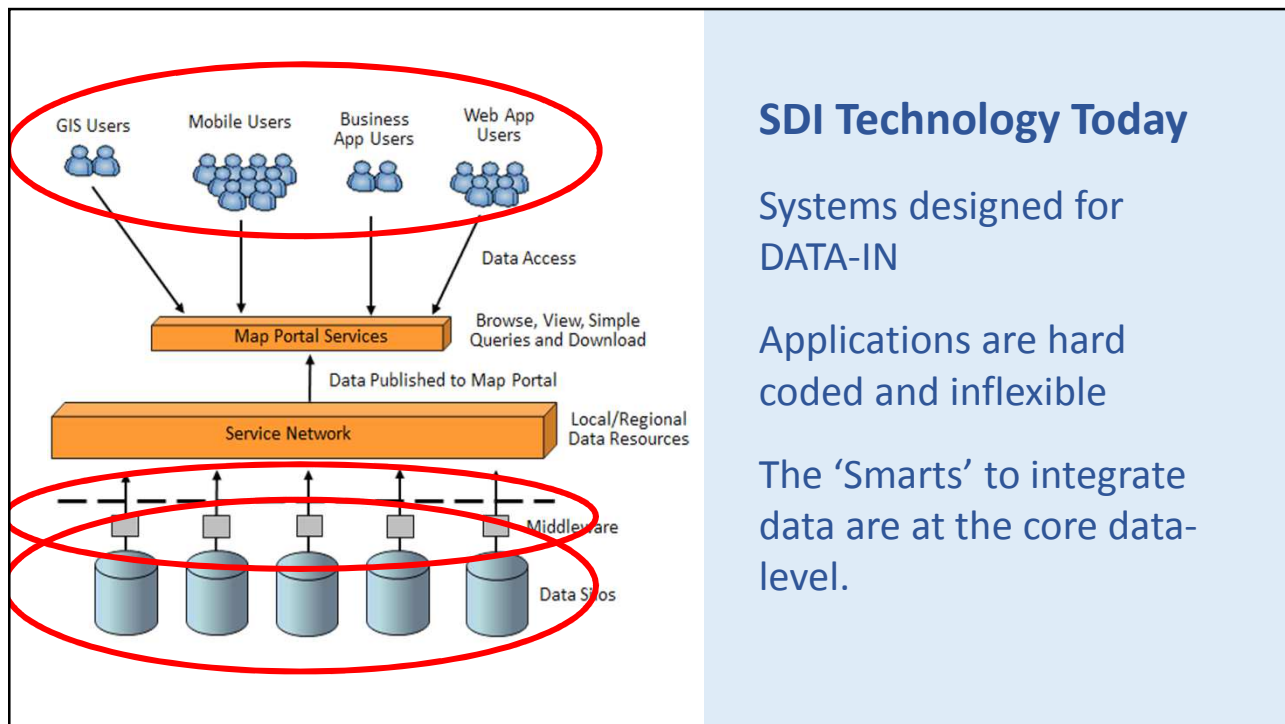


Process



Data

Time consuming manual process

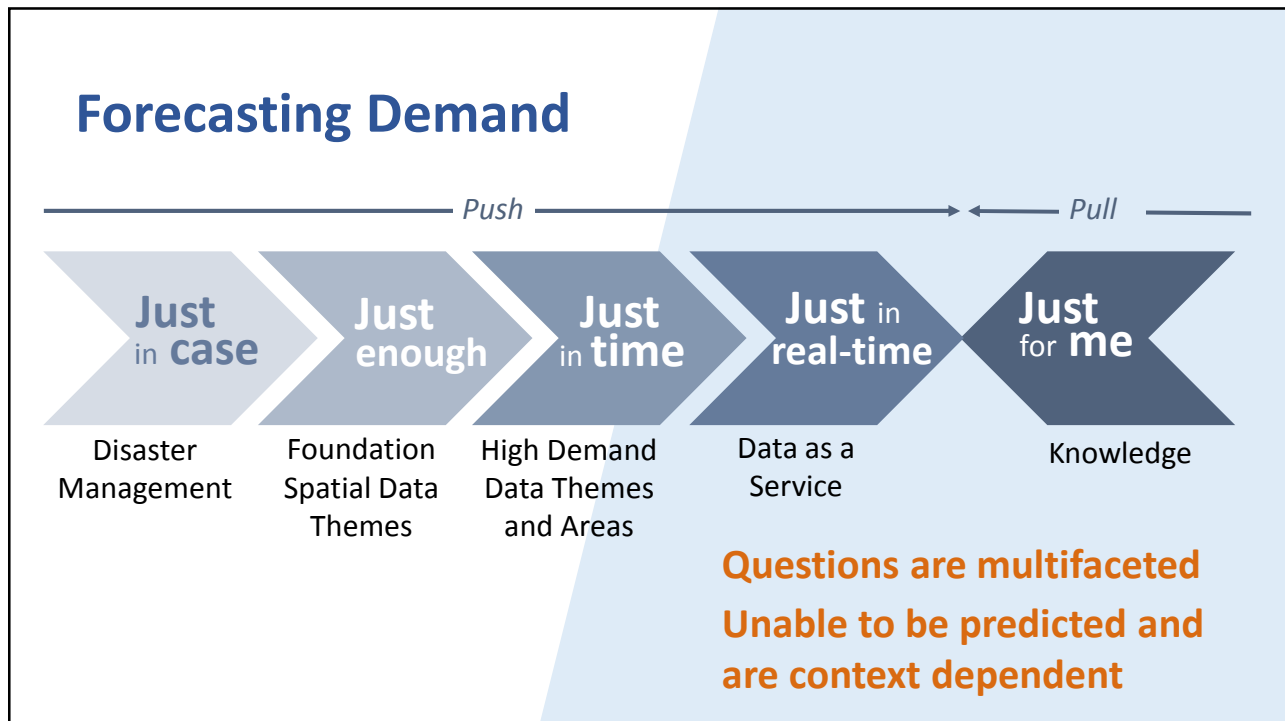


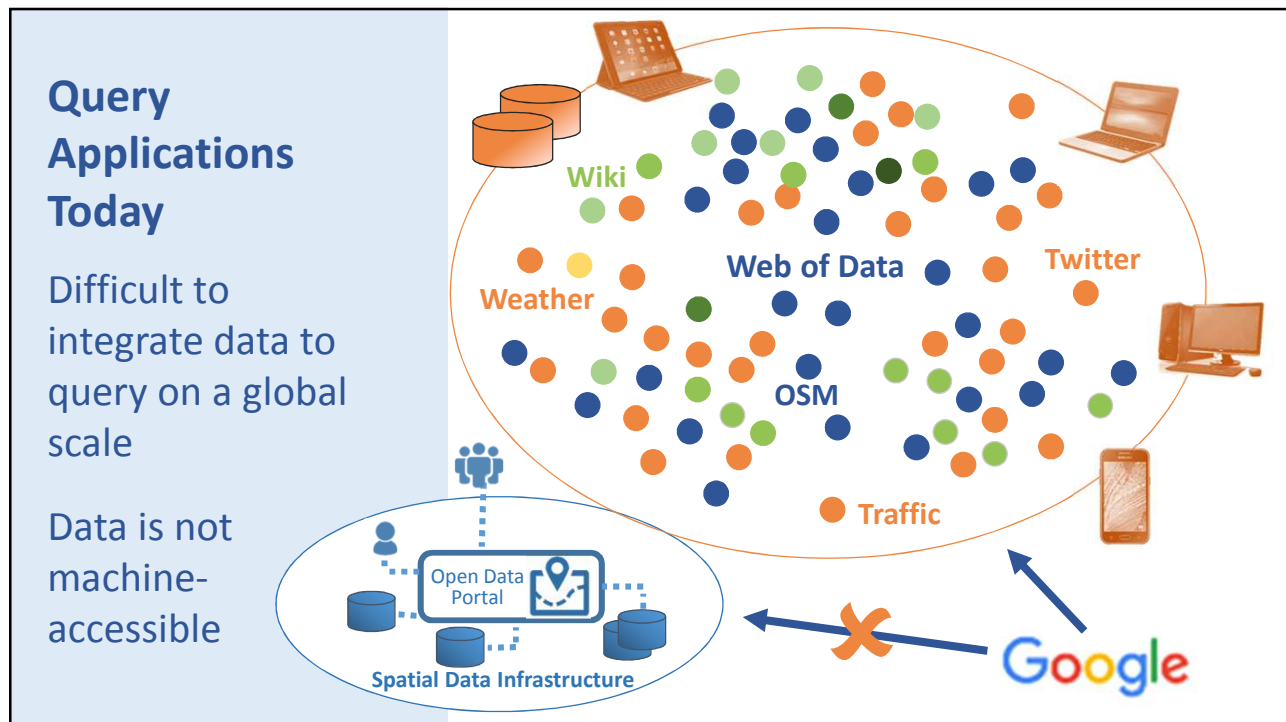
SDI Technology Today

Systems designed for DATA-IN

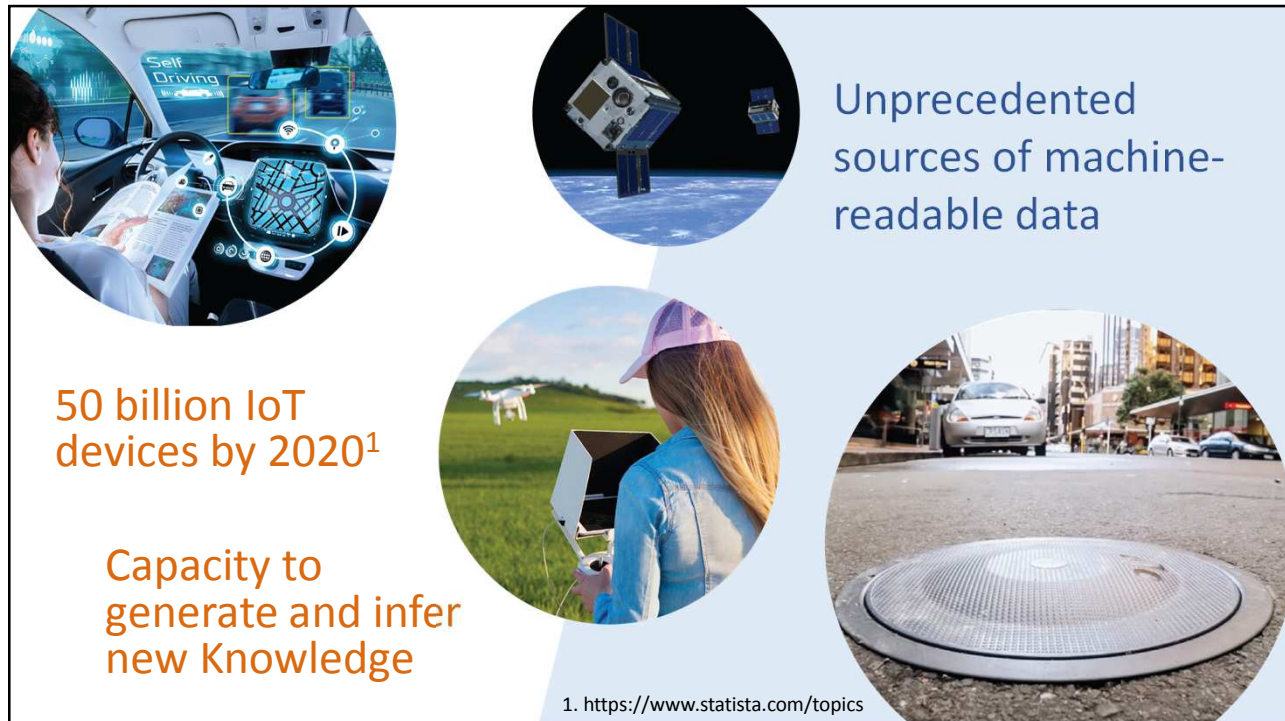
Applications are hard coded and inflexible

