Accessing Tourism data as a Virtual Knowledge Graph

Guohui Xiao, Benjamin Cogrel and Geri Skenderi

Software Developers' Thursday, NOI, Bolzano, 06/02/2020
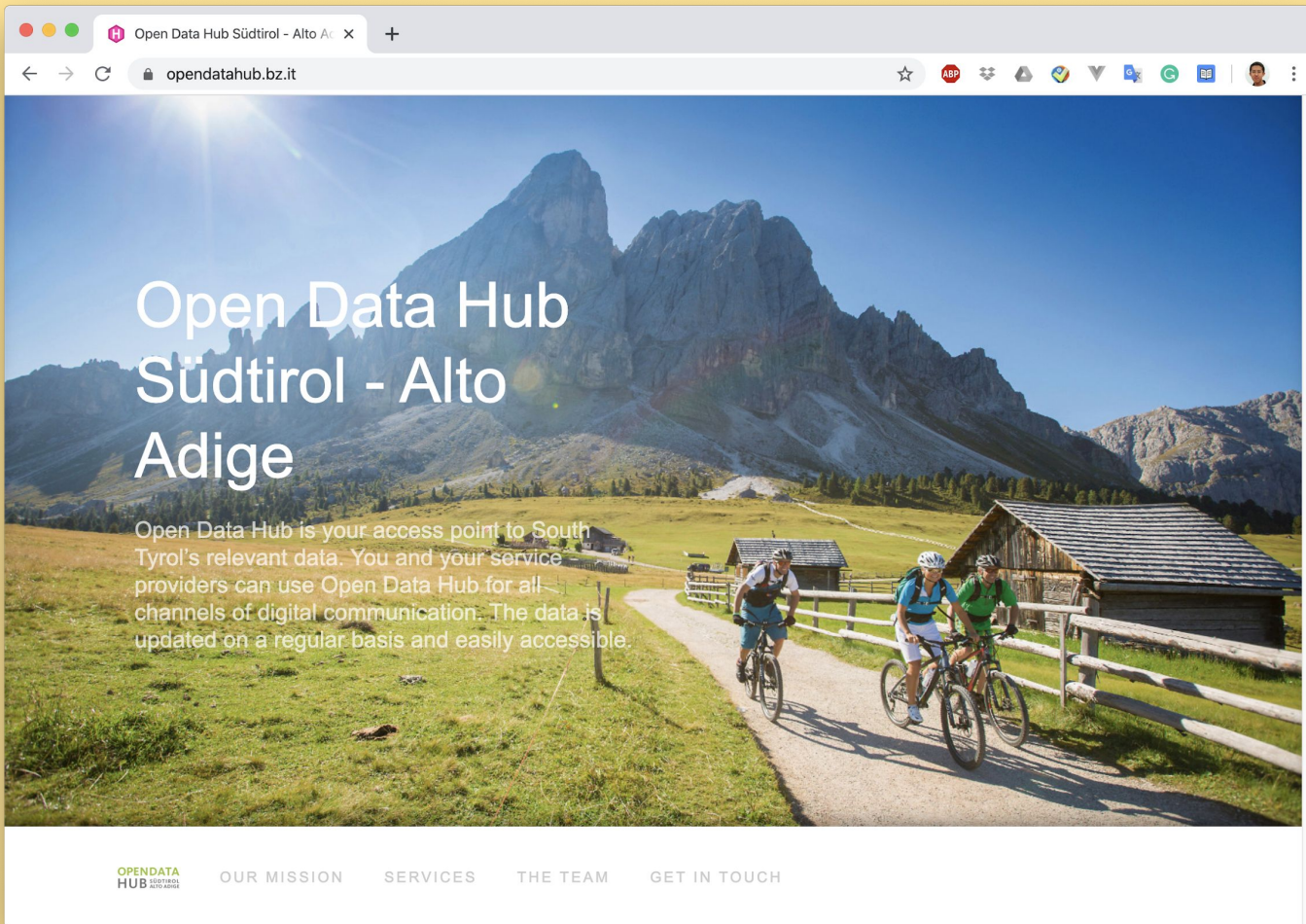
ONTOPIC

About us

❖ Guohui Xiao
  ➢ Chief Scientist and co-founder of Ontopic
  ➢ Assistant Professor at Unibz

❖ Benjamin Cogrel
  ➢ CTO and co-founder of Ontopic

❖ Geri Skenderi
  ➢ Freelance

Context

Open Data Hub Südtirol - Alto Adige

Open Data Hub is your access point to South Tyrol's relevant data. You and your service providers can use Open Data Hub for all channels of digital communication. The data is updated on a regular basis and easily accessible.

