WOUDC Web Services
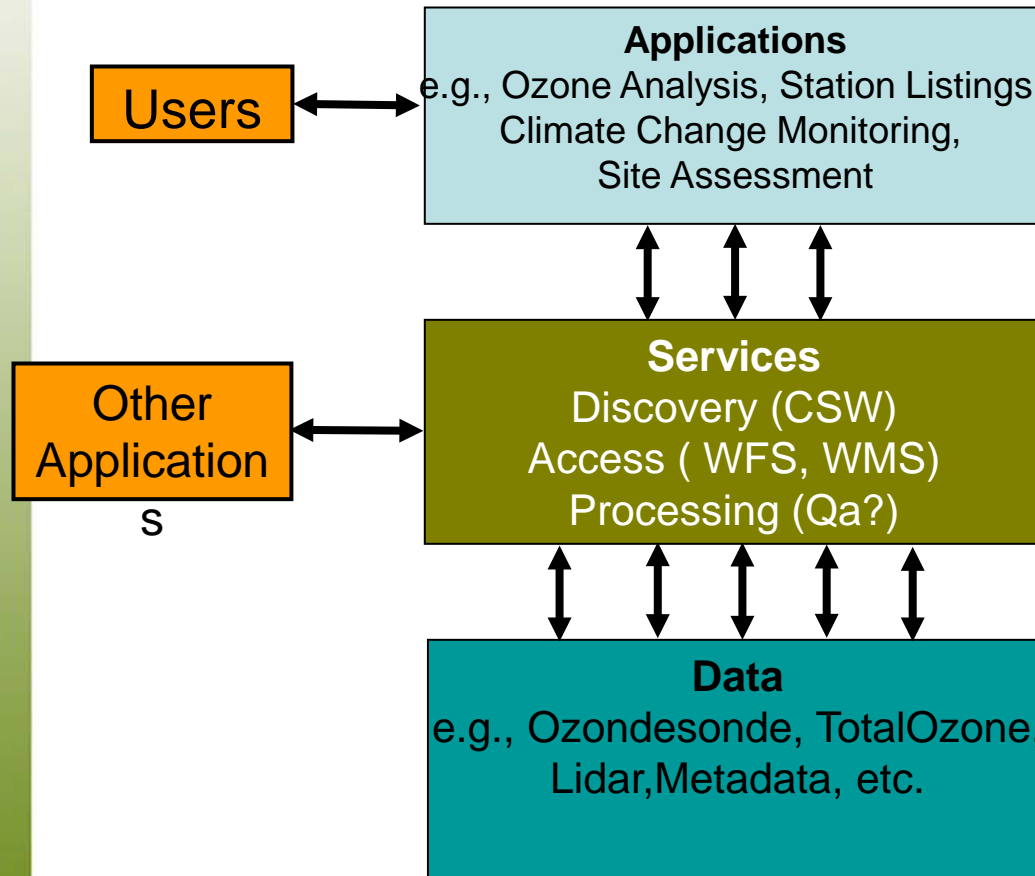
Web Services Definition

- A Web service is a method of communications between <u>two electronic devices</u> over the World Wide Web. It is a <u>software function</u> provided at a network address over the web with the service always on as in the concept of utility computing (on demand).

- Users can dynamically mix and match Web services to perform complex transactions with <u>minimal programming</u>.

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Web Services Architecture

Users

Applications
e.g., Ozone Analysis, Station Listings,
Climate Change Monitoring,
Site Assessment

Other Applications

Services
Discovery (CSW)
Access (WFS, WMS)
Processing (Qa?)

Data
e.g., Ozondesonde, TotalOzone,
Lidar,Metadata, etc.

