Skill Delivery Framework

How to Develop Engaging Voice and Multi-Modal Interactions

amazon alexa

Overview & Purpose

With the growth of the Alexa service, large and small brands alike have looked to build rich experiences that connect with their customers through voice.

As voice is new, many brand representatives, product owners, designers, and developers need tools to guide their creation of rich experiences. They are looking for best practices and expert advice in order to have a voice presence that meets a high-quality bar just like their other customer touchpoints.

The purpose of this framework is to orient product owners, creatives, and developers on what it takes to build rich and engaging experiences on Alexa. It addresses the different needs and information of each audience, with development documentation for developers, and an overview of what it takes to build, launch, and maintain a skill for brand product owners.

Since the process can be long, the framework seeks to encourage and inspire each audience along the way, and provides best-in-class examples to inspire the creation of equally engaging experiences.

Refer to the Amazon Echo/Alexa Brand Guidelines for guidance on appropriate usage of Amazon Echo and Alexa brand assets. TV commercials, film, video advertising, radio broadcasts, packaging, sweepstakes, or contests will require Amazon review. Please reach out to ae-skills-partners@amazon.com.

What’s in the Skill Delivery Framework

An Overview of Building a Skill

Planning

Voice Design

Development

Testing, QA & UAT

Certification

What Happens After Certification

Additional Resources & Best Practices

ADDITIONAL DETAIL AVAILABLE VIA WEBSITE

Please note that this guide is meant to be used with a website companion experience. That experience includes additional detail and examples, and will be linked to throughout this guide.

And for detailed VUI design best practices, we encourage you to visit the Alexa Design Guide website by clicking here.

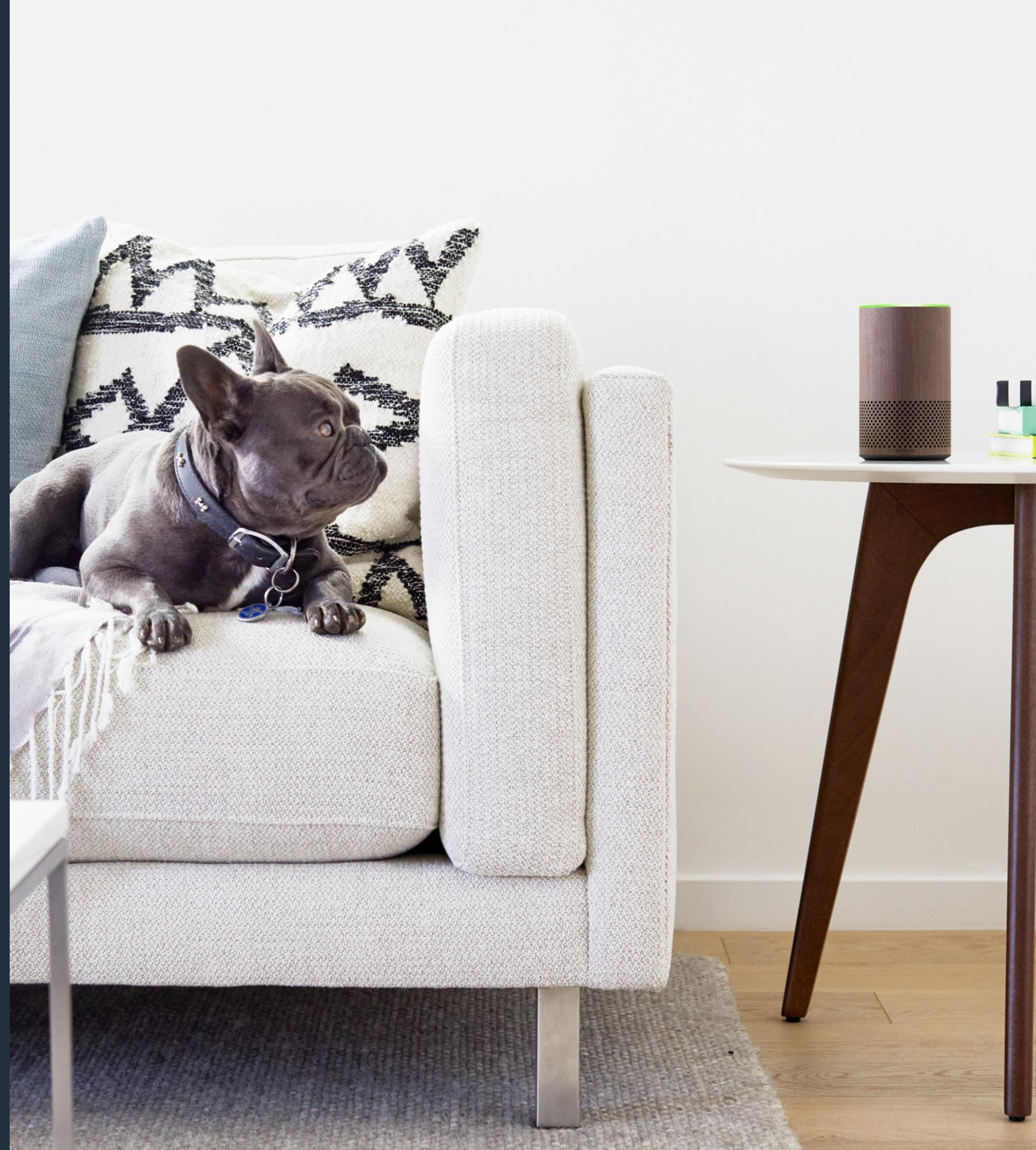
An Overview of Building a Skill

FROM CONCEPT TO POST-LAUNCH

Congratulations! The decision to launch a branded skill experience on Alexa is a fantastic one! This section will walk you through everything you need to know in order to prepare for this project.

