
Voice content, multimodal accessibility, and the story of Ask GeorgiaGov

Preston So (he/him) • September 14, 2021 • AllyNYC September 2021

Welcome!

Preston So (he/him) is a product architect and strategist, digital experience futurist, innovation lead, developer advocate, three-time SXSW speaker, and author of [Voice Content and Usability](#) (A Book Apart, 2021), [Gatsby: The Definitive Guide](#) (O'Reilly, 2021), and [Decoupled Drupal in Practice](#) (Apress, 2018).

He has been a programmer since 1999, a web developer and designer since 2001, a creative professional since 2004, a CMS architect since 2007, and a voice designer since 2016.

A product leader at Oracle, Preston has led product, design, engineering, and innovation teams since 2015 at Acquia, Time Inc., and Gatsby. Preston is an editor at [A List Apart](#), a columnist at [CMSWire](#), and a contributor to [Smashing Magazine](#) and has [delivered keynotes](#) around the world in three languages. Preston is based in New York City, where he can often be found immersing himself in languages that are endangered or underserved.

preston.so • @prestonso • preston.so@oracle.com

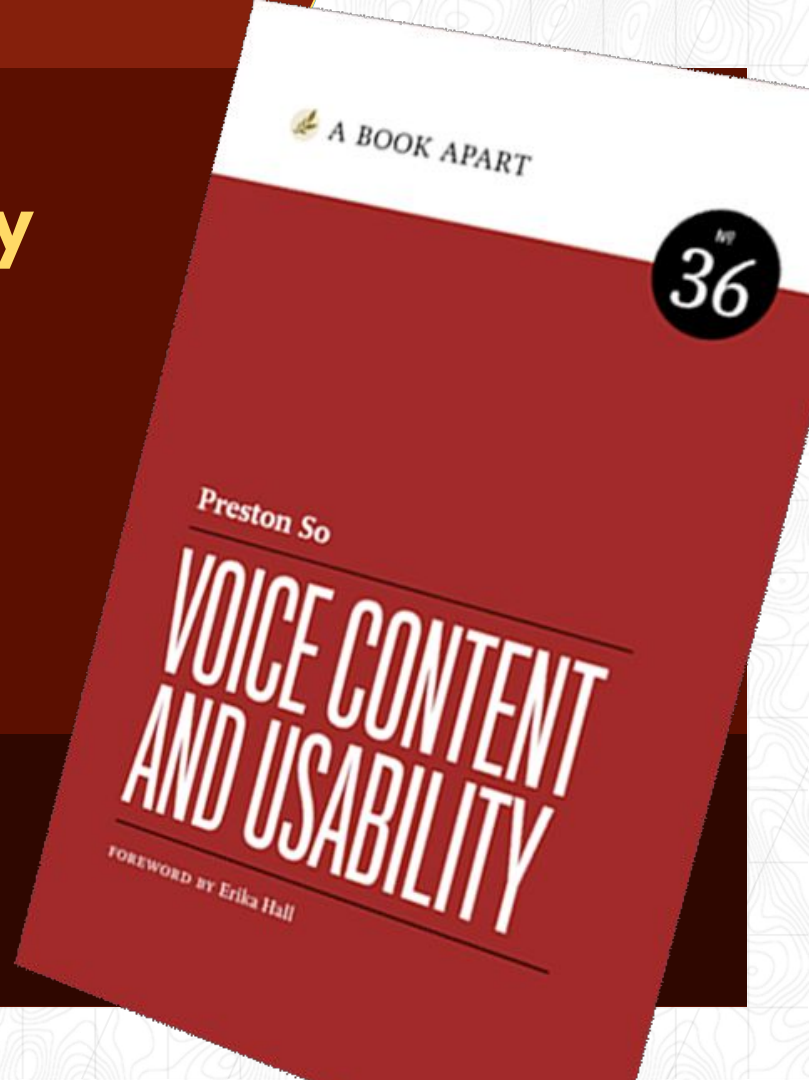
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The Definitive Guide

Build and Deploy Highly Performant JAMstack
Sites and Applications



Preston So

Gatsby: The Definitive Guide

The first comprehensive guide to the **Gatsby framework**—from starters to source plugins, from static queries to schema customization, with a foreword by Jason Lengstorf.

Preview and preorder now!

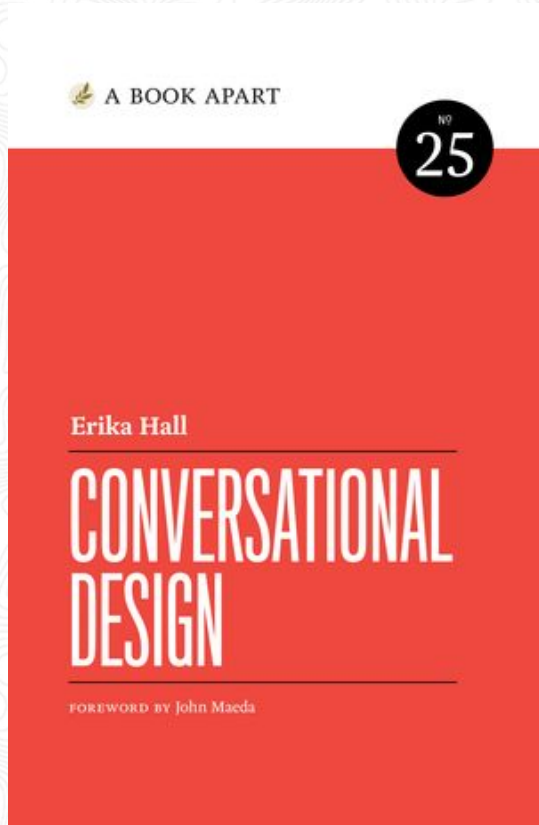
preston.so/books/gatsby

What we'll cover

- What's in a conversation?
- Voice and its role in multimodal accessibility
- Web content versus voice content
- Crafting effective dialogues and flows
- The accessible future of voice content

1

**What's in a
conversation?**



Conversation is not a new interface. It's the oldest interface.

