Upcoming changes in OGC standards and how to get involved

Bart De Lathouwer
President, OGC

Brussels, 24 October 2019

at FOSS4G Belgium 2019

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Making location count.

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Using location, we connect people, communities, technology and decision making to create a sustainable future

What is the OGC?

- *Hub for thought leadership and innovation*
- *Forum for communities to tackle interoperability issues within and across communities*
- *Global consortium of members (industry, government and academia)*
- *Open location standards organization*

Communities-
Tech & Domain

Partnerships
& Alliances

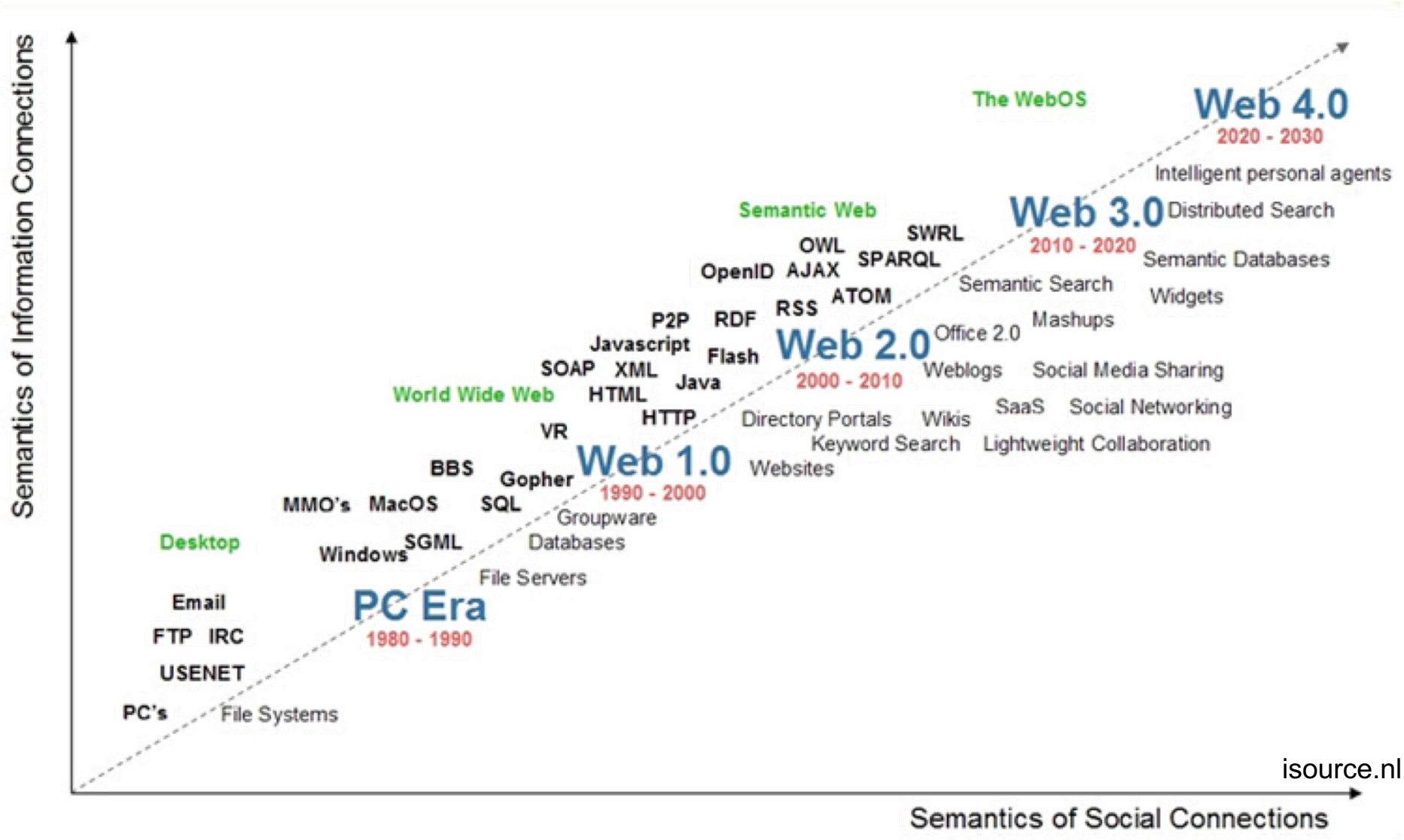
Process for
Standards &
Innovation

Spatial should not be Special*

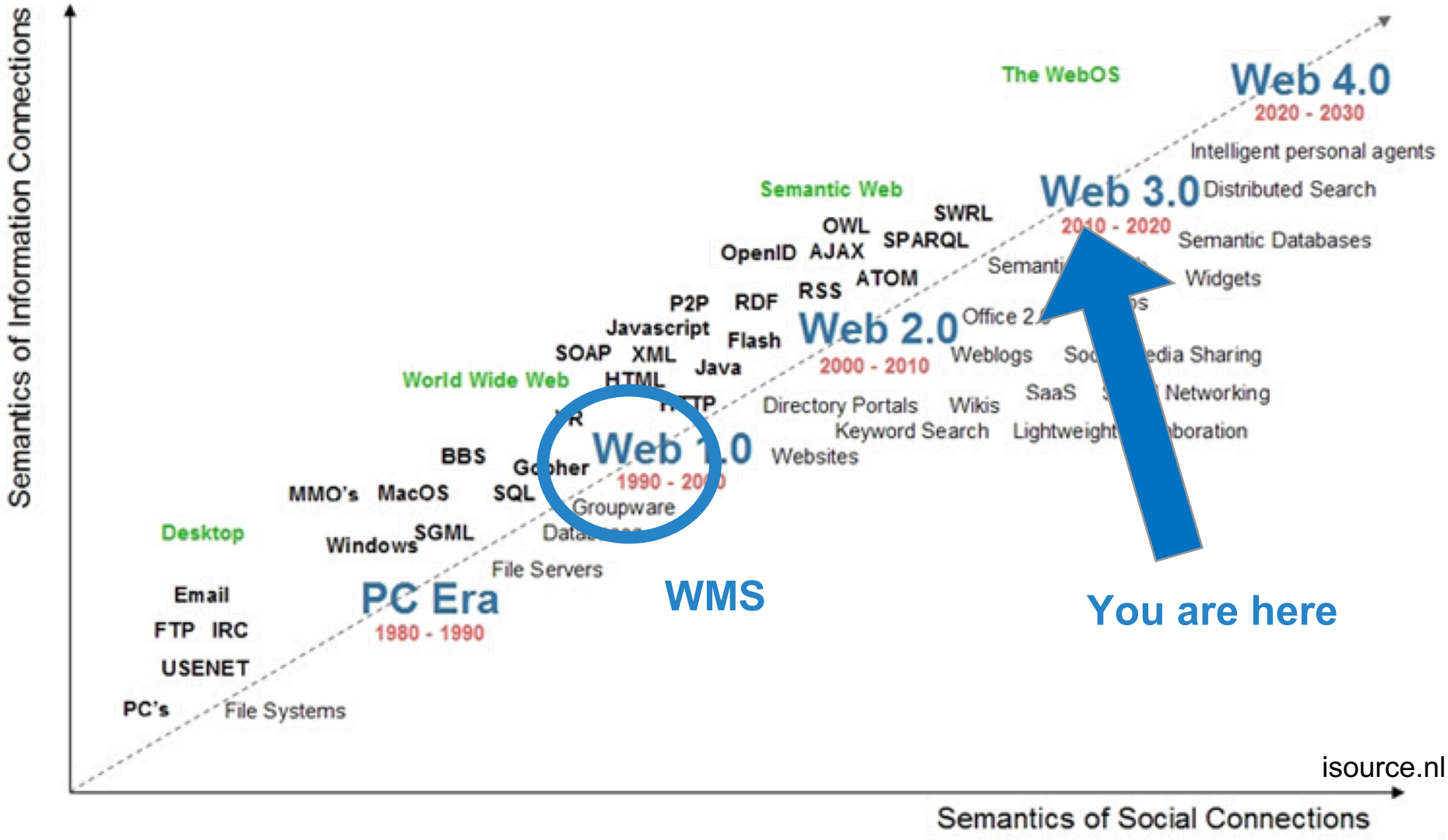
Image: Blade Runner

* Recognizing the complexity

Well how did we get here?
A brief history of …

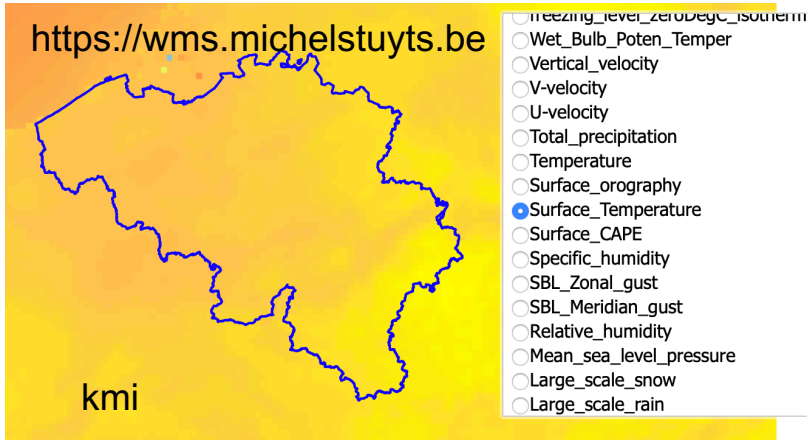


We were ahead of our time!

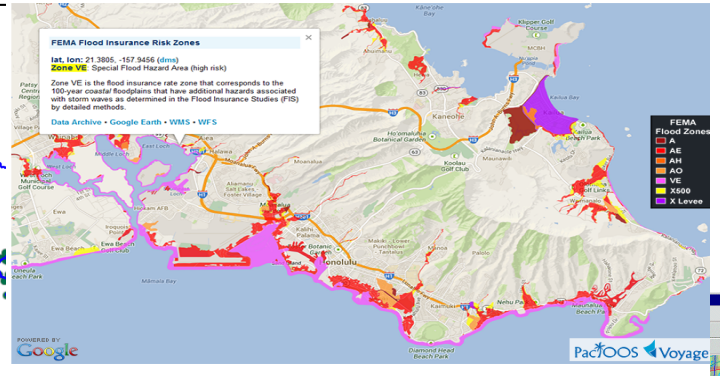


Millions of Geospatial Datasets on >200K Servers

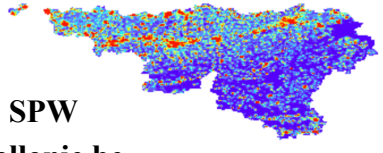
Web Map Service (WMS)
Web Map Tile Service (WMTS)
Web Feature Service (WFS)
Web Coverage Service (WCS)
KML, GML, GeoPackage
GeoTIFF, NetCDF, HDF



