Breaking Drupal out of the box with **augmented reality and beacons**

Chris Hamper, Preston So • 27 Sep 2017 • DrupalCon Vienna 2017

Herzlich Willkommen!

Chris Hamper is a lifelong computer nerd and Acquia Certified Developer with experience contributing to Drupal core and contributed modules. He is currently working as an Acquia Labs Engineer, exploring emerging technologies such as Conversational UIs, Machine Learning, and Augmented/Virtual Reality, and how they can be combined with Drupal to create useful and cool new things.

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Herzlich Willkommen!

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Previously, Preston contributed to the Spark initiative in the Drupal project, co-founded the Southern Colorado Drupal User Group (est. 2008), and operated an award-winning freelance web and print design studio. Preston has presented keynotes at conferences on three continents in multiple languages.

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What we'll cover

- From a page-driven mentality to a geospatial mentality
- The case for augmented reality with beacons
- Augmented reality and content management
- AR-driven content with Drupal
- Demo: Augmented reality and Drupal at the grocery store
- Connecting beacons with Drupal
- Demo: Beacons and Drupal at the airport
- Epilogue: Contextualizing content in a decontextualized world

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From a page-driven mentality
**to a geospatial mentality**

Content is increasingly
needed everywhere
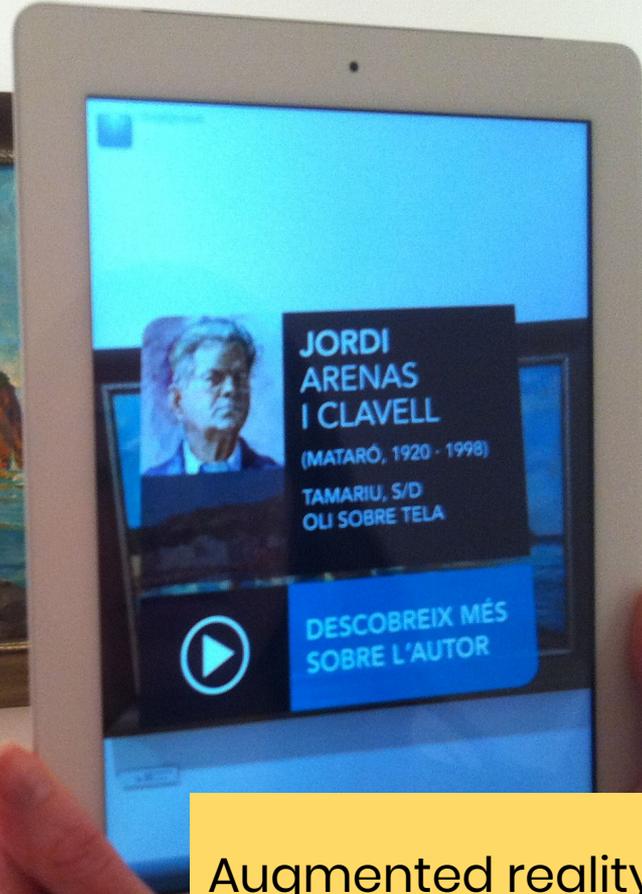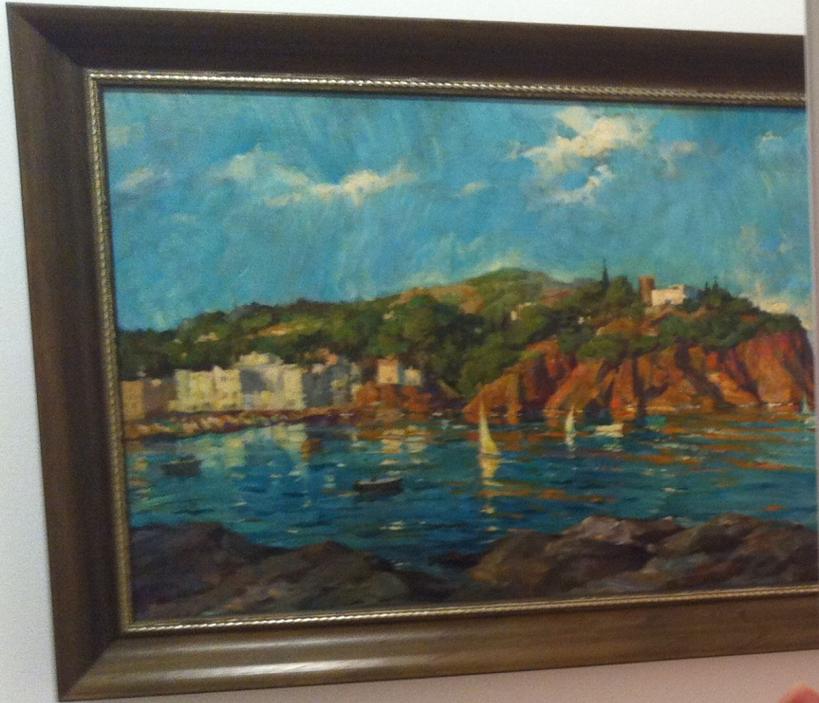
Augmented reality

Augmented reality

- Flexible design; but content is situational
- Limited text superimposed situationally
- Images superimposed situationally
- Multimedia superimposed situationally
- Interactions via gestures and motion (content proprioception)
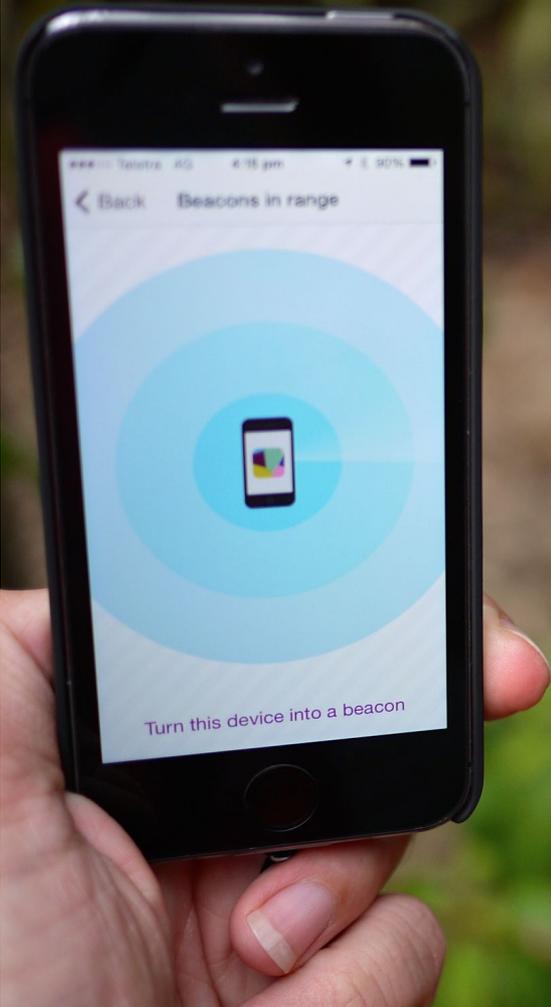
Beacon technology

Beacon technology

- Provides fine-grained geospatial context and localization
- Beacons enable bidirectional interaction
- Notifications provide opportunity for user to interact with additional mobile content

What's next?