Conversation is how humans interact with one another, and have for millennia. We should be able to use the same principles to make our digital systems and intuitive to use by finally getting the machines to play by our rules.

Erika Hall,
Conversational Design



**Spoken or signed conversation is
inherently messier than written
conversation**

Voice interactions

According to *The Conversational Interface*, we engage in conversations because:

- we need something done (such as a **transaction**),
- we want to know something (**information** of some sort), or
- we are social beings and want someone to talk to (**prosocial** conversations for conversation's sake)

Voice interactions realizing an outcome for the user fall into these categories too.

**All voice interactions are
conversations, but
not all conversations are voice
interactions**

Transactional voice interactions

Alison: Hey, how's it going?

Burhan: Hi, welcome to Crust Deluxe! It's cold out there. How can I help you?

Alison: Can I get a Hawaiian pizza with extra pineapple?

Burhan: Sure, what size?

Alison: Large.

Burhan: Anything else?

Alison: No thanks, that's it.

Burhan: Something to drink?

Alison: I'll have a bottle of Coke.

Burhan: You got it. That'll be \$13.55 and about fifteen minutes.

Informational voice interactions

Alison: Hey, how's it going?

Burhan: Hi, welcome to Crust Deluxe! It's cold out there. How can I help you?

Alison: Can I ask a few questions?

Burhan: Of course! Go right ahead.

Alison: Do you have any halal options on the menu?

Burhan: Absolutely! We can make any pie halal by request.

Alison: What about gluten-free pizzas?

Burhan: We can definitely do a gluten-free crust for you, no problem. Anything else I can answer for you?

Alison: That's it for now. Good to know. Thanks!

Burhan: Anytime, come back soon!

Voice content
involves informational, not
transactional interactions

Voice content
involves the transmission of
information across time, not space

Thinking about human-computer interactions from a screen-based perspective was never truly human-centered from the start.

The ideal interface is an interface that's not noticeable at all—a world in which the distance from thought to action has collapsed and merely uttering a phrase can make it so.

Erika Hall,
Conversational Design

Intent
I need to order
a pizza.



Keyboard and mouse



Touch screen and dialpad



Conversation



Zero user interfaces

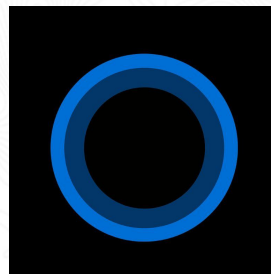
**Pure voice interfaces are interfaces
that have no screen and only allow
interaction through speech**



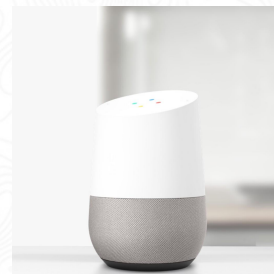
Apple Siri



Amazon Echo



**Windows
Cortana**



Google Home

Examples of voice assistants: a subset of voice interfaces

Voice interfaces

- In the 1990s, **Interactive voice response** (IVR) systems were the first true voice interfaces that engaged in authentic conversation.
- Unlike written chatbots, **voice assistants** are *monochannel* (hardware-specific); chatbots are *omnichannel* and can be used on multiple devices.
- The proliferation of omnichannel frameworks (Dialogflow, Amazon Lex, Wit.ai, IBM Watson) is blurring the boundary between these.

But this taxonomy glosses over one key category of voice interfaces.



**We already have an example of
off-the-shelf voice content:
the screen reader**

**But do screen readers truly deploy
content for people with disabilities as
efficiently as they could?**

**For more on voice interactions and
accessibility implications,
see *Chapter 1 of Voice Content***

2

Voice and its role in multimodal accessibility

1986



The Research Centre for the Education of the Visually Handicapped (RCEVH) at the University of Birmingham developed the Screen Reader for the BBC Micro and NEEC Portable.

That same year, Jim Thatcher created the first IBM Screen Reader for text-based computers,, later recreated for computers with graphical user interfaces (GUIs).

A brief history of the screen reader

- For Blind or visually impaired website users, **screen readers** that transcribe visual content into synthesized speech are the predominant method of interacting with text, multimedia, etc.
- Thanks to the introduction of semantic HTML and especially ARIA roles beginning in 2008, screen readers started facilitating interactions with web pages allowing users with disabilities to traverse the page as an aural and temporal space rather than a visual and physical one.

[Screen readers for the web]
provide mechanisms that
**translate visual design
constructs—proximity,
proportion, etc.—into useful
information.** At least they do when
documents are authored
thoughtfully.

Aaron Gustafson,
“Conversational Semantics”
A List Apart

But there's just one problem:
screen readers are difficult to use
and unremittingly verbose for the
vast majority of use cases



**For many screen reader users,
working with web-based
interfaces exacts a cognitive toll**

[Agencies](#)[Cities & Counties](#)

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Why screen readers can be less efficient

Links

Navbars

Calls to action

Form elements

Multimedia

From the beginning, I hated the way that Screen Readers work. **Why are they designed the way they are? It makes no sense to present information visually and then, and only then, translate that into audio.** All of the time and energy that goes into creating the perfect user experience for an app is wasted, or even worse.