Waterinfo.be

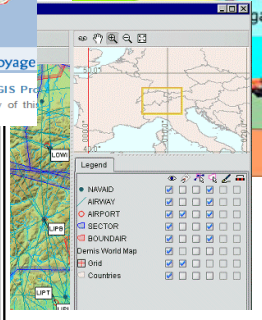


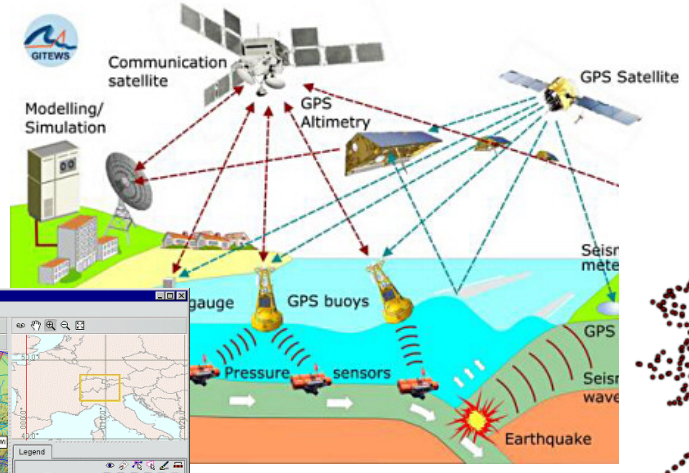
PacIOOS has generated a Web Map Service (WMS) and Web Feature Service (WFS) from the original Hawai'i Statewide GIS Pro
These interoperable Open Geospatial Consortium (OGC) standards will help users who may want to incorporate map imagery of thi
mapping applications: WMS GetCapabilities · WFS GetCapabilities



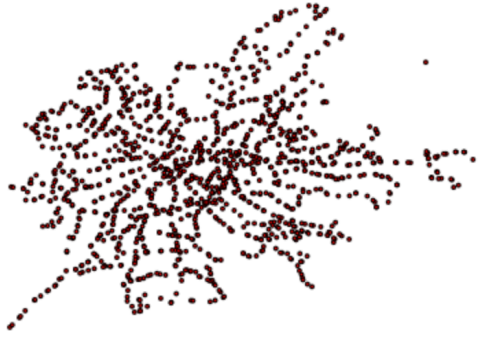
SPW
Wallonie.be

Bus au lieu de résidence
Bus au lieu de travail
Trains au lieu de résidence
Trains au lieu de travail