For Example…

A community website provides station locations for ozone measurements

Uses services

Based on Data Contributors

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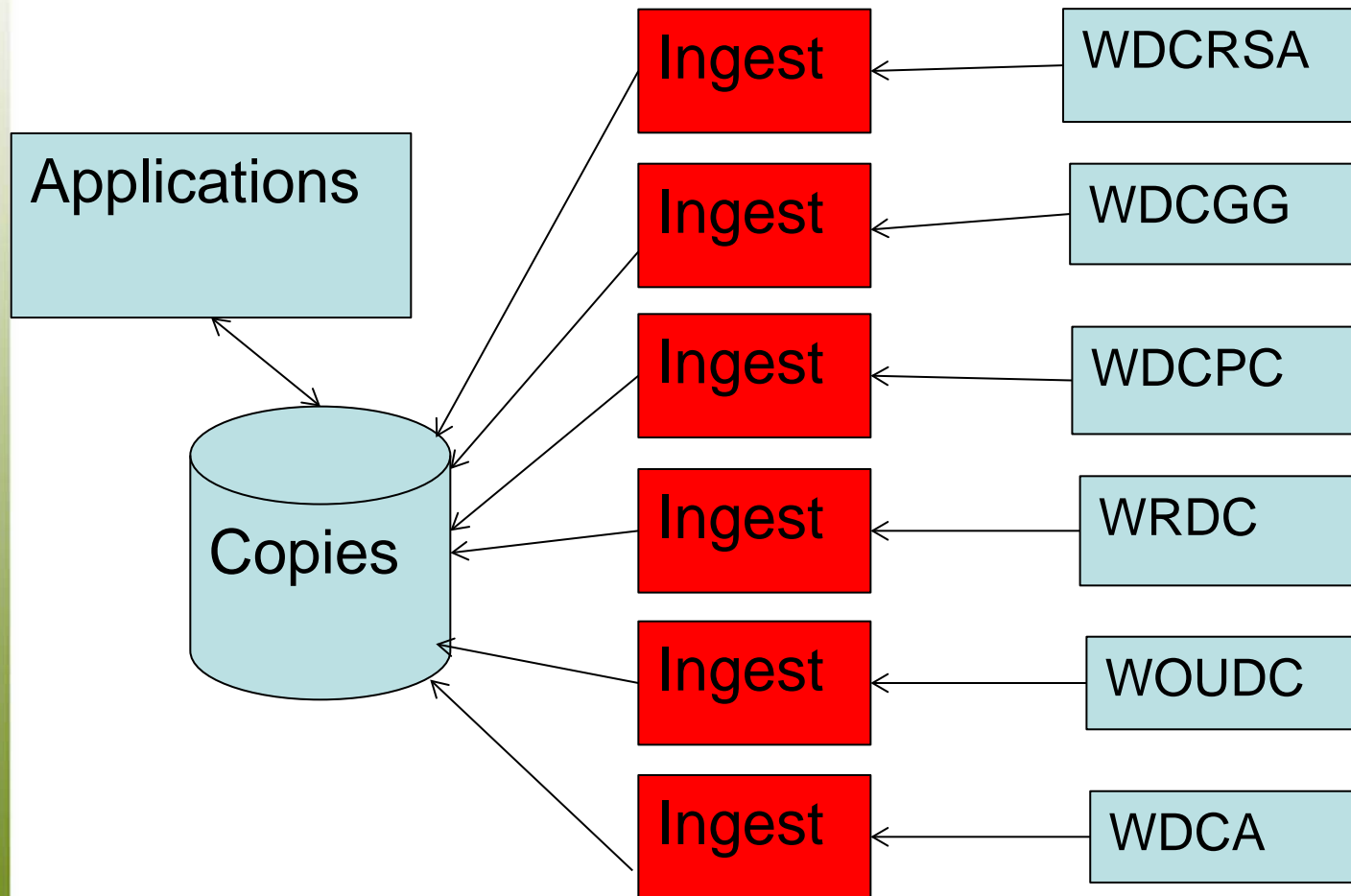# Open Standards and Interoperability