Native mobile app

Website

IoT app

Single-page app

Chat app

Content store

Set-top box

Native app

Other back ends
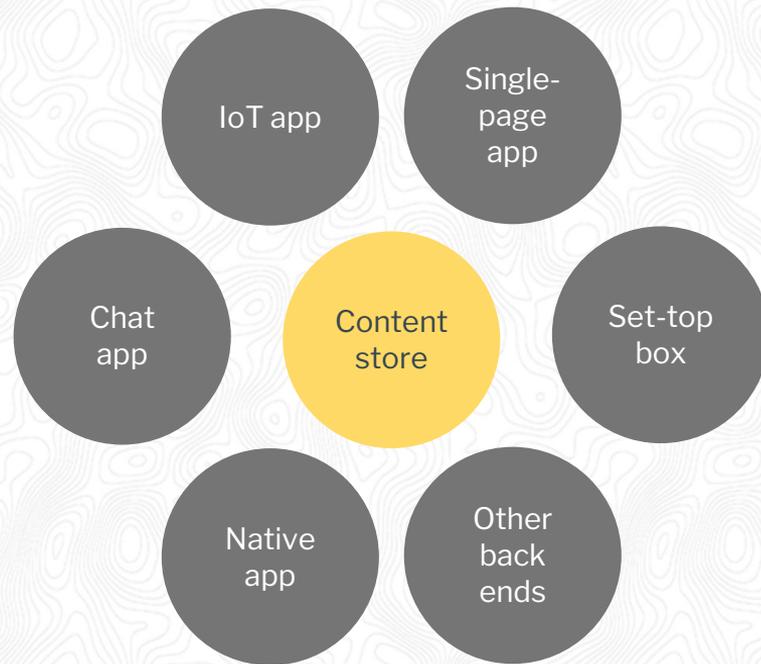
We're moving from standalone digital experiences to entire digital ecosystems.

Amazon Echo push notification

AR/VR notification overlay

In-store product alerts
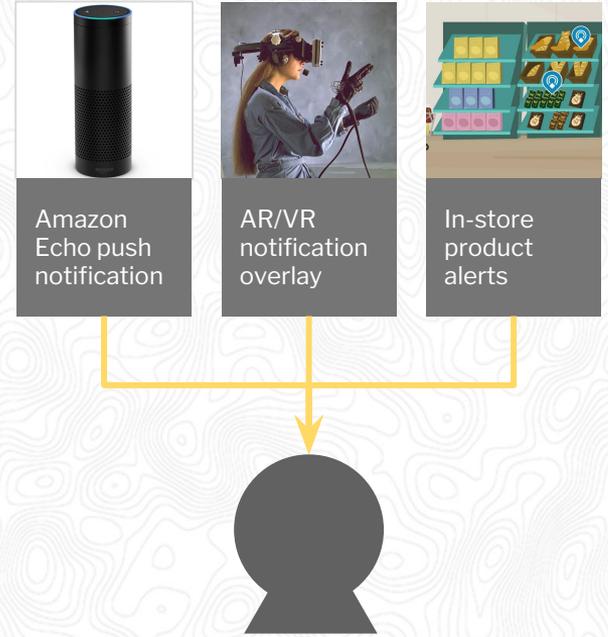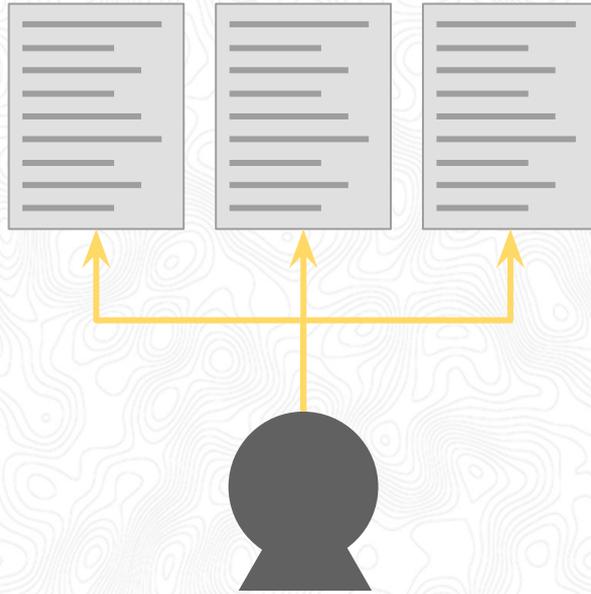
We're moving from pull-based to push-based content delivery.

Amazon Echo push notification

User-generated response

Interaction with AR/VR interface

AR/VR notification overlay
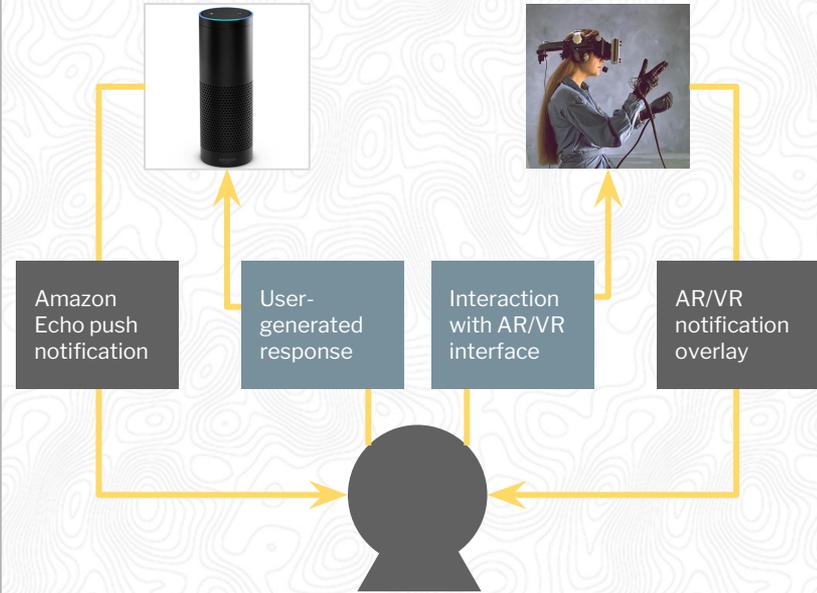
We're moving from consumption of content to interaction with content.

