

Publishing AR Content, as Data on Web

Persistent, Indexable, Composable

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Quick Overview

- WebXR enables developers to build very rich experiences within a web browser. Foundational, and expressive. But, alongside that, we desire to...
- Publish, as structured data, a simple **mapping** between:
 - **Web content**, suitable for embedding in AR
 - **Where** in the world to show it, supporting AR enabled techniques
 - **When & How** to show it

History: Places

- Once upon a time, mapping became possible on the web
 - ...but good information about most places in the world was largely unavailable.
 - Crawlers could scrape web content and make best guess associations, but this was difficult and unreliable. It was also only possible with significant effort.
 - Eventually, we settled on structured data: Microdata, JSON-LD, schema.org, etc.
- Location data is now surfaced in search results, maps, online directories, review sites...
- Today, if you own a local business, you do not just publish a website, you also publish structured data about your business.
 - Sometimes, do not even publish a full website...

Sample markup

```
<div itemscope itemtype="http://schema.org/Hotel">
  <h1><span itemprop="name">ACME Hotel Innsbruck</span></h1>
  <span itemprop="description">A beautifully located business hot
heart of the alps. Watch the sun rise over the scenic Inn valley
enjoying your morning coffee.</span>
  <div itemprop="address" itemscope itemtype="http://schema.org/P
    <span itemprop="streetAddress">Technikerstrasse 21</span>
    <span itemprop="postalCode">6020</span>
    <span itemprop="addressLocality">Innsbruck</span>
    <span itemprop="addressRegion">Tyrol</span>,
    <span itemprop="addressCountry">Austria</span>
  </div>
  <div itemprop="geo" itemscope itemtype="http://schema.org/GeoCo
    <meta itemprop="latitude" content="47.2649990" />
    <meta itemprop="longitude" content="11.3428720" />
  </div>
</div>
```

<https://schema.org/GeoCoordinates>

```
<script type="application/ld+json">
{
  "@context": "http://schema.org",
  "@type": "Restaurant",
  "image": [
    "https://example.com/photos/1x1/photo.jpg",
    "https://example.com/photos/4x3/photo.jpg",
    "https://example.com/photos/16x9/photo.jpg"
  ],
  "id": "http://davessteakhouse.example.com",
  "name": "Dave's Steak House",
  "address": {
    "@type": "PostalAddress",
    "streetAddress": "148 W 51st St",
    "addressLocality": "New York",
    "addressRegion": "NY",
    "postalCode": "10019",
    "addressCountry": "US"
  }
}
```

<https://developers.google.com/search/docs/data-types/local-business>

Better search results, with rich preview

<https://www.bing.com/search?q=bouchon+in+lyon>

The screenshot shows a Bing search results page for the query "bouchon in lyon". At the top, there is a search bar with the query and a magnifying glass icon. Below the search bar, navigation tabs include "All", "Images", "Videos", "Maps", "News", and "My saves". The "All" tab is selected and highlighted with a red underline. Below the tabs, the search results are displayed. The first result is titled "The 10 Best Bouchon Lyonnais Restaurants in Lyon ..." and includes a URL from TheFork. Below the text is a map showing the location of "Les Lyonnais Bouchon" in Lyon, France. The map includes street names like "Rue de la Bombard" and "A La Marquise", and various icons for navigation and zooming. Below the map, there are two restaurant listings. The first listing is for "La Gargouille" with a 4.5-star rating and 448 reviews on TripAdvisor. The second listing is for "Les Lyonnais Bouchon" with a 4.8-star rating and 967 reviews on TripAdvisor. Each listing includes a small image of the restaurant's interior or food, the name, rating, address, phone number, and opening hours. There are also icons for "WEBSITE" and "DIRECTIONS" for each restaurant.

bouchon in lyon

All Images Videos Maps News | My saves

792 000 Results Date Language Region

The 10 Best Bouchon Lyonnais Restaurants in Lyon ... Translate this page
<https://www.thefork.com/restaurant+bouchon-lyonnais+lyon>
FIND THE BEST Bouchon Lyonnais restaurant in Lyon on TheFork. Read restaurant reviews from our community and reserve your table online today!

