ECOM-ICOM Experts Address Series
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Linked Open Data: Semantics at Global Scale

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Data

Open Data → Smart Cities

Linked Open Data → Global Semantics

↓

Semantic Data Architecture

The Economist Topics Print edition More

https://www.economist.com/news/leaders/21721656-data-economy-demands-new-approach-antitrust-rules-worlds-most-valuable-resource

Regulating the internet giants

The world's most valuable resource is no longer oil, but data

The data economy demands a new approach to antitrust rules

Data

We generate a lot of it

We don't really know what to do with it

We hope that analytics gives us the edge

Open Data

Creates Opportunity	**innovation and economic growth**
Improves Government	**improve services and tackling transparency and corruption**
Empowers Citizens	**informed decision making and social mobilisation**
Solves Public Problems	**data-driven engagement and assessment**

The Impact of Open Data

Description: A platform created by the Mexican Institute for Competitiveness (IMCO) that provides citizens with information about school performance. It helps parents choose the best option for their children, empowers them to demand higher-quality education, and gives them tools to get involved in their children's schooling. It also provides school administrators, policymakers, and NGOs with data to identify hotbeds of corruption and areas requiring improvement. Data available on the site was used in a report that uncovered widespread corruption in the Mexican education system and stirred national outrage.

http://www.oreilly.com/data/free/the-global-impact-of-open-data.csp

Open Data drives Smart Cities

Government support is crucial in advancing smarter travel - whether it is open data friendliness or advocacy work.

"Smarter travel" is all about personalization and empowerment. Consumers will continue to expect this kind of empowerment allowing them the convenience of totally personalized solutions from flights to local activities. To keep up with the surge in Smarter Travel, policymakers should encourage open data, for example, in public transportation, traffic, flight information, mapping information while promoting industry innovation.

nielsen

Google

http://services.google.com/fh/files/misc/2017_google_nielsen_smarter_digital_city_whitepaper.pdf

Report of Consultancy Study on Smart City Blueprint for Hong Kong

June 2017

pwc

Principles

1. Data should be open as far as practicable, with exceptions made for legal, privacy, security, commercial sensitivity, competition and operational concerns
2. Data is timely and comprehensive. The data should be consistently updated, and real-time if available and feasible, to ensure not only quantity but also the quality of data.
3. Data is accessible and usable, provisioned in a way that allows for easy retrieving, downloading, and searching.
4. Data is comparable and interoperable, provisioned in standard formatting for ease of use by different stakeholders.
5. Open data is used to stimulate creativity, innovation, and collaboration.

Principle 4 – Comparable and Interoperable

1. We recognize that in order to be most effective and useful, data should be easy to compare within and between sectors, across geographic locations, and over time.
2. We recognize that data should be presented in structured and standardized formats to support interoperability, traceability, and effective reuse.
3. We will:
   a. Implement consistent, open standards related to data formats, interoperability, structure, and common identifiers when collecting and publishing data;
   b. Ensure that open datasets include consistent core metadata and are made available in human- and machine-readable formats;
   c. Ensure that data is fully described, that all documentation accompanying data is written in clear, plain language, and that data users have sufficient information to understand the source, strengths, weaknesses, and analytical limitations of the data;
   d. Engage with domestic and international standards bodies and other standard setting initiatives to encourage increased interoperability between existing international standards, support the creation of common, global data standards where they do not already exist, and ensure that any new data standards we create are, to the greatest extent possible, interoperable with existing standards; and
   e. Map local standards and identifiers to emerging globally agreed standards and share the results publicly.

https://opendatacharter.net/principles/

https://www.smartcity.gov.hk/report/full/

A Smart City needs a Data Architecture

Open data is at the centre of London's transition into a smart city

The capital has made major strides with open data initiatives. But questions remain about privacy, data ownership and the role of public and private sectors

Open data initiatives are changing the way we think about our cities. Photograph: Vladimir Zakharov/Getty Images/Moment Open

London is winning plaudits for its open data initiatives, which proponents claim are changing how the city is governed and organised. But the benefits of the open data revolution aren't confined to government. Advocates say it is also kickstarting a wave of enterprise and innovation around public sector data.