The 'Smarts' to integrate data are at the core data-level.





Information technologies
have crossed a threshold



Unprecedented sources of machine-readable data

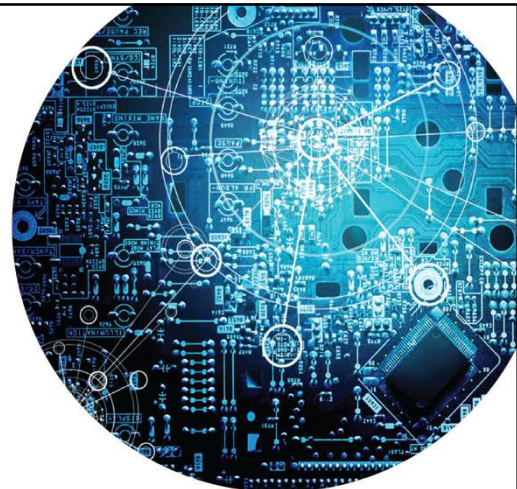
50 billion IoT devices by 2020¹

Capacity to generate and infer new Knowledge

1. <https://www.statista.com/topics>

AI Landscape for Knowledge On-demand

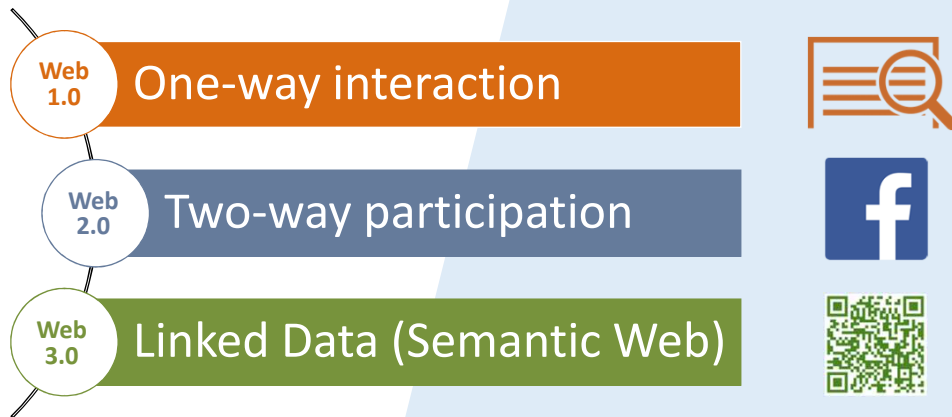
- Speech Recognition
- Natural Language Processing
- Machine-learning
- Deep-learning
- Predictive Apps
- Image Recognition
- Knowledge Representation
 - Ontologies
 - Vocabularies