Chris Maury,
“War Stories”
Wired Magazine

**Often, well-designed voice interfaces
can speed users to their goals faster
than long-winded screen readers**

Why voice interfaces plus screen readers?

- **Multimodal accessibility** involves the provision of accessible interfaces across multiple dimensions of usability, such as screen readers for web users, voice assistants for Blind users, and refreshable Braille displays for Deaf-Blind users.
- Whereas visual interface users can ignore areas irrelevant to them in the viewport, Blind users must listen to every utterance. **Voice interfaces should exist in parallel with and alongside screen readers for content delivery.**

Search for topics, agencies, cities



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Answering Georgians' questions at home

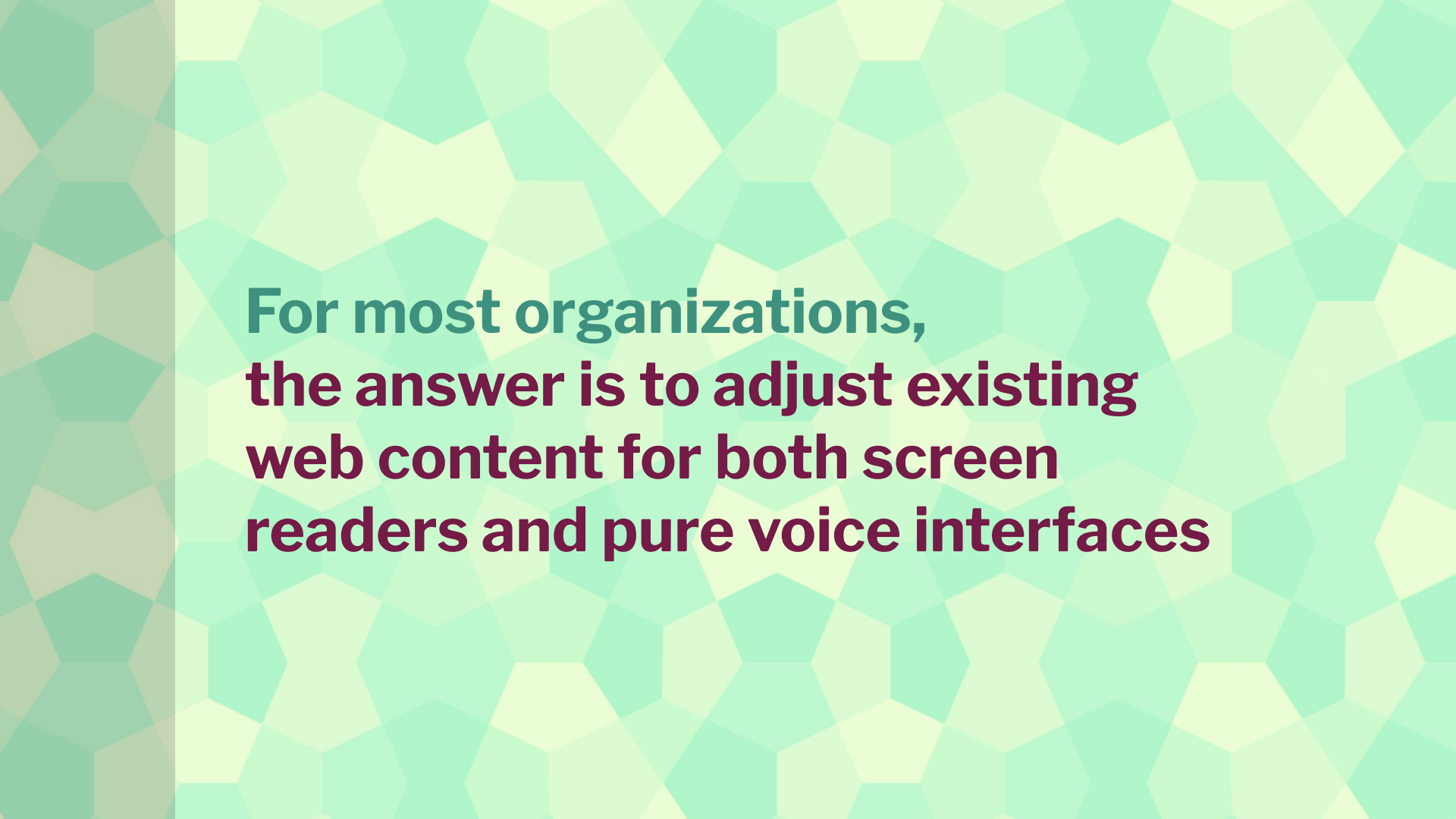
Entirety of Georgia.gov FAQ
content available through
Amazon Alexa

Alternative access to voice
content for elderly Georgians
and Georgians with disabilities



Cities &
Counties

**For content strategists focused on
multimodal accessibility,
how do you juggle parallel content
across screen reader and voice?**



**For most organizations,
the answer is to adjust existing
web content for both screen
readers and pure voice interfaces**

3

Web content versus voice content

Content legibility

**Is it understandable to a listener
rather than a reader?**

Content discoverability

**Is content discoverable for users
working with flows, not links?**



Driver's Licenses

Topic

The Department of Driver Services (DDS) helps you obtain, renew, or replace learner's permits, ID cards, and licenses. In Georgia, you must be at least 16 years of age (with the exception of drivers with legally blind parents) to carry a full license for everyday, non-commercial vehicles.

What You Should Know:

- You must renew your license every 8 years. Customers may be required to pass a vision test, knowledge exam, and the road skills test.
- You'll pay \$32 to renew your license for 8 years. You may be eligible to receive a \$5.00 discount by [renewing online](#).