Our page-driven mentality
is no longer relevant

Most of the web remains page-based

Title

Lorem ipsum dolor sit a|

Body

Consectetur adipiscing elit lorem ipsum dolor sit amet.

Lorem ipsum dolor sit a|

Consectetur adipiscing elit lorem ipsum dolor sit amet.

Read more

As a result, our ideas of content editing are page-based

Men's dress shirts on sale|

Our blazers are exquisite|

Ties 50% off|

But we need to move to a geospatial mentality

Proximity marketing
is gaining traction in IoT

Emerging trends point to transparently immersive experiences

Content needs to be
geospatial, physical, situational

As a result, content is
decontextualized

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The case for augmented reality
with beacons

Beacons are here to stay

- According to a [report](#) by ABI Research in 2015, shipments of BLE beacons will break 400 million by 2020.

- Target, Walmart, and Macy's (big-box store chains in the U.S.) have [introduced](#) beacon technology to their sales floors.

- Marriott has [placed](#) beacons at 14 hotel locations to send promotional messages about hotel spas, bars, and restaurants.

Where are beacons found?

- Airports
- Big-box stores (sales notifications)
- Hotels (seamless mobile check-in)
- Museums
- Restaurants
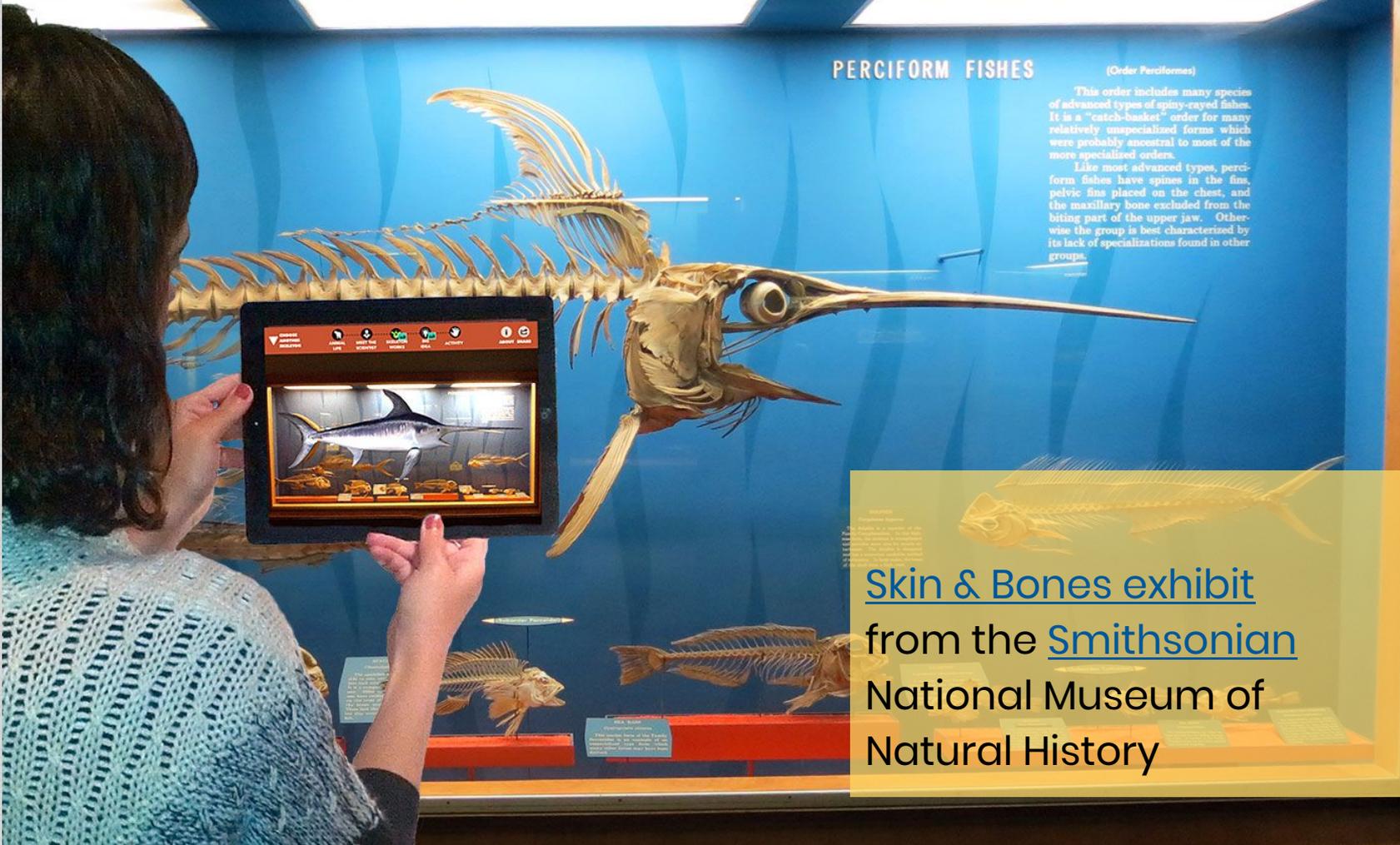
PERCIFORM FISHES (Order Perciformes)

This order includes many species of advanced types of spiny-rayed fishes. It is a "catch-basket" order for many relatively unspecialized forms which were probably ancestral to most of the more specialized orders.

Like most advanced types, perciform fishes have spines in the fins, pelvic fins placed on the chest, and the maxillary bone excluded from the biting part of the upper jaw. Otherwise the group is best characterized by its lack of specializations found in other groups.