New tools for next-generation spatial infrastructures

Semantic Web – Making Data Smart

Third stage in the Evolution of the Web



Knowledge On-Demand Query Process

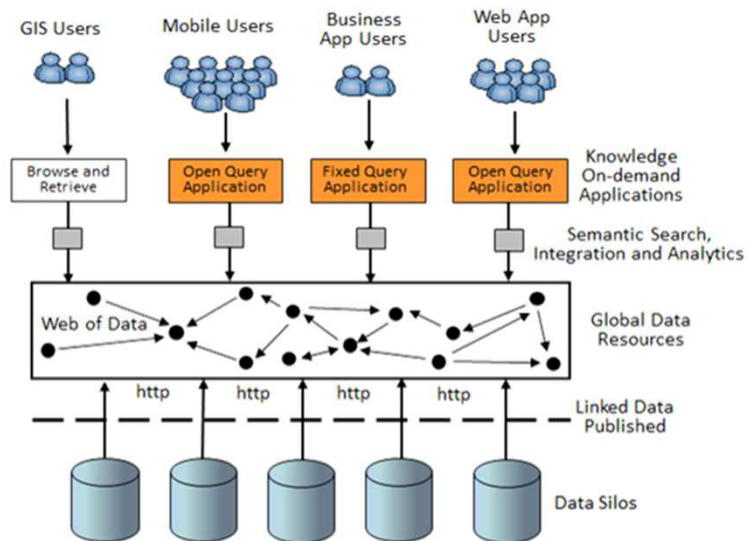


Ability to infer knowledge Automatically

Next Generation infrastructure

Designed for Knowledge -OUT

Open Query Applications



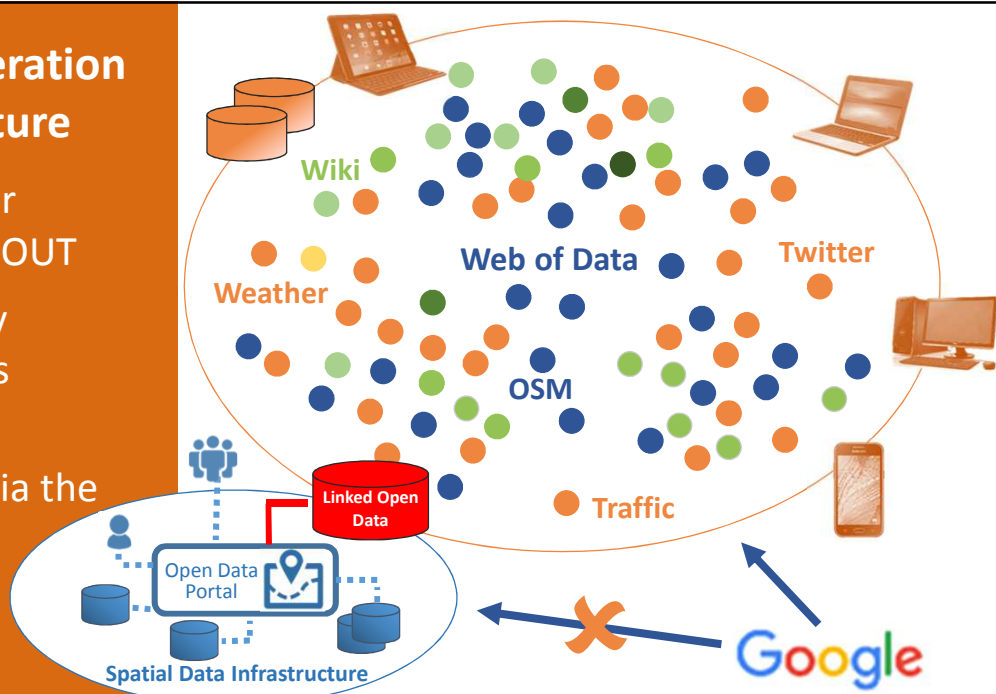