HERE'S WHAT WE'LL COVER IN THIS SECTION:

1. The Different Phases of Building a Skill
2. Roles Involved with Skill Building



1

An Overview of Building a Skill

The Different Phases of Building a Skill

This section contains an overview of our Alexa Skill Delivery Framework. This process has been finely tuned as the Alexa service has evolved. This process enables you to launch with a polished and highly engaging experience for your customers and ours.

You'll see a breakdown of the various stages we've identified to help you create and develop a great skill. We will dive into each of these sections throughout the Skill Delivery Framework, to help provide context along the way.

The Different Phases of Building a Skill

PLANNING

Planning Phase

Research & Strategic Planning
Define Product Success
Marketing Strategy

Scope Finalization

Establish High-Level Functionality
Estimate Timelines for Development

DESIGN

Voice Design

Define the Value Proposition
Write a Script
Test the Dialog
Define the Turns & Storyboard
Build the Interaction Model

DEVELOPMENT & LAUNCH

Development Kickoff

Skill Build
Account Linking Services
Developer Accounts

Testing

Quality Assurance
Functionality Testing
User Acceptance Testing

Release

Certification
Post-Launch Considerations
Marketing Plan Execution

An Overview of Building a Skill

Skill Build Life Cycle

START

1. PRODUCT PLANNING

Research & Strategic Planning
Establish High Level Functionality
Define Product Success

2. VOICE DESIGN

Design Voice User Interface (VUI)
Skill Name & Invocation
Think Multi-modal (Echo Show, Echo Spot, Fire TV)
Prioritize Engagement
Surprise & Delight

3. BUILD, TEST, CERTIFY

Code Logic & Develop Skill
Testing, Testing, Testing
Amazon Certification
Publish to Skill Store

4. LAUNCH & PROMOTE

Drive Organic Traffic
Drive Own Channel Traffic
Drive Paid Traffic
Utterances = The New #Hashtag

5. OPTIMIZE & IMPROVE

Analyze Performance
Optimize Functionality Based on Feedback
Plan & Roadmap Future Versions (2.0+)
Sustain Marketing and Advertising

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An Overview of Building a Skill

Roles Involved with Skill Building

As a team moves a skill from concept through certification, and releases it to their intended market, a variety of team members and roles are needed. We will break these roles down into the core team members and the supporting team members.

Supporting team members include members of the team who are not active throughout the entire skill development life cycle, while core team members are usually spending time on the project throughout each phase of skill development.

Supporting team members may include Amazon representatives and certifiers, business analysts or strategists, graphic designers, or DevOps team members. Each of these team members will be mentioned later. Core team members are profiled next.

Roles Involved with Skill Building

EXAMPLE CORE TEAM

PRODUCER

This could be a product manager or a project manager, but it should be someone who can align stakeholders and keep track of overall project status.

DESIGNER

Mostly, Voice Experience Designers (VX or VUI Designers) are User Experience Designers (UX) who have been trained on the nuances of voice.

DEVELOPER

A programmer who can code the skill experience. While a skill can be built in any programming language, NodeJS (JavaScript) and Python are the most commonly used.

Planning

Before you can begin designing or building a great voice experience, you need to make sure you have a defined strategy and clear scope.

HERE'S WHAT WE'LL COVER IN THIS SECTION:

1. Scoping Process Overview
2. Scoping Process Detail

1

Planning

Scoping Process Overview

Scoping Process Overview

WHERE TO BEGIN

The Scoping Process is an important step in developing a skill, as it helps determine the team you need, the timeline and budget, and highlights any areas that might require special attention.

Creating a great voice experience for your customers is a unique way to showcase your brand, provide utility, and delight them. Scoping can also be used as an activity to validate that the concept is meaningful and will meet both customer expectations and business goals.

The following list is meant to facilitate a scoping exercise for an Alexa voice experience and assumes a concept has already generally been defined.

We will explore each of these topics in greater detail:

- Brand, Customer Expectations, and High-Level Scope
- Detailed Skill Information
- Skill Title and Invocation Name
- GUI Strategy
- Retention Strategy
- Monetization Strategy
- Account Linking & Customer Information
- Web-Page, Email, and Tech Support
- Testing and UAT Strategy
- Long-Term Skill Maintenance Plan

2

Planning

Scoping Process Detail

Scoping Process Detail

BRAND, CUSTOMER EXPECTATIONS, AND HIGH-LEVEL SCOPE

When defining a high-level scope of the skill, first consider customer expectations of your brand and the services/products you offer. With those in mind, determine the problem or customer friction point that the company's skill will solve. The skill should focus on the most meaningful feature that provides the best time-saving utility, the best delightful moment, or the most helpful information.