OPENDATA HUB SÜDTIROL ALTO ADIGE

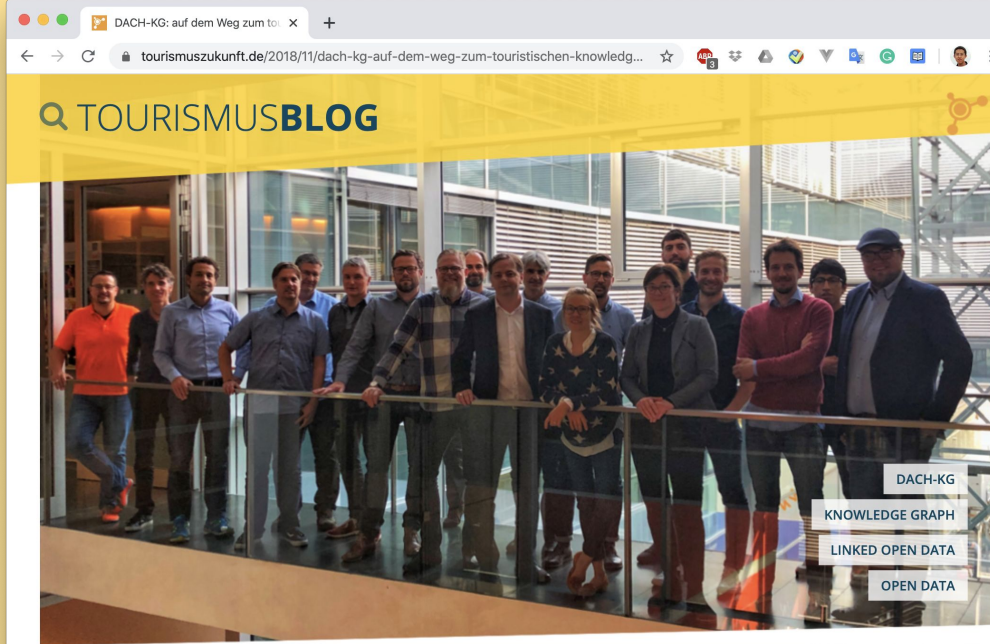OUR MISSION   SERVICES   THE TEAM   GET IN TOUCH

opendatahub.bz.it

Open Data Hub (South Tyrol)

- ❖ https://opendatahub.bz.it/
- ❖ **Tourism** and mobility
- ❖ Data about hotels, restaurants, wines, etc.
- ❖ Web API
  - ➢ Accessible to anyone (Open Data)
  - ➢ Specific interface (custom)
  - ➢ PostgreSQL DB underneath
- ❖ Operates at the provincial level

DACH-KG: auf dem Weg zum tou ✕

tourismuszukunft.de/2018/11/dach-kg-auf-dem-weg-zum-touristischen-knowledg...

⌕ TOURISMUS**BLOG**

DACH-KG

KNOWLEDGE GRAPH

LINKED OPEN DATA

OPEN DATA

— Florian Bauhuber | 12. November 2018

DACH-KG: auf dem Weg zum touristischen Knowledge Graph!

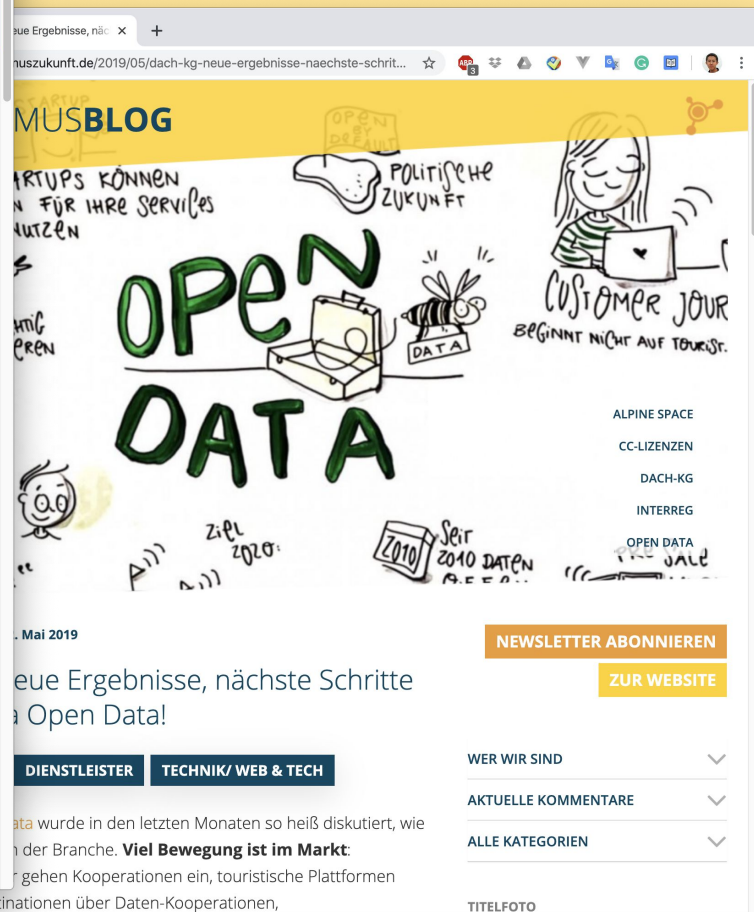**MARKETING & VERTRIEB**   **TECHNIK/ WEB & TECH**