Next Generation Infrastructure

Designed for Knowledge-OUT

Open Query Applications

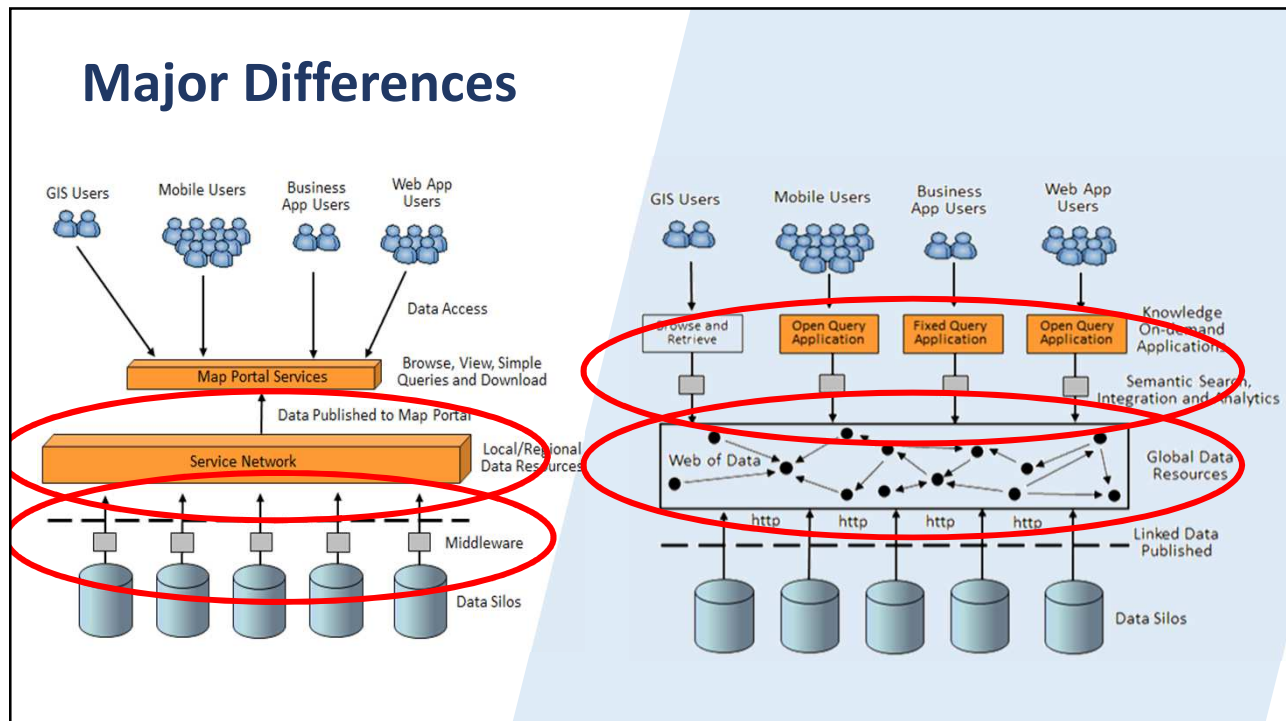
Linked Data accessible via the Web

Global data integration

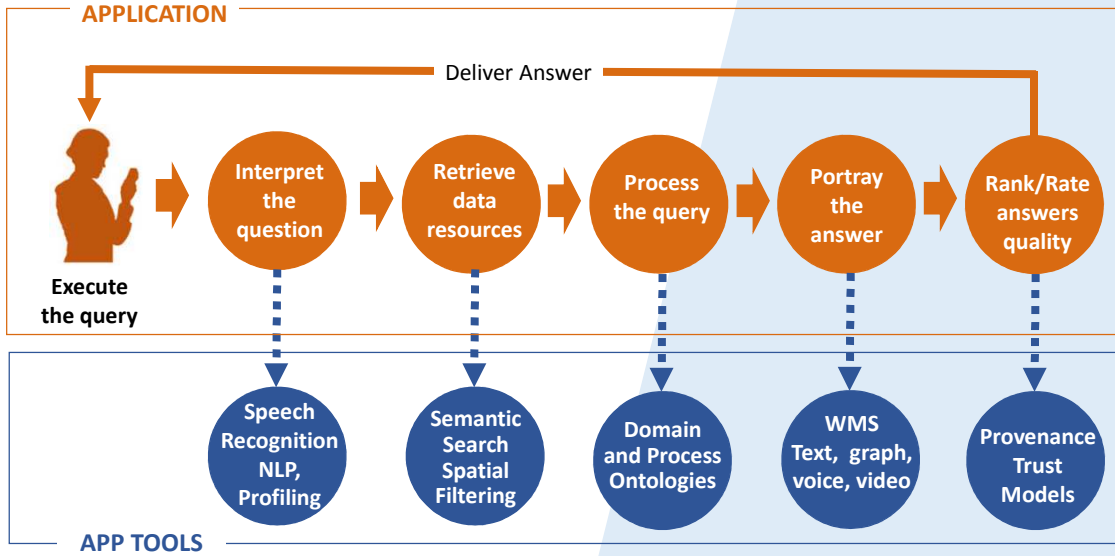


A Global Data Space is some years away

Local, National and Regional Geospatial
Linked Data Resources will eventually
link up to form a global data space