Les Lyonnais Bouchon

La Fabrique Givree

A La Marquise

Auberge Rabelais

Poste de Police

Rue de la Bombard

© 2018 HERE, © OpenStreetMap

Larger map

La Gargouille
★★★★☆ TripAdvisor (448)
70, Rue Saint Jean, 69005 Lyon · 09 51 36 10 61
Open 7:00 AM - 1:00 AM

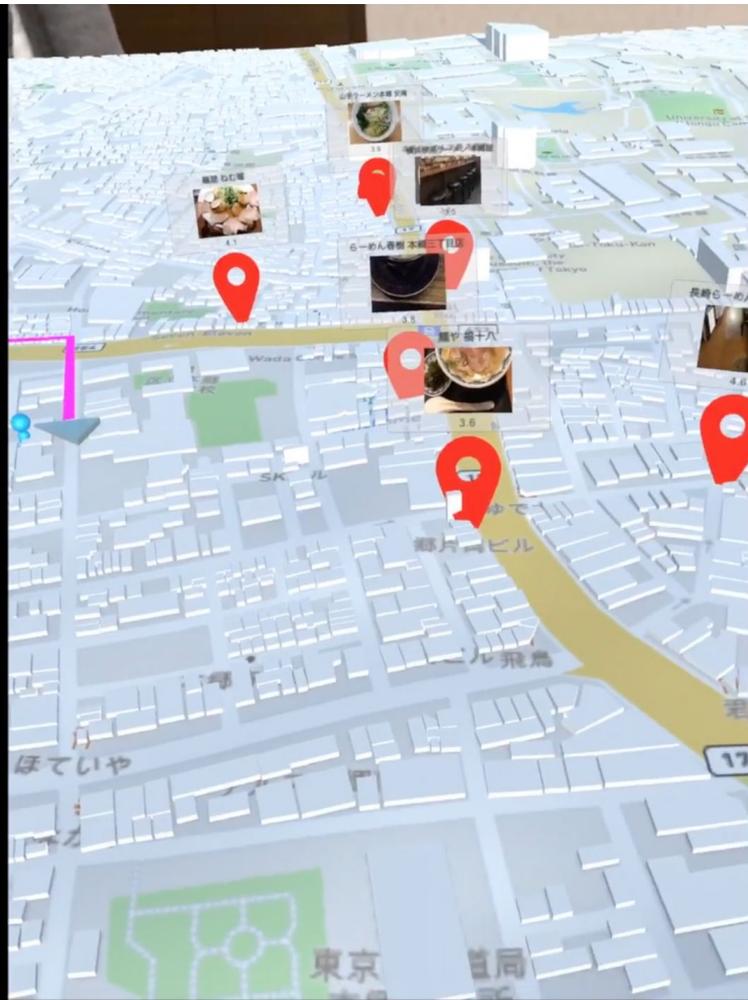
Les Lyonnais Bouchon
★★★★☆ TripAdvisor (967)
19, Rue de la Bombarde, 69005 Lyon · 04 78 3...
Open today 12:00 PM - 2:30 PM, 7:00 PM - 10...