Meteorology, Hydrology
Ocean Monitoring



WMS INPSIRE de la STIB
Irisnet.be

ormation / Safety

stics: GeoSeer spatial data search engine: https://geoseer.net

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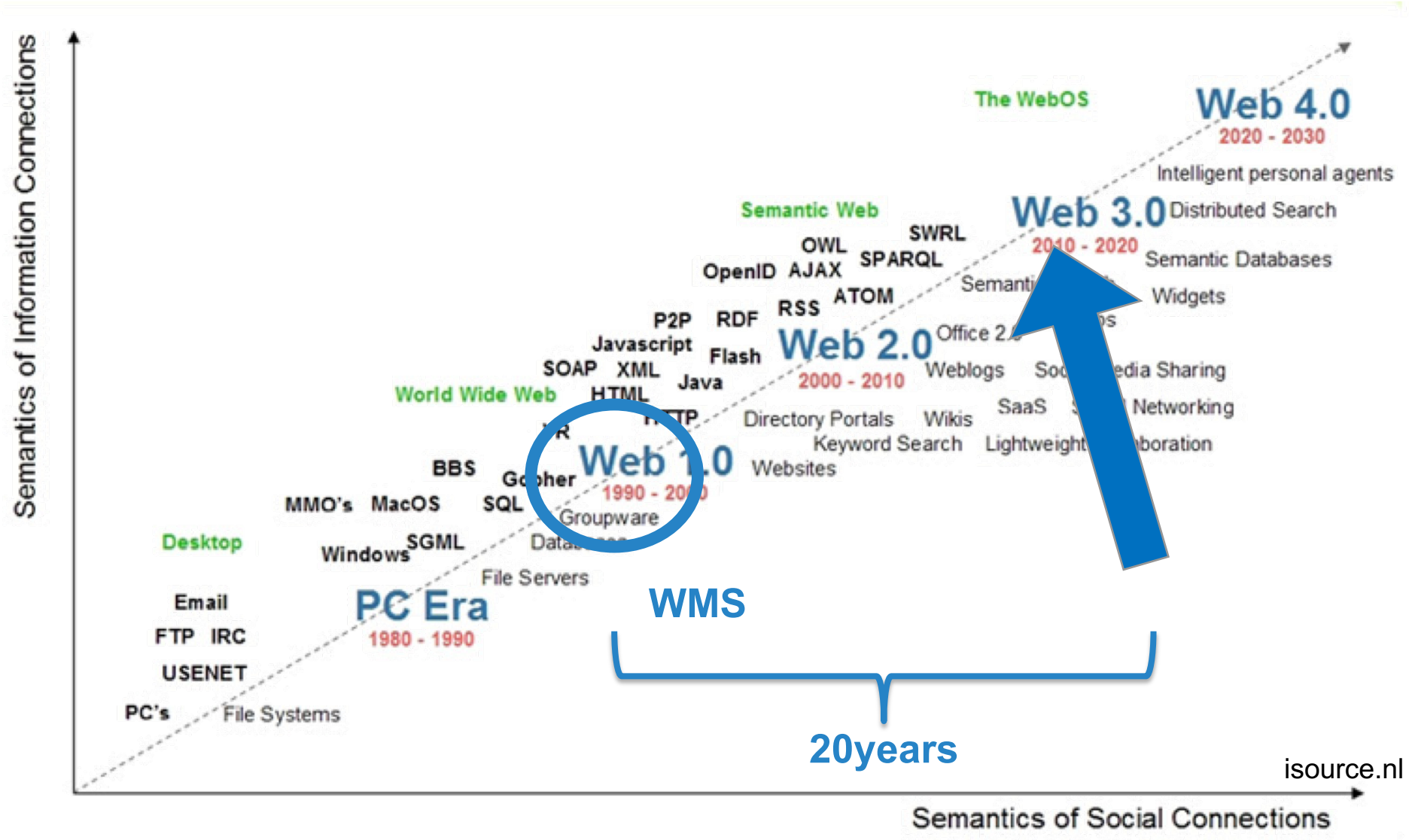
We are ahead of our time!
Harder, Better, Faster, Stronger



Madame Globe and Mister Cube met in 2014

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OGC and W3C come together in 2014, Universal Nation

OWS and API Innovation

- OGC is advancing new standards while simultaneously maintaining the OGC Standards Baseline
- The OGC API approach is based on technologies that did not exist during development of initial OGC Web Services (OWS).
- OGC will continue to maintain the approved OWS Standards, e.g., WFS, Version 2, while developing and maintaining new standards based on using approaches for APIs and OGC building blocks

This approach is consistent with the OGC Innovation Statement from 2014 that anticipates OGC addressing the innovator's dilemma of maintaining the current OGC standards baseline while simultaneously developing standards to support evolving and potentially disruptive technologies, community needs and market trends. ”

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OGC/W3C Best Practices for Spatial Data on the Web

Web principles for spatial data

- Use globally unique persistent HTTP URIs for spatial things
- Make your spatial data indexable by search engines
- Link resources together to create the Web of data

Key spatial aspects

- Use spatial data encodings that match your target audience
- Provide geometries on the Web in a usable way
- Provide geometries on the Web at the right level of accuracy, precision, and size
- Choose coordinate reference systems to suit your user's applications
- State how coordinate values are encoded
- Describe relative positioning

Access

- Use appropriate relation types to link Spatial Things
- Provide information on the changing nature of spatial things
- Expose spatial data through 'convenience APIs'

Metadata

- Include spatial metadata in dataset metadata
- Describe the positional accuracy of spatial data

https://www.w3.org/TR/sdw-bp/

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OGC API Standards Development – We Come 1

Modular API building blocks; spatially enable Web APIs in a consistent way

- Spatial Data on the Web Best Practices
- Leverages OpenAPI
- Focus on developer experience and usability
- Modular building blocks for access to spatial data that can be used in data APIs,
- Open development; Public GitHub, Early implementations, In-depth validation