Open Query Process






Emergency Responder



Insurance Broker



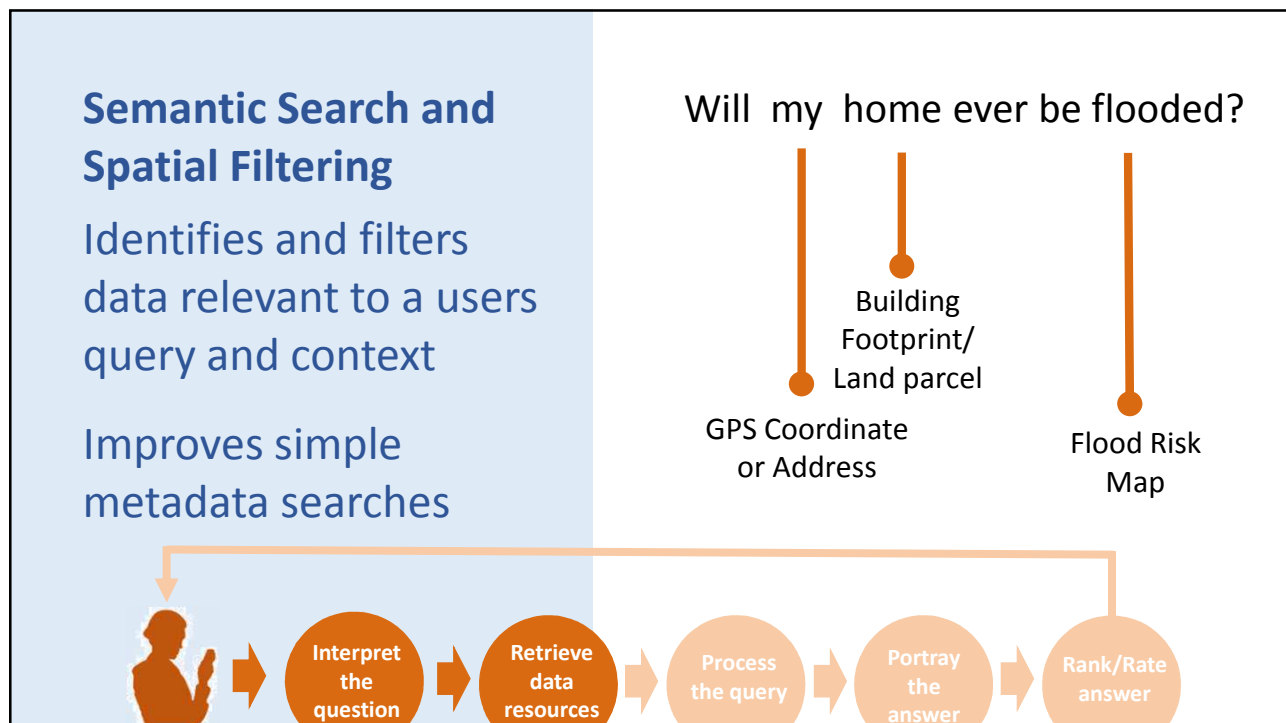
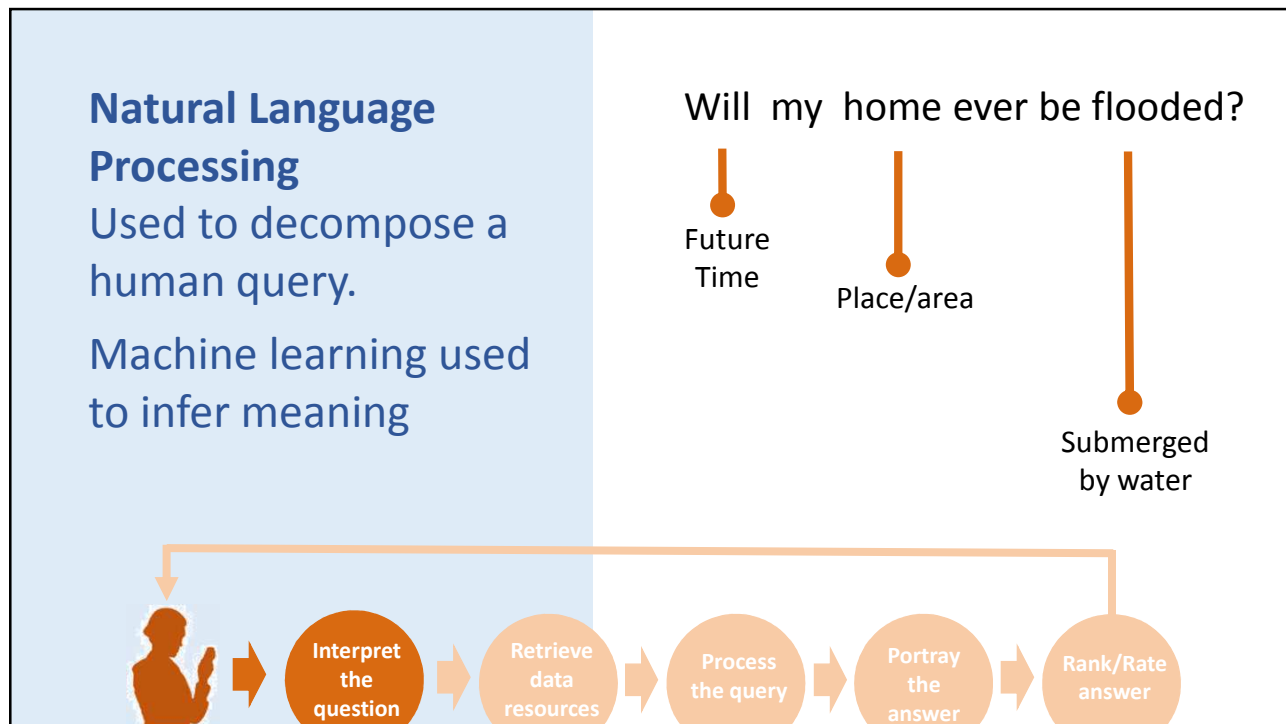
Urban Planner



Home Buyer

Will this home be flooded?