WEBSITE DIRECTIONS

WEBSITE DIRECTIONS

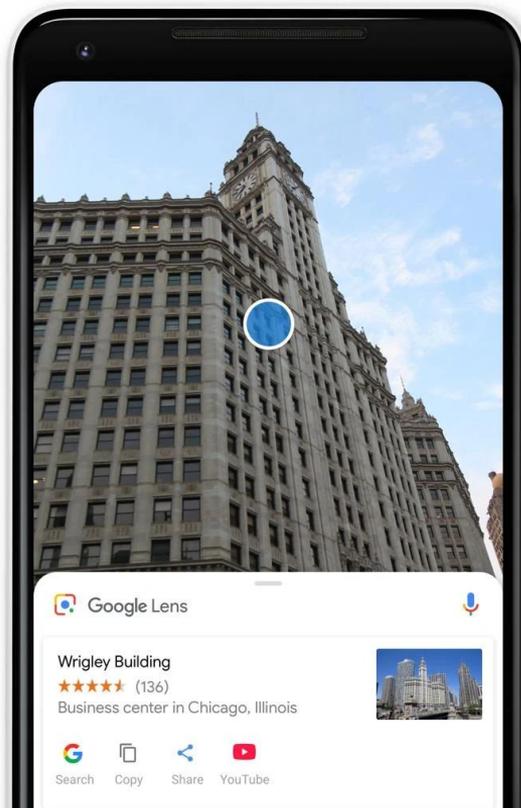
3DMap powered by ARKit & Mapbox.