OGC API - Features

OGC API - Coverages

OGC API - Map Tiles

OGC API - TJS

OGC API - Processes

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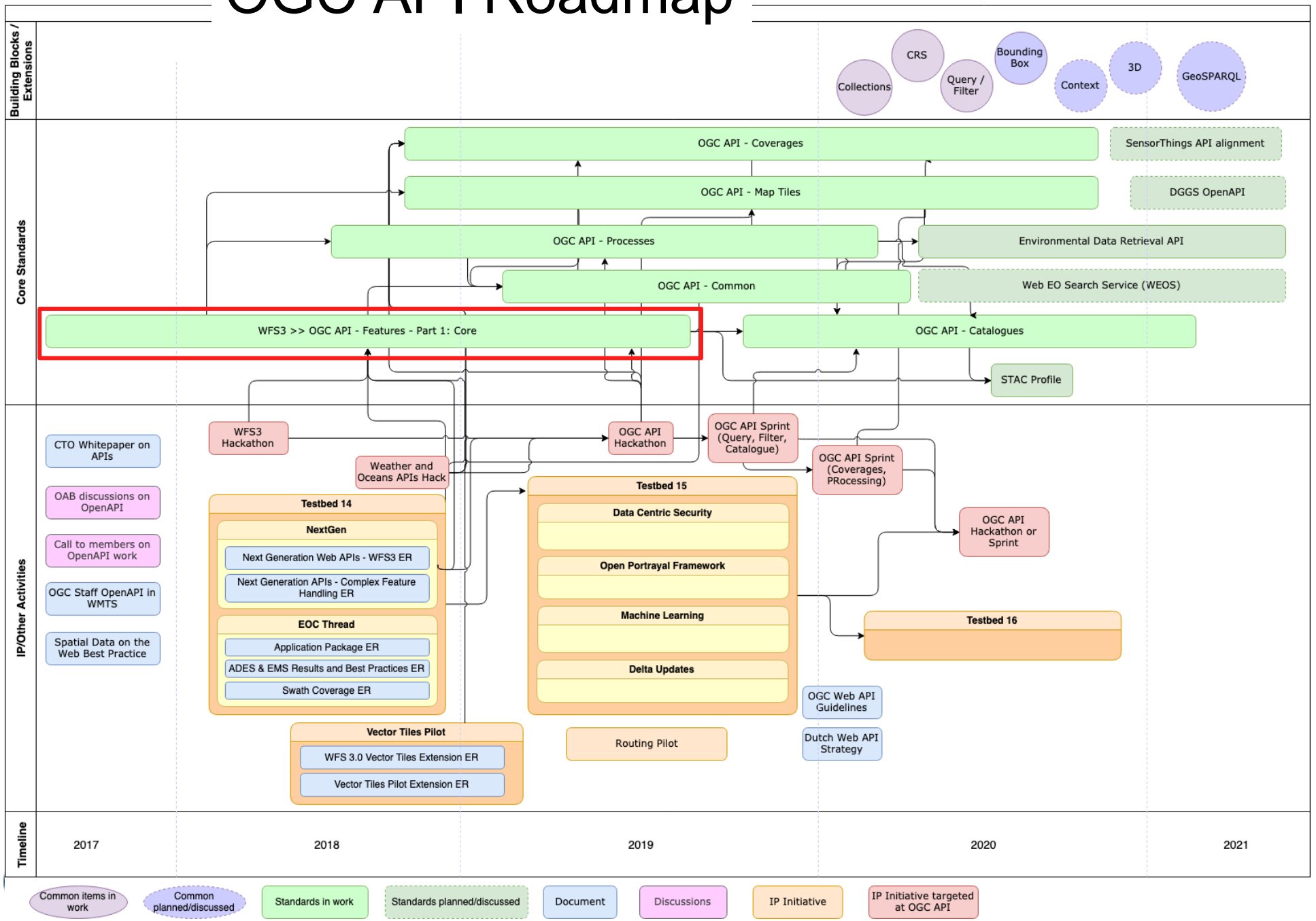
OGC API Roadmap



OGC - API Features: Access to collections of features

GET /collections

- Lists geospatial data collections that can be queried; describes basic information about the collection, e.g., id, description, spatial and temporal extents of all the data contained

GET /collections/buildings/items?bbox=160.6,-55.95,-170,-25.89

- Requests all data in collection "buildings" that is in the New Zealand economic zone.
- Response format (typically HTML or GeoJSON feature collection; GML is supported) determined using HTTP content negotiation. Data returned in pageable chunks.
- Core specification supports a few basic filters, in addition to the bbox filter

GET /collections/{collectionId}/items/{featureId}

- Returns single 'feature' - (a building, a stream, a county, etc.); typically described by a geometry plus other properties. Provides a stable URL to link to the ‘spatial thing'

OGC API Features - Implementations

- OpenAPI definition examples
  - first example (ogcapi-features-1-example1.yaml)
    - generic example uses path parameters to describe feature collections and all features.
  - second example (ogcapi-features-1-example2.yaml)
    - does not use path parameter for collections; explicitly provides information about feature collection 'buildings' (paths /collections/buildings etc.), schema of the building features (schema buildingGeoJSON), and filter parameter for building features

- Servers
  - interactive instruments, CubeWerx Inc., GeoServer, pygeoapi, jivan, sofp, STAC, nls-fi
- Clients
  - go-wfs3-client, ogr/gdal WFS 3.0 client driver, OWSLib WFS 3.0 client, STAC

https://github.com/opengeospatial/ogcapi-features

OGC API Companion / Advisory Documents

OGC Web API Guidelines

Principle #1 – Don't Reinvent
Principle #2 – Keep It Simple and Intuitive
Principle #3 - Use Well-Known Resource Types
Principle #4 – Construct consistent URIs
Principle #5 – Use HTTP Methods consistent with RFC 2616
Principle #6 – Put Selection Criteria behind the '?'
Principle #7 – Error Handling and use of HTTP Status Codes
Principle #8 – Use of HTTP Status Codes
Principle #9 – Use of HTTP Header
Principle #10 - Content Negotiation
Principle #11 - Pagination
Principle #12 – Processing Resources
Principle #13 – Support Metadata
Principle #14 – Consider your Security needs
Principle #15 – API Description
Principle #16 - Use IANA well-known identifiers
Principle #17 - Use explicit geospatial relations
Principle #18 - Support W3C Cross-Origin Resource Sharing
Principle #19 - Resource encodings
Principle #20 - Good APIs are testable from the beginning

https://github.com/opengeospatial/ogc-web-api-guidelines

OGC API Common

- API landing page
- API definition
- Declaration of Conformance.
- HTTP
- Web caching.
- Support for cross-origin requests
- Encodings .
- Coordinate reference systems
- Link headers
- Collections metadata
- Resource Collection metadata.
- Resource Collections
- Parameters.