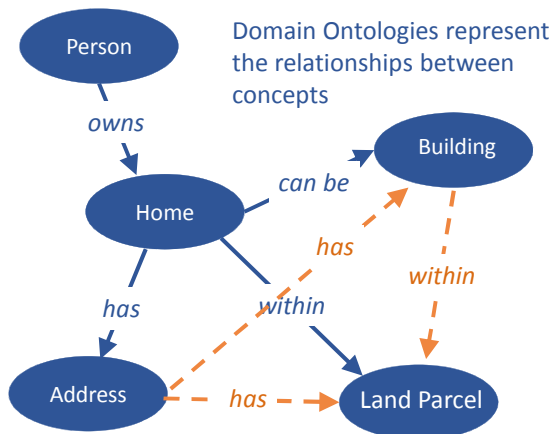
Queries need to be context dependent



The knowledge to answer a question initially comes from humans.

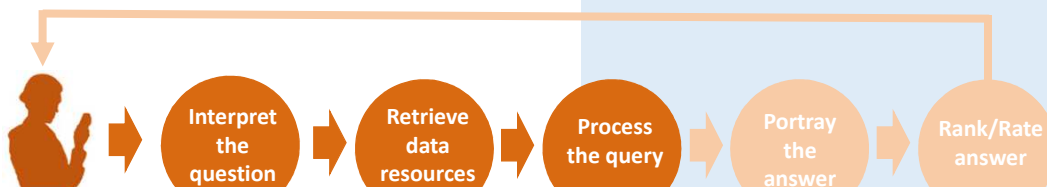
What, Where, Why, When, and How.

Machines learn from this knowledge.



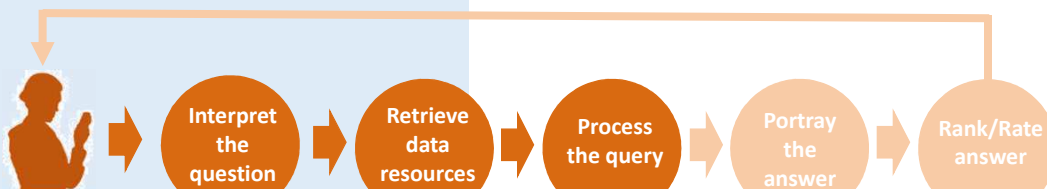
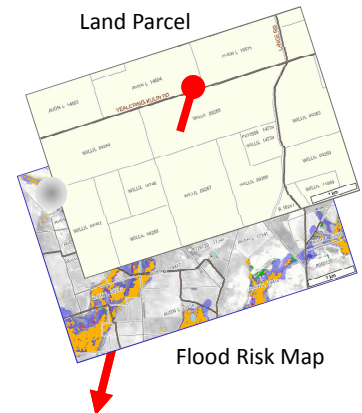
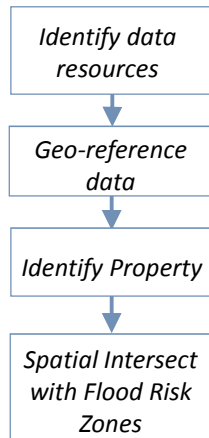
Domain Ontologies are used to represent knowledge in a particular domain.

They are shareable and reusable.



Process Ontologies are used to compile, coordinate and run a series of processes to answer a query.

They are shareable and reusable.



Ontology Libraries Exist

Developers need not start from scratch

There is a need to coordinate these knowledge repositories



Linked Open Vocabularies (LOV)

frappe - FraPPE: Frame, Pixel, Place, Event vocabulary
<http://streamreasoning.org/ontologies/frappe#>

FraPPE is a vocabulary to enable Visual Analytics operations on geo-spatial time varying data. By enabling Visual Analytics instruments FraPPE ease the capture, correlation and comparison operations on geo-spatial data from different sources evolving over time @en

g50k - 50K Gazetteer Vocabulary

<http://data.ordnancesurvey.co.uk/ontology/50kGazetteer/>

A vocabulary developed to describe the Ordnance Survey 50k Gazetteer linked data @en

geo - WGS84 Geo Positioning

http://www.w3.org/2003/01/geo/wgs84_pos

A vocabulary for representing latitude, longitude and altitude information in the WGS84 geodetic reference datum. @en

geod - Administrative vocabulary for Norway

<http://vocab.jenka.no/geo-deling>

Vocabulary describing the administrative subdivision of Norway @en

geof - Geo Features

<http://www.mindswap.org/2003/owl/geo/geofFeatures20040307.owl>

This ontology contains geographic feature classes and associated properties including classes and properties for describing the spatial location of the geographic feature. The classes and properties have been defined based on an ESRI dataset. @en

Government can support innovative
query applications by publishing
machine-readable data