Releasing a technically well-designed voice experience that doesn't clearly set or fulfill customer expectations will lead to unhappy customers leaving negative reviews and feedback. Set expectations early with customers through skill title, description, welcome message, marketing, etc.

Consider the following components:

1. Brand and Services: Short description of brand and services/products offered
2. High-level Skill Scope: Quick overview of how the skill will augment or extend the services listed above
3. Specify Services Supported: Bulleted list with description of products/services and use cases supported in skill
4. Specify Services Not Supported: Bullet list of unsupported products/services and use cases

Scoping Process Detail

DETAILED SKILL INFORMATION

The following set of information will help shed light on how customers intend to interact with your skill, both in terms of the ways in which customers use the skill (use cases), the frequency at which they do, and anything that might affect those.

Consider the following components:

1. Use Cases: Bullet list of use cases supported in the skill
2. Frequency of User Interaction: Do you expect users to interact multiple times a day, daily, weekly, monthly?
3. Maximum Number of Interactions: Based on content depth and use cases, what's the maximum number of times you expect typical users to interact with the skill?
4. Seasonal Factors: Any seasonal factors that will dramatically impact usage of skill?
5. Retention: How are you planning on retaining users, to keep them coming back to the skill for ongoing usage?

Scoping Process Detail

SKILL TITLE AND INVOCATION NAME

- The skill title is the title displayed in the skill store.
- The invocation name is what customers use to invoke or open your skill (“Alexa, ask Uber to get me a car”).
- The skill title and invocation name are often, but not always, the same. If the skill doesn’t support the full breadth of scenarios/products your company offers, a skill title can be used to set customer expectations before enabling and using the skill.
- For example if you had a social networking app called App and the skill will only read content, consider naming the skill “App Reader.” The skill name “App Reader” clearly tells the customer what the skill can do (read content). The invocation name remains “App” to make the invocation of the skill more natural. Should the skill later be expanded to include more functionality, the skill title can easily be changed.

The invocation name is a key part of your skill. Make sure to select an invocation name that is a clear reference to your brand, is easy for users to remember, and adheres to Alexa guidelines. Review the invocation name requirements and recommendations.

Test the invocation name before finalizing the decision. Invoke the skill at least 100 times, per desired invocation name, using different people, and understand the failure rate with each of those. Any invocation name that has a 75% or less success rate should be changed or rethought.

Consider the following questions:

1. Skill Title: The title of your skill shown in the skill store. *How will users best recognize the brand?*
2. Invocation Name: The name customers use to invoke/start your skill. *What is the conversational phrase to talk to the brand?*

Scoping Process Detail

GUI STRATEGY

Customers are now engaging with Alexa-enabled devices that have a screen (Echo Show, Echo Spot, Fire TV), and this is expanding with the inclusion of external device launches that include screen support. As you consider a voice-first experience, think about how you will use visuals to optimize the voice experience for users. All skills should include some level of support for those devices.

Alexa Presentation Language (APL) provides a markup language that can be used to create responsive visual layouts. APL is not meant to be used to replicate a brand's website on the device, but it is meant to augment the voice experiences.

Consider the following questions:

How will your skill support landscape viewports, such as the Echo Show, or larger format devices, such as televisions using a Fire TV Cube?

1. How will your skill support the smaller round viewport using an Echo Spot?
2. How many unique APL templates will need to be designed?
3. How do you plan to make this visual experience helpful/memorable?

Scoping Process Detail

MONETIZATION

With the recent launch of monetization on the Alexa service, there is now the opportunity to create a premium skill experience using one-time payments, subscription services, and consumables. The skill only needs to initiate the payment request by indicating to Alexa the amount of the purchase, and then Alexa handles the rest of the payment process with the user.

One-time purchases: Entitlements that unlock access to features or content within a skill. One-time purchases do not expire.

Consumables: Content or features that can be purchased, depleted, and purchased again. For example, hints for a game, in-game currency or extra lives.

Subscriptions: Offers access to premium content or features for a period of time. Users are charged on a recurring basis until they cancel their subscription.

Review the information on Grow Your Business with Voice.

Consider the following questions:

1. Do you plan to have an in-skill monetization strategy?
2. Will your service or content include a monthly subscription?
3. If yes, how will you define the free vs. paid content within the skill?
4. Do you have enough premium and unique content to provide value for paid users that is meaningful compared to the content a free user would receive?

Scoping Process Detail

ACCOUNT LINKING & CUSTOMER INFORMATION

The Alexa Skills Kit offers a mechanism to allow customers to link your skill on their Alexa device to their accounts with you. This enables you to surface and access customer-specific information for each customer and is called account linking. Account linking can either be required or optional. It is recommended for skills to choose the optional setting for account linking and provide some basic functionality for users who haven't linked an account or provided personal information.

Consider the following topics:

Account Linking

1. Will the skill support account linking? (e.g., the ability for a customer to grant Alexa access to an existing user account in your own database)
2. Is an existing account necessary for the customer to use the skill?
3. Can users easily create an account if they don't have one?
4. Will the skill function for users that do not complete account linking?
5. Does the skill require the customer to have a subscription?
6. Is there sensitive content that should require an additional PIN before allowing access to features, such as for banking skills?

