User-generated spatial content and the need for SDI standards

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The GSDI Association and UGC

- Non-Profit Organization: heavy focus on inclusiveness and democratic processes (**user generated content**)
- Foster spatial data infrastructure developments in support of important worldwide needs such as:
  - improving local to national economic competitiveness
  - addressing local to global environmental quality and change
  - increasing efficiency, effectiveness, and equity in all levels of government, and
  - advancing the health, safety and social wellbeing of humankind.
- Global commons/global marketplace in geographic data
  - redirect technological and legal approaches towards **providing incentives for sharing locally collected data and enabling sharing**

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B Poore, USGS at GIScience 2010

Recently, several National Mapping Agencies have debated whether VGI might be incorporated into national map products and spatial data infrastructures (SDI). The U.S. Geological Survey (USGS), is currently undertaking an experimental project on this topic.

The term "VGI" has likely caught on within the academic community not only because it originated from an authoritative source (Goodchild 2007) but also because it rolls off the tongue with ease. In many respects, however it is misleading because it does not distinguish between very different types of user-generated content (UGC).

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Wikipedia definition of UGC

User-generated content (UGC), also known as Consumer generated media (CGM) or user-created content (UCC), refers to various kinds of media content, publicly available, that are produced by end users. Its use for a wide range of applications reflects the expansion of media production through new technologies that are accessible and affordable to the general public.

- Open source
- Free software
- Flexible licensing/related agreements
- Reduce collaboration barriers/build skills

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Tech Megatrends

Social	Real-time	Location based services	Mobile	Behaviour & Transactions
Explosive growth of Facebook, Twitter, DailyBooth, etc. Openness / **willingness to share**: users share more each passing quarter Consumer behaviour more 'forgiving' re privacy/ disclosure. Mobiles/smartphones ideal for social web and instant sharing.	Time-relevant data being created/used in new ways. Twitter led charge, others now integrating time-relevancy in products. Collective wisdom and crowd-sourcing, piecing together unstructured information in mashed up services. User analogue status and movement **based on place** being turned into digital, real-time streams. Twitter, FourSquare	'Check-ins' = important structured data. **Trending locations,** awareness of location of others, and ultra-relevant LBS ads. Alerts for traffic jams, turn-by-turn directions, finding the nearest ATM or coffee shop. + Local discovery Foursquare, Gowalla, Yelp, Loopt,Brightkite, Google Latitude	Intertwined with real-time data. Pervasiveness amplifies sharing and increases potential of the collective wisdom. Power shift to those mastering content, monetization, access and cloud. **Initial or most common interface** for many new products and services. Apple & Google lead.	Analogue transactions and behaviours rapidly convert into real-time feeds of data and services. UI and UX important in social communities and products – the 'new IP' driver. **Social Engineering is replacing Algorithm Engineering**. Initial product cycles = finding key insights in shifting behaviour trends and patterns. Hipmunk, Foursquare, WePay and Tweetdeck.

User Generated Content

Several categories:

- Crowd sourcing, e.g. Wikipedia

- Expert sourcing, e.g. OSGB

- Volunteered geographic information
('VGI' coined by Goodchild 2007)

- Asset data, e.g. highways or maintenance

- Feedback on base reference mapping,
e.g. Tele Atlas Mapshare

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UGC for crisis mapping

Source: http://www.ushahidi.com/

Source: www.inrelief.org

Source: http://www.sahanafoundation.org

Source: http://www.openstreetmap.org/

- Ushahidi
- InRelief
- OpenStreetMap
- Sahana
- CrisisCommons

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Crisis mapping relevance

- OpenStreetMap data was the best anyone had in Haiti – better than military or the UN

- The Ushahidi-Haiti / Tufts University GeoSMS incident reporting was a game-changer

- The efforts have been institutionalized in the form of conferences, support from major players like NATO, UN, World Bank, and foundations

- These organisations **are involved in SDIs**

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Next steps for crisis mapping

- Crisis Mappers are also seeing a need to connect these highly successful efforts to ongoing, institutional capacity building work.

- Often more money and expertise is devoted to an area in a crisis than at any other time.

- We must leverage this to catalyze organizational work such as local SDI efforts, building out the UN SDI, building geospatial technology expertise at the local level, etc….