The market will establish new business
models

In summary -
for Knowledge On-Demand to flourish

- Modernised infrastructure
- Published Linked Data
- Demonstrated Examples

Ontology Libraries Exist

Developers need not start from scratch



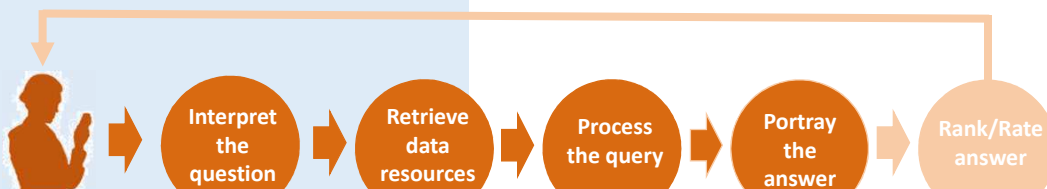
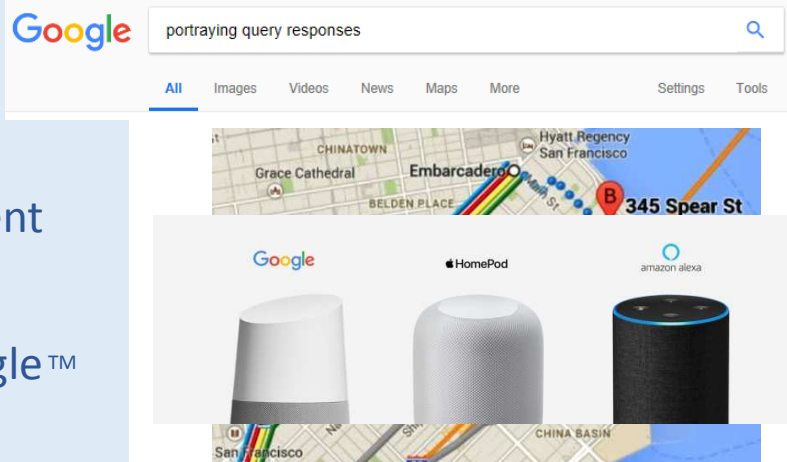
Linked Open Vocabularies (LOV)

Portray Answers

Query dependent

Application dependent

User preference dependent e.g. Google™

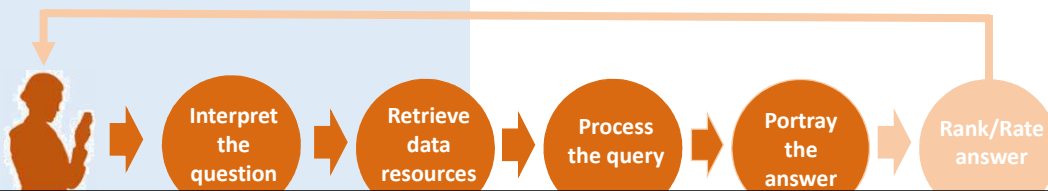
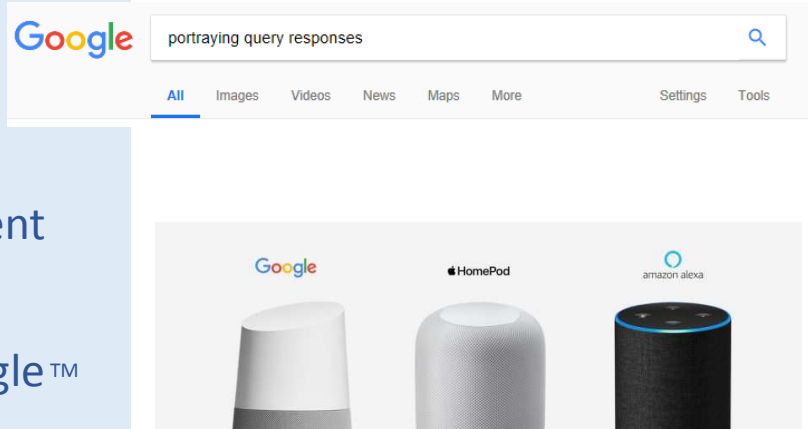


Portray Answers

Query dependent

Application dependent

User preference dependent e.g. Google™



Ranking according to accuracy

Rating according to relevance

No models currently exist for geospatial analytics/queries

Nutrition Facts		
Serving Size 1 cup (85g) (3 oz.)		
Servings per container 2.5		
Amount per serving		
Calories 45	Calories from Fat 0	
% Daily Value*		
Total Fat 0g	0%	
Saturated Fat 0g	0%	
Cholesterol 0mg	0%	
Sodium 55 mg	2%	
Total Carbohydrate 10g	3%	
Dietary Fiber 3g	12%	
Sugars 5g		
Protein 1g		
Vitamin A 250% • Vitamin C 8% • Calcium 2% • Iron 0%		
<small>*Percent Daily Values are based on a diet of other people's misdeeds.</small>		
Total Fat	Less than 60g	60g
Sat. Fat	Less than 20g	20g
Cholesterol	Less than 300mg	300mg
Sodium	Less than 2,400mg	2,400mg
Total Carbohydrate	Less than 300mg	300mg
Dietary Fiber	Less than 75g	75g
Calories per gram: Fat 9 • Carbohydrate 4 • Protein 4		