Last month, the Greater London Assembly (GLA) was named best publisher by the Open Data Institute (ODI), winning praise from world wide web creator Tim Berners-Lee.

The centre piece of their programme, the GLA's London DataStore, created in 2010, contains over 500 free to use datasets in a range of formats, making it a valuable resource for developers and researchers.

29 SEP 2017 https://www.thoughtworks.com/insights/blog/building-ecosystem-innovation

Building an ecosystem for innovation

City as a Platform (CaaP)

At the end of the day, it all comes down to data. These new digital platforms are the new brokers of information, which allow them to connect to a large number of ecosystems, and by that provide even more value to their users. With the right data, nearly any problem can be solved. In Manchester, a small team of passionate ThoughtWorkers used publicly available data to address the challenge of planning a trip within the city.

Linked Open Data

How to deal with data you have never seen before?

The Semantic Web

The Semantic Web

Formal Knowledge Representation

Global Identification

Properties are First Class (Semantics)

Reasoning and Inferencing

Open World Assumption

Linked Open Data - Maturity Levels

RDF

Everything is a Resource "Things, not Strings"

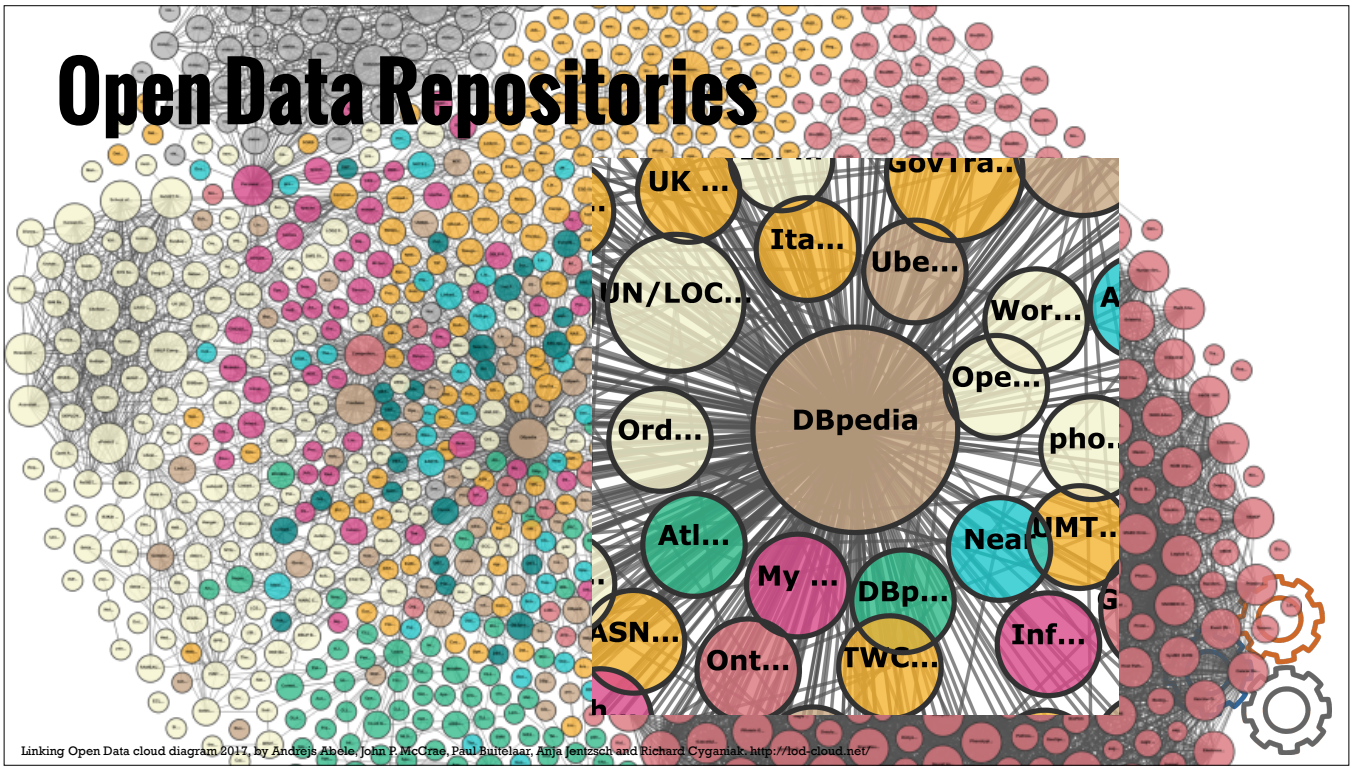
Combine data from disparate sources

Discover more data (context)

