

Rosenfeld Media Community Talk

Demystifying Multimodal Design: The Design Practice You Didn't Know You're Doing

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Computer, who is Cheryl?

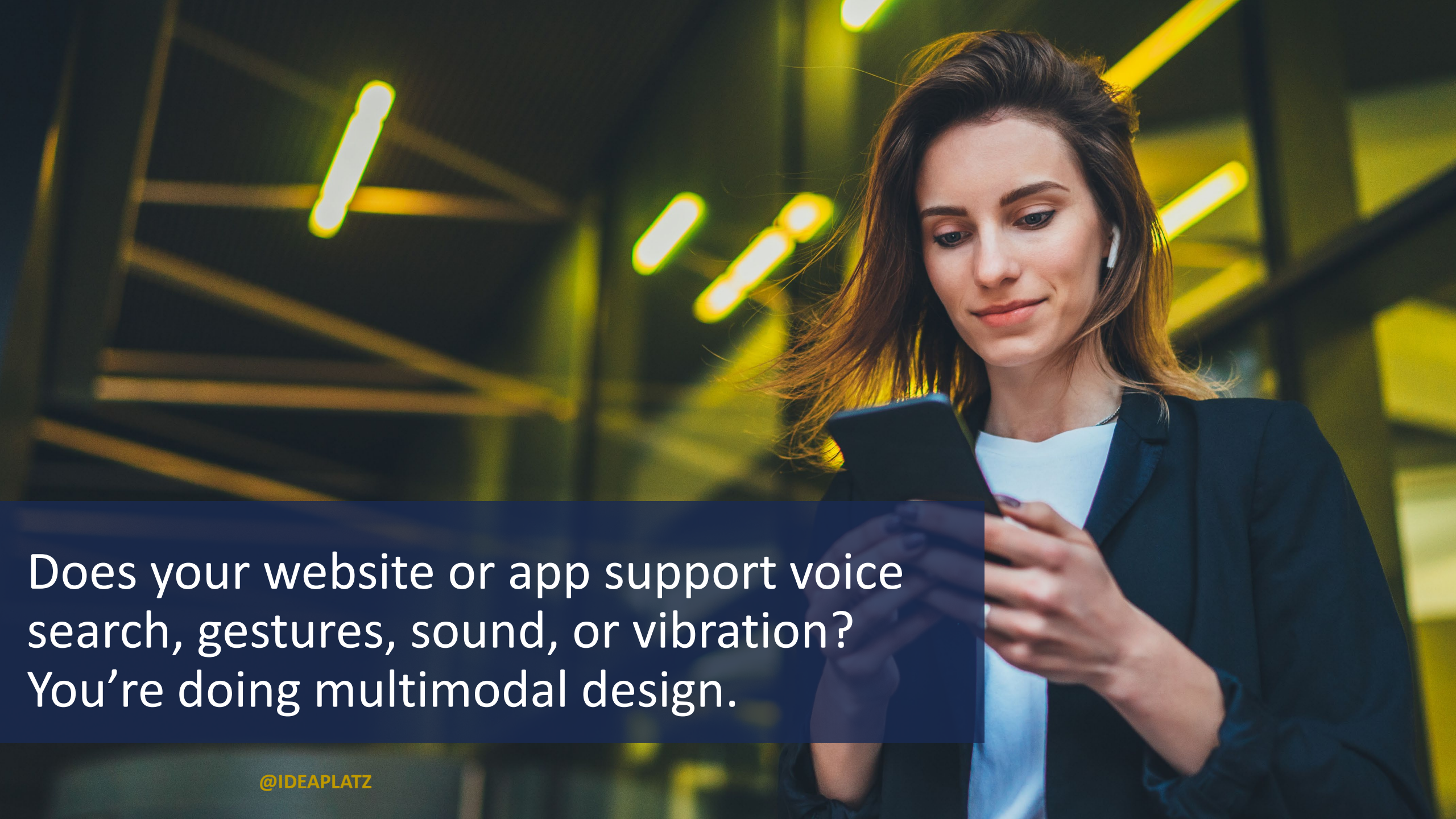
- Author of **Design Beyond Devices**
- Original UX Designer on Echo Look team
- Original designer for Alexa Notifications
- Voice, systems, and multimodal design: Alexa, Cortana, Windows Automotive, Dynamics Power Virtual Agents
- Shipped one of the first speech-enabled Nintendo DS games (Disney Friends)
- Creator of several popular Alexa skills
- Cross-platform video game designer for Riot Games, EA, Amaze Entertainment / Griptonite Games, and Scopely



Multimodal design is the design practice you probably don't realize you're doing. Intentionality can take your work to the next level.



Are you designing for visuals, audio, and/or haptics? You're doing multimodal design.



Does your website or app support voice search, gestures, sound, or vibration? You're doing multimodal design.



Are you designing for VR, AR, or MR?
You're doing multimodal design.



The future is multimodal,
because humans are multimodal.

A **mode** (in this context) is a type of communication, and humans communicate using their senses.

A **multimodal interaction** is an exchange between a device and a human being where multiple input or output modalities may be used simultaneously or sequentially depending upon context and preference.



What is multimodal design?

DEFINITION

Multimodal design seeks to coordinate the delivery of multiple input and output stimuli to create a flexible, coherent experience for our customers.

PRACTICE

Multimodal design is an additional layer of design rigor added on top of our existing modality-specific designs, like voice UI (VUI) designs.





In my book Design Beyond Devices, we talk about BOTH multimodality AND cross-device design.

WHY INCLUDE BOTH “MULTIMODAL” AND “CROSS-DEVICE” EXPERIENCES?

It's short-sighted to assume ANY experience exists in a vacuum. Our customers are swimming in devices.

Even websites are cross-device now: most websites must function on desktop and mobile, which means interruption, context, and notifications become relevant.

The limits of multimodality on one device may cause a customer to turn to another device.

Let's take a quick tour of some of the basics.

- Multimodal Design Fundamentals
- Capturing Customer Context
- Transition Strategy
- Proactive Communication Strategy
- Design & Delivery
- My top FAQ from readers

Whether you're an intentional practitioner or new to this space, there's something here for you today.





FUNDAMENTALS

Multimodal Design



Modality	Description
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Visual	Projection or rendering of a stimulus that will be interpreted over optical channels—from books and e-readers to GIFs and videos.
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Auditory	The use of acoustic waves to communicate meaning: music, sound effects, or language.
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Haptic	Communicating meaning with changes to the physical environment: pressure, vibration, force feedback, or direct manipulation like taps or clicks.
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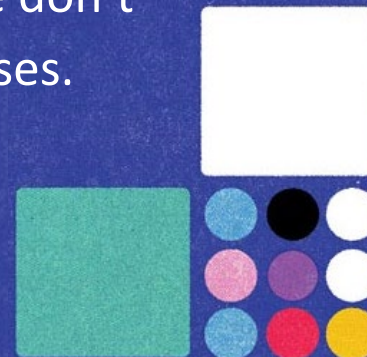
Kinetic	Communication based on movement or orientation in space.
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Ambient	Inferred meaning driven by environmental or biometric conditions: temperature, heart rate, lighting, etc.
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COMMUNICATION MODALITIES

A framework for thinking about input and output modalities as defined in Design Beyond Devices (Table 1.1). Note that these don't align 1:1 to the human senses.



Dimensions driving multimodality

How rich is your information?

- Low information density
Temperature, sports score
- High density
Book, movie times, 10-day forecast

How close is the device to the customer?

- Close proximity
Wearable to arms-reach
- Long range
3-10 feet



THE SPECTRUM OF MULTIMODALITY

By plotting information density and proximity on a grid, you can place all current and future experiences in one of four categories.



RICH INFORMATION

QUADRANT 2
Anchored

Experiences with rich physical presence where a customer is usually nearby.

Fire TV, Xbox One, Cortana on PC

QUADRANT 1
Adaptive

Experiences that support both close proximity and long-range interactions.

Echo Show, Facebook Portal, Google Nest Hub

CLOSE PROXIMITY

LONG RANGE / FAR FIELD

QUADRANT 3
Direct

Customer and device must be in direct contact or extreme proximity for use.

Fitbit, Google Glass, Hololens, Apple Watch

QUADRANT 4
Intangible

Hands-free experience where close proximity to the device is not required.