[Skin & Bones exhibit](#) from the [Smithsonian](#) National Museum of Natural History

Augmented reality is here to stay

- [Forrester in 2016](#): "Companies will continue to experiment with AR and VR, setting the foundation for larger implementations in 2018 and 2019."

- Augmented reality was the subject of a U.S. Senate Committee on Commerce, Science, and Transportation [hearing](#) in November 2016.

Situational content

- There are already cases of content such as museum exhibit information being displayed as augmented reality overlays.

- But **locational** or **situational content** is increasingly a buzzword as the intersection of beacons and augmented reality becomes clearer.

Situational content

- Rather than simply showing additional information as an overlay when the user finds the right place to point their smartphone (an **active** or **explicit** interaction) …

- … it makes more sense to use beacons to have a **passive** or **implicit** interaction with what's in view directly to the user — and facilitate richer bidirectional interaction (and gathering of data).

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Augmented reality and content management
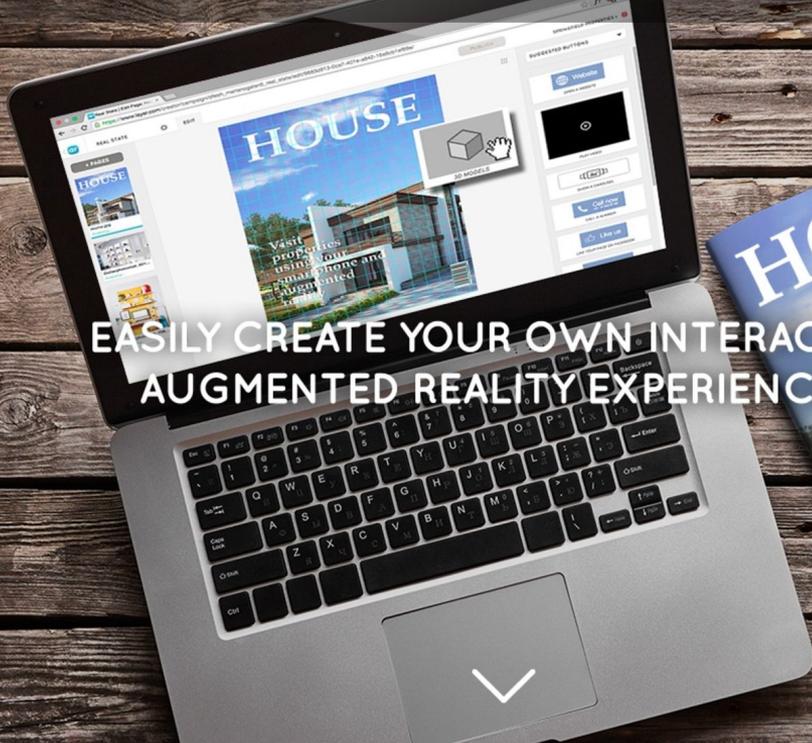
EASILY CREATE YOUR OWN INTERACTIVE AUGMENTED REALITY EXPERIENCES

Augmented reality "CMSes" like Layar are appearing

We can no longer think of content as pages

Situational change

Situational change

Situational change

Situational change

Link
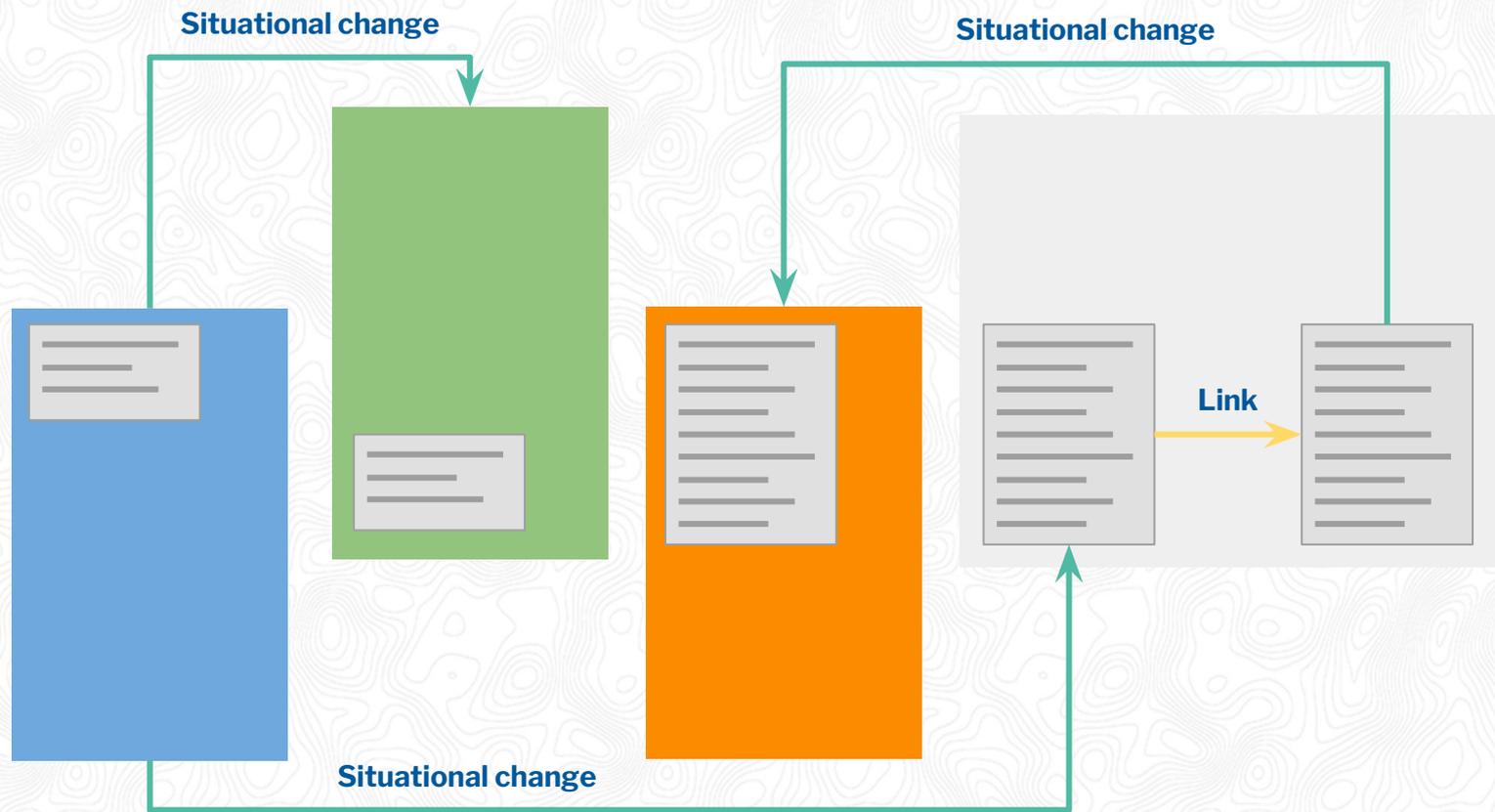
We can think of them as **experiential overlays**

Toni's Freilandeier

$2.49

Most recent review by criz: 5 out of 5
These are great!