If Yes to Account Linking:

1. Do you have multiple types or tiers of customers that are supported? Examples: legacy account, trial account, paid accounts, tiered paid accounts (silver, gold, etc.).
2. If you have multiple account tiers (trial, silver, gold), do you plan to offer some functionality to some account tiers, and other/more functionality to other tiers?
3. If account linking is optional, when will users be prompted to link their accounts?

Customer Information

1. Does the skill require specific information about the customer in order to work? For example, location, credit card in their account, etc.?

Revisit these questions after reading through the Account Linking sections.

Scoping Process Detail

WEB-PAGE, EMAIL AND TECH SUPPORT

To help enable an ongoing positive customer experience with your skill, Amazon recommends creating an Alexa-specific webpage where customers can read more about the skill functionality, as well as reach tech support to troubleshoot issues. If your skill collects email addresses or phone numbers, we recommend sending corresponding welcome emails/texts to those contacts with pertinent information about the skill.

Give thought to the following topics:

1. Will an Alexa-specific webpage or landing page be created to promote the skill?
2. Will a welcome email or welcome SMS be sent to users who have linked their accounts or provided their content information?

LONG-TERM SKILL MAINTENANCE PLAN

Similar to other digital touchpoints, a good method to retain users is to provide updates to the content and functionality of the Alexa skill. At minimum, a maintenance plan should be included to ensure a process is in place to update the skill for improved Alexa features, or resolve issues that might occur in the hosting environment.

Consider the following questions:

1. Who will debug the skill if it becomes inaccessible?
2. Are there APIs or other services that need to be maintained in order for the skill to continue functioning?
3. Is there a roadmap of additional features that will be included?

Revisit these questions after reading through the Development sections.

Voice Design

The following section gives you a high-level overview of the Voice Design process. Please reference the Alexa Design Guide for more detailed information on how to design engaging voice experiences.

HERE'S WHAT WE'LL COVER IN THIS SECTION:

1. Voice Design Process
2. Principles & Patterns of Skill Design

1

Voice Design

Voice Design Process Overview

The Voice Design Process at 20 Thousand Feet

Define the Value Proposition

You've decided you want to create a skill – great! Now, you must ask yourself "what value will this bring to the customer"; in other words, "what is the value proposition"? This is critical.

Like any channel, you should understand the benefits for the customer and the needs it addresses or pain points for which it solves.

Alexa offers a variety of skill types with built-in capabilities that you can use, or, if you prefer, you can create your own custom skill.

Write a Script

Now that you've decided on the type of skill you want to build and its purpose for and value to customers, it's time to get started on its script.

Writing a script is a way to visualize any number of pathways (or conversational turns) that a customer might take when interacting with your experience.

A basic script won't fully represent how customers will interact with your skill in real life, so you'll need to account for unexpected turns in the conversation.

Test the Dialog

As you write scripts, define turns, and create a storyboard to represent the flow of the customer's conversation and your skill's interactions/responses, you'll want to iteratively test these elements to ensure they're natural and conversational in nature.

To do so, test your dialog out loud with a friend or colleague. This will expose edge cases you've not thought of as well as will temperature check the flow.

Define the Turns & Storyboard

Understanding the elements of a conversational turn is critical to a successful dialog with your customer.

The next step in the script writing process is to take your scripts, which have outlined some of your turns, and convert them into storyboards (a linear progression through time). Get started with Storyboards by viewing the Alexa Live Design resources and downloading the Storyboards Starter Kit.

This conversion enables you to think through all the common skill paths and to add situational variations and address error cases.

Build the Interaction Model

After you figure out the dialog and potential flow of the design, you'll need to connect these back to the way you'll build your skill.

You'll want to map customer utterances to intents, which represent the unique actions the skill can take. This is called the interaction model.

Not all customers will invoke an intent the same way, so you'll want to prepare for every thinkable scenario.

2

Voice Design

Principles & Patterns of Skill Design

Be Adaptable

Let users speak in their own words.

Not all customers are the same, which means there is no guaranteeing all utterances will be the same. Being able to understand and process a variety of utterances is imperative to providing a seamless and valuable customer experience.

Below, find and overview of the top design patterns related to adaptability. You can use thee to ensure your skill will comprehend, process, and respond to a wide range of utterances. For the full set, please visit the Be Adaptable section of the Alexa Design Guide or click on each of the individual guidelines to the right to go to that specific section of the Guide.

- *Never assume customers will say the exact phrase that you anticipate for an intent; design against a range of utterances.* Learn more ›
- *Sometimes a customer will indicate multiple answers in one response, which means the Q&A path will need to be responsive.* Learn more ›
- *Sometimes the customer is vague and doesn't clearly indicate their command or request. Create clarifying questions and statements.* Learn more ›
- *Customers may take it upon themselves to course correct an Alexa misunderstanding using "I said" or "No." Plan for these scenarios.* Learn more ›
- *Be upfront when the skill doesn't understand a request and use a straightforward response to let the customer know what they can do.* Learn more ›

To learn more about this design pattern please review the Be Adaptable section of the Alexa Design Guide.