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What do users want?

User Generated Content

- Who is this common man?
- Highly educated, well-paid and trained professionals working on UGC
- How to motivate different players in VGI?
- Data integration activity
- Legal aspects: copyright and intellectual property, privacy

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A Legal Perspective

1. a big part of the problem is that people wish to set aside the legal issues associated with combining "authoratitive" data with crowd-source data. In an ideal world it would be easy to combine the two types of data sets, but the reality is that there are significant legal issues (privacy, intellectual property rights, data quality/liability) that make it difficult to combine the two without serious thought and discussion. Until both (or all) sides are willing to reasonably articulate and address those issues I am concerned the potential benefits will not be realized.

Kevin Pomfret (Lawyer and OGC Board Member) response to an industry blog.

Be the Crowd

16 September 2010 by Bill Dollins

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Implications: Law and Policy

- The Lemming Report - Accident Reports Based on GPS
  - Turns on to train tracks, hit by train

  - Truck navigated to narrow township roads, and occasionally trapped / wedged between buildings

  - Car collides with sand pile

  - Drive into river (ford)

  - Drivers stranded on gravel track adjacent to 100ft cliff

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OGC and UGC

- Standards facilitate interoperability and data sharing
- There are existing, proven standards for web services
- The OGC community involved in VGI, citizen science, crowdsourcing and other user generated content areas
- OGC groups actively addressing issues:
  - Business Value Committee
  - Spatial Law and Policy Committee
  - Data Quality Working Group
  - Geosynchronisation Standards Working Group
  - Open GeoSMS Standards Working Group
  - KML Standards Working Group

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User Generated Content

ACTIVITY	EXAMPLE	STATUS	CONSENT
Open Community (crowdsourcing)	Open Street Map Wikipedia	Data ready for review/open use	Yes
Private Community (VGI)	Tele Atlas, Navteq ESRI Community Maps	Data ready for review/paid use	Yes
Citizen Science (VGI)	Antartic research, birdwatching input	High quality expert output	Yes
Sensors (VGI)	In-vehicle, mobile phone, CCTV, RFID	Raw data	Not always
Social (VGI)	Twitter, Facebook, LinkedIn, Google, FourSquare, etc.	Push-pin maps and embedded algorithms	Optional
Spatial Data Infrastructure	VGI-Net and OSGB Open Data	????	????

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Citizen Science

- Research in the US has shown that citizen scientists identified crab types correctly 95% of the time (Cohn 2008)

- Citizen scientists show significant commitment to the topic and are as capable as the best researchers, in many cases. Thus, the information that they produce should be **trusted**.

- M. Haklay, May 2010, Position paper for GIScience workshop on the role of VGI in advancing science, **Geographical Citizen Science – clash of cultures and new opportunities.**

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OGC Sensor Web Enablement (SWE)

SWE is a revolutionary approach for exploiting Web-connected sensors such as flood gauges, air pollution monitors, satellite-borne earth imaging devices etc.

The goal of SWE is to creation of Web-based sensor networks. That is to make all sensors and repositories of sensor data discoverable, accessible and where applicable controllable via the WWW.

OGC defines specifications and services for this goal.

http://www.crisisgrid.org/html/ogc-swe.html

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Citizens as sensors

- SWE proved useful for clarifications. Presented a mapping between central SWE concepts and VGI Sensing, as well as a possible application of SWE technologies to VGI.

- A workflow for event detection based on VGI Sensing was specified, including the role of (virtual) VGI sensors. An example walkthrough was provided for the case of flood detection based on Flickr images.

- VGI Sensing can be complementary to remote sensing, and 'traditional' in situ sensors. It can providehigh-scale value-added information at low cost.

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Citizens as sensors

- The approach could be used as to enrich crisis management models inputs or to refine output results.

- As a next step, they will investigate this relation, especially in respect to shared features of interest, observed properties and measurement procedures.

- VGI Sensing relies on human reporting changes intheir environment and it is the human input to Web 2.0 that is sensed.