Manner Wafer Cookies

$1.99

Most recent review by dasjo: 5 out of 5
Delicious!

Content undergoes decontextualization in AR

Toni's Freilandeier

Price: 2.49

criz's review:
5 out of 5 stars

These are great!

Manner Wafer Cookies

Price: 1.99

dasjo's review:
5 out of 5 stars

Delicious!
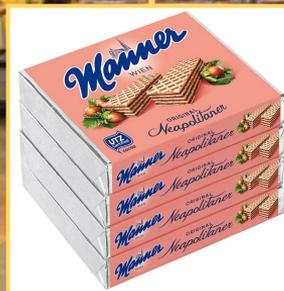
Context undergoes decontextualization in AR

Questions to consider

- How should you manage content in a decontextualized way for augmented reality and beacons?

- How does situational content management differ from web-based content management?

- When content is no longer on a page but in the physical world, how can you organize it in a sane way?

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AR-driven content
with Drupal

AR use case

- Smartphone app uses built-in camera

- Recognize "targets" by their appearance

- Drupal site contains content related to targets

- Display scene on smartphone as captured by camera, with information overlaid

Requirements and dependencies

- Custom smartphone app

- AR Library

  - Vuforia

  - Many others: ARToolkit (Open source), EasyAR, Kudan

- Smartphone API Libraries

  - moshi-jsonapi

  - retrofit

- Drupal application with related content and API

How it works

- Vuforia library processes video, identifies pre-configured targets (on-device or cloud)
  - Displays video on screen, optional 3D model overlaid
- Each pre-configured target has a unique ID
- Query Drupal API for that target's ID
- Get related content back, and display on overlay UI

AR targets

Targets (15)

Add Target

	Target Name	Type	Rating
☐	eggs	Single Image	★★★★☆
☐	wafer-cookies	Single Image	★★★★★

A typical architecture
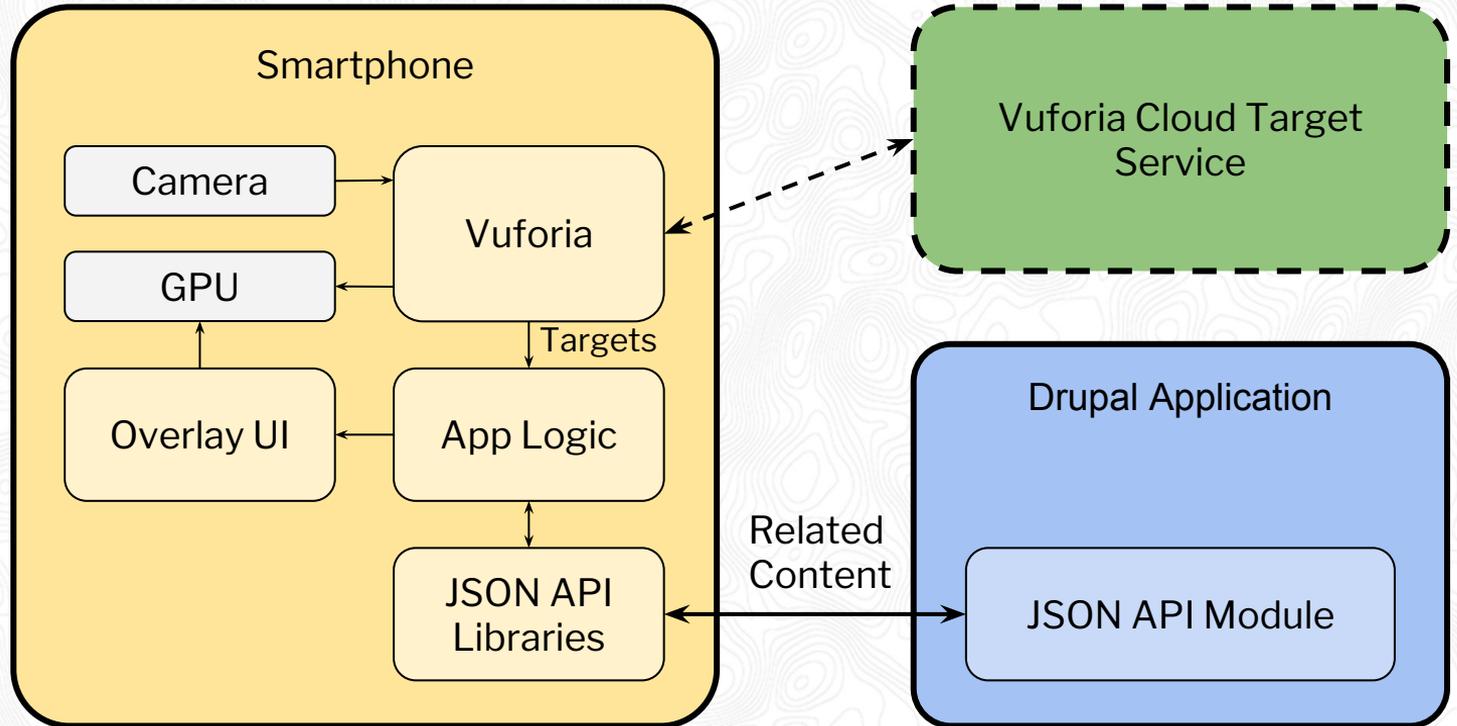
Challenges and risks

- Getting good target images
  - Rectangular
  - Transparency, reflections, glossiness cause problems
- Scene must be reasonably well-lit
- Writing and maintaining app(s)
- May need understanding of 3D graphics math
- May need to pay for AR library

Rewards

- Really cool!

- Immerse the user in your data

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Demo

Augmented reality and Drupal at the grocery store

JSON API

API call

API response

Manner Wafer Cookies

Price: 1.99

dasjo's review:
5 out of 5 stars

Delicious!