<https://www.youtube.com/watch?v=V7vU2wk6LyA>



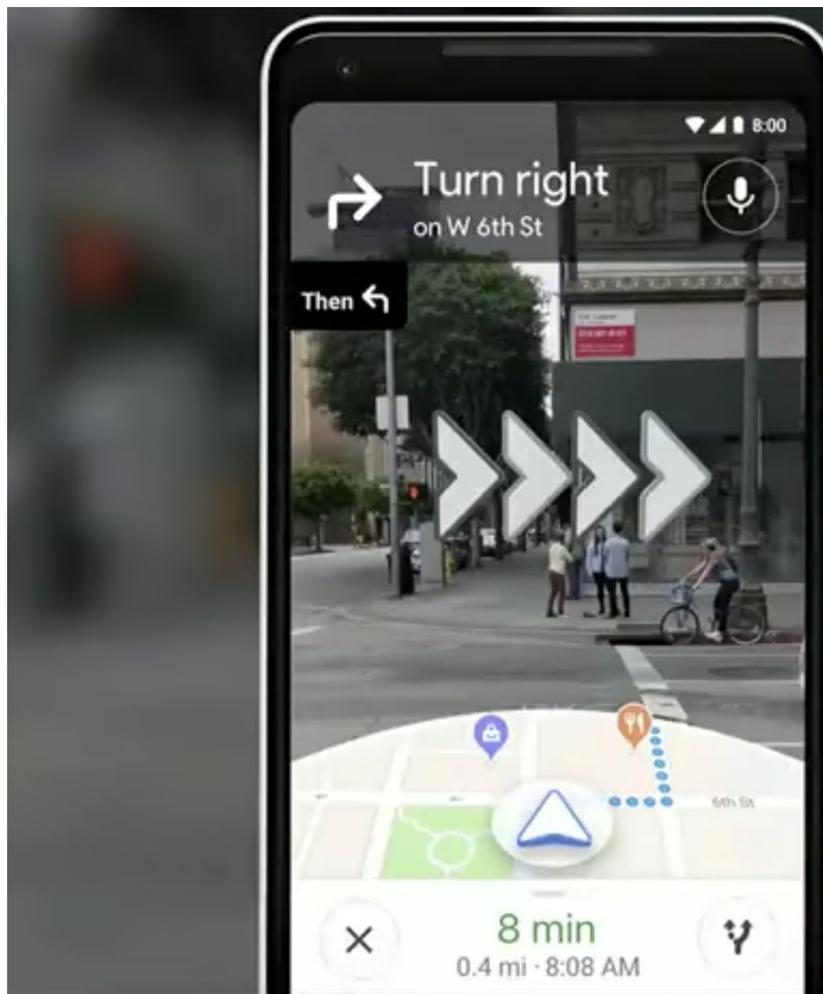
Google Lens

Learn more about
the world



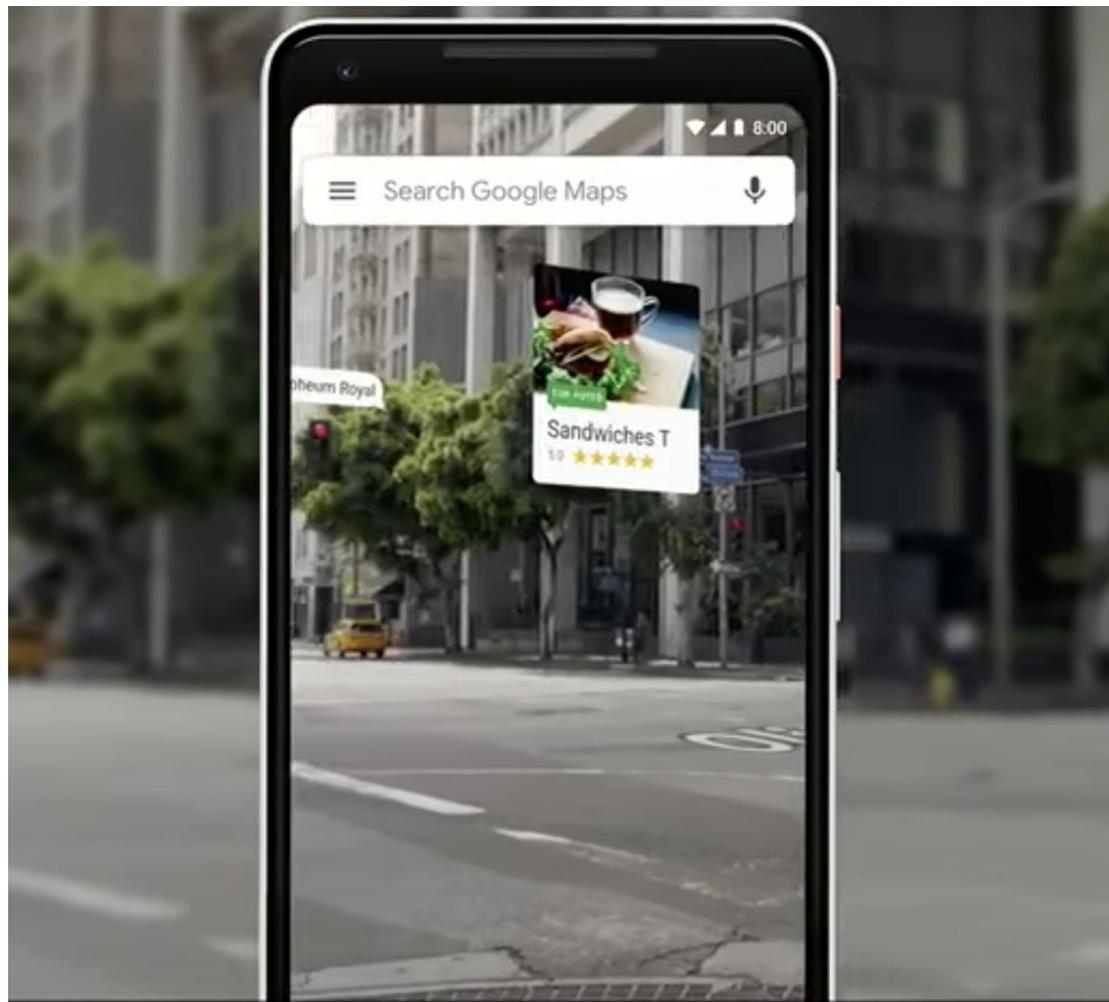
Google Maps AR

Screenshot from I/O 2018



Google Maps AR

Screenshot from I/O 2018



By publishing as Data, Presentation can evolve

- Majority of Places did not have AR in mind at all, and yet, by publishing as data, an ecosystem of aggregators and creative presentation continues to evolve
- For these local businesses, largely they only care to reach and inform users, don't necessarily even want to maintain the presentation