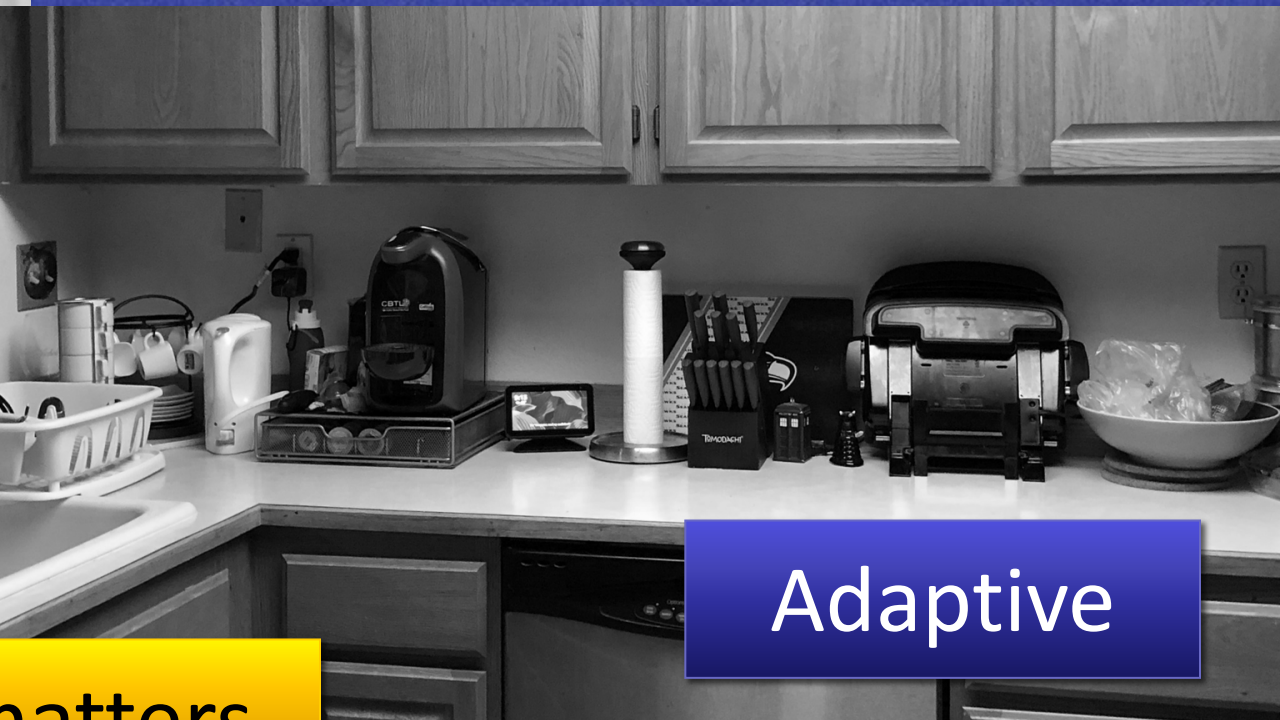
Echo (original) Google Home

SCOPED INFORMATION

@IDEAPLATZ

You must **understand your customer's context** to know what interaction model makes sense in the moment.





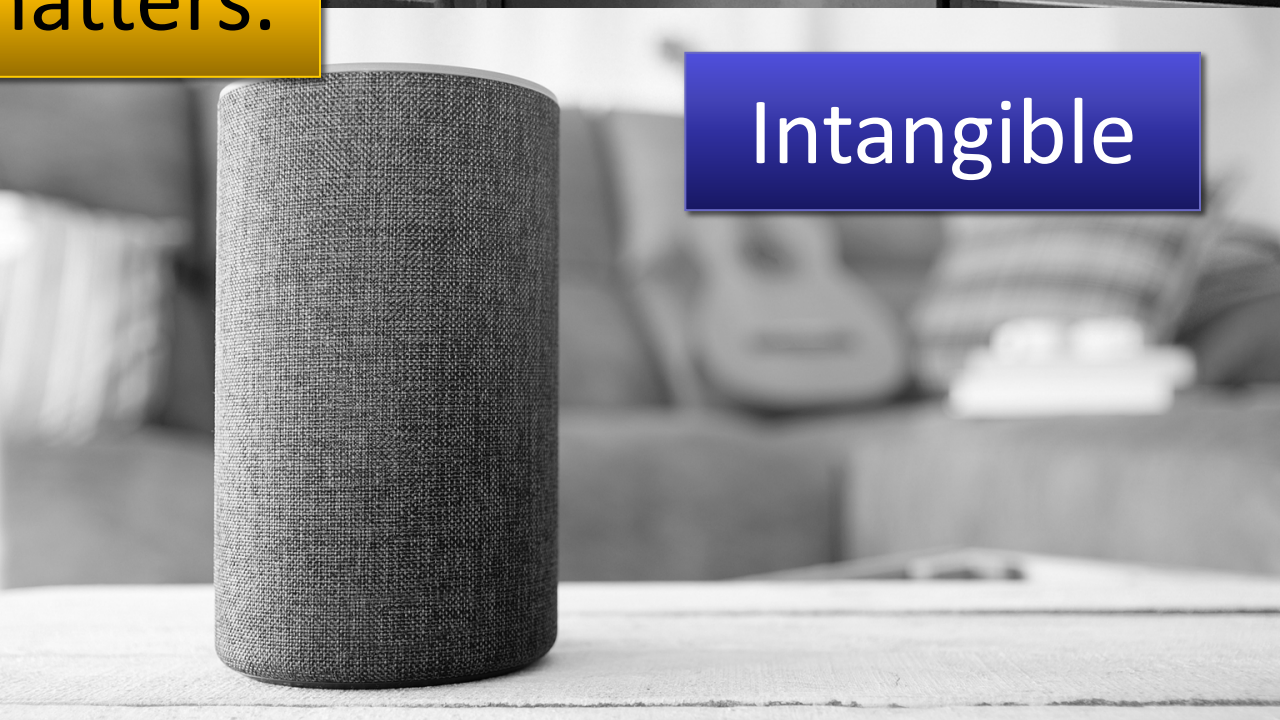
Anchored

Adaptive

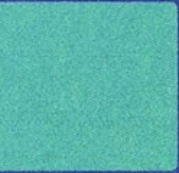
Context matters.



Direct




Intangible



EXPANDING YOUR UNDERSTANDING

Capturing Customer Context





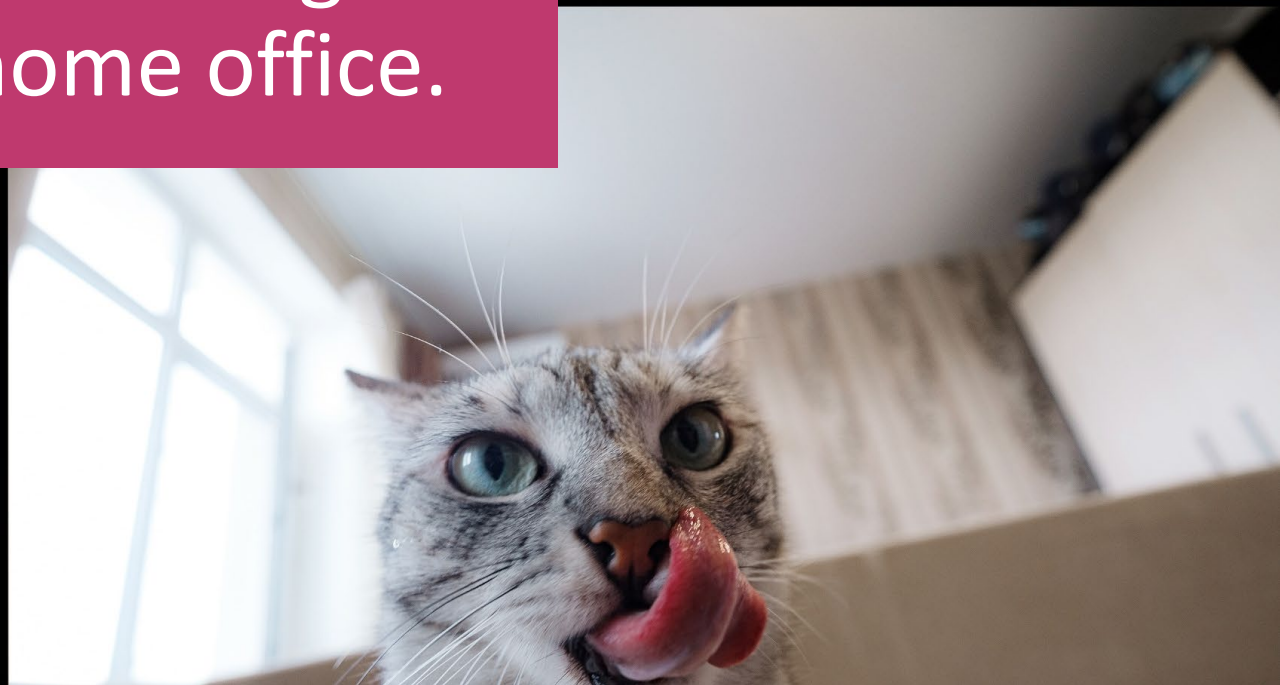
What we thought we knew about the world as researchers and designers has changed.




Are whiteboards and stickies really the holy grail of creativity when we're in a hybrid world?



We've all learned
there's no such thing as
a "typical" home office.





Use CROW to help you define and capture customer context.

CROW is a **storytelling shorthand** we use at my improv theater (Unexpected Productions) to quickly define the essential elements of a scene.

CROW stands for:

- **Character**
- **Relationship**
- **Objective**
- **Where**



C: Character

What *defines* your customer?

Dimension	Definition	Example questions
Attributes	Fundamental traits, mannerisms, and habits. Skills, quirks, gender identity, preferred pronouns, disabilities, communities.	<ul style="list-style-type: none">• How does your customer define their own identity to themselves and others?• Which of your customer's attributes are underrepresented, and how might that affect them?
Attitudes	Emotions and reactions to outside stimuli—other people, objects, or situations.	<ul style="list-style-type: none">• Would this customer have any preconceived opinions or learned behaviors that they would bring to bear on this experience?
Choices	The actions you take, based on your beliefs and attitudes.	<ul style="list-style-type: none">• Why would a customer choose to seek out your experience? Did they have a choice at all?

Design Beyond Devices – Table 2.1 + 2.2



R: Relationships

What *connects* your customer?

The closer you are to someone (or something), the more likely you are to get emotional about it.
Relationships drive satisfaction - and frustration.

Human to device

- Device ownership
- Anthropomorphization
- Emotional attachment
- Financial investment
- Self-expression

Human to business

- Communication channels
- Perception
- Choice
- Market conditions
- Expectations

Human to human

- Cooperative use
- Sequential use
- Trust
- Identity
- Competition



O: Objective

What *drives* your customer?

What have you defined as your customer's objective?

Is that *truly* their end goal, or simply a sentence written to get the customer to your feature?