Learn the schema/ontology

Your data is more discoverable

Open Data Repositories



Linking Open Data cloud diagram 2017, by Andrejs Abele, John P. McCrae, Paul Buitelaar, Anja Jentzsch and Richard Cyganiak. http://lod-cloud.net/

Linking Repositories
Global "Web of Data"
Reuse concepts, terms, types
Assert "Sameness"
Repository Metadata (Provenance)

Case Study - Data.Gov.Hk

Electric Car Charging Stations

ELECTRIC VEHICLE CHARGING STATION LOCATIONS

CLP Power Hong Kong Limited Transport Historical Data Available

This API (in XML format) provides location data (including GPS data, address, etc.) of elect to the data dictionary for detail.

Share

Facebook Google+ Twitter Sina Weibo

Data Resources

XML Electric vehicle charging station locations (English / Traditional Chinese)

Additional Information

Maintainer	Enquiries opendata@clp.com.hk 26786662
Update Frequency	As and when necessary
Data Dictionary	https://opendata.clp.com.hk/ev_opendata_spec.

DETAILS OF HK ELECTRIC EV CHARGING STATIONS

The Hongkong Electric Company, Limited Transport Historical Data Available

Provide the location data and service detail of HK Electric EV charging stations. The CSV file contains carpark name, district, addresse, level/ floor, parking bay no., service provided and GPS data of the charging station.

Share

Facebook Google+ Twitter Sina Weibo

Data Resources

CSV Details of HK Electric EV charging stations (English)

CSV Details of HK Electric EV charging stations (Traditional Chinese)

Additional Information

Maintainer	General Enquiries ev@hkelectric.com 2510 2701
Update Frequency	As and when necessary
Data Dictionary	https://www.hkelectric.com/en/CustomerServices/Documents/Spec_EV_charging_station_en.pdf

Data Dictionaries

Field Name	Data Type	Description
HK Electric EV Charging Station_Car Park	String	Name of the car park where the HK Electric EV charging station located
District	String	District of the HK Electric EV charging station: -Eastern -Wan Chai -Southern -Central & Western
Address	String	Detail address of the HK Electric EV charging station
Level/ Floor	String	The floor of the HK Electric EV charging station in the car park
EV Parking Bay No.	String	Parking bay no. of the HK Electric EV charging station in the car park ("/" = Not applicable)
Service Provided	String	The type of charging service provided at the HK Electric EV charging station: -Standard charging -Quick charging (CHAdeMO Standard) -Quick charging (IEC Type 2 AC, CCS DC Combo and CHAdeMO standard)
Latitude	Number	Latitude of the HK Electric EV charging station
Longitude	Number	Longitu

location	The location name of the EV charging station	**Lung Cheung Mall**
lat	Latitude of the EV charging station	**22.34259033**
lng	Longitude of the EV charging station	**114.1907196**
type	Charging type of the EV charging station Valid value(s): -Standard -SemiQuick -Quick	**Standard**
districtL	Area name Valid value(s): - Hong Kong Island - Kowloon - New Territories - Outlying Islands	**Kowloon**
districtS	District under the area (districtL)	**Wong Tai Sin**
address	The full address of the EV charging station	**Lung Cheung Plaza Carpark, Level 3, 136 Lung Cheung Rd, Wong Tai Sin, Kln**