Match a variety of utterances to your intent

Handle over-answering

Ask for more information

Accept corrections

Handle errors gracefully

Design for when Alexa doesn't understand

Design for when Alexa understands but can't help yet

Re-prompt when the customer does not respond

Provide contextual help

Be Personal

Individualize your entire interaction.

Conversations are inherently personal (and contextual!) and the same should apply to your voice-first skill. By personalizing the experience for customers, you reward them for their use of the skill, as well as create familiarity with the experience overall.

To personalize conversations and move the discussion forward, you'll need to collect and store information about the customer's interactions. In these moments, you'll need to determine what information must be stored and what can be discarded once an individual session is complete. Below are a few ways you can begin to personalize your skill.

Below, find and overview of the top design patterns related to adaptability. You can use thee to ensure your skill will comprehend, process, and respond to a wide range of utterances. For the full set, please visit the Be Personal section of the Alexa Design Guide or click on each of the individual guidelines to the right to go to that specific section of the Guide.

- *Skills should understand the status of the customer – whether they are returning to an experience or starting a new one. Skills should address the customer by name, include several variations of welcome messages, and afterward should immediately ask the customer what they'd like to do. Reminders should be considered to refresh the customer on the skill's capabilities.* Learn more ›
- *As a customer gets more familiar with your skill, they won't need the same prompts as they received their first time. Consider making subsequent prompts shorter and more direct.* Learn more ›

To learn more about this design pattern please review the Be Personal section of the Alexa Design Guide.

Recognize new and returning customers

Capture information through skill use

Use adaptive prompts

Access a customer's location

Resume a skill session after exit

Be Available

Collapse your menus, make all options top-level.

Build your skill so that the customer can access it through a variety of ways in, providing a way to trigger an action or intent a number of ways. Building your skill in a horizontal, voice-first design will keep all options open for customers; a nested, vertical menu pattern that is used in GUI designs will not.

Below, find and overview of the top design patterns related to adaptability. You can use thee to ensure your skill will comprehend, process, and respond to a wide range of utterances. For the full set, please visit the Be Available section of the Alexa Design Guide or click on each of the individual guidelines to the right to go to that specific section of the Guide.

- *Skills wait eight seconds before re-prompting a customer if they've remained silent or haven't answered a question. Shorten a re-prompt for brevity when a customer is familiar enough with the context of the conversation that they won't need the entire prompt again immediately.* Learn more ›
- *When a customer asks a question, be sure to provide them a finite number of answers/choices to avoid ambiguity.* Learn more ›
- *For articles or lengthy information read aloud, avoid showing all items without first indicating how much information there is.* Learn more ›
- *When reading a list, have Alexa introduce it (i.e., "Here are the top gluten-free recipes") and then pause briefly between items in the list.* Learn more ›

To learn more about this design pattern please review the Be Available section of the Alexa Design Guide.

Create an effective invocation name

Design for response time limits

Create a simple set of options

Create well defined, concrete tasks

Avoid tasks with complex input and high ambiguity in searches

Find the top three best matches to the input

Announce items in a list

Make lists brief

Ensure effective pacing with lists

Prompt customers for Alexa to say more list items

Engage customers with questions

Prompt with guidance for the customer

Avoid unnecessary yes/no confirmations

Keep either/or questions short

Complete the task and end the skill session

Be Relatable

Talk with them, not at them.

Conversations are a two-way street. They are based on listening and responding, and repeating those two steps over and over. The same goes for how you design your skill. It must talk *with* your customers, not *at* them. Your customers need Alexa to speak concisely to help them understand what information your skill needs and what your skill does.

Below, find and overview of the top design patterns related to adaptability. You can use thee to ensure your skill will comprehend, process, and respond to a wide range of utterances. For the full set, please visit the Be Relatable section of the Alexa Design Guide or click on each of the individual guidelines to the right to go to that specific section of the Guide.

- *Try to use your own natural language when writing scripts. Test this by acting out the dialogue with another person.* Learn more ›
- *Read scripts aloud after you've written them. If you can say the words at a normal pace in one breath, the length is probably good.* Learn more ›
- *List options in the order of most to least contextually relevant.* Learn more ›
- *Use the same tense and format for nouns and verbs, especially for items in a series.* Learn more ›
- *Explore a selection of responses to avoid monotony in common or repeated interactions.* Learn more ›
- *"Thanks," "got it," "okay" are markers to let the customer know they've been understood.* Learn more ›

To learn more about this design pattern please review the Be Relatable section of the Alexa Design Guide.

Write it the way you'd say it

Be brief

Apply the one-breath test

Be contextually relevant

Use parallel language

Add variety

Vary Alexa's responses in repetitive tasks

Use conversation markers

Use timeline markers

Use acknowledgements and feedback

Use pointers

Use transitions

Development

HERE'S WHAT WE'LL COVER IN THIS SECTION:

1. A Technical Overview of the Alexa Service
2. Code Source Control Best Practices
3. Managing Content
4. API Considerations
5. Account Linking
6. Database Considerations
7. Server Availability and Scaling
8. Analytics
9. Amazon Developer Account

1

Development

A Technical Overview of the Alexa Service

Development

Alexa Framework

Comprised of two important frameworks that enable brands to connect to customers

ALEXA SKILLS KIT

Uses Amazon Devices

ASK is how you connect to your customer

Amazon device-run skills available on Skill Marketplace

Lives in the Cloud

Automated Speech Recognition (ASR)

Natural Language Understanding (NLU)

Always Learning

ALEXA VOICE SERVICE

Uses Amazon & 3P Devices

AVS allows your content to be everywhere

AVS SDK downloaded and run on your own hardware

echo

fire tv

Development

How the Alexa Skills Kit Works

Development

How the Alexa Skills Kit Works

Starbucks example

"Your regular is a grande flat white from the Starbucks at 23 Washington Ave. It costs $3.24. Would you like to order?"