Has your product team assumed that their solution stands alone? Is that *true*, or are you part of a larger, **device-agnostic human objective** that might span multiple experiences?



DON'T OBSTRUCT THE OBJECTIVE

Timing and context matter when considering customer objective. Even if you're offering something of value *later*, you might be obstructing objective in the moment.

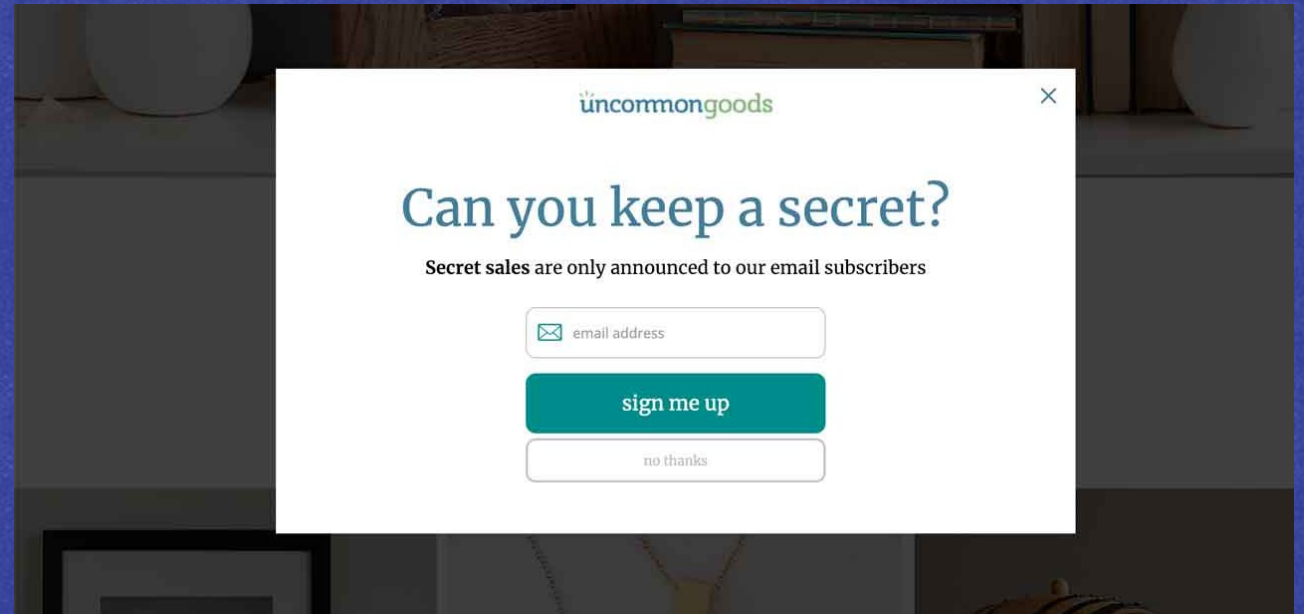


Image from <https://www.nngroup.com/articles/popups/>



W: Where

What *surrounds* your customer?

- Where will your customer be when they want to interact with you?
- Will they be seated? Standing? Moving?
- What is in arm's reach?
- What devices will be available?
- Who else will be in those environments?
- Are there distractions in the environment?
- Will customers expect to continue this experience between locations or devices?



Worksheet 1: Shared Understanding Baseline



Constraints

What are the business objectives?

Who are the key stakeholders?

Is there a timeline or key dates?

What do we know?

What previous research has been completed?

Capturing Customer Context
Worksheet 2: Visualizing Context

What do we know?
Who is your customer?
Where is your customer?
What do they need to accomplish?
Why are they seeking help?

Sketch the key aspects you know - or hypothesize - about your customer.

1. Tear off instructions.
2. Fold along dotted lines to create 6 blank segments.
3. Spend 1-2 mins sketching an idea in each segment.
4. In each segment, circle either "Know" or "Hypothesis".

Have

1. Know - or - Hypothesis? _____

2. Know - or - Hypothesis? _____

Worksheet 3: Capturing CROW



As you review the team's sketches, capture relevant insights about your customer's CROW.

C: Character	R: Relationships
Customer identity	Human-to-device
Cultural influences	Human-to-business
	Human-to-human

<https://bit.ly/DBDContextWorksheets>

Worksheet 4: Open Research Questions

Check the items you believe you understand, and circle those that require further research.

C: Character	R: Relationships
ATTITUDES	HUMAN TO DEVICE
<input type="checkbox"/> How does your customer define their own identity to themselves and others?	<input type="checkbox"/> How long has your customer used your device? Who owns it?
<input type="checkbox"/> How does your customer differ from other customers when communicating?	<input type="checkbox"/> Does your customer consider expensive & treasured, or common?
<input type="checkbox"/> Would your customer have any physical limitations that might impact their experience?	<input type="checkbox"/> Does your customer anthropomorphize the device? Are they likely to give it a name?
<input type="checkbox"/> Which of your customer's attributes are underrepresented in the greater population?	<input type="checkbox"/> How much time does your customer spend with the device, and how do they use it?
ATTRIBUTES	HUMAN TO BUSINESS
<input type="checkbox"/> What cultural influences have shaped your customer's preferences and beliefs?	<input type="checkbox"/> Does your customer deal with your company or a 3rd party?
<input type="checkbox"/> What is your customer's likely emotional state when starting this experience?	<input type="checkbox"/> Did they get to choose to use your device, or was it assigned to them?
<input type="checkbox"/> Would this customer have any relevant preconceived opinions or learned behaviors?	<input type="checkbox"/> What are your customer's expectations of your business and your brand in this situation?
CHOICES	HUMAN TO HUMAN
<input type="checkbox"/> Why would a customer choose to seek out your experience? Did they have a choice at all?	<input type="checkbox"/> Is the experience used by multiple people? At the same time, or do they take turns?
<input type="checkbox"/> What choices are you asking your customer to make when engaging with you?	<input type="checkbox"/> Who determines who will share a specific device? Head of household? Manager? Someone else?
<input type="checkbox"/> How does your customer express individuality? Is your experience part of that expression?	<input type="checkbox"/> When sharing an experience, do your customers trust each other?

O: Objective	W: Where
Short-term objectives	Locations? Public or private?
Long-term objectives	Visible elements
Potential obstructions	Objects at arm's reach
	Potential distractions

CROW Customer Context worksheets

These worksheets are available for you to download and use from the Ideaplatz company website.

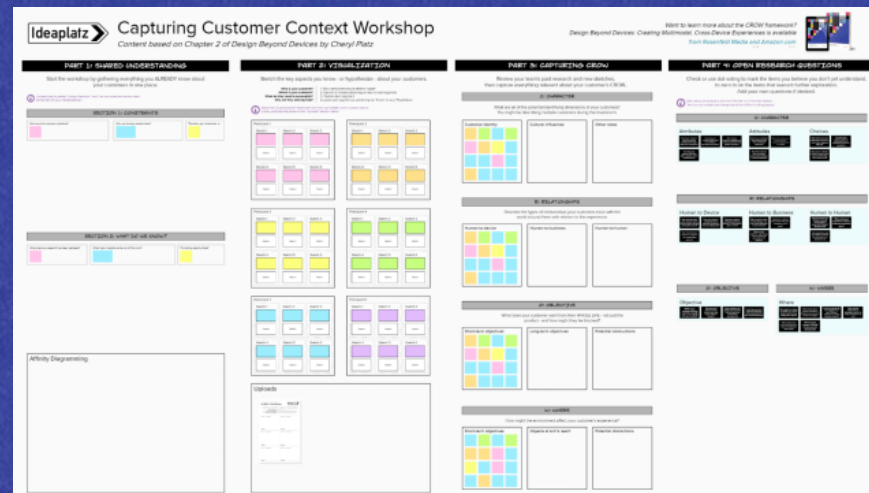
1. Shared Understanding Baseline
2. Visualizing Context
3. Capturing CROW
4. Open Research Questions



Also available at <http://bit.ly/DBD-Ideaplatz>:

MURAL template for Capturing Customer Context workshops

Interview guide with CROW- inspired questions




So you understand your
customer context. Great!
But what changes in the design
process for multimodal and
cross-device design?

COPING WITH TIME

Transition Strategy





TRANSITIONS WILL MAKE OR BREAK YOUR MULTIMODAL AND CROSS-DEVICES EXPERIENCES.

We're so used to designing for the moments when things are fixed – but what about the shifts?

- Between modalities
- Between network connections
- Between devices



Transitioning between modalities

VOLUNTARY

The customer initiated the transfer, motivated by the belief the new modality will be easier or more appropriate.

INVOLUNTARY

The current modality is deemed insufficient by the system, and the customer will be forced to switch to continue their activity.



PAY SPECIAL ATTENTION TO YOUR INPUT AND OUTPUT CLIFFS

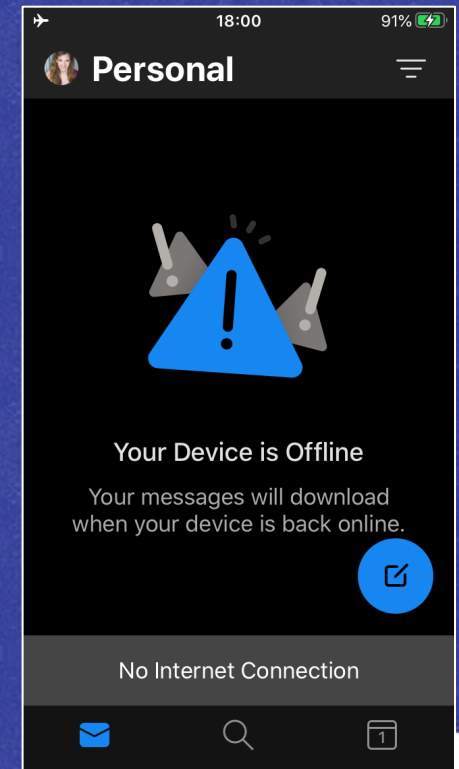
Cliffs are the rough “edges” between interactions. (Table 9.1 in Design Beyond Devices.)