- 'Classical' sensing, on the contrary focuses on the environmental changes directly. It remains to be explored how both sensing principles can benefit from each other.
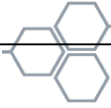
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Citizens as sensors

- SWE as a component of VGI
  Conclusions:The potential of up to 6 billion human sensors to monitor the state of the environment, validate global models with local knowledge, and provide information that only humans can capture is vast and has yet to be fully exploited…

- In the paper the focus of attention moved from citizen as sensors to sensing of VGI flows.

- http://gisandscience.com/2010/10/19/citizens-as-sensors-for-crisis-events-sensor-web-enablement-for-volunteered-geographic-information/

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How do users contribute?

Who are the users?

Emergency Services

Agriculture

Transportation

Sustainability

E -Gov

Municipal Services

Water

Energy & Utilities

How can Web 2.0 capabilities help governments do more with less in each area of SDI societal benefit?

- Gov. to Gov. (G2G) – reporting, data sharing within and between government

- Gov. to Business (G2B) – delivery and service agents need effective data

- Gov to Citizen (G2C) – scrutiny, transparency, informed choice, marketing and promotion

Figure from OGC and Bill Oates, Welsh Assembly Government
http://www.slideshare.net/wpoates1/wherecampeu-do-we-need-or-want-an-sdi
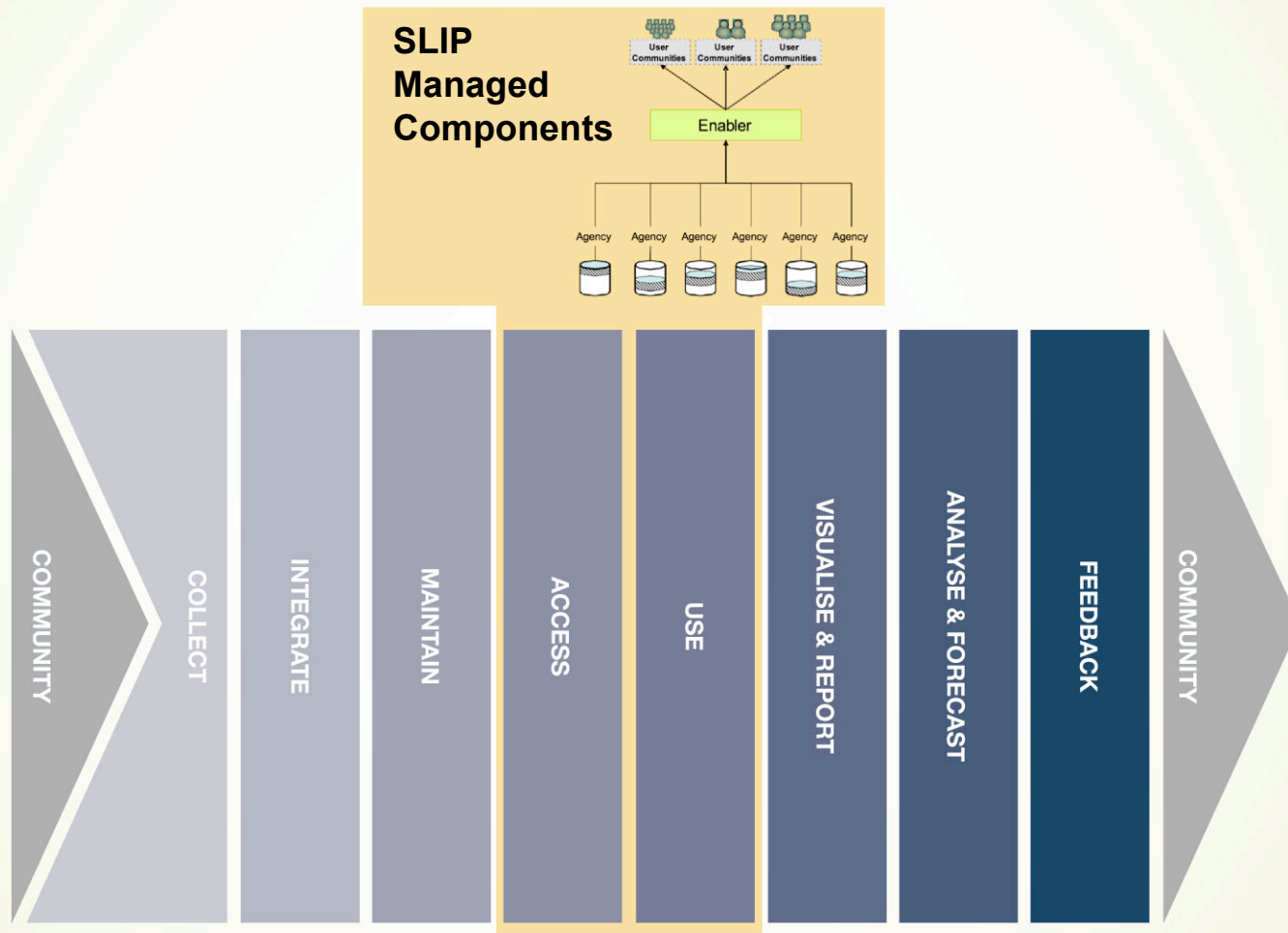
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What has changed