What's going on?

Live demo: Augmented reality

Demo video: Augmented reality

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Connecting beacons
with Drupal

Approaches to using beacons

- Physical Web (Google "Nearby")

- Custom Mobile App

Physical Web

- Notification displayed on user's phone with a URL and page title

- User taps on notification to visit the URL in a web browser

Physical Web requirements

- BLE beacon that supports Eddystone, iBeacon, AltBeacon

- Web page URL to point to

- Physical Web client installed and enabled
  - "Nearby" enabled (Android)
  - Chrome app installed and notifications enabled (iPhone)
 - Other 3rd-party apps available

Physical Web: Eddystone-URL

- Beacon must support Eddystone-URL packet

- URL programmed directly into beacon

- URL can only be about 17 characters long (excluding protocol)

  - Use a URL shortener—tiny.cc and bit.do allow you to change the redirect URL

Physical Web: Eddystone-UID/iBeacon/AltBeacon

- URL lookup via Google Beacon Platform

- URL can be practically any length

- Must register the beacon, and then assign a URL

- URL can be changed via Google Beacon Platform

Physical Web architecture
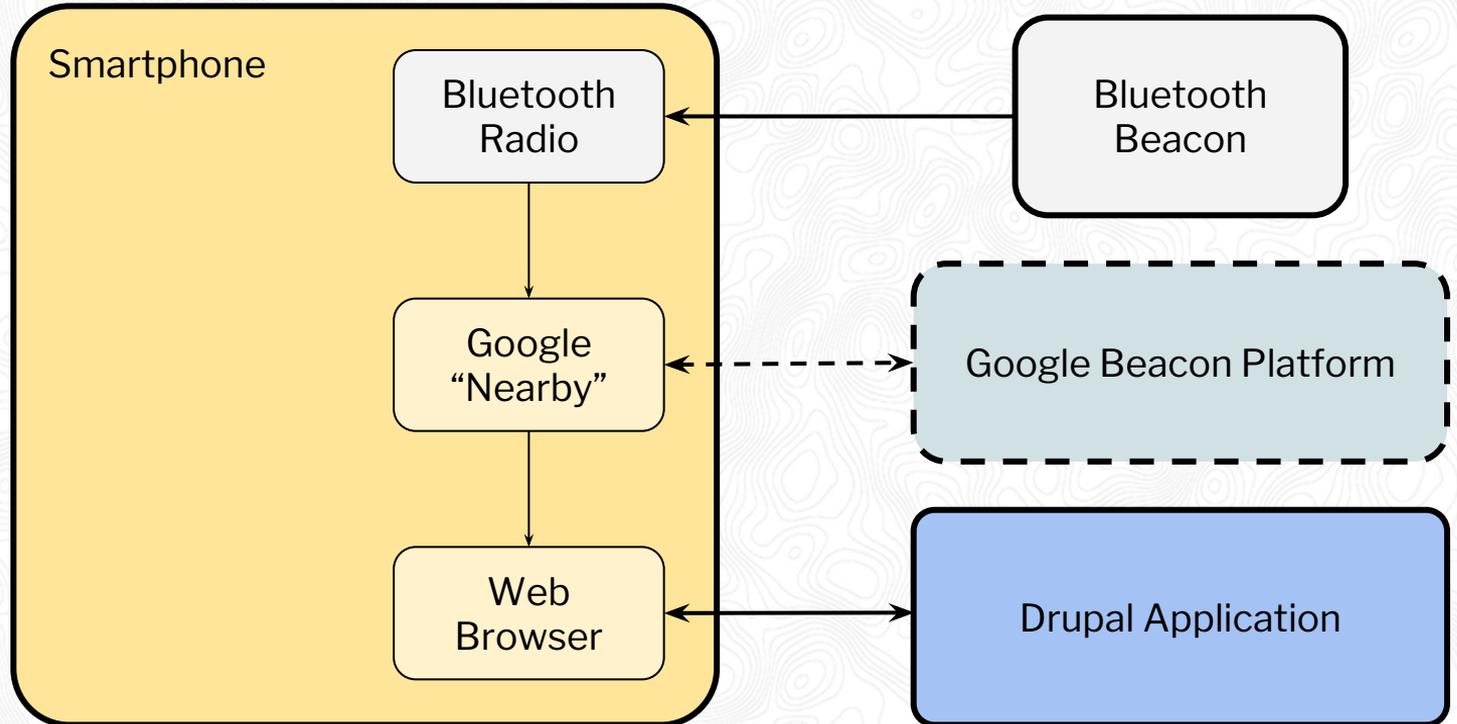
Physical Web challenges

- Programing URL into beacon (Eddystone-URL)
    - Method depends on manufacturer's toolset
- Registering beacon with Google Beacon Platform (Eddystone-UID/iBeacon/AltBeacon)

Physical Web risks and limitations

- URL length limit (Eddystone-URL)
- URL required to be HTTPS for some Physical Web clients
- Users must have Physical Web features enabled on their smartphone

Physical Web risks and limitations (cont'd)