Cliff Type	Description
Input Transition	A customer transitions between two or more input modalities during a single activity.
Output Transition	The system changes the way it communicates with a customer in the middle of an activity.
Input/Output Mismatch	A system responds to a customer request using an output modality that does not match the input modality the customer used to make the request.

Network connection transitions

Many apps fail to fully and properly consider the experience their customers will have when moving between network connections.

- Intentional connection loss
- Unstable connection
- Insufficient connection
- Proximity loss
- Connection failure



Why enable transitions between devices or modalities?

ENVIRONMENTAL CHANGES

- Commuting
- Traveling
- Mealtime
- Exercise
- Daytime/nighttime shift

DEVICE SUITABILITY

- Data entry vs. consumption
- Physical comfort
- Temporary interference
- Multitasking



At Riot, I used transition-focused analysis to drive early business development on the Xbox Game Pass project.

(Read more about this work at cherylplatz.medium.com)

Player Scenario #1:
Enter Riot game through Xbox Game Pass UX

"I heard Game Pass now has Riot Games benefits and I want to try them out."

PLAYER:
Authenticated Microsoft customer who has downloaded a Microsoft Game Pass App (PC, Mobile) or is accessing the Game Pass website

SUCCESS:
I can use my Game Pass benefits in a Riot Games game of my choice, or connect my account after downloading Riot Client.

Game Pass Intake UI - from Microsoft Game Pass App

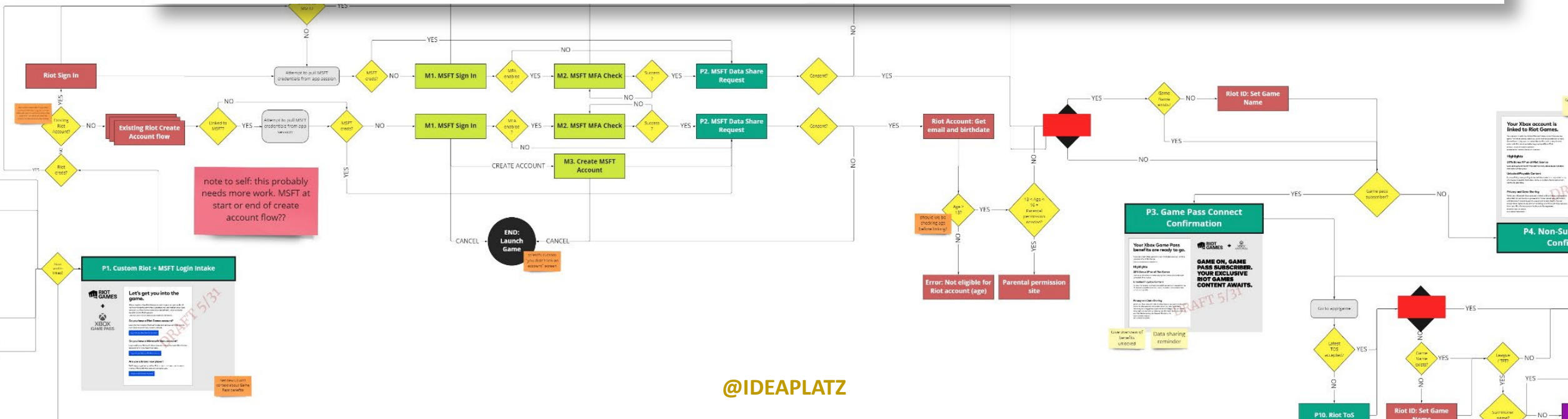
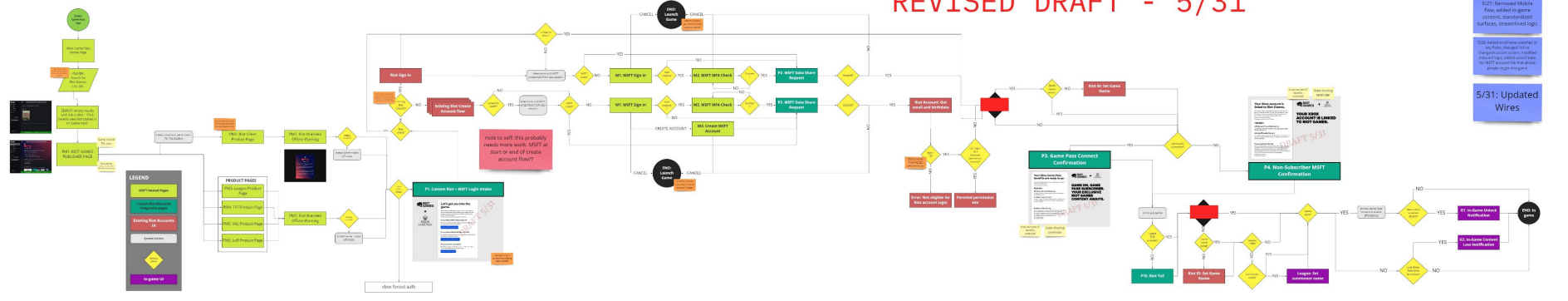
REVISED DRAFT - 5/31

Key Changes

5/27: Removed Mobile flow, added in game content, streamlined surfaces, streamlined logs

5/28: Added in game content, streamlined surfaces, streamlined logs, added in game content, streamlined surfaces, streamlined logs

5/31: Updated Wires






CHANNELING ATTENTION

Proactive Communication Strategy





To **responsibly** interrupt your customers, or to transition between devices, you'll need to understand what types of activities your customer may be engaged in at any given time.

HOW CAN YOU BE POLITE IF YOU DON'T KNOW WHAT'S HAPPENING?





Activity Model:

An abstraction of common customer behavioral patterns, for use in our platforms and design systems

WHY ACTIVITY MODELING?

It's too much to model every single customer activity – we need to find patterns of behavior, drawing from what we learned when seeking out that customer context.

THE GOAL

The goal is to find clusters of behaviors that share similar characteristics – whose similarities inform how a customer might want to be interrupted in the moment.



Activity Modeling Case Study: Alexa Notifications

Activity	Description	Cognitive Load	Length
Passive	Unfocused attention not directed at a single device or activity.	(Almost) None	Indefinite
Sustained	A long-running activity, low-burden activity often without a known endpoint. It can usually be paused, suspended, or even run in parallel with other tasks without loss of detail.	Low	Indefinite
Discrete	An activity that requires directed attention but may leave some cognitive bandwidth for multitasking or interruption. The activity usually has a known, discrete endpoint.	Moderate	Short
Focused	An activity that consumes most or all cognitive resources: from the creative state of "flow" to operation of a motor vehicle. Recovery from interruptions is costly.	High	Long
Live	A real-time activity like a phone call. Due to the unpredictable nature of real-time interactions, full attention is required. Any distraction will cause loss of context, if not actual harm.	Full	Long



This is why capturing context is
critical to your success.

Once you understand customer
behavior, you can start mapping
interruptions against these
activity patterns.

YOUR INTERRUPTION MATRIX

An incredibly useful tool that helps you map your notification archetypes against your activity archetypes and define expected behaviors. Defining patterns saves tons of design and engineering work and risk.

Interruption	Current Foreground Activity		
	Short-running activity (e.g. Weather TTS)	Live Activity (e.g. Active Phone Call)	Long-Running Activity (e.g. Music Service)
Urgent Notification (e.g. Incoming Call)	VUI	STOP Weather TTS *RING* "Incoming Call from Prof. Plum"	CONTINUE Phone Call *RING* (No Announcement)
	GUI	Full Screen App (Active Call) ("Professor Plum is calling.")	Full Screen App (Active Call) ("Professor Plum is calling.")
Scheduled Notification (e.g. Timer)	VUI	CONTINUE Weather TTS *Short Timer Alert Tone*	SUSPEND Music *RING* "Incoming Call from Prof. Plum" RESUME Music
	GUI	[LAUNCH] Full Screen App (Timer) Full text: "Turkey timer is complete"	Full Screen App (Timer) Full text: "Turkey timer is complete"
Standard Notification (e.g. Message)	VUI	CONTINUE Activity *Notification Earcon*	
	GUI	Notifications with preview (e.g. Message): Banner Notification with the Message preview Notifications w/o preview (third party skills): Persistent card on the home screen after screen times out to Home.	
Customer Speaks to Device (Wake Word)	VUI	STOP TTS Only (Retain context of last prompt)	CONTINUE Phone Call
	GUI	Display voice chrome and retain context (if user's to-do list was on the screen before the user spoke, it remains)	
Wake Word + Error		REPEAT Weather TTS	CONTINUE Phone Call
User Requested Live Activity (e.g. Pick up an Incoming Call)	VUI	STOP Weather TTS	STOP original Phone Call
	GUI	SWITCH to Full Screen App (Active Call)	SWITCH to Full Screen App (Active Call) (for the new call)
User Requested Short Activity (e.g. "WW, what time is it?")	VUI	STOP Weather TTS	CONTINUE Phone Call START Short Activity
	GUI	SWITCH to Full Screen App (Clock)	SWITCH to Full Screen App (Clock)
User Requested Long Activity (e.g. "WW, play Spotify")	VUI	STOP Weather TTS	CONTINUE Phone Call START Spotify
	GUI	SWITCH to Full Screen App (Spotify)	Chrome Transport Controls
			STOP Prime Music
			SWITCH to Full Screen App (Spotify)



You can absolutely apply these frameworks in your own work – I've done it repeatedly.