"Alexa, tell Starbucks to order my regular"

Raw audio sent to Alexa

Alexa decodes the raw audio and converts it to an intent. In this case, the user wants to order their regular coffee via the Starbucks Skill

amazon alexa

OrderRegularIntent

Response sent back by skill

Your skill would receive the intent and determine what the order is and at what store

Product Name
Product Description
Store Name
Store Address
Cost (inc. Tax)

2

Development

Code Source Control Best Practices

Code Source Control Best Practices

All source code should be managed and deployed from a code version control system. Typically a Git repository like Github or BitBucket is used to store all code and business logic in a single code repository. This code repository may also include libraries to integrate with other APIs, APL markup for screen support, responses, and any static assets such as images or audio that might be served by the skill.

AWS CodePipeline is a fully managed continuous delivery service that helps you automate the deployment of your code to services such as Lambda. Use AWS CodePipeline or another continuous integration service to keep the development and deployment automated.

Although the code for Alexa skills is often similar in structure to other web applications, Alexa presents a new technical component to this: the interaction model. The interaction model is sometimes loosely used to mean “how a user interacts with the skill,” but in more technical terms, it is the actual JSON format of intents, utterances, and slots that make up the skill functionality.

These intent names are used by skills in the code. For example, a recipe skill may have the intent “FindRecipeIntent,” which would be referenced as a string in the skill code. However, even though the specific utterances that are included in the interaction model
are not referenced or used by the code, it is a best practice to include the JSON representation of the interaction model in your code repository.

Whether you use the ASK CLI to update the interaction model, or copy and paste the interaction model into the Developer portal, maintaining parity between the developer portal’s version of the interaction model and your code is critical.

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Development

Managing Content

Managing Content

Additional items to keep in mind when developing a skill include where content will be sourced from, who controls access to the content, and where is it stored. Since Alexa skills can run on any web server, there are a number of options available to you for content management. The table to the right shows some of the most popular, including a breakdown of their ability to be managed.

It is important to note that the word “content” in the context of the responses that Alexa provides can mean both the full response, and a single piece of a response that could come from somewhere else, such as an API.

For example:

“Hello John Peters. Thanks for your recent order of Headphones from our website. Your order will arrive on March 27th. Would you like to order something else?”

Sourced from S3 File **Sourced from API**

While it is helpful to know this distinction, you should come up with a content management strategy that includes both. Below is a comparison of several options for where to manage the content for a skill:

CONTENT STORAGE	EXAMPLES	EASY TO UPDATE	EASY TO IMPLEMENT
CODE REPOSITORY	Hard Coded into Skill File	✗*	✓
CLOUD STORAGE	S3	?**	✓
HEADLESS CMS	Prismic, Contentful	✓	✗

** Meaning that a non-technical person cannot update the file, and often requires changing the code.*
*** Meaning that it still requires a technical person to update, but does not require changing the code.*

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Development

API Considerations

API Considerations

If your skill connects to another API in order to source content or responses, you must make the following considerations and take them into account when building a technical plan.

1. Does your backend system expose an API?
2. Do you have a high-level architecture diagram of your backend infrastructure? Does that include elements such as data flow, protocols, authentication mechanisms, storage system, and scaling procedures?
3. Is this API publicly available over the internet? Will hosting service for the skill be able to access the API endpoint?
4. Does your API cover 100% of the functionalities exposed to Alexa customers? If there are any gaps, what are they? Are you planning to fill in these gaps?
5. Does your endpoint accept SSL / TLS connections? Is the SSL / TLS certificate signed by an Amazon-approved Certificate Authority?
6. How do API clients authenticate to the API?
7. Where is your backend API deployed? In which geography?

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Development

Account Linking

Account Linking

In your skill, account linking lets you connect the identity of the user with a user account in a different system. At some point within the skill flow, either user information is required or desired (it's best practice not to limit user interaction with the skill if possible), and the user is then prompted to see the Alexa Companion App on their mobile device in order to account link. The account linking webpage itself returns a web view that allows the user to log in.

In the Alexa developer portal, skills can indicate that account linking is either required or optional. In either case, the skill will also need to handle users who have not linked their accounts. Users may skip account linking even when it is required. The skill may send users a card in the Alexa companion app prompting them to link their account.

Skills that can provide functionality before account linking is required should select the optional setting and only ask the user to link their account when it is necessary.

For more detailed information about developing with Account Linking, see the Account Linking Documentation.