What you should know

Structure of Ask GeorgiaGov content

FAQs:

How do I transfer my out-of-state driver's license once I move to Georgia?

Within 30 days of moving to Georgia you are required to visit the nearest Department of Driver Services (DDS) [Customer Service Center](#). Bring along:

- Your current license,
- Proof of your Social Security number,
- 2 proofs of Georgia residency (such as a bank statement, utility bill, or rental contract), and
- Proof of identity (such as a birth certificate, passport, or immigration card).

Additional documents required if you are changing your name. Visit the Department of Driver Services website to create a [Custom Checklist](#) and be sure you arrive with the necessary documents.

Question

Answer

FAQ

Structure of Ask GeorgiaGov content

**We performed a first-ever
omnichannel content audit for
cross-channel legibility and
discoverability**

Title	No.	Recommendation	Proposed Accepted Y/N	Changes Made on Live Site Y/N
Getting Copies of Criminal Records (Georgia Crime Information Center)	2	<p>fee structure sheet:</p> <p>Proposed: delete sentence, remove link (included later on this page already): "A fee, payable by certified check or money order to the Georgia Crime Information Center, is required."</p> <p>Current: "Reference the fee structure sheet for applicable fees."</p>	Y	Y
		Federal Bureau of Investigation		
—How do I run a background check on an applicant for employment?	1	<p>Read more about this: Delete sentence; use previous sentence.</p> <p>Proposed: "If, however, you'd like a fingerprint-based record check, you'll need to fill out a Georgia Crime Information Center Service Agreement and complete an enrollment form for the Georgia Applicant Processing Service (GAPS)."</p> <p>Current: "If, however, you'd like a fingerprint-based record check, you'll need to fill out a Georgia Crime Information Center Service Agreement and complete an enrollment form for the Georgia Applicant Processing Service (GAPS). Read more about this."</p>	Y	Y
—How much does a background check cost?	1	<p>fee structure sheet:</p> <p>Proposed: "Fees vary from \$10 to \$48.25 based on the type of services requested. A fee structure</p>	Y	Partially - added second sentence

Legend

	Keep intact
	Reword surrounding sentence per suggestion (action-based link; no context)
	Rewrite phrasing of question; also needs further discussion
	Needs further discussion
	Other
	No action needed

Voice content audit for Ask GeorgiaGov

**Like countless other editorial teams
Georgia could only manage one
single source of truth for content**

We audited for:
voice content legibility
voice content discoverability

Before

Medicaid has several programs that can help you and your family. Learn more about these programs.

For both the elderly and those with disabilities, waiver programs provide medical assistance within the comfort of a home- or community-based environment. Health professionals come to you to help you through recovery. Learn more about these programs.

You can update the name on your passport by securely mailing your application and fee to the U.S. Department of State. Find out what you need to do before sending the application.

After

Medicaid has several programs that can help you and your family.

For both the elderly and those with disabilities, waiver programs provide medical assistance within the comfort of a home- or community-based environment.

You can update the name on your passport by securely mailing your application and fee to the U.S. Department of State.

Addressing links and calls to action

Before

The Georgia Lottery Corporation only raises money for the Georgia Pre-K and HOPE Scholarship programs; it does not administer those programs. Read more about the Pre-K Program and the HOPE Scholarship.

Although the state provides a standard homestead exemption of \$2,000 for your primary residence, some counties offer taxpayers even greater exemptions. Learn about these exemptions for your county.

After

The Georgia Lottery Corporation only raises money for the Georgia Pre-K and HOPE Scholarship programs; it does not administer those programs.

Although the state provides a standard homestead exemption of \$2,000 for your primary residence, some counties offer taxpayers even greater exemptions.

Addressing verbosity

Before	After
How do I submit an advertisement? (on “Subscribing to the Farmers & Consumers Market Bulletin” page) (“Which advertisement?”)	How do I submit an advertisement to the Farmers and Consumers Market Bulletin?
How long can I receive benefits? (on “Applying for Unemployment Benefits” page) (“Which benefits?”)	How long can I receive unemployment benefits?
How do I start my loan application? (on “Applying for Environmental Loans and Tax Credits” page) (“For which loan?”)	How do I start my environmental loan application?

Addressing context and ambiguity

Before	After
<p>See the differences between an <u>LLC, Sole Proprietorship, and Corporation</u>.</p>	<p>Not sure which business type meets your needs? Learn the differences between an <u>LLC, Sole Proprietorship, and Corporation</u> in the Georgia.gov blog.</p>
<p>Read about <u>licensed practical nursing requirements and transferring a license from another state</u>.</p>	<p>You'll follow a different application process to get your nursing license depending on if and where you've been licensed before. The Georgia Secretary of State website provides <u>licensed practical nursing requirements</u> and <u>licensed registered nursing requirements</u>.</p>