HK Electric EV Charging Station_Car Park	District	Address	Level/ Floor	EV Parking Bay No.	Service Provided	Latitude	Longitude
The Peak Galleria Car Park	Central & Western	118 Peak Road, The Peak, Hong Kong	B1	60	AC Quick Charging (21kW IEC Type 2 and 13A socket)	22.27038383	114.1494522
Star Ferry Car Park	Central & Western	9 Edinburgh Place, Central, Hong Kong	1/F	311	DC Quick Charging (50kW CHAdeMO Standard)	22.28308105	114.1602554
Star Ferry Car Park	Central & Western	9 Edinburgh Place, Central, Hong Kong	1/F	317, 318 & 321	AC Medium Charging (7kW IEC Type 2 and 13A socket)	22.28308105	114.1602554
Composite Building C Park, HKU						02	114.136429
Cityplaza Car Park						9167	114.2182007
Cityplaza Car Park						9167	114.2182007
Oi Tung Estate Car Pa						38	114.226713
Yue Wan Estate Car P						3345	114.2402496
Hing Wah (I) Estate C Park						96	114.235072
Tin Hau Car Park						3528	114.1916885
Cyberport Car Park 1	Southern	Cyberport 2, 100 Cyberport Road, Hong Kong	2/F	216, 217	AC Quick Charging (21kW IEC Type 2 and 13A socket)	22.26254463	114.1307755
HK Electric ex-Operational Headquarters	Southern	2 Yi Nga Drive, Ap Lei Chau, Hong Kong	G/F	/	AC/DC Quick Charging (41kW IEC Type 2, 50kW CCS DC Combo and 50kW CHAdeMO Standard)	22.24452	114.148218
Stanley Plaza Car Park	Southern	23 Carmel Road, Stanley, Hong Kong	4/F	444	DC Quick Charging (50kW CHAdeMO Standard)	22.220867	114.208706

```
<station>
    <no>33</no>
    <location>Cyberport</location>
    <lat>22.262451171875</lat>
    <lng>114.130599975586</lng>
    <type>Standard</type>
    <districtL>Hong Kong Island</districtL>
    <districtS>Southern</districtS>
    <address>Cyberport Car Park 1, 2/F Cyberport 2, 100 Cyberport Road, Hong Kong</address>
    <provider>Others</provider>
    <parkingNo/>
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</station>
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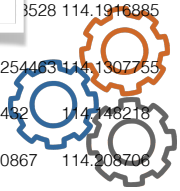


Semantic Questions

What is a station and it's data model?

How can I identify the same station?