https://github.com/opengeospatial/oapi_common/blob/master/19-xxx.html

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OGC API - Features and Catalogues Sprint, Nov 2019

- Extensions for OGC API – Features and OGC API - Catalogue
  - Organized jointly with the SpatioTemporal Asset Catalog (STAC)

- Query and Filter Operations
  - Will bring OGC API - Features to similar capability as WFS

- Dates: Tuesday, 5 November to Thursday, 7 November, 2019
  - Location: IQT CosmiQ Works, Arlington, VA, USA.
  - Apply to attend here: https://forms.gle/ELu3nbXQ16yLuu2S9
  - Majority of time will be spent in collaboration between participants in active coding

https://www.opengeospatial.org/events/191105apisprint

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ESIP/OGC API-Coverage/Grid Analytics Sprint, Jan 2020

- Extensions to OGC API - Coverages and OGC API - Processes
  - Methods to be available as building blocks for reuse in all OGC APIs
- Coverage analytics
  - As in OGC Geospatial Coverages Data Cubes Community Practice
  - Analytics using either OGC WCS Processing Extension (WCS-P) and/or OGC Web Processing Service (WPS).
  - Consider: Jupyter notebooks and Python scripting language; Array Databases, e.g., ISO/IEC 9075-15 SQL/MDA (Multi-Dimensional Arrays); GeoXarray and ZARR API;
  - Also OGC NetCDF, DAP/OPeNDAP, and RDF Data Cube with Geo-Spatial Extensions
- Sprint Co-located with 2020 ESIP Winter Meeting
  - 6/Monday and 7/Tuesday, January 2020 in Bethesda, MD, USA
  - Registration: https://2020esipwintermeeting.sched.com/info

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113TH OGC TECHNICAL COMMITTEE

Toulouse, FR

18-21 November 2019

#OGC19FR

Join us!
ogcmeet.org

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What Else Is There?

OGC Tech Trends

www.ReneMagritte.org

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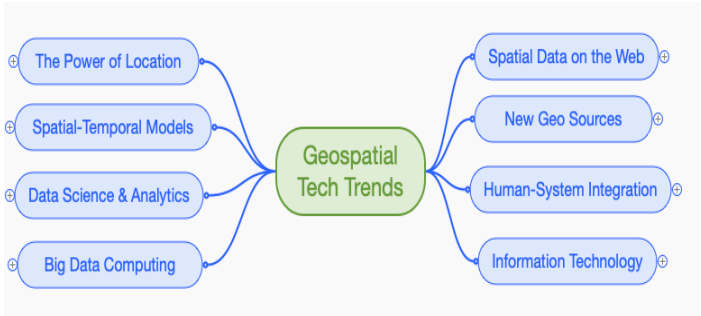
OGC Technology Trends