TECHNOLOGIE TRENDS

Am 18. Juli 2018 war ein historischer Tag. In Innsbruck fand das erste
Treffen von DMOs & Forschungseinrichtungen mit dem Titel „**Linked Open**

NEWSLETTER ABONNIEREN

ZUR WEBSITE

WER WIR SIND   ⌄

AKTUELLE KOMMENTARE   ⌄

ALLE KATEGORIEN   ⌄

neue Ergebnisse, näc ✕

...tourismuszukunft.de/2019/05/dach-kg-neue-ergebnisse-naechste-schrit...

...MUS**BLOG**

ALPINE SPACE

CC-LIZENZEN

DACH-KG

INTERREG

OPEN DATA

. Mai 2019

...eue Ergebnisse, nächste Schritte
a Open Data!

DIENSTLEISTER   **TECHNIK/ WEB & TECH**

...ata wurde in den letzten Monaten so heiß diskutiert, wie
...n der Branche. **Viel Bewegung ist im Markt:**
...r gehen Kooperationen ein, touristische Plattformen
sprechen mit Destinationen über Daten-Kooperationen,

NEWSLETTER ABONNIEREN

ZUR WEBSITE

WER WIR SIND   ⌄

AKTUELLE KOMMENTARE   ⌄

ALLE KATEGORIEN   ⌄

TITELFOTO

Larger scale: DACH-KG

❖ Ongoing initiative

❖ Knowledge Graph (KG) for the German-speaking area in Europe

❖ Integrating tourism data
  ➢ From many data providers (e.g. local tourism organizations)
  ➢ To the big actors such as Google and Amazon

❖ Uses schema.org as a foundation

schema.org

URL:

❖ Designed by Google and others
❖ Known by everybody in the Search
   Engine Optimization (SEO) industry
❖ Graph data model (RDF)
❖ Set of classes and properties
❖ Class hierarchy
❖ Extensible

https://schema.org/Hotel

Hotel

Thing > **Organization** > **LocalBusiness** > **LodgingBusiness** > **Hotel**
Thing > **Place** > **LocalBusiness** > **LodgingBusiness** > **Hotel**

A hotel is an establishment that provides lodging paid on a short-term basis (Source: Wikipedia, the free encyclopedia, see http://en.wikipedia.org/wiki/Hotel).

See also the dedicated document on the use of schema.org for marking up hotels and other forms of accommodations.

[more...]

Property	Expected Type	Description
Properties from LodgingBusiness		
amenityFeature	LocationFeatureSpecification	An amenity feature (e.g. a characteristic or service) of the Accommodation. This generic property does not make a statement about whether the feature is included in an offer for the main accommodation or available at extra costs.
audience	Audience	An intended audience, i.e. a group for whom something was created. Supersedes serviceAudience.
availableLanguage	Language or Text	A language someone may use with or at the item, service or place. Please use one of the language codes from the IETF BCP 47 standard. See also inLanguage
checkinTime	DateTime or Time	The earliest someone may check into a lodging establishment.
checkoutTime	DateTime or Time	The latest someone may check out of a lodging establishment.

Virtual Knowledge Graphs

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Virtual Knowledge Graphs (VKGs)

❖ Maps relational DBs into KGs
❖ Virtual
  ➢ Data stays in the data sources
  ➢ No ETL, no duplicates
  ➢ No RDF graph DB (triplestore)
❖ Application to ODH
  ➢ Maps the existing PostgreSQL DB…
  ➢ …into a VKG using schema.org as vocabulary
❖ Powered by Ontop

Demo: SPARQL endpoint

URL: https://sparql.opendatahub.bz.it

❖ SPARQL endpoint: Standard Web API based on the SPARQL query language for RDF-based KGs

Mapping

Query reformulation

❖ SPARQL queries are reformulated into SQL queries

❖ A lot of optimizations are applied

❖ Efficient reasoning
➢ Close to zero extra-cost

Ontop

URL: https://ontop-vkg.org

❖ Open Source VKG engine (Apache 2.0)

❖ Maintained by

  ➢ In2Data research group at Unibz

  ➢ Ontopic s.r.l.

Applications

Current applications

❖ Quick visualization of the data

    ➢ Illustrate some data quality issues

❖ Amazon Alexa skill

    ➢ Voice-based UI

Why using a VKG for the Alexa skill?

- ❖ Based on schema.org
  - ➢ Loosely-coupled to South Tyrol
  - ➢ Most queries would work for other regions
- ❖ Makes prototyping faster
  - ➢ New queries can be tested immediately
  - ➢ No custom Web API to change
- ❖ Ongoing experimentation