How can I tell that type and Service Provided properties are the same?

Is standard the same as AC Quick Charging (21kW IEC Type 2 and 13A socket)?

Global Semantics

About: Parking lot

http://dbpedia.org/resource/Parking_lot

An Entity of Type : Ort, from Named Graph : http://dbpedia.org, within Data Space : dbpedia.org

rdf:type	▪ owl:Thing ▪ dbo:Place
rdfs:comment	▪ A parking lot (Australian and British English: car park), also known as a car lot, is a cleared area that is intended for parking vehicles. Usually, the term refers to a dedicated area that has been provided with a durable or semi-durable surface. In most countries where cars are the dominant mode of transportation, parking lots are a feature of every city and suburban area. Shopping malls, sports stadiums, megachurches and similar venues often feature parking lots of immense area. (en)
rdfs:label	▪ Parking lot (en)
owl:sameAs	▪ wikidata:Parking lot ▪ dbpedia-wikidata:Parking lot ▪ dbpedia-cs:Parking lot

About: Parking space

http://dbpedia.org/resource/Parking_space

An Entity of Type : Ort, from Named Graph : http://dbpedia.org, within Data Space : dbpedia.org

Property	Value
dbo:abstract	▪ A parking space is a location that is designated for parking, either paved or unpaved. Parking spaces can be in a parking garage, in a parking lot or on a city street. It is usually a space delineated by road surface markings. The automobile fits inside the space, either by parallel parking, perpendicular parking or angled parking. Depending on the location of the parking space, there can be regulations regarding the time allowed to park and a fee paid to use the parking space. When the demand for spaces outstrips supply vehicles may overspill park onto the sidewalk, grass verges and other places which were not designed for the purpose. (en)
dbo:thumbnail	▪ wiki-commons:Special:FilePath/Blue_Disc_Parking_Area_Markings_Blue_Paint.JPG?width=300
dbo:wikiPageExternalLink	▪ http://www.monkeymeter.com/drivetips/color_curb.php ▪ http://www.mutcd.fhwa.dot.gov/htm/2009/html_index.htm