- User must be actively using their phone and notice the notification

- Control over the interaction is limited

Physical Web benefits

- No smartphone development necessary

- No app installation required*

Custom smartphone app

- Native mobile app detects a BLE beacon via its unique ID

- App fetches content from Drupal using JSON API, core REST, or GraphQL

Custom app requirements

- Practically any BLE beacon

- Drupal site to serve content via API

  - JSON API

- Smartphone app

  - Supporting libraries for API

    - moshi-jsonapi

    - retrofit

Custom app architecture
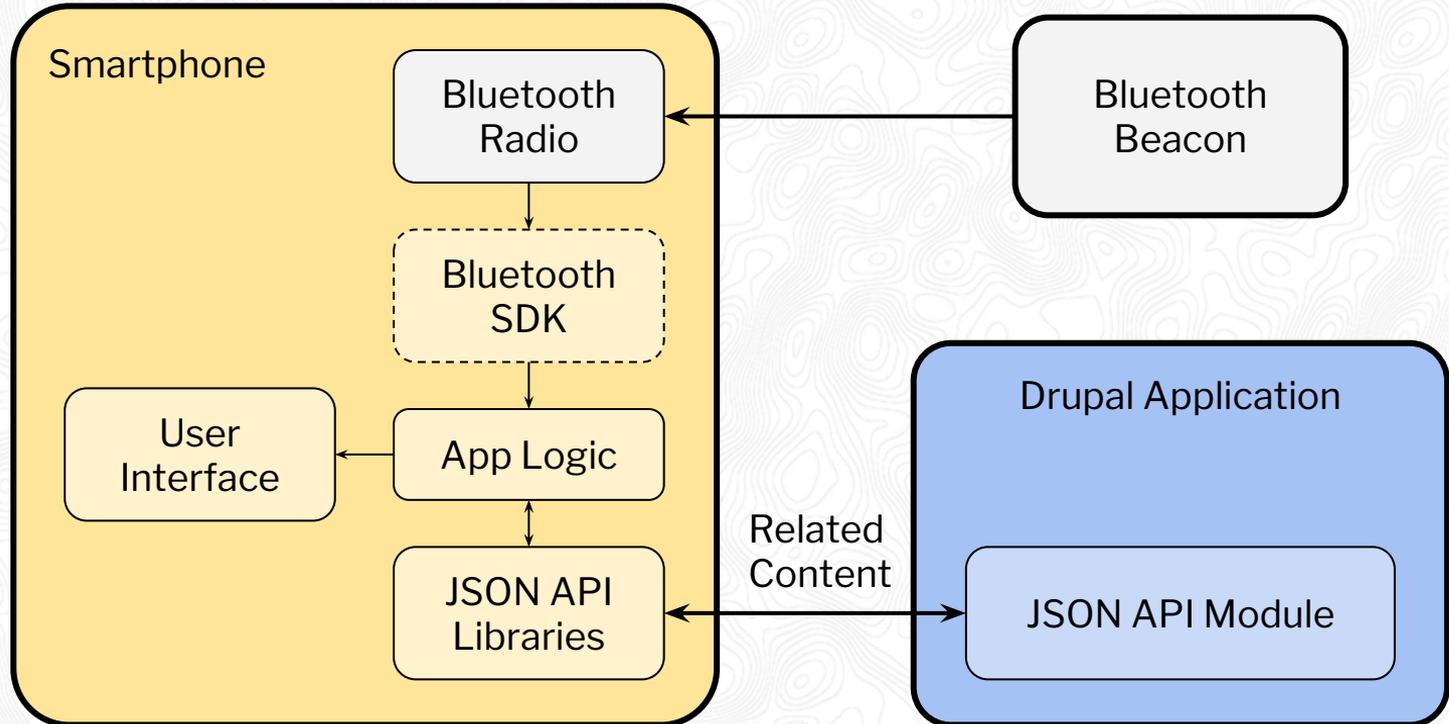
Custom app challenges

- Writing and maintaining the app(s)
  - Cross-platform (hybrid) app could be created using frameworks—such as Ionic—which have APIs for BLE
- Convincing users to install the app
- Serving related content via the API

Custom app benefits

- Full control over the user experience

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Demo

Beacons and Drupal at the airport
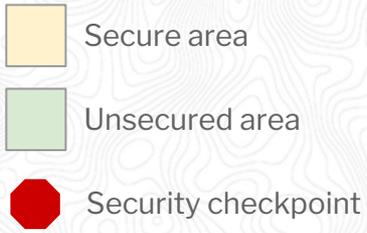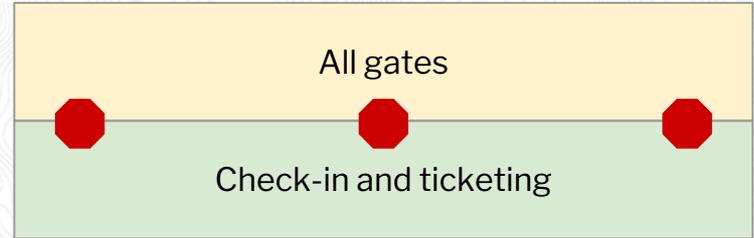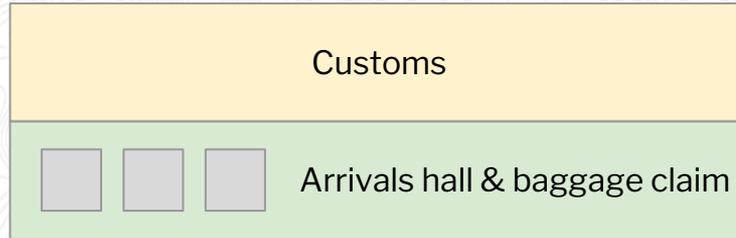
Secure area

Unsecured area

Security checkpoint

Departures level

All gates

Check-in and ticketing

Arrivals level

Customs

Arrivals hall & baggage claim

Drupal International Airport
FLY THE FRIENDLY FORM A.P.-SKY

What's going on?

Secure area

Unsecured area

Security checkpoint

Beacon location

Post-security

Departures level

Airport entry

Arrivals level
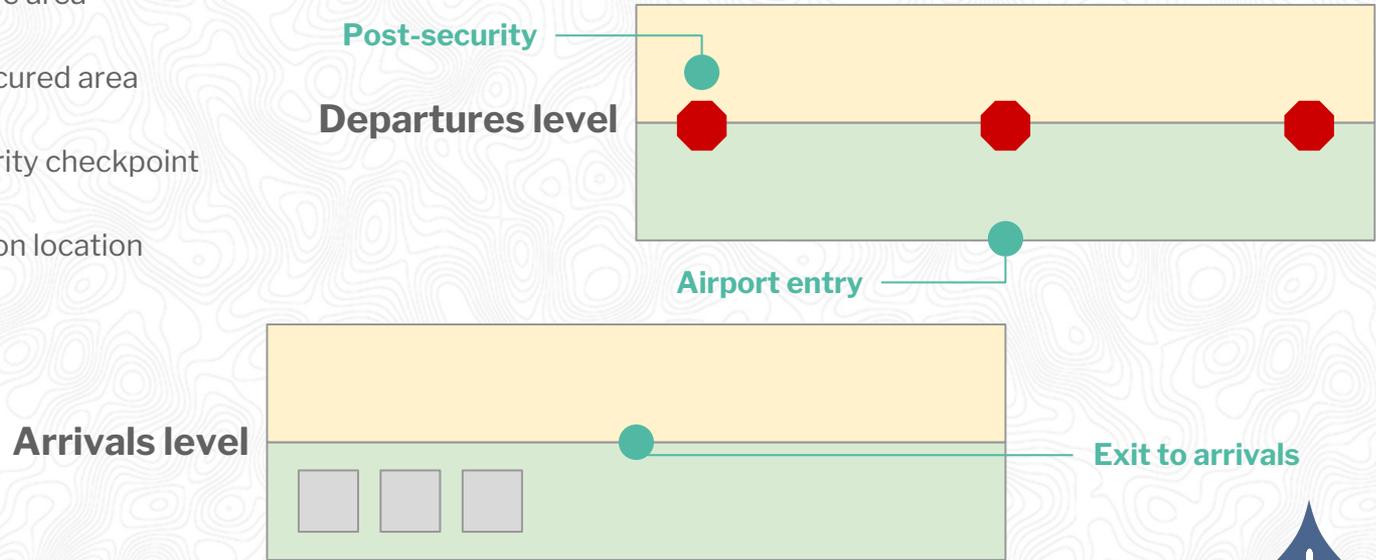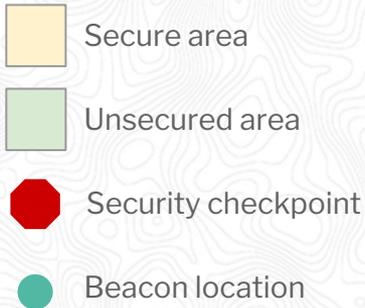
Exit to arrivals