- SDIs aim to provide governments, local communities, non-governmental organizations, businesses, the academic community and citizens with increasingly useful data and tools to solve a wide range of problems

- Mobile devices and easy-to-use web services have added a new dimension to this progress. Previously, most mapping and spatial data infrastructure development was performed by or for governments

- Citizens now have hand-held devices incorporating phones, cameras, GPS, maps and location services, and also internet-connected sensors embedded in homes, offices, stores and vehicles that are contributing location and descriptive data.

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LOCATION INFORMATION STRATEGY - MAKING IT REAL!

SLIP Managed Components

COMMUNITY

COLLECT

INTEGRATE

MAINTAIN

ACCESS

USE

VISUALISE & REPORT

ANALYSE & FORECAST

FEEDBACK

COMMUNITY

Governance – Collaboration – Innovation – Industry Development – Education and Awareness Raising

Land Data

Climate Data

Infrastructure Data

Cultural Data

Social Data

Defence

Demographic

Health

SLIP Enabler Components

Application Use

Portal Services

Catalogue

OGC Web/Data Services

Security

powered by
SLIP ENABLER ®

System Management

Map Viewer

User & Information Services
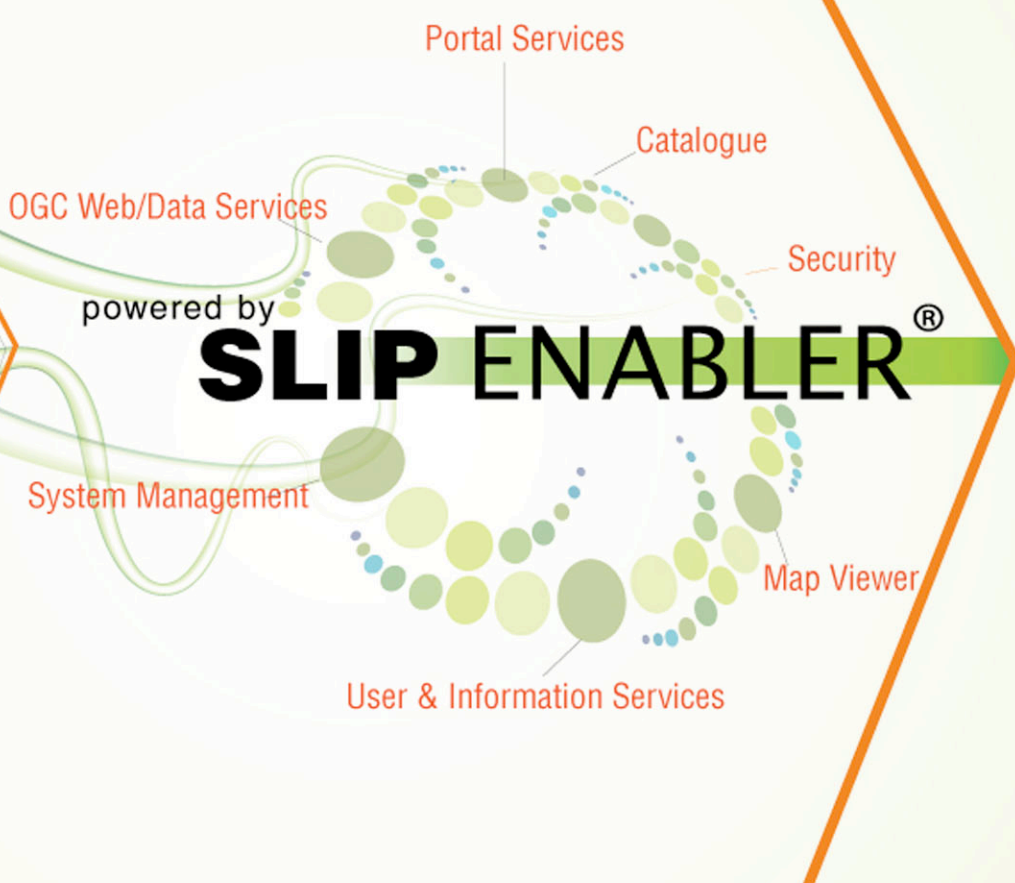
Mobile Application