Facilitating cross-channel interactions: sometimes compromise is best

**For more on voice content auditing,
see *Chapter 2 of Voice Content***

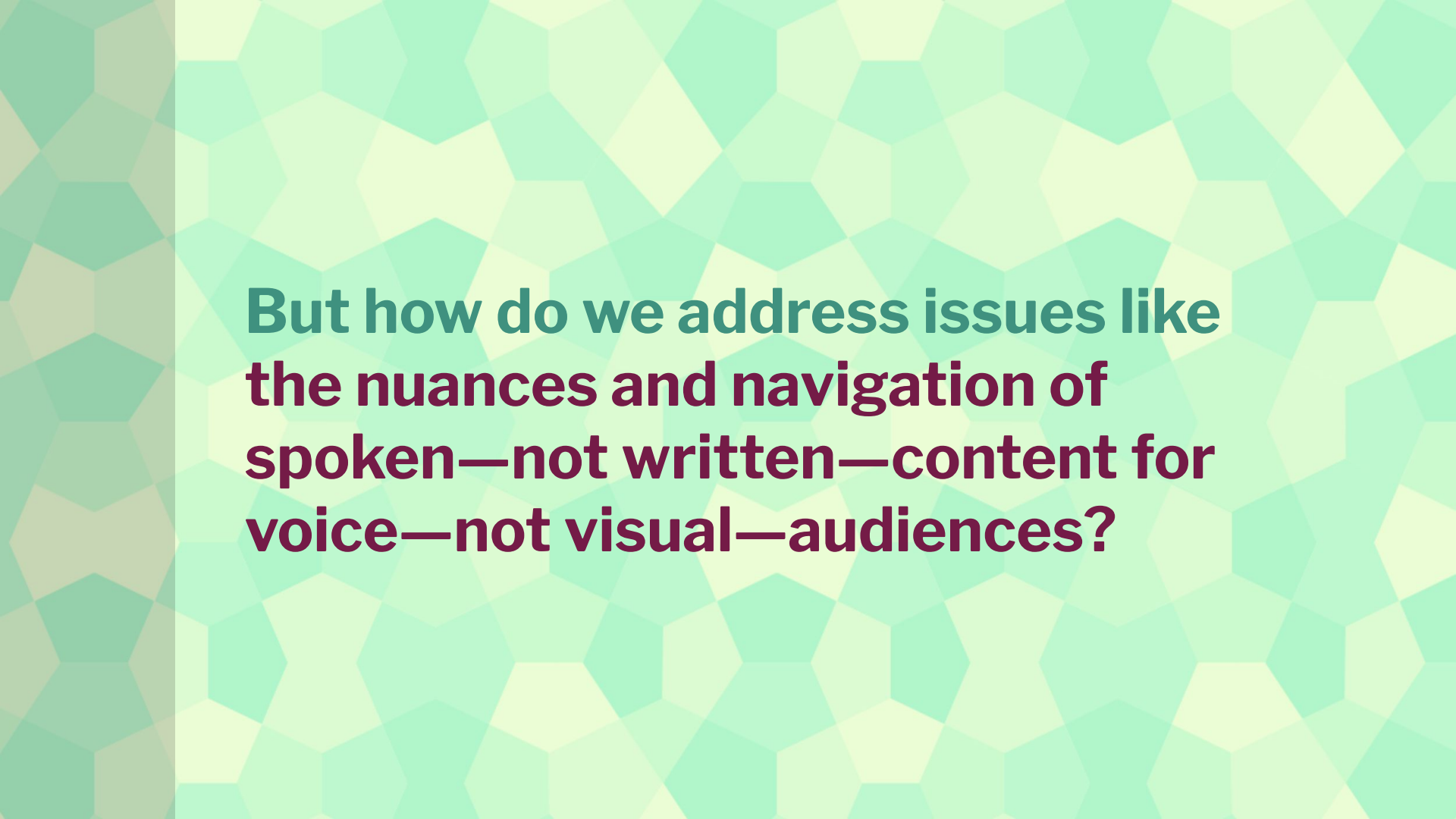
Eight months later ...

- **79.2%** success rate on all interactions
- **71.2%** of all interactions led to agency phone number being provided

Most popular keywords:

- vehicle registration
- driver's licenses
- state sales tax

**The only sustainable approach is
a single source of truth for content
reused across channels**



**But how do we address issues like
the nuances and navigation of
spoken—not written—content for
voice—not visual—audiences?**

4

Crafting effective dialogues and effective flows

**Voice interface design at its core
is about writing effective dialogues
and crafting efficient flows**

Four elements of dialogue

- **Onboarding:** Orient the user
- **Prompts:** Elicit user responses
- **Intents:** Understand what the user wants
- **Responses:** Deliver information and feedback

Onboarding

Ask GeorgiaGov: Welcome to GeorgiaGov.

Ask GeorgiaGov: Welcome to GeorgiaGov, your source for state government information.

Ask GeorgiaGov: Welcome to GeorgiaGov, your source for state government information. I can answer any question you have about state government in Georgia.

Prompts

Ask GeorgiaGov: Welcome to GeorgiaGov. Feel free to ask a question.

Ask GeorgiaGov: Welcome to GeorgiaGov. Feel free to ask a question, like “Who is the governor of Georgia?” or “How do I register to vote?”

Intents

Ask GeorgiaGov: Welcome to GeorgiaGov. Feel free to ask a question.

User: How do I renew my license?

Ask GeorgiaGov: Does this sound helpful? Getting a boating, fishing, or hunting license.

User: No.

Ask GeorgiaGov: Does this sound helpful? Driver's licenses.

User: Yes.

**For more on intent identification,
see *Chapter 3 of Voice Content***

Responses: Confirmation

Ask GeorgiaGov: Welcome to GeorgiaGov. Feel free to ask a question.

User: How do I renew my driver's license?

Ask GeorgiaGov: Does this sound helpful? Driver's licenses.

User: Yes.

Responses: Error recovery

Ask GeorgiaGov: Welcome to GeorgiaGov. Feel free to ask a question.

User: (Unclear)

Ask GeorgiaGov: Sorry, I didn't understand. Ask me a question related to the state government of Georgia.

User: How do I renew my driver's license?

Ask GeorgiaGov: Does this sound helpful? Driver's licenses.

User: Yes.