RIOT GAMES

As part of my work as Director of UX for the Player Platform at Riot Games, I helped uplevel my team's understanding of these techniques, and we applied them to successfully pitch an overhaul of our outdated out-of-game notification systems.

ALEXA NOTIFICATIONS

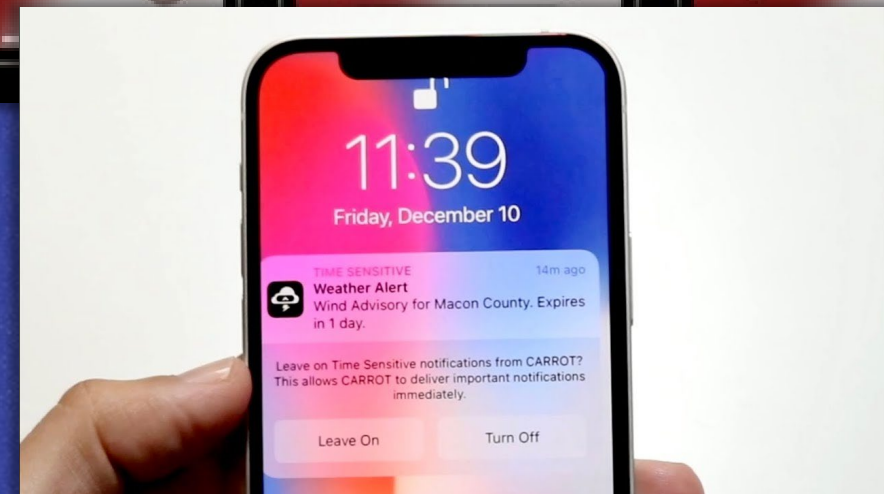
These techniques were critical to my success as the solo designer on the rollout of the Alexa Notifications platform in support of the launch of Alexa messaging, and are still reflected in the product's behavior today.

*Check out **Design Beyond Devices** chapters 4 and 10 for detailed information on defining your activity models, interruption types, and applying these systems in practice.*



SINCE THE BOOK'S RELEASE, APPLE HAS EVOLVED THEIR IOS NOTIFICATIONS TO BE CUSTOMER-AWARE.

Apple's Focus Modes are a way for customers to tell the device about their current activities or activity patterns, and Time-Sensitive Notifications are a way for developers to ensure that only the most critical information breaks through focus.





DESIGN & DELIVERY

Combining Multimodal Inputs and Outputs






What does your customer see when they're interacting with your device?

And how will your chosen interaction model impact your design?





When designing multimodal experiences, you'll need mode-specific designs AND cross-modal designs that bring it all together.

MULTIMODALITY JUST ADDS ONE MORE LAYER OF COMPLEXITY.



THE SPECTRUM OF MULTIMODALITY

By plotting information density and proximity on a grid, you can place all current and future experiences in one of four categories.

CLOSE PROXIMITY

LONG RANGE / FAR FIELD

RICH INFORMATION

QUADRANT 2 Anchored

Experiences with rich physical presence where a customer is usually nearby.

*Fire TV, Xbox One,
Cortana on PC*

QUADRANT 1 Adaptive

Experiences that support both close proximity and long-range interactions.

*Echo Show, Facebook Portal,
Google Nest Hub*

QUADRANT 3 Direct

Customer and device must be in direct contact or extreme proximity for use.

*Fitbit, Google Glass,
Hololens, Apple Watch*

QUADRANT 4 Intangible

Hands-free experience where close proximity to the device is not required.

*Echo (original)
Google Home*

SCOPED INFORMATION

QUADRANT 1:

ADAPTIVE experiences

(Echo Show, Google Nest Hub etc.)

PROXIMITY: Far (or close)
INFO DENSITY: Medium/High



- Generally support both close and far scenarios
- Scenarios are completable remotely but proximity unlocks new options
- Customers can choose how to interact in some or all situations

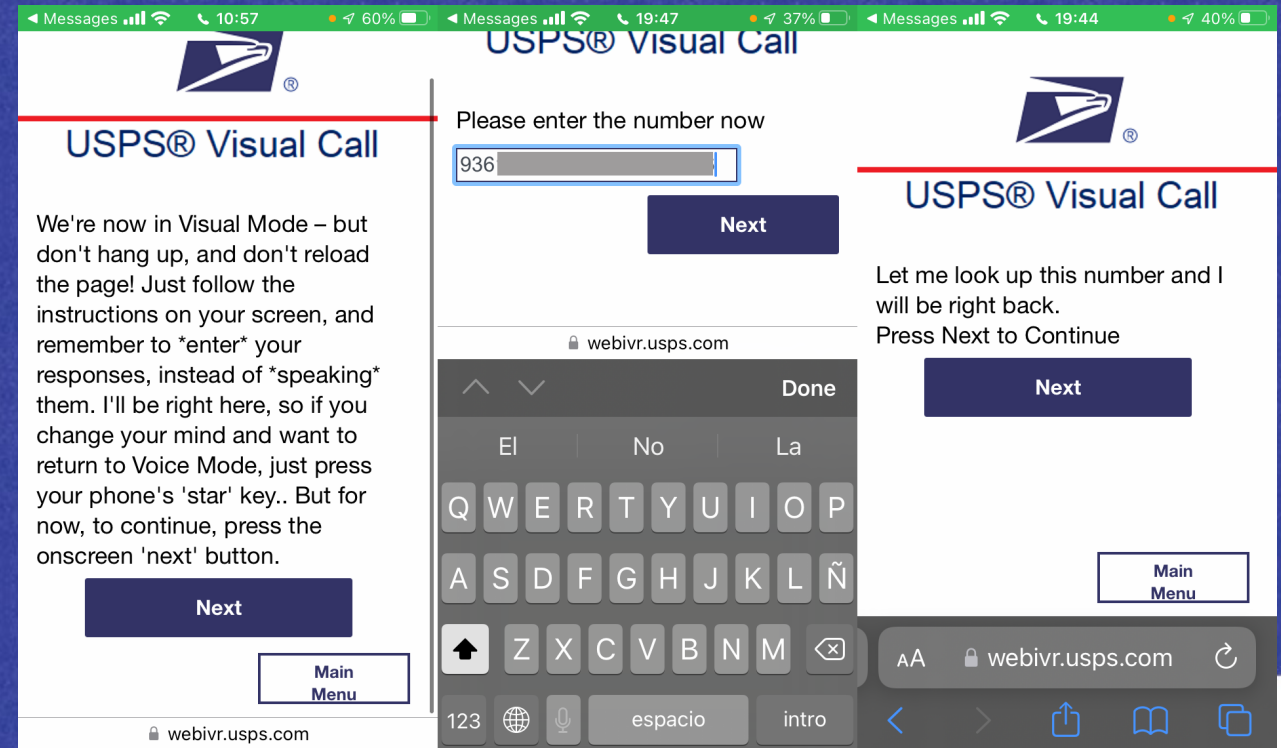


THE UNITED STATES POSTAL SERVICE IS A GREAT EXAMPLE OF ADAPTIVE TRANSITIONS.

The USPS phone package tracking experience offers to text you a link to a companion web experience WITHOUT ending the call.

This is a true ADAPTIVE experience:

- Web and voice are synced
- Customer can switch to voice only at any time
- Task can be completed in both modalities



QUADRANT 2:

ANCHORED experiences

(Smart TV, home computer, VR, etc.)

PROXIMITY: Close
INFO DENSITY: High



- Customer is likely to be in arms' reach of a controller or screen
- Close proximity means high density displays are supported
- Voice is usually supplemental due to high visual load



QUADRANT 3:

DIRECT experiences

(Smart watches, Google Glass, AR, etc.)

PROXIMITY: Close
INFO DENSITY: Low



- Device is usually attached to or in immediate proximity to customer
- Proximity allows use of additional ambient input sensors
- Small, constrained screens force low information density



QUADRANT 4:

INTANGIBLE experiences


(Smart speakers, etc.)

PROXIMITY: Far
INFO DENSITY: Low/Medium



- Customer is rarely near the device
- Customer does not have to look at the device to interact
- All interactions should be completable without physical interaction due to lack of proximity
- Lower information density





Multimodal flows are used to show how customers transition between multiple modes of interaction.

THOSE TRANSITIONS CAN BE SYSTEM-DRIVEN OR CUSTOMER-DRIVEN.



Choose your flow technique:

SIMPLE FLOW

Useful to depict a single path through an experience, with minimal branching possibilities.

TRIPLE FLOW

Depicts a few branching possibilities and makes it clearer when each modality updates.

SWIM LANES

Best for situations where input and output may change separately, or fluidity and complexity are high.