Breadth

Identify and Characterize Trends

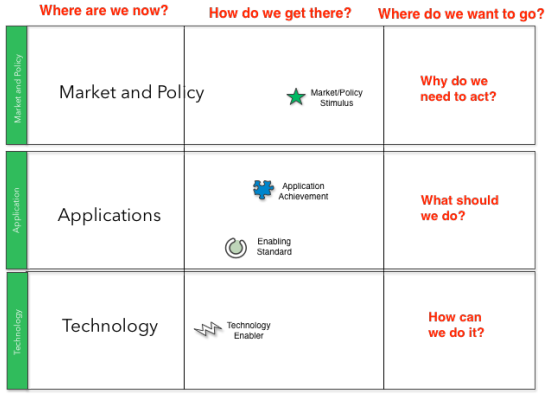
Trends Mindmap



Assessment

Prioritize and Evaluate Trends

Technology Roadmaps



Focus

Take Action

Innovation Program

e.g. planning Testbeds

Standards Program

e.g. Future Directions

Marketing And Promotion

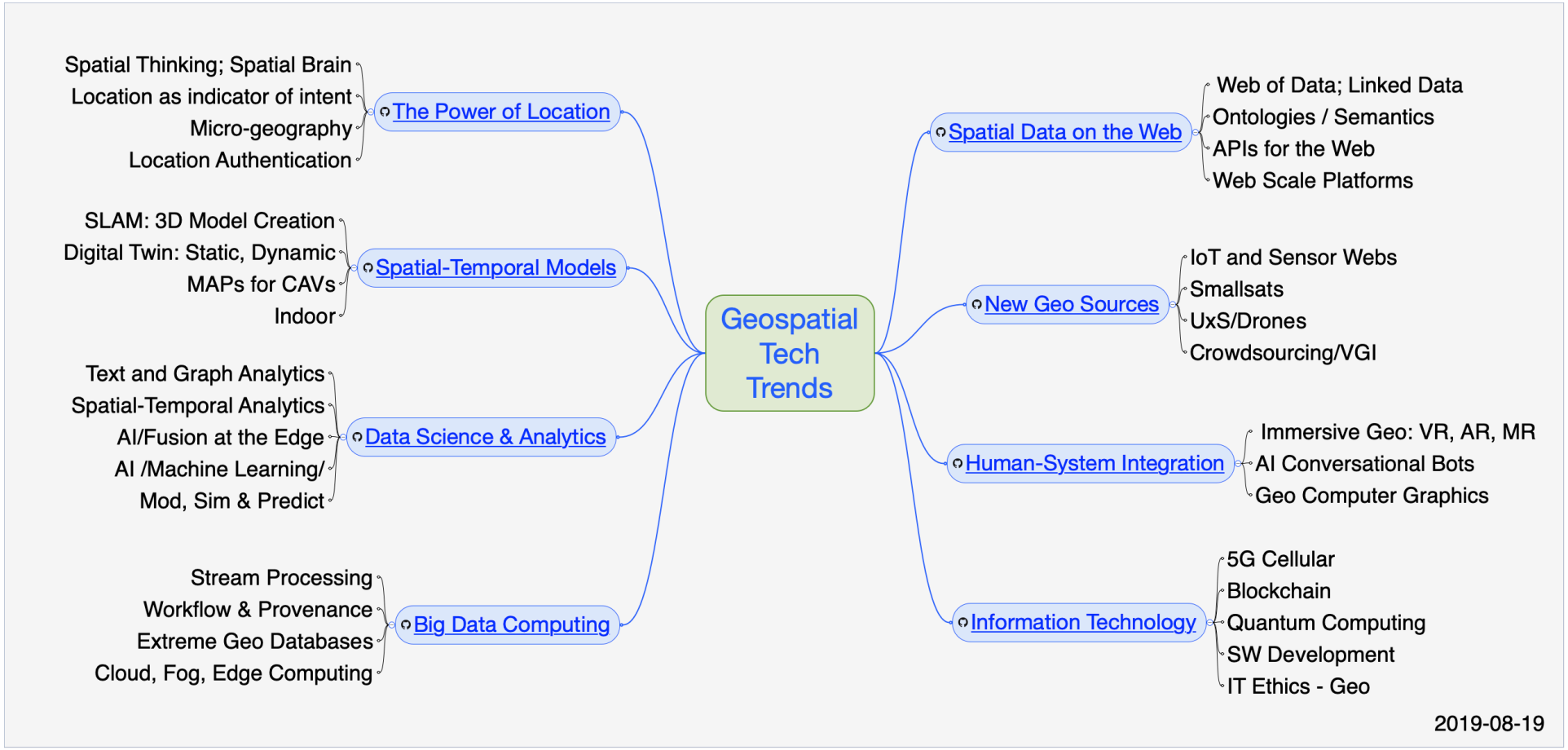
e.g. Location Powers

Member Consultation

e.g. NDA Tailored forecasts/discussion

https://github.com/opengeospatial/OGC-Technology-Trends

OGC Tech Trends Mindmap



Publicly Available at: https://github.com/opengeospatial/OGC-Technology-Trends

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OGC Trends Assessed in 2019

- 2019Q1
  - Indoor
  - UAV/UAS/UxS
  - Blockchain
  - Immersive Geo: AR, VR, xR
  - Mod, Sim, Predict
- 2019Q2
  - Digital Twin: Static and Dynamic
  - Web of Data: Linked Data, GQL
  - Machine Learning
  - Quantum Computing & Sensing
- 2019Q3
  - Edge Computing: AI/ML, VR
  - Maps for CAVs
  - Geo IT Ethics
  - Data Science: AI/ML
- 2019Q4
  - Scaling to 100,000+ sources
  - Geospatial Technology Basemap

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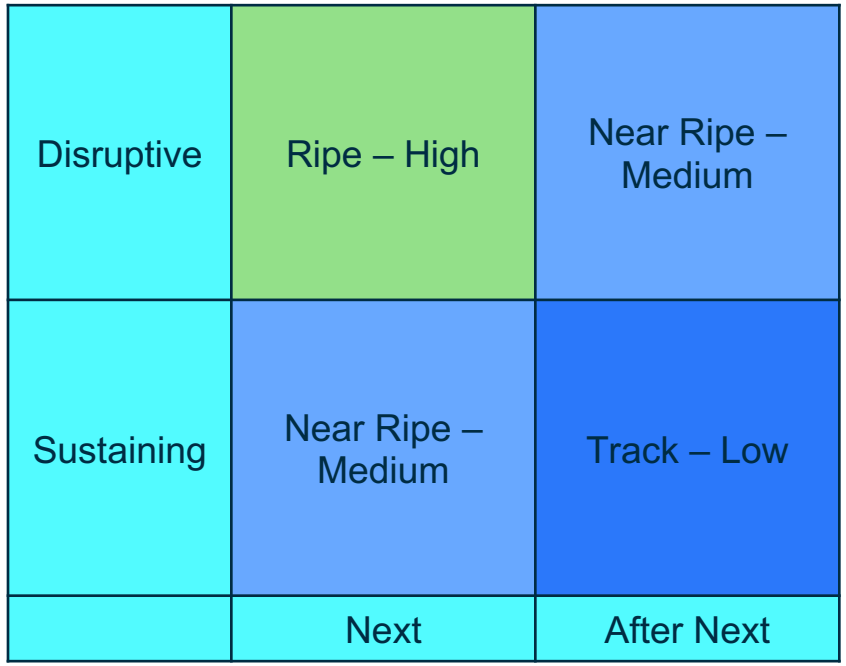
Identifying “Ripe Trends”

- Criteria 1: Horizon
  - Now: current activity in OGC program that is leading to mature product (TRL 6+)
  - Next: Planned for next testbed or a SWG to happen in the next year.
  - After Next: Future
- Criteria 2: Impact
  - Sustaining innovation
    - comes from listening to the needs of customers in the existing market and creating products that satisfy their predicted needs for the future.
  - Disruptive innovation
    - Disruptive innovation creates new markets separate to the mainstream; markets that are unknowable at the time of the technologies conception.