Responses: Resource delivery

Ask GeorgiaGov: The Department of Driver Services helps you obtain, renew, or replace learner's permits, ID cards, and licenses. In Georgia, you must be at least 16 years of age (with the exception of drivers with legally blind parents) to carry a full license for everyday, non-commercial vehicles. I have a list of related information. Would you like to hear it?

User: Sure.

Ask GeorgiaGov: Does this sound useful? How do I transfer my out-of-state driver's license once I move to Georgia?

User: Yes.

Best practices for dialogue writing

- **Keep it short.** Dialogues should avoid lengthy sentences, unfamiliar terminology, and too many options.
- **Keep it natural.** Dialogue should be as natural to the human ear as possible.
- **Design for ambiguity.** Voice interfaces can't simply display a list of options to disambiguate similar-sounding options. The more ambiguities present in a dialogue, the more difficult it is to conduct disambiguation through dialogue in a natural way.

Best practices for dialogue writing

- **Support corrections.** Users should be able to repair an utterance containing a mistake by issuing a correction, even if it's easy for the user to start over from the beginning.
- **Timing is important.** Time is one of the key means by which voice interfaces can approximate physical space. Like negative space, silence is extremely effective, but pauses of longer than 400 milliseconds sound unnatural in human conversation.

Sounding natural

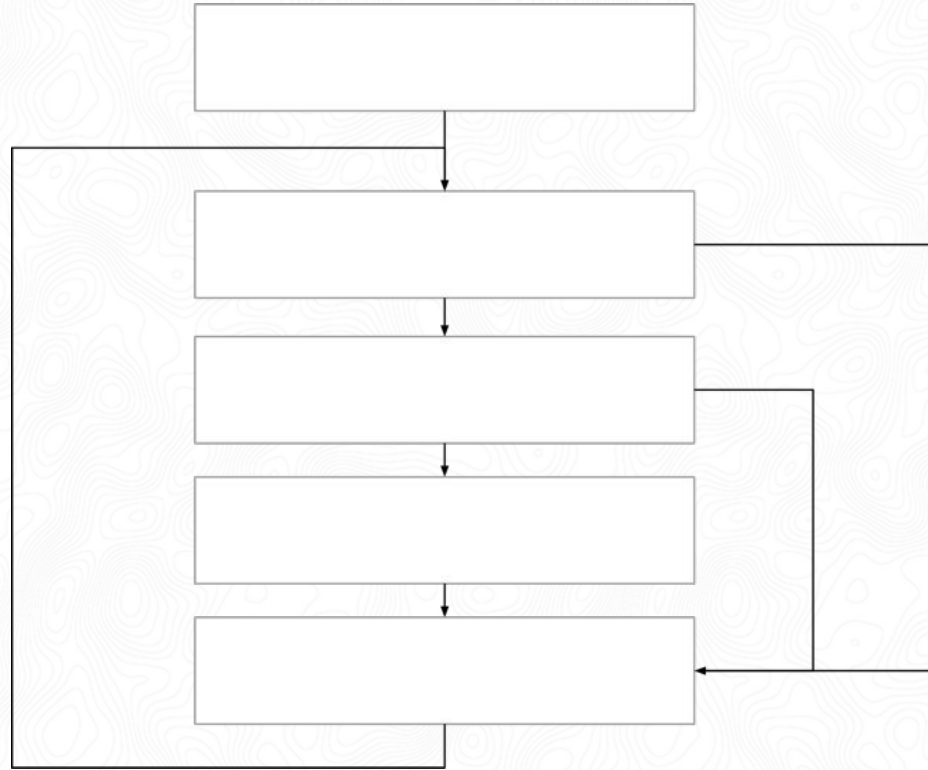
Conversational markers are linguistic elements that bind together chunks of conversation into a cohesive narrative.

- **temporal markers** (e.g. *first* and *last*, *previous* and *next*, and *almost there* and *finally*)
- **acknowledgments** (e.g. *thanks* or *got it*, *understood* or *sorry*, and *didn't catch that*)
- **affirmative feedback** (e.g. *great job*, *nice work*, and *you did it*)

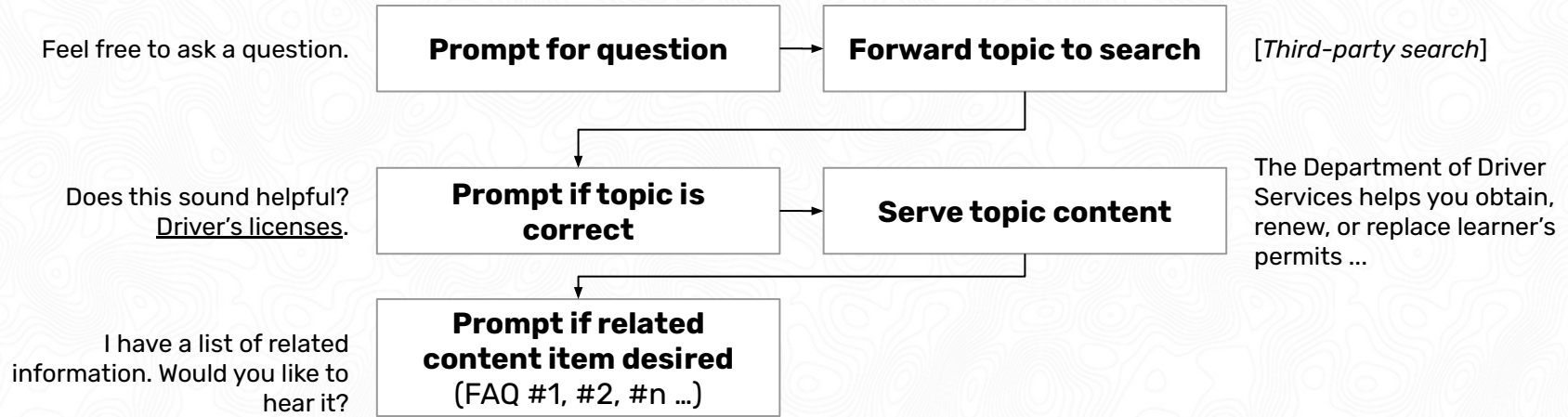
**In a web-optimized IA,
we can see everything's structure
(but screen reader users can't)**