Example simple flow for a single intent

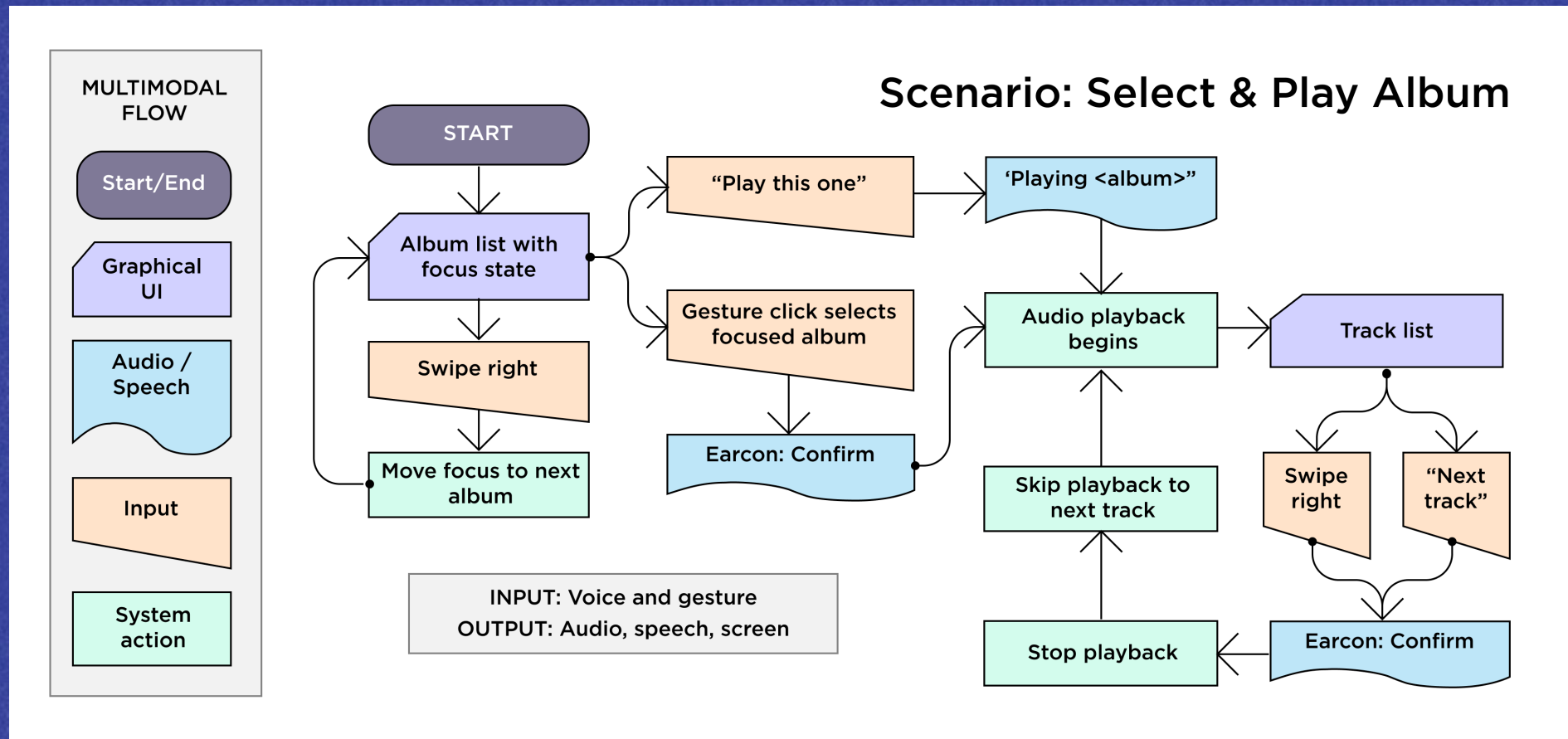
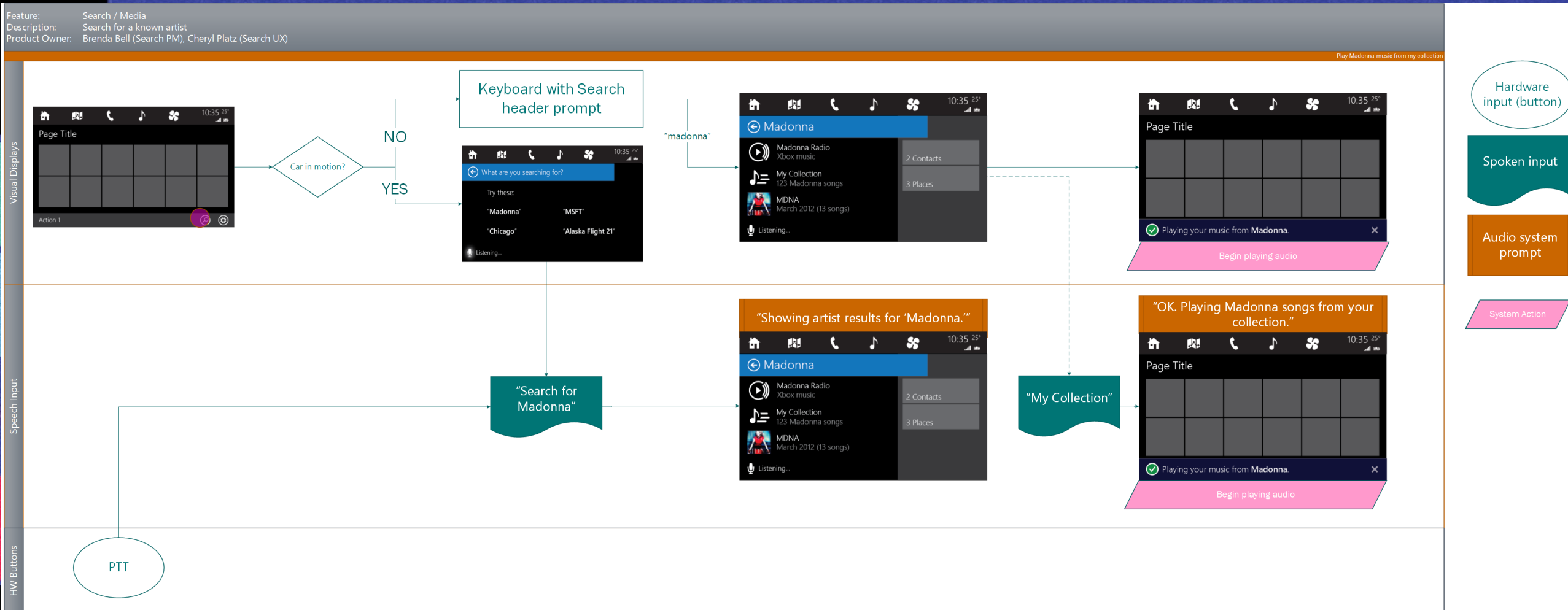


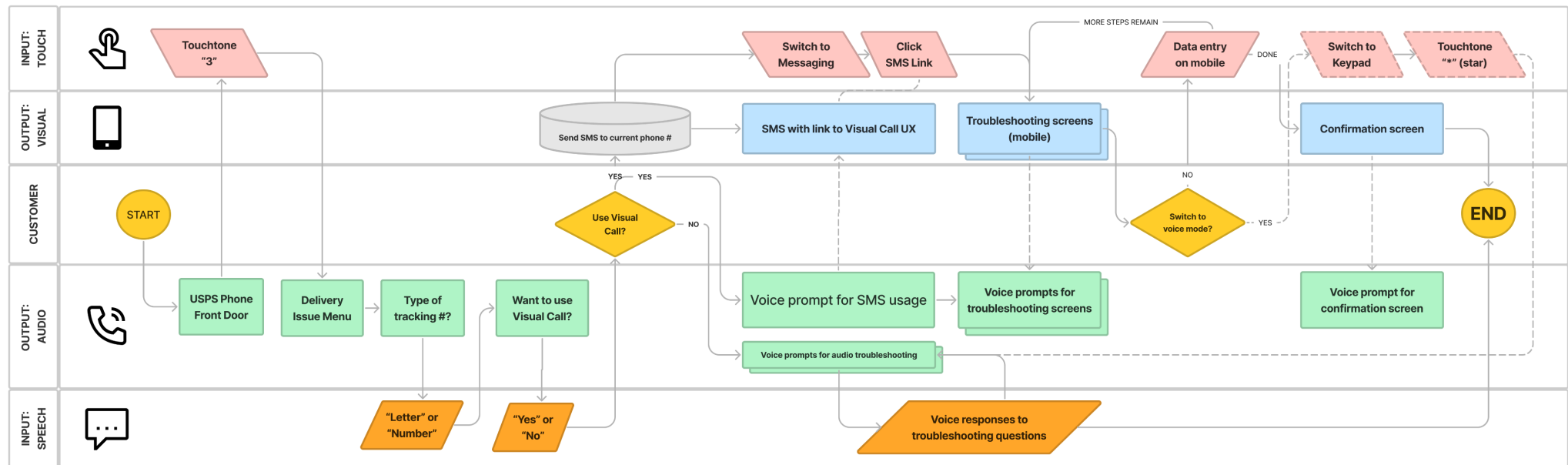
Figure 12.1 from *Design Beyond Devices: Creating Multimodal, Cross-Device Experiences*

Windows Automotive “triple flow”



Here's what a swim lane diagram of the US Postal Service experience might look like at a high level:

USPS Visual Call UX Case Study - Mapping my experience with a simplified multimodal swim lane diagram



Multimodal flows: Example patterns

There are no industry standards, but this shorthand has served me well at multiple companies. Adapt and change as needed. Colors are optional.