- Interoperability – ability to share information and services…degree to which they are to be shared.
- If two or more systems are capable of communicating and exchanging data, they are exhibiting syntactic interoperability. Specified data formats, communication protocols and the like are fundamental.
- Beyond the ability of two or more computer systems to exchange information, semantic interoperability is the ability to automatically interpret the information exchanged meaningfully and accurately in order to produce useful results as defined by the end users of both systems. To achieve semantic interoperability, both sides must refer to a common information exchange reference model.
- Open standards rely on a broadly consultative and inclusive group including representatives from vendors, academicians and others holding a stake in the development.
- They are usually published and are available freely or at a nominal cost to any and all comers, with no further encumbrances.
- Various vendors and individuals (even those who were not part of the original group) can use the standards document to make products that implement the common protocol defined in the standard, and are thus interoperable by design, with no specific liability or advantage for any customer for choosing one product over another on the basis of standardised features.
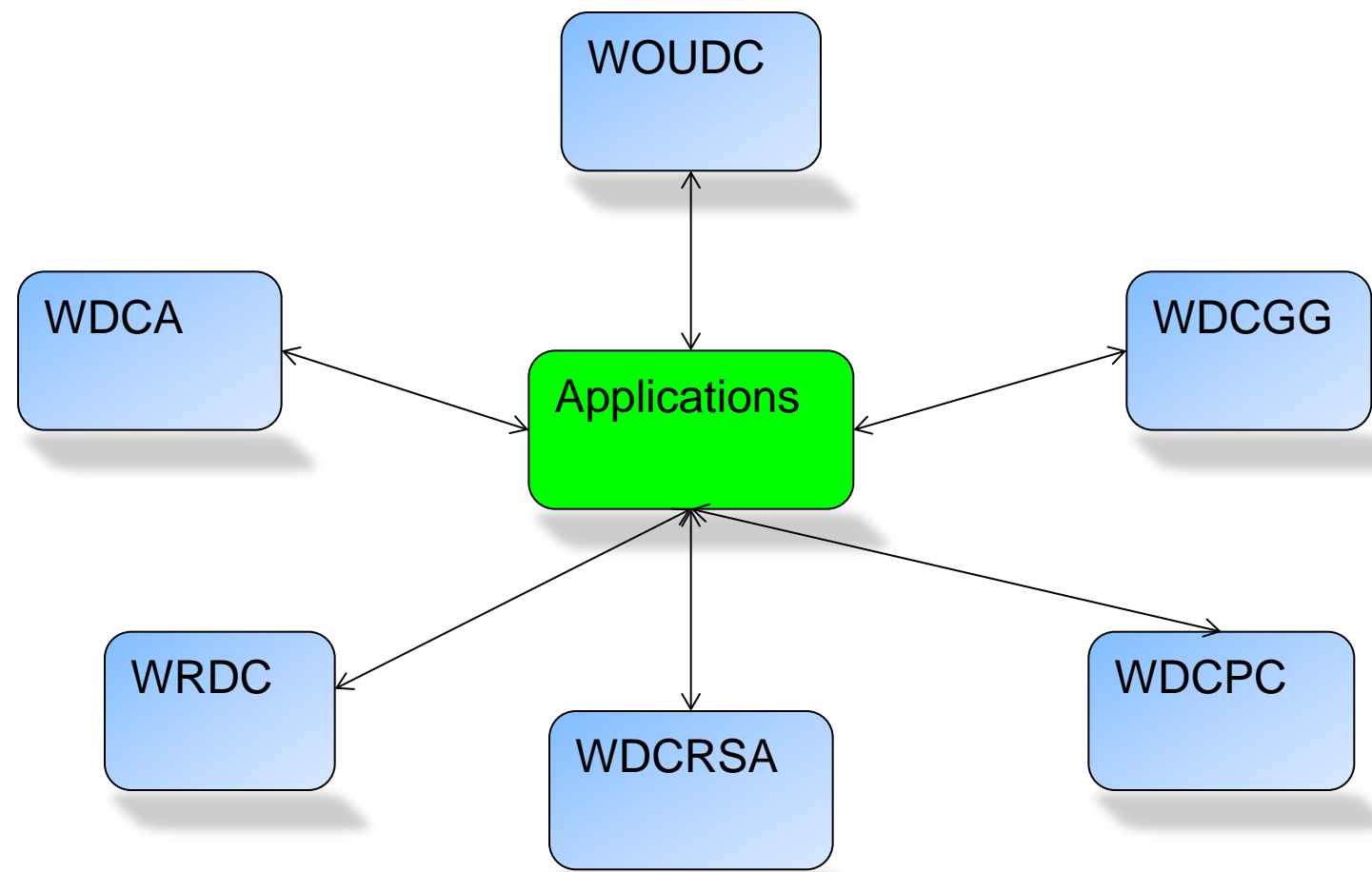
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Interoperability: From This