**In a voice-optimized IA,
the structure has to be given to us**

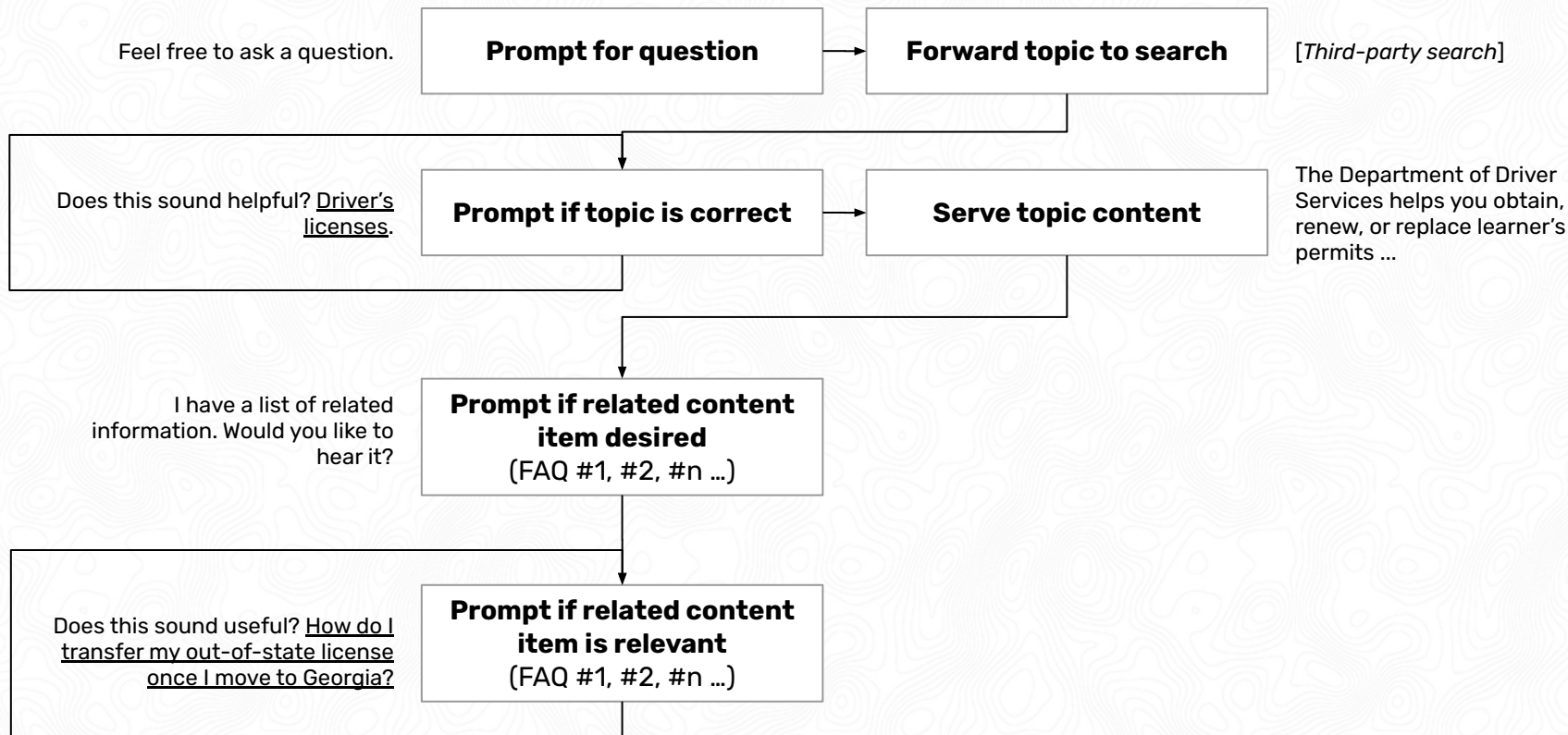
**Information architecture requires
guided, unidirectional flows,
not sitemaps or navbars**