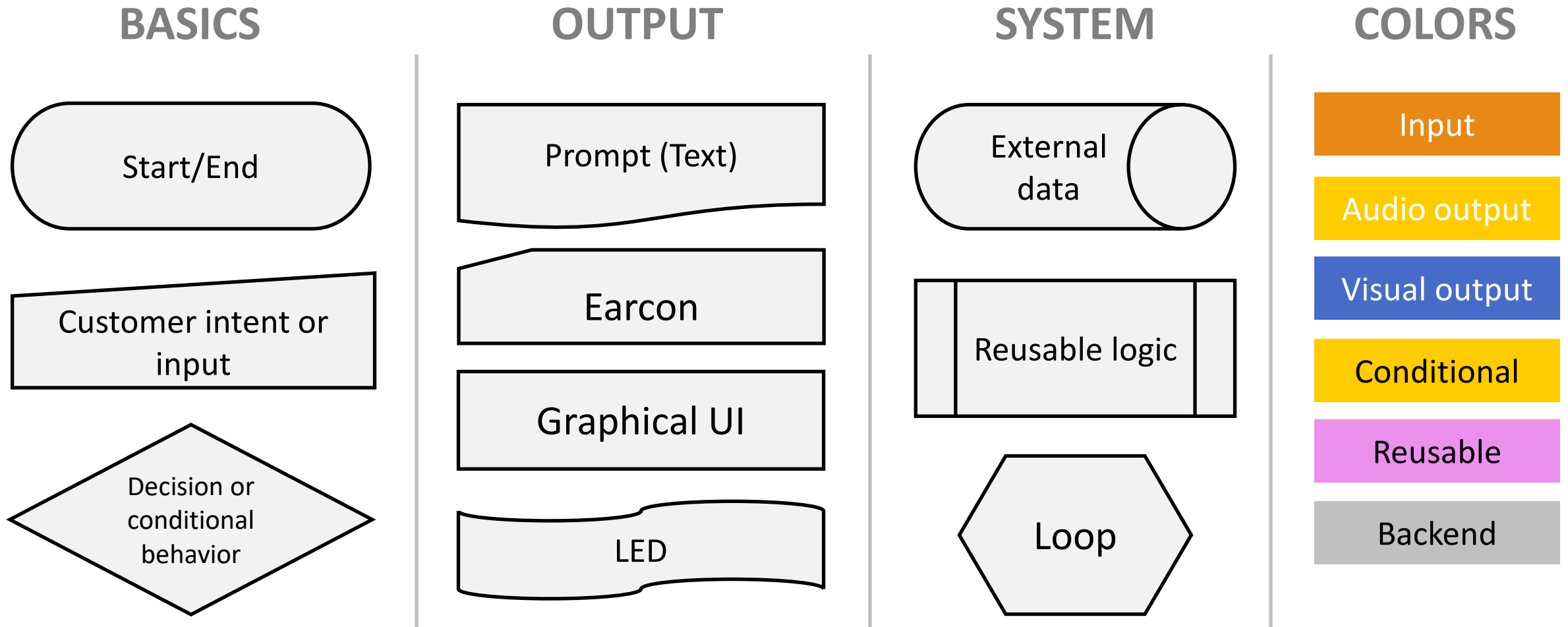


Figure 12.2 from [Design Beyond Devices: Creating Multimodal, Cross-Device Experiences](#)

@IDEAPLATZ



Coping with the complexity

Multimodal flows supplement your modality-specific designs.


These swim lanes depict the ways customers may move between modalities in systems that support those transitions.

Add these flows as an additional deliverable.

FOCUS ON FLOWS WITH THESE ELEMENTS:

- Customer-driven transitions between modalities
- System-driven transitions between modalities
- Handoffs to other devices
- System state changes
- Events





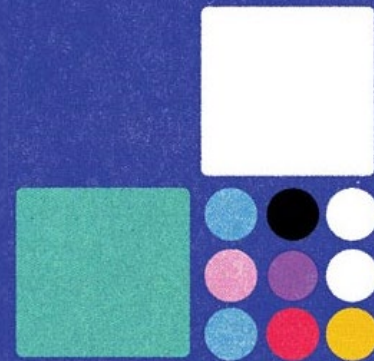
Keep in mind: intangible and adaptive experiences should almost always offer hands-free completion scenarios for tasks.

Visuals and haptics can be additive, but never **REQUIRED** in these two quadrants.





What's the most frequently asked question from my readers?



HOW DO I CONVINCe STAKEHOLDERS THAT WE SHOULD INCORPORATE MULTIMODAL DESIGN?

STEP 1: LISTEN

The first step is to understand what problems your stakeholders are trying to solve, and how they are rewarded. Is accessibility a concern? Market reach? Success rates? CSAT?

STEP 2: CONNECT

The second step is to try and map the benefits of multimodality – greater inclusion and market reach, better accessibility, better performance on specific scenarios – to the needs of your stakeholders.

STEP 3: UNDERSTAND

If connecting doesn't quite solve things on its own, pursue a shared understanding workshop where all sides can be heard and agree on opportunities, concerns, and more





CLOSING





TO EXTEND YOUR DESIGNS FOR MULTIMODALITY AND CROSS- DEVICE SCALE, CONSIDER:

- What input and output modalities will you support?
- Where does your experience fall on the spectrum of multimodality?
- What transitions will be key in your experience?
- How will your chosen interaction model impact your design?
- Which flows are most critical to document from a multimodal perspective?



DESIGN BEYOND DEVICES

CREATING MULTIMODAL,
CROSS-DEVICE
EXPERIENCES

All paper books on the Rosenfeld
site come with the e-book version!

Use code **APRIL4DBD** for
15% off the book!





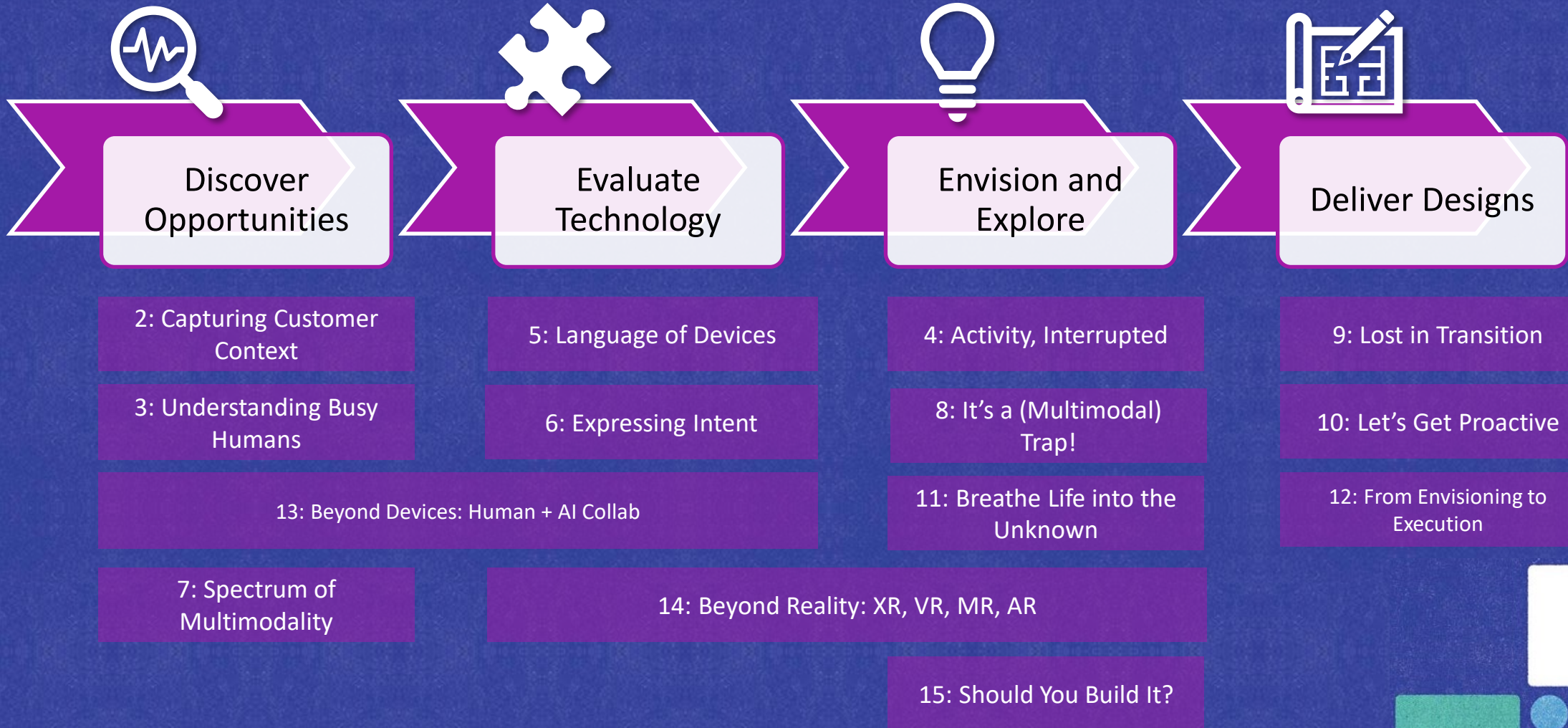
THE BOOK CAN BE DIVIDED INTO FOUR THEMES.

Each chapter fits into one or two of these core themes, each a critical piece of the puzzle you'll need to complete to become a responsible, resilient multimodal designer.