Airport entry beacon welcomes user to the airport

Post-security beacon notifies user gate and boarding time

Exit to arrivals beacon notifies user baggage carousel

What's going on?

Drupal International Airport

FLY THE FRIENDLY FORM A.P.-SKY

Secure area

Unsecured area

Security checkpoint

Beacon location

Ted's route

Post-security

Goes to gate

Departures level

Checks in

Airport entry

Arrivals level

Exit to arrivals

Heads to baggage claim
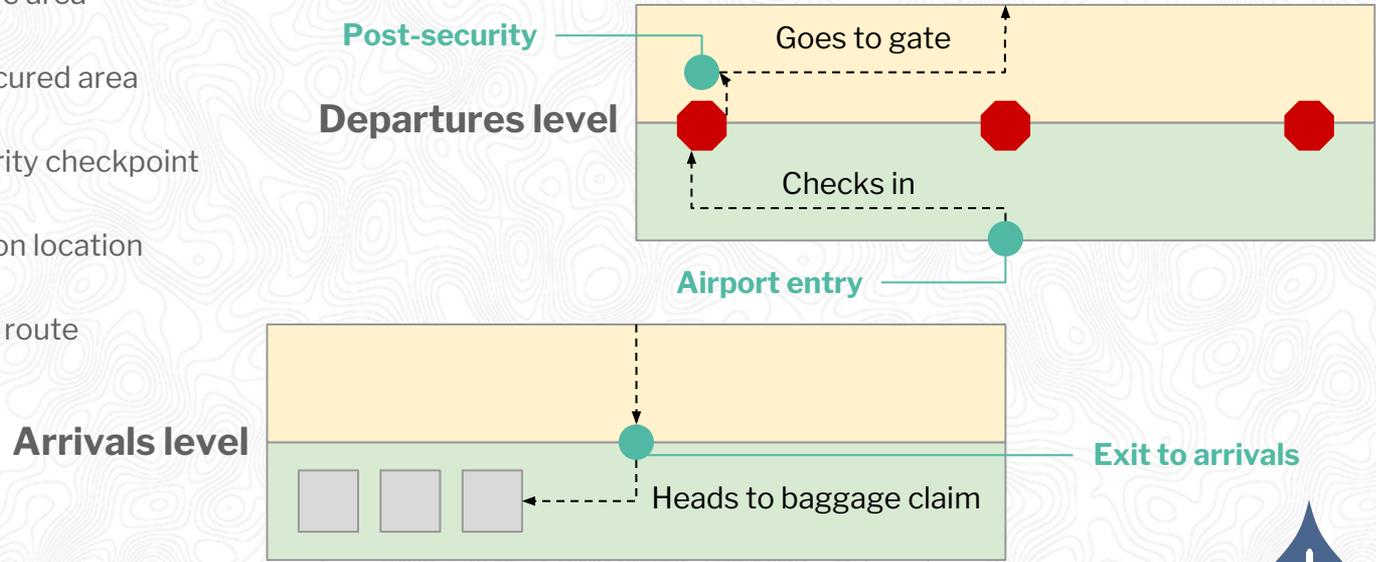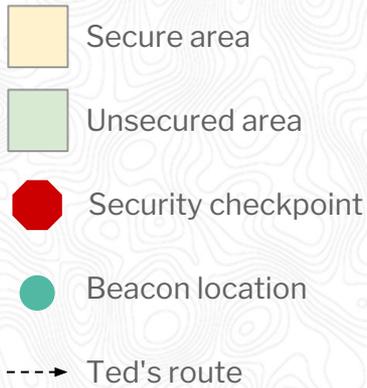
Drupal International Airport

FLY THE FRIENDLY FORM A.P.-SKY

What's going on?

Demo video: Beacons

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Epilogue

Contextualizing content in a decontextualized world

Content increasingly has no context,
but CMSes contextualize by design

How can Drupal administer
content for augmented reality?

Just as we administer context,
can we administer physical context?

**Is our new blank canvas
a world map, not a blank web page?**

Food for thought

- What would a user experience for augmented reality-driven content look like?

- Can we orchestrate across both beacons and augmented reality?

- How can Drupal (and you) prepare for augmented reality and beacons? And you?

- Should Drupal only be used for AR and beacons if it's part of a larger experience ecosystem?

More decoupled Drupal at Vienna

- **Decoupled site building: Drupal's next challenge**
  Thu, 28 Sep — 10:45–11:45 — Strauss

Join us for contribution sprint

- **Mentored Core Sprint**
  Fri, 29 Sep — 09:00–18:00 — Stolz 2

- **First-time Sprinter Workshop**
  Fri, 29 Sep — 09:00–12:00 — Lehar 1, Lehar 2

- **General Sprint**
  Fri, 29 Sep — 09:00–18:00 — Mall

#drupalsprints

What did you think?

- **Evaluate this session**
events.drupal.org/vienna2017/sessions/breaking-drupal-out-box-ar-and-beacons

- **Take the survey!**
surveymonkey.com/r/drupalconvienna

Vielen Dank! • Thank you!

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