Applications

Copies

Ingest ← WDCRSA

Ingest ← WDCGG

Ingest ← WDCPC

Ingest ← WRDC

Ingest ← WOUDC

Ingest ← WDCA

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Interoperability: To This

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Geospatial Data

- Geospatial data, GIS data or geodata has explicit geographic positioning information included within it, such as a road network from a GIS, or a geo-referenced satellite image. Geospatial data may include attribute data that describes the features found in the dataset.

- There are two types of geospatial data - vector and raster.

- Vector data uses the simple geometric objects of points, lines, and areas (polygons) to represent spatial features

- Raster data uses a grid to represent its geographic information. Points are represented by single cells, lines by sequences of neighboring cells, and areas by collection of grouping cells.

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Open Geospatial Consortium (OGC)

- The OGC is an international voluntary consensus standards organization … open standards for geospatial content and services, GIS data processing and data sharing.
- WMO investment in OGC
  - OGC MOU [1]
  - OGC MetOcean Domain Working Group
  - WMO Information System (WIS)
    - WMO Core Metadata Profile (ISO XML)
    - Cataloguing, Metadata, Discovery
    - Data Formats / XML
- implemented by many initiatives
  - GEOSS
  - WMO WIS
  - EU INSPIRE
  - Open Data

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OGC Standards

- CSW - Catalog Service for the Web: access to catalog information
- GML - Geography Markup Language: XML-format for geographical information
- KML - Keyhole Markup Language: XML-based language schema for expressing geographic annotation and visualization on existing (or future) Web-based, two-dimensional maps and three-dimensional Earth browsers
- NetCDF (Network Common Data Form) is a set of software libraries and self-describing, machine-independent data formats that support the creation, access, and sharing of array-oriented scientific data.
- Observations and Measurements
- SensorML - Sensor Model Language
- WFS - Web Feature Service: for retrieving or altering feature descriptions
- WMS - Web Map Service(WMS): provides map images

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ISO Standards

- 19115 – Metadata

- 19115-2 - Metadata - Part 2: Extensions for imagery and gridded data

- 19128 - Web Map server interface

- 19136 - Geography Markup Language

- 19139 - Metadata - Implementation specification

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Data Services / Standards Matrix

	Service / Interface	Format / Encoding
Discovery Metadata	OGC CSW SRU OAI-PMH OpenSearch	ISO 19115 WMO Core Metadata Profile
Station Metadata	OGC WMS OGC WFS	Web images OGC SensorML
Instrument Metadata	OGC WMS OGC WFS	Web images OGC SensorML
Observations	OGC WMS OGC WFS	Web images OGC O&M XML CSV KML Shapefiles GeoJSON

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Open-source software (OSS)

- OSS is computer software with its source code made available and licensed with a license in which the copyright holder provides the rights to study, change and distribute the software to anyone and for any purpose. Open-source software is very often developed in a public, collaborative manner.

- A report by the Standish Group (from 2008) states that adoption of open-source software models has resulted in savings of about $60 billion per year to consumers

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Technology: Free and Open Source

- Backend Processing System
  - Python
- Archive Database / Datamarts
  - PostgreSQL
  - PostGIS: geometry handling
- Geospatial Web Services
  - MapServer (WMS, WFS, SOS)
  - pycsw (CSW, SRU, OAI-PMH)
- Web Application / UI
  - Web Experience Toolkit, PHP
  - jQuery, Leaflet
  - Selenium Web Automation testing

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Next steps

- WOUDC Web Services user acceptance testing and implementation – March, 2014
- ET-WDC interoperability strategy and action plan?

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