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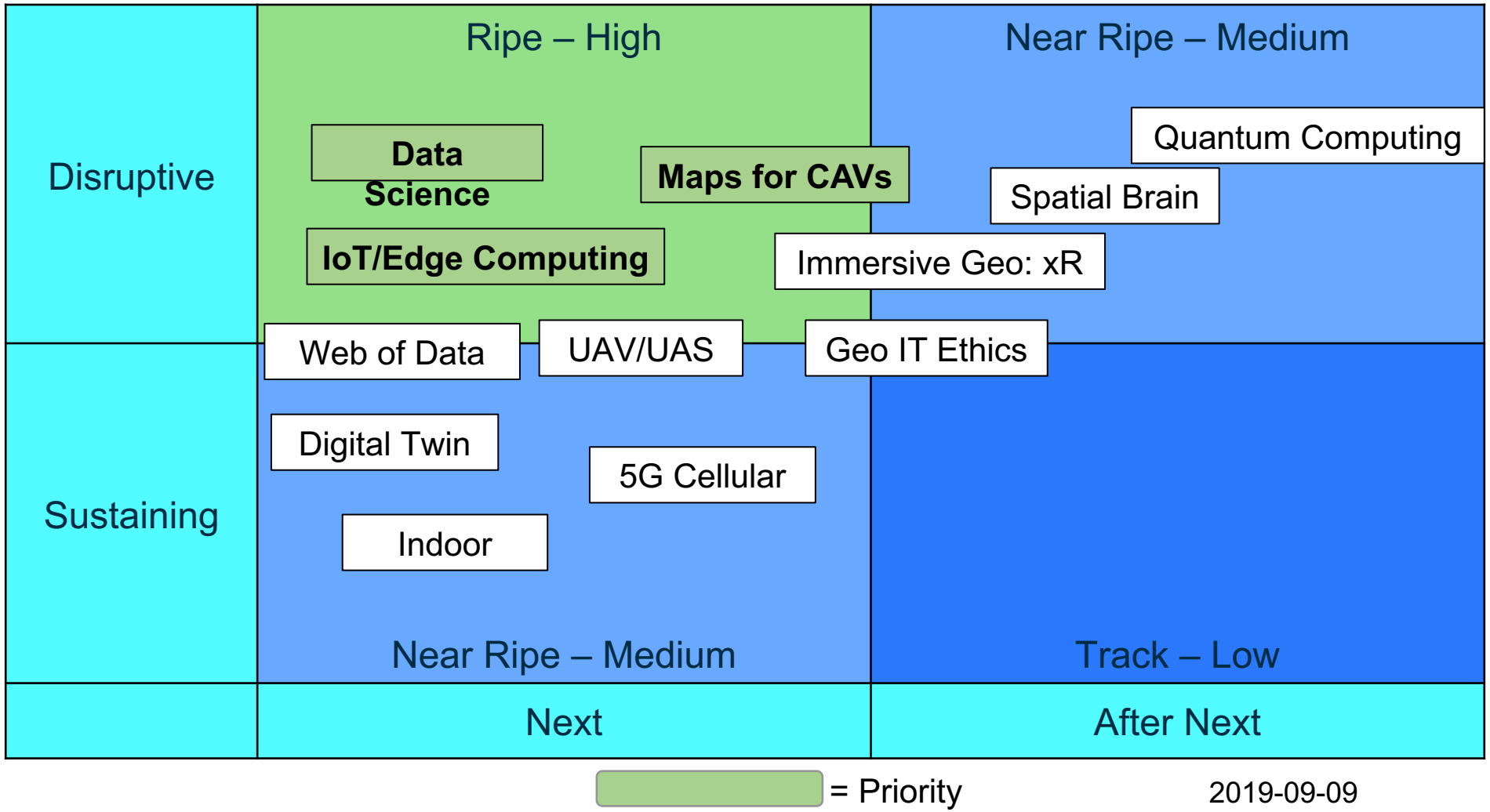
Priority Tech Trends



https://github.com/opengeospatial/OGC-Technology-Trends/

Conclusions

- Spatial is not special*
  - We need align with mainstream IT
  - Democratize location
- OWS is here to stay
  - OGC is advancing new standards while simultaneously maintaining the OGC Standards Baseline
- OGC API aligns with web best practices
- We are ahead of the technology curve

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* Recognizing the complexity

Thank you!!

- Please reach out:
  - bdelathouwer@ogc.org
  - @BartDeLathouwer

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