SLIP Developer Partners

GIS Desktop Application

Web Browser

Statistics Report, Excel

Volunteer Geographic Information

Improved Decision Making

SLIP Enabler
Shared Land Information Platform
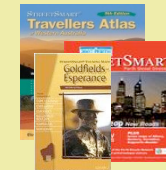
Dynamically updated Online Products

- Maps
- Data
- GIS Analysis

Products represent a 'View'of the underlying Data

TOPO / Carto DB

**Extensible
Well Structured
In Built Location Knowledge**

Dynamically Updated Map Products

Travellers Atlas
Goldfields Esperance
STREETSMART

Products represent a 'View'of the underlying Data

Joined Up Government Location Information Maintenance

Trusted Partners (including Direct Shared Editing, Crowd Sourcing , etc)

WALIS Members

Open standards example

Open GeoSMS is an open-coordinate short message service (SMS) standard to allow transmission of map information and communications among different platforms of digital maps. The goal is to share location information across operating systems and applications.

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Open GeoSMS

- In progress to be
  an OGC Standard

- Significant potential for
  many applications

- Characteristics
  - Multilingual
  - Multi-device
  - Harmonmized with many
    existing applications
  - Incorporates relevant
    ISO standards

http://maps.google.com/maps?q=35.237312,129.078884&GeoSMS=T
13:00 to 15:00, June 5th, 2010.
Department of Computer Science and Engineering
Pusan National University
Kumjung-Gu, Pusan, 609-735 South Korea

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Open GeoSMS and
real-time traffic alerts
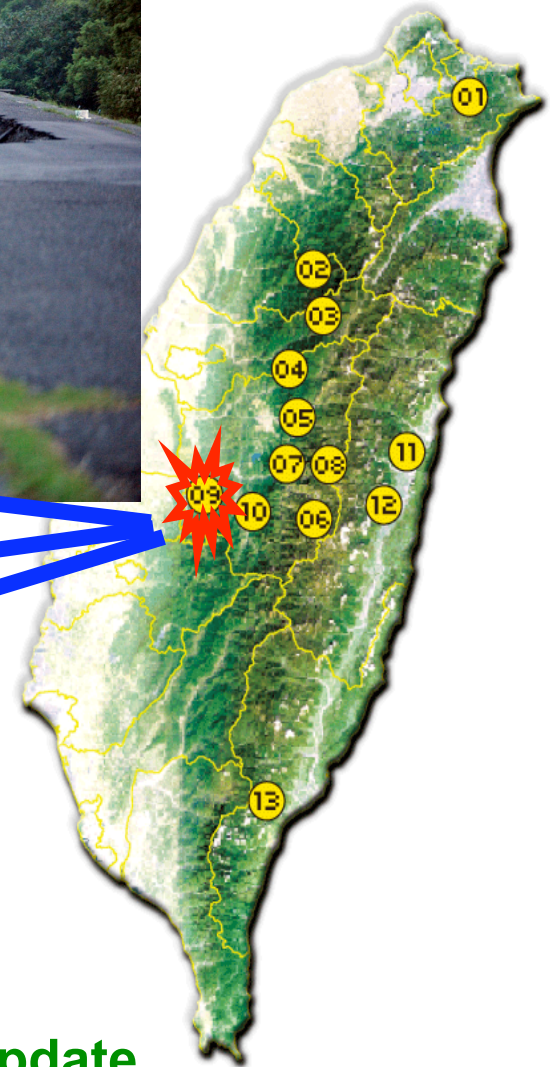
Open
GeoSMS

Emergency Real-time Alert or Update

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User Generated Standard

Open GeoSMS is being driven by the Taiwanese community (a consortium of organizations and companies). It has been implemented by many carriers in the Asian market.