DBpedia

Formats

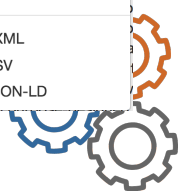
RDF:
- N-Triples
- N3/Turtle
- JSON
- XML

OData:
- Atom
- JSON

Microdata:
- JSON
- HTML

Embedded:
- JSON
- Turtle

- CXML
- CSV
- JSON-LD



Global Semantics

About: Charging stations

An Entity of Type : Concept, from Named Graph : http://dbpedia.org, within Data Space : dbpedia.org

Property	Value
dbo:wikiPageID	▪ 14083481 (xsd:integer)
dbo:wikiPageRevisionID	▪ 609346441 (xsd:integer)
rdf:type	▪ skos:Concept
rdfs:label	▪ Charging stations (en)
owl:sameAs	▪ wikidata:Charging stations ▪ dbpedia-es:Charging stations ▪ dbpedia-ja:Charging stations ▪ dbpedia-wikidata:Charging stations

About: SAE J1772

An Entity of Type : Whole100003553, from Named Graph : http://dbpedia.org, within Data Space : dbpedia.org

Die Norm SAE J1772 (auch Stecker-Typ 1 genannt) beschreibt eine Reihe von Steckverbindern und Lademodi für Elektrofahrzeuge und wird von der Society of Automotive Engineers (SAE) gepflegt.

Property	Value
dbo:abstract	▪ SAE J1772 (IEC Type 1) is a North American standard for electrical connectors for electric vehicles maintained by the SAE International and has the formal title "SAE Surface Vehicle Recommended Practice J1772, SAE Electric Vehicle Conductive Charge Coupler". It covers the general physical, electrical, communication protocol, and performance requirements for the electric vehicle conductive charge system and coupler. The intent is to define a common electric vehicle conductive charging system architecture including operational requirements and the functional and dimensional requirements for the vehicle inlet and mating connector. (en)
dbp:caption	▪ SAE J1772-2009 electric vehicle connector.
dbp:manufacturer	▪ Yazaki and others
dbp:name	▪ SAE J1772
dbp:numPins	▪ 5 (xsd:integer)
dbp:productionDate	▪ 2009 (xsd:integer)
dbp:type	▪ dbr:Automotive ▪ dbr:Electrical_connector

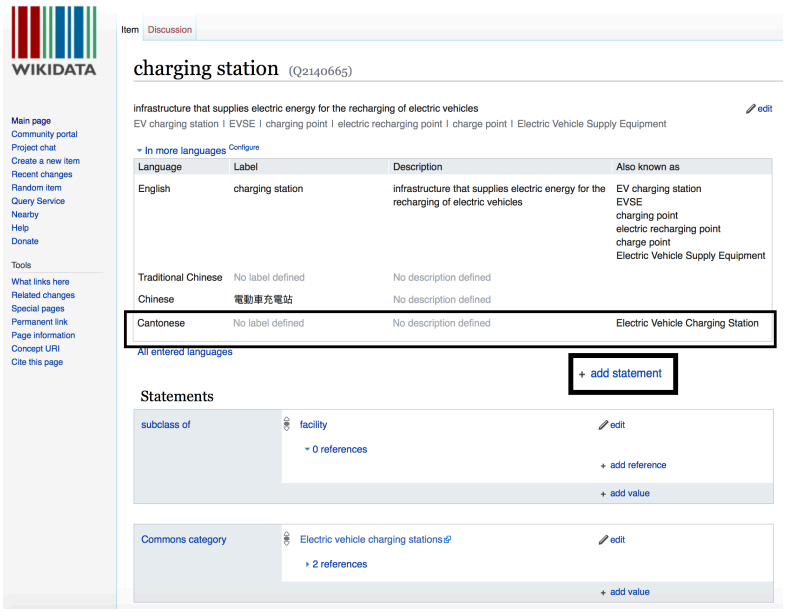
About: CHAdeMO

An Entity of Type : Organisation, from Named Graph : http://dbpedia.org, within Data Space : dbpedia.org