Call flow diagrams



Converting dialogues into flows



Diagramming recursive behaviors

**For more on call flow diagrams,
see *Chapter 4 of Voice Content***

5

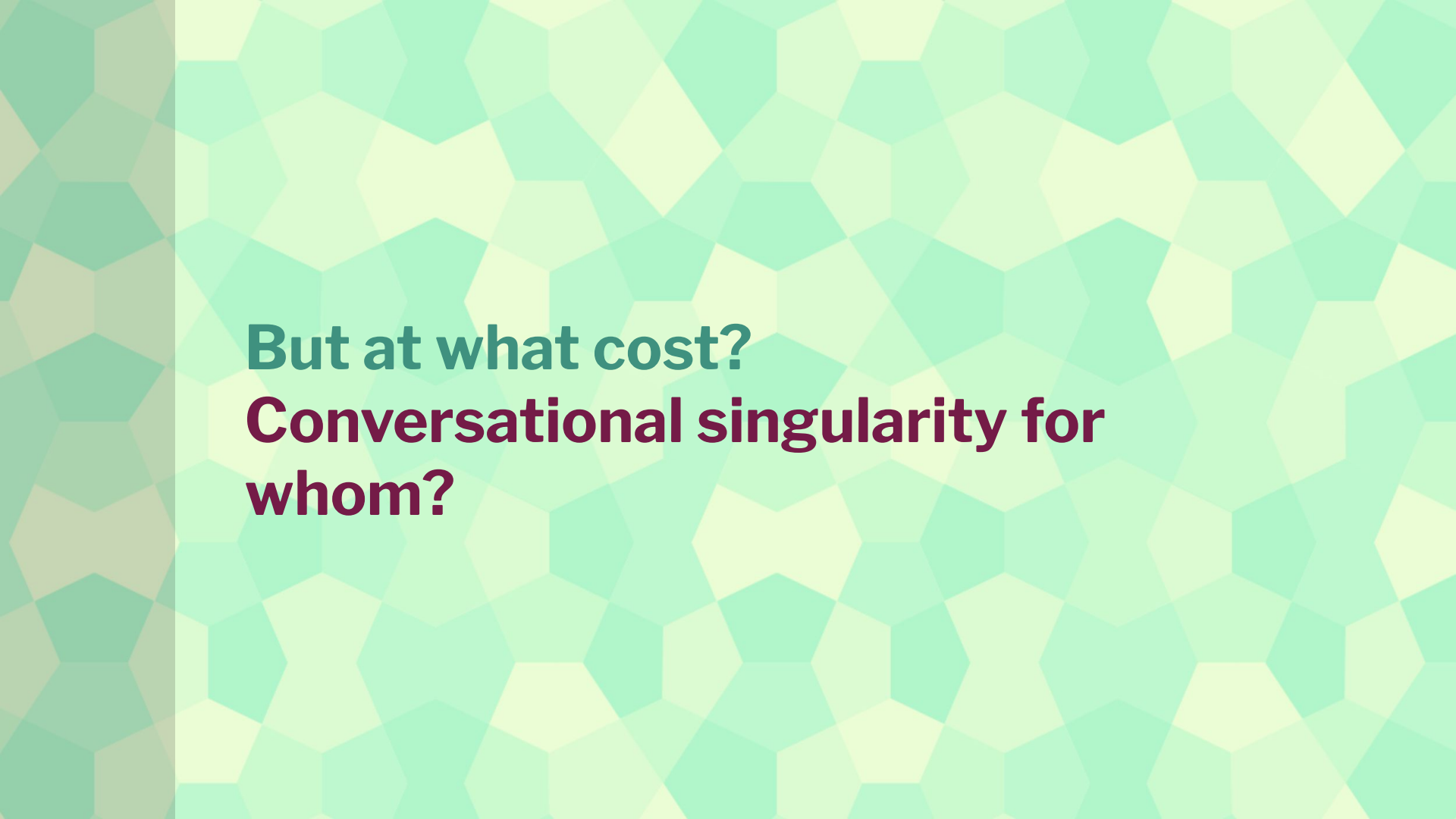
The accessible future of voice content

**When you hear Alexa or Siri speak,
who is the person you imagine?**



**Voice interfaces must represent
the richness of human language**

**The conversational singularity will
make voice interfaces indiscernible
from natural human conversation**



But at what cost?
**Conversational singularity for
whom?**

**Usability research shows that
some users prefer more artificial
conversational interactions**



**Voice interfaces
are the most human of interfaces**



**Voice content
is rooted in verbal language and
aural flows, not visual structures**



**Voice content
cannot stand alone
alongside web content**



**Voice content must be part of
an omnichannel and multimodal
accessibility strategy**

Resources

- ["Personality for voice interfaces: Humanizing the most human of interfaces"](#)
(preston.so, June 22, 2021)
- ["How to classify interactions for conversational interfaces"](#)
(preston.so, June 8, 2021)
- ["Register, diglossia, and why it's important to distinguish spoken from written conversational interfaces"](#)
(preston.so, June 2, 2021)
- ["How we integrated Alexa with Drupal for Ask GeorgiaGov, the first voice interface for residents of Georgia"](#)
(preston.so, May 26, 2021)

Resources

- ["Can voice assistants displace screen readers?"](#)
(preston.so, May 19, 2021)
- ["Conversational maxims and the cooperative principle in voice interface design"](#)
(preston.so, May 11, 2021)
- ["Can your content speak for itself?"](#)
(preston.so, May 5, 2021)
- ["Voice interface design is about good writing, not just good design"](#)
(preston.so, April 16, 2020)
- ["Affordance and wayfinding in voice interface design"](#)
(preston.so, March 3, 2020)

Resources

- ["Building usable conversations" series](#)
(*preston.so*, January 18, 2019)
- ["Usability testing for voice content"](#)
(*A List Apart*, April 9, 2020)
- ["Ask GeorgiaGov: Answering Georgians' questions with Alexa and Drupal"](#)
(*VOICE Summit Newark*, July 25, 2018)
- ["Talk over text: Conversational interface design and usability"](#)
(*Frontend United Utrecht*, June 1, 2018)

Thank you!

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He has been a programmer since 1999, a web developer and designer since 2001, a creative professional since 2004, a CMS architect since 2007, and a voice designer since 2016.

A product leader at Oracle, Preston has led product, design, engineering, and innovation teams since 2015 at Acquia, Time Inc., and Gatsby. Preston is an editor at [A List Apart](#), a columnist at [CMSWire](#), and a contributor to [Smashing Magazine](#) and has [delivered keynotes](#) around the world in three languages. Preston is based in New York City, where he can often be found immersing himself in languages that are endangered or underserved.

preston.so • @prestonso • preston.so@oracle.com

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