As a reminder, it is never a good idea to store Personally Identifiable Information (PII) gathered through the process of Account Linking (or any interactions) unless you have gone through the necessary steps to provide a secure server environment.

Technical considerations for building a skill with Account Linking:

1. While most of the Alexa development is a backend exercise, the account linking process is one where front-end development is required to code the web views.
2. HTTPS must be used for all communications to the account linking server.
3. Since this is a publicly exposed URL, the account linking server should exist within an environment that can monitor network requests and raise a flag on potential hacking risks.
4. Consider whether account linking is optional or required for the skill, and occasionally invite unauthenticated users to link their account when it will augment their experience.
5. Are you planning to use a third-party identity repository? (Login with Amazon, Login with Facebook, Login with Google)
6. Are you planning to use an in-house identity repository? (OAuth server). Is your in-house OAuth server purposely built for Alexa? Is your in-house OAuth server managed by the same team that manages the Alexa skill or a different team?

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Development

Database Considerations

Database Considerations

Sometimes in the course of building a skill, it is important to use a database. Common use cases for adding persistence layers include:

1. State by User: You may want to store a user's state beyond what you are able to do in the Alexa session or model, for example, if you want to welcome a user back into a skill flow after a long period of time has passed.

2. Information and Request by User: You also may want to store information that a user has given you in order to craft a better experience. Take for example the experience of ordering pizza via voice. It may be helpful to know that a unique user has always asked for pepperoni as a topping so that you could target them directly with messages or specific offers. Collecting a history of interactions beyond the Alexa session would require a database to do this.

3. Interaction Specific Information: Another good example of information you might want to store is information pertinent to a user's interactions. Let's say that you have developed a daily quiz skill and want the user to be presented only with the day's question at first, but then if they ask for another, all of the questions they have previously missed. This would require persistence beyond the Alexa session.

Example from Pizza Ordering Skill User Table

```
{
        userId: "amzn1.ask.account.AFBF7UN5X3V62SF5T",
        createdDate: "2018-05-21T22:52:19.768Z",
        sessionCount: 8,
        lastRequestedTopping: "Pepperoni"
}
```

Database Considerations

It is important to note that you may have more info available to you to store than you actually want to. Ensure you have considered what Personally Identifiable Information your skill might collect or store and any regulations based on that type of info and the requirements of the locality of your skill.

It's also important to note that many developers use the "UserId" that Alexa returns in the request to demarcate a user. The UserId will remain persistent for that user for a specific skill across sessions; however, if a user disables and re-enables the skill, a new UserId will be provided by Alexa. Users who have purchased premium content using In-Skill Purchasing of Consumables will keep a persistent UserID.

Skills that provide account linking can also use their own user identifiers in the database in order to integrate with other systems external to the skill.

For more on Persistence with Alexa, see the training provided by Amazon Partner Big Nerd Ranch.

As a reminder, there are various events that Alexa will send a skill notifying the endpoint of users that have enabled or disabled the skill. This is another opportunity to consider what data is kept and when it is deleted.

7

Development

Server Availability and Scaling

Server Availability and Scaling

Every Alexa skill requires an endpoint that receives all of the requests from users via the Alexa service. There are some common questions and considerations that you should use as a checklist in determining the servers hosting your Alexa skill.

- ✓ Is your backend deployed on AWS Cloud, another public cloud, or on-premises?
- ✓ If deployed on AWS, are you using AWS Lambda or another AWS service (such as EC2, Elastic Beanstalk, or ECS)? AWS Lambda will automatically scale to the amount of requests up to AWS service limits.
- ✓ Will the database automatically scale with increases in traffic? Consider using Amazon DynamoDB On-Demand that will automatically scale to your skill's usage.
- ✓ If deployed using EC2, do you have a proper auto-scaling configuration and a load balancer in place?
- ✓ If not deployed on AWS, have you configured a scaling mechanism to handle spikes in traffic?
- ✓ What is your load testing plan?
- ✓ What are the metrics you are monitoring and what are the thresholds to raise alarms?

If you host your skill code on AWS, we have best practices to ensure your code is deployed in a scalable and highly available way.

See companion document AWS Scaling Best Practices for Alexa Skills.

8

Development

Analytics

Analytics

There are a number of ways that you measure skill engagement and usage. Each of them provides insight into different parts of a user's customer journey.

AMAZON ALEXA DASHBOARD

The best place to start is the built-in Amazon Alexa Dashboard for analytics information. It is recommended to integrate additional analytics that can allow you to track usage of your skill's specific content usage.

The Analytics tab of the Amazon Alexa Dashboard provides:

- Unique customer counts
- Number of sessions
- Usage data based on the utterances and intents defined in the interaction model
- Retention statistics
- Interaction paths
- Skill enablement

The metrics available from Alexa will continue to be expanded.

THIRD PARTY ANALYTICS

The following analytics tools are commonly used by skill developers within a skill to provide additional analytics. Specifically, each of these allows you to register custom events so that you can create an analytics profile that suits your needs.

1. Voice/Conversation Analytics Tools - Amazon maintains a list of popular third-party analytics providers that support Alexa.
2. Google Analytics or Adobe Analytics - While each of these mobile or web analytics is not built for conversation-first experiences, each allows you to register custom events, and if you have analytics data already in these experiences, some convergence of information may be useful.