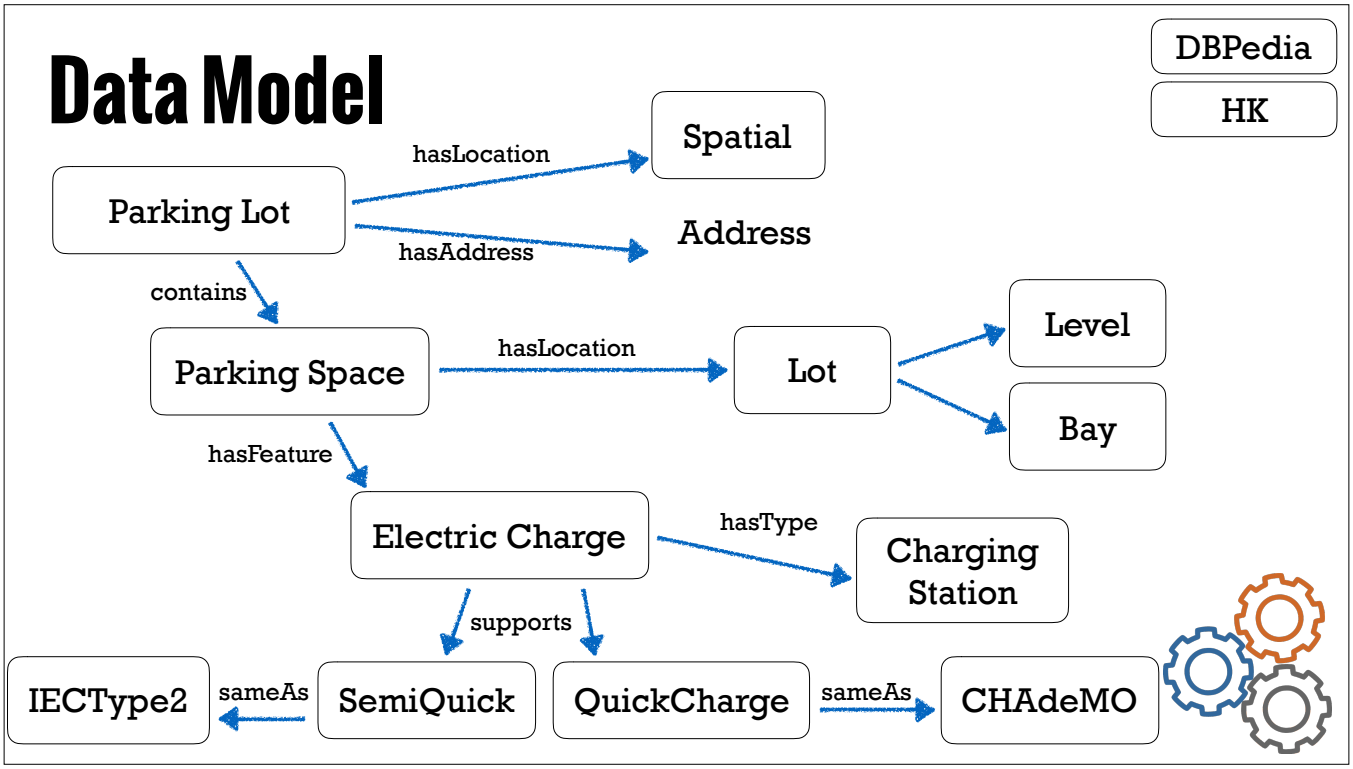
CHAdeMO ist der Handelsname einer markenübergreifenden elektrischen Schnittstelle eines Batteriemanagementsystems für Elektroautos. Mit dieser in Japan entwickelten Schnittstelle basierend auf Gleichspannung kann der Akkumulator eines Elektrofahrzeuges oder Plug-In-Hybrid-Fahrzeugs direkt mit einer hohen elektrischen Leistung geladen werden. Die typische Ausbaustufe der Ladesäulen und damit die größte Verbreitung haben CHAdeMO-Ladesäulen mit einer Ladeleistung bis 50 kW.

Property	Value
dbo:abstract	▪ CHAdeMO is the trade name of a quick charging method for battery electric vehicles delivering up to 62.5 kW of direct current (500 V, 125 A) via a special electrical connector.It is proposed as a global industry standard by an association of the same name and included in IEC 62196 as type 4. CHAdeMO is an abbreviation of "CHArge de MOve", equivalent to "move using charge" or "move by charge". The name is also a pun drawn from O cha demo ikaga desuka in Japanese, translating to English as "How about some tea?", referring to the time it would take to charge a car. CHAdeMO can charge low-range (120 km / 75miles) electric cars in less than half an hour. (en)

(my) Global Semantics

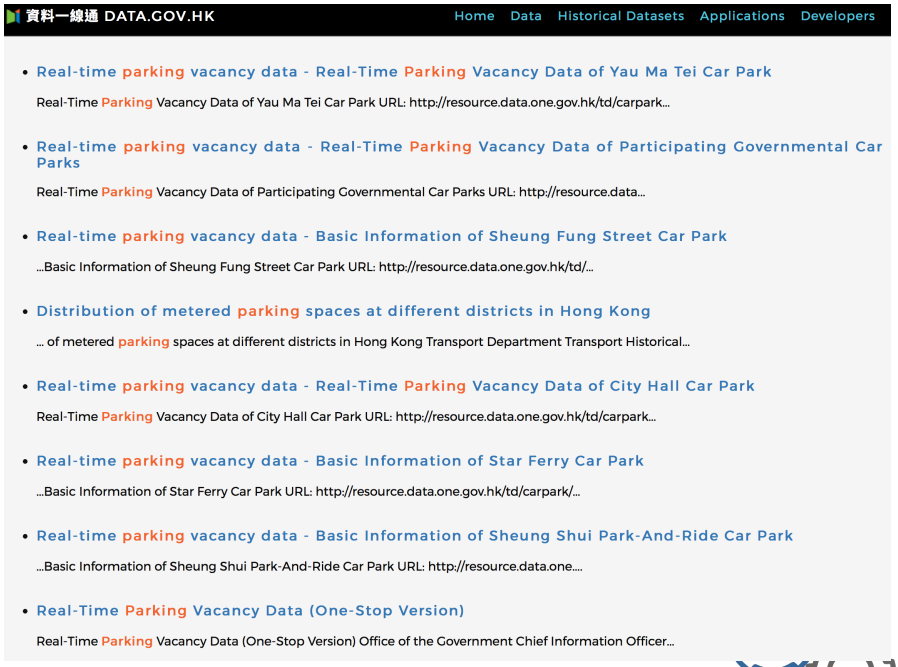


Data Model



Now I know where the Electric Charging station is…

Is it free?



A Smart Car needs a…

Smart Parking Lot with…

Smart Parking Bays with…

Smart Real Time Availability data with…

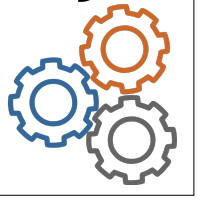
Smart Booking features and…

Smart Traffic data…

You can't build a Smart City with Dumb Data

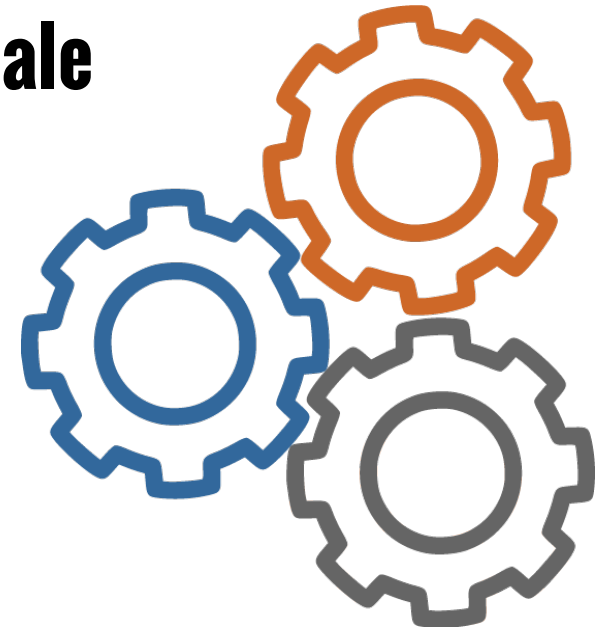
A Smart City needs a Semantic Data Architecture

Strategic Road Map
Design as a Data Consumer
Develop (reuse) Common Data Models
Link to and define Global Semantics
Data Architecture Capability (gov & industry)
Open Data "Smart City" Platform



Linked Open Data: Semantics at Global Scale

Questions?



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