The latest version has been enhanced to be consistent with ISO/OGC spatial referencing (CRS)and GML. There is also now an extension mechanism so that KML, GML and other encodings can be referenced.

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GeoNode

- People fill user profiles to establish identity on the web
- Profiles then *become* useful data
- GeoNode has user profiles and features them
- Those profiles have ISO metadata fields within them

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Metadata Made Easy

Rolando Peñate

Rolando Peñate joined CAPRA on May 15, 2009 and has shared **352 data sets** and created **17 maps**.

Description:
I make maps, I help make software for making maps, and I generally spend too much time around maps.

Languages:
English (Preferred), Spanish

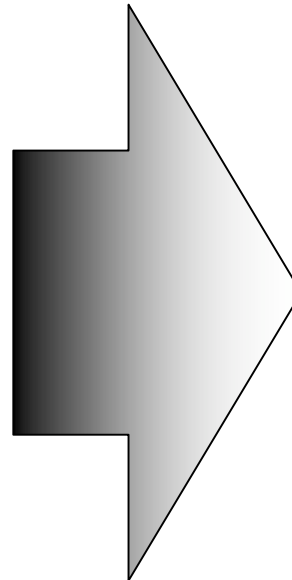**Location:**
Brooklyn, NY, USA 11238

Organization:
OpenGeo
349 W 12th Street #3
New York, NY 10014

Edit profile

Following (4)

General Details	
Dataset Title:	Domestic Energy Consumption, 2006
Time Period of Dataset(s):	01/01/2006 to 31/12/2006
Geographic Coverage:	England and Wales
Lowest Area Output:	Middle Layer Super Output Areas (MSOA)
Supplier:	Department of Energy and Climate Change (DECC)
Department:	Energy Statistics
National Statistics Data?	National Statistics
Revisions:	None

Data Quality

This document provides a range of information that describes the quality of the data and details any points that should be noted when using the data.
ONS has developed Guidelines For Measuring Statistical Quality ; these are based upon the six European Statistical Service (ESS) Dimensions of Quality developed by Eurostat. The dimensions are:

- Relevance
- Accuracy
- Timeliness and Punctuality
- Accessibility and Clarity
- Comparability
- Coherence

About the dataset
(including the quality dimensions: Relevance and Timeliness and Punctuality)
The dataset provides total and average consumption of domestic ordinary electricity, economy 7 electricity and gas as well as counts of meter points at Government Office Region (GOR), Local

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Metadata Published

Metadata is published with open, OGC standard CSW using GeoNetwork.

- Open standards for data access.
- GeoNode also has open APIs
- Data published by GeoServer in OGC Services: WMS, WFS, WCS
- Metadata published by GeoNetwork in OGC CSW

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- Content owners control access with easy user interface
- Data security extends to OGC services

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Open standards example

- GeoRSS and the GeoRSS GML profile was contributed to by the OGC.

- However, there is no adopted GeoRSS GML profile.

- OGC Fast track process, possible way forward.

- GeoRSS GML has been implemented in many products and applications (BING, Google Maps, ArcGIS, ERDAS Titan, Opengeo, Geoserver), as well as integrated into a number of news aggregators.

- GeoRSS has become the industry de facto standard for encoding location in the feedworld.

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Open standards example

- GeoSPARQL - aligned with OGC Simple Features and SQL MM.

- OGC more involved in the semantic interoperability domain with this work.

- Also starting a new PubSub Standards Working Group whose focus is defining standard architecture and operations for implementing consistent PubSub for all OGC Web Service standards.

- This is key to eventually having a consistent foundation for handling events.

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Unattributed quote GIScience 2010

VGI can be seen as a way of producing geographical information, and as a tool for updating national geographical databases (Antoniou, Haklay & Morley in press) in which case the appropriate context is spatial data quality and the production of geographical information.

Standards can help with many aspects from defining the quality, metadata through to data access and delivery.

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Thank you for listening

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