1. Customer context & ethics
2. Multimodal frameworks
3. Ideation and Execution
4. Emerging technology

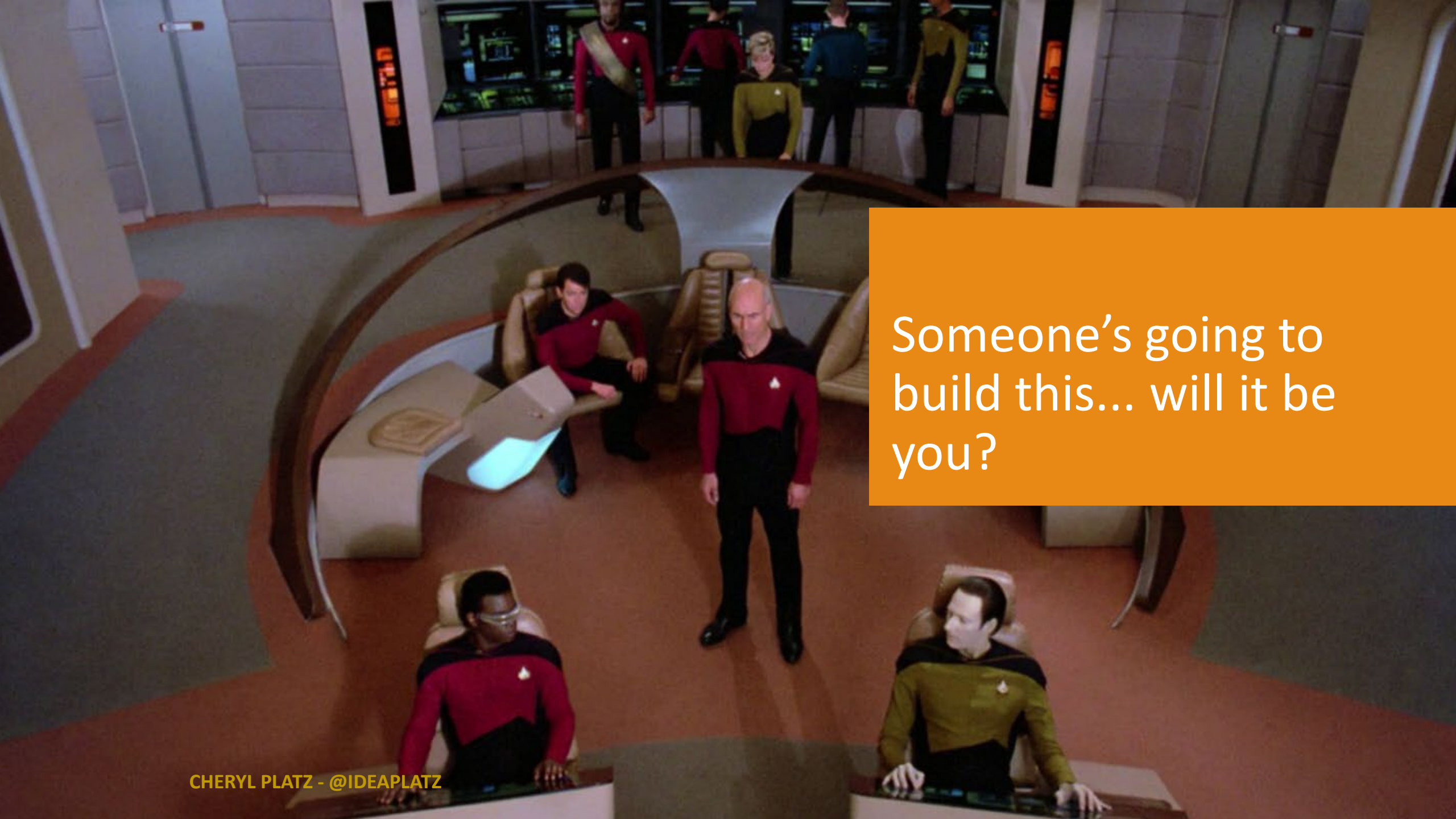


Putting it all together



As I tell folks outside the software industry, I hope this book will be the design manual for folks who want to design the bridge of the Starship Enterprise.



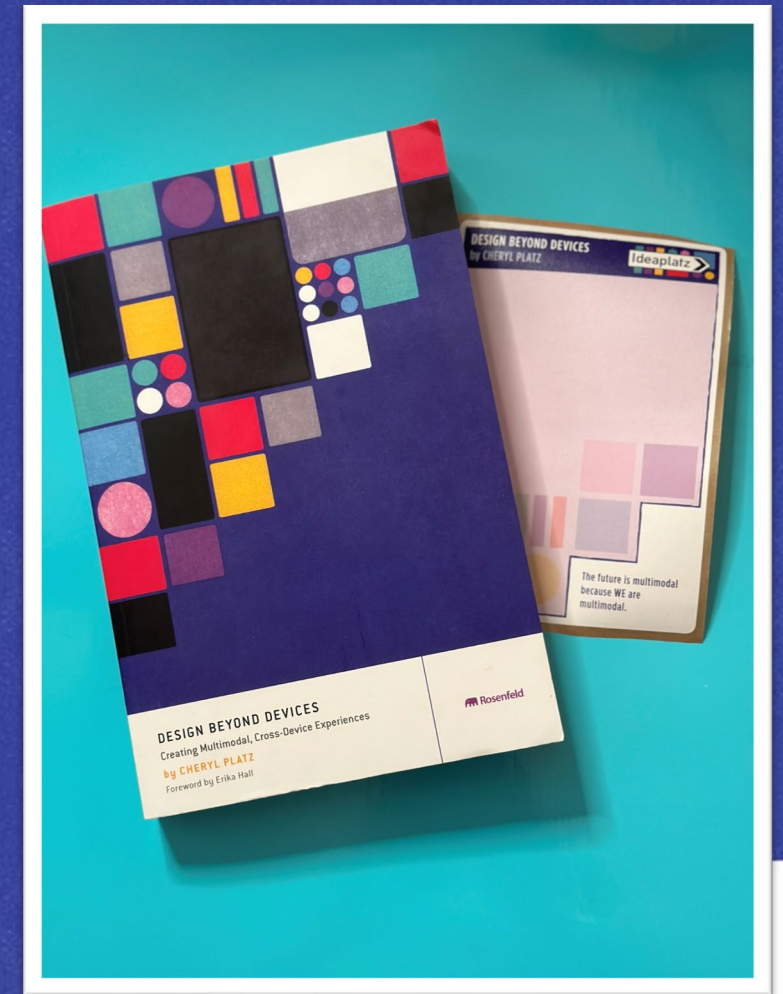


Someone's going to build this... will it be you?

Virtual book signing:

I'll mail a signed bookplate sticker to any Rosenfeld community member – I'll cover shipping!

1. Take selfie with or a staged picture of my book in your workspace
2. @ me in a LinkedIn post and include a comment about what excites you most in this design space
3. Email your mailing address to cheryl@ideaplatz.com!

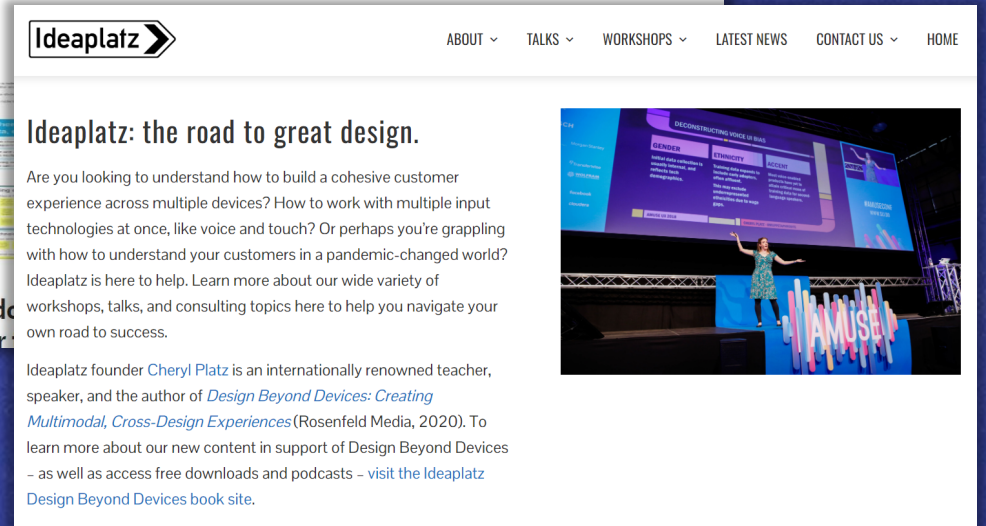
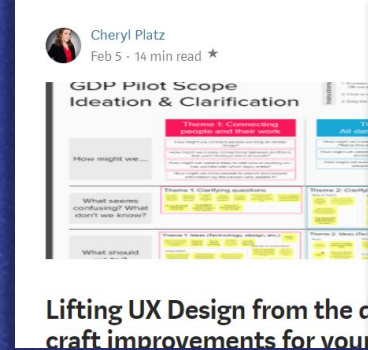
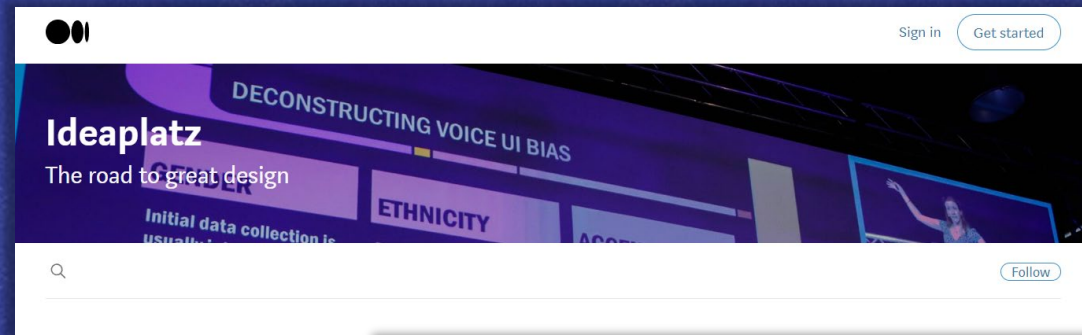


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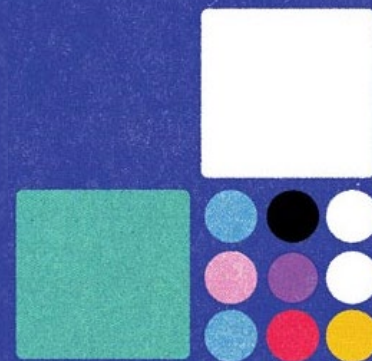
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