What's new with AR

- Classification & Localization
 - Existing: Geolocation, Barcodes/QRcodes[*]
 - New: Visual Markers (2d images), OCR, 3d spaces, ML models...
- Content
 - Existing: Page Snippets, Structured Data based templates, Rich Media Types
 - New: Magic windows, dioramas, Augmented Planes, explicit 3d Positioning, Declarative 3D Content (GLTF, <model>)...
- (Shout out: WebHD, Web Packaging, Portals -- for potentially richer, privacy preserving rendering)

Best Practices

Data on the Web Best Practices

W3C Editor's Draft 23 October 2018

This version:

<http://w3c.github.io/dwbp/bp.html>

Latest published version:

<https://www.w3.org/TR/dwbp/>

Latest editor's draft:

<http://w3c.github.io/dwbp/bp.html>

Implementation report:

<http://w3c.github.io/dwbp/dwbp-implementation-report.html>

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Changes:

[Change History](#)

[Diff to previous version](#)

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Spatial Data on the Web Best Practices

W3C Working Group Note 28 September 2017

This version:

<https://www.w3.org/TR/2017/NOTE-sdw-bp-20170928/>

Latest published version:

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

Latest editor's draft:

<https://w3c.github.io/sdw/bp/>

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<http://w3c.github.io/dwbp/bp.html>

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

“One of the main goals [...] is to facilitate interaction between publishers and consumers of data on the Web.”

ARML?

OGC® Augmented Reality Markup Language 2.0 (ARML 2.0)

- 1) Overview
- 2) Downloads
- 3) Schema
- 4) Related News

1) Overview

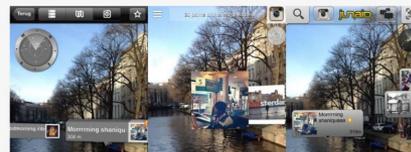
This OGC® Standard defines the Augmented Reality Markup Language 2.0 (ARML 2.0). ARML 2.0 allows users to describe virtual objects in an Augmented Reality (AR) scene with their appearances and their anchors (a broader concept of a *location*) related to the real world. Additionally, ARML 2.0 defines ECMAScript bindings to dynamically modify the AR scene based on user behavior and user input.

Augmented Reality (AR) Pilot



Importance and vision of AR + Web + Geospatial

Augmented Reality (AR) is helping people enhance their view of the world by displaying data on top of their phone as digital information, such as nearby facilities or attractions, being overlaid in real-time onto a video feed.



<http://www.opengeospatial.org/standards/arml>

<http://www.opengeospatial.org/projects/initiatives/arpilot2017>

“AR becomes truly magic when one can start ‘browsing’ reality - but this requires constant and adaptive access to live data about the surrounding environment. While the data can be provided using OGC standards and displayed using W3C ones, ensuring the two can be combined in real-time live AR experiences remains to be shown.”

Too early for AR publishing?

- Note: [Immersive-web Charter](#) → **Out of scope**: Defining mechanisms for global-scale AR browsing.
- Acknowledge and embrace the level of exploration and innovation that is happening on high precision tracking systems (e.g. indoor mapping, cm-level anchoring, etc.)
 - It is a non-goal to define or pick any specific tracking systems.
 - Instead the goal is to develop generic guidelines that can accommodate the evolution of these services without requiring a redesign.

Potential Benefits

- Help reach Critical Mass for AR
 - By surfacing *many simple results* in one place, give users destinations which yield useful results regularly. Build habits.
- Discoverability, for publishers
 - Useful Entry point which launches standalone immersive experiences
- Solve real world problems for users
- Support solutions which are built on Web
 - Useful for Search
 - Useful AR content portals

Closing Thoughts

- We've begun to investigate existing practices, and identify missing pieces. Expect us to reach out with our findings.
- Some Google products will begin publishing guidelines for third party content integration into AR-enabled products
 - Google Lens (Photos, Assistant, Camera...)
 - They *want* to build this on web standards, so that data is hosted publically -- not stored in a silo. But we must provide the path forward and seize opportunity.
- We hope/expect others must be facing similar challenges & goals --
Let's talk!