9

Development

Amazon Developer Account

Amazon Developer Account

Set up an Amazon Developer Account for your brand. The dashboard provided will serve many different functions throughout the process of developing a skill.

The following are the different ways that your Amazon Developer Account is used:

1. Interaction models are defined in the developer portal and include all of the intents, utterances, and slots. This is what trains Alexa to understand the requests for your skill.
2. The skill's Endpoint, Account Linking and Permissions are configured in the portal and will need to be connected to the code built to operate the backend logic of the skill.
3. Provides a place to create a test skill listing, including the "Test" panel that allows you to quickly type inputs into Alexa in order to test your skill and view the output of your skill on simulators for the Echo Show, Echo Spot, and Fire TV.
4. Sharing a skill under development is possible using a Beta Test which is configured on the "Distribution" tab along with all of the skill publication information and availability settings.
5. The Intent History can be found in the "Build" tab and is displayed when your skill has 10 or more active users in a day in a specific locale.
6. Control of your publication status is controlled in the "Certification" panel. You can list, pause, and stop listing your skill through this dashboard.
7. The analytics dashboard can be viewed. The analytics dashboard was previously covered in this document and is a good source of analytics information on general usage of the skill.

Testing, QA & UAT

The following section covers some basics of testing the experiences you've built.

Thorough QA by the skill development team before submitting for certification can help decrease the time required for certification.

HERE'S WHAT WE'LL COVER IN THIS SECTION:

1. Different Types of Testing Methodologies
2. Best Practices for Automated Development Testing
3. Best Practices for Acceptance & User Testing
4. Sample Processes for UAT

1

Testing, QA & UAT

Different Types of Testing Methodologies

Different Types of Testing Methodologies

Within the development and product development communities, different testing methodologies are used to test various aspects of a given software. While most of these remain unchanged with Alexa skills, there are some slight nuances that are worth noting.

Each of the below methods for testing are covered in detail in the following sections, but at a high level the three types of testing break down as comparable in the following ways:

FUNCTIONAL / INTEGRATION TESTING (AUTOMATED DEVELOPMENT TESTING)

Owned by: Development Team
Happens: During development, before Acceptance Testing

USER TESTING

Owned by: Entire Skill Team
Happens: After development, before Certification

USER ACCEPTANCE TESTING (UAT)

Owned by: Production Team
Happens: After development and usually after at least one round of certification; any blocking bugs should already be resolved.

2

Testing, QA & UAT

Best Practices for Automated Development Testing

Best Practices for Automated Development Testing

FUNCTIONAL / INTEGRATION TESTING (AUTOMATED CODE TESTING)

Functional and integration testing refers to the automated testing within a skill's codebase. Since building a skill is most comparable to building an API, apart from the unit testing within a codebase of specific modules, good functional and integration testing should include mocking requests to the codebase and testing for properly formatted responses.

In order to build the data for such mocked tests, the Alexa Developer Portal Test area can be used to inspect the JSON request sent to the skill at every step in the VUI Design Flow. Each step within the design flow should be tested by sending these requests to your skill. When possible these tests should be built into the scripts executed by a continuous integration service to test the code before each deployment.

3

Testing, QA & UAT

Best Practices for Acceptance and User Testing

Best Practices for Acceptance and User Testing

ACCEPTANCE TESTING (USER ACCEPTANCE TESTING)

Often called User Acceptance Testing (UAT), here the “user” is often the client or brand stakeholders who are pretending to be a user and using the skill. Thus, “Acceptance Testing” is likely a more accurate title for this function, but it answers the question: “Does the skill accomplish everything it was scoped to do?”

Often, this is the last step before sending a skill for certification.

USER TESTING

Actual, traditional user testing means putting real end users in front of Alexa devices and recording, measuring, and diagnosing their interactions with your skill for learnings. Some brands do this with their own focus groups, while others turn to companies like the Amazon-backed Pulse Labs, which helps automate this process.

This can be very helpful during early releases of a skill meant to have a long roadmap. If your skill plans to play a part in the overall customer journey, user testing, combined with good analytics best practices (covered previously in this framework), can help you refine what features and functionality to spend time on within a skill. Additionally, user testing will help validate the invocation name.

4

Testing, QA & UAT

Sample Processes for UAT

Sample Processes for UAT

BUILD A TEST PLAN

The best way to attack User Acceptance Testing (UAT) is to develop a test plan. This can be as detailed as you'd like, but at a minimum should include sample scripts to allow the user to test all "Happy Paths," important skill functionality, common errors, and top-level intents. Each time that a bug is found, it should be prioritized, based on how likely it is that a user is going to be able to reproduce the error.

Was the bug found when using the sample scripts provided for a "Happy Path" feature? Then the bug is probably a high priority. Was the bug found only on the 10th time the skill was opened, and the "HelpIntent" was triggered instead of an expected prompt? It may be a lower priority.

PRIORITIZE DEVELOPMENT

Internally, Amazon uses the following standard for how releases are categorized:

STANDARDS – SKILL CONTAINS:
100% of scoped functionality
90% of GUI/visuals (Echo Show, Echo Spot, cards), skill contains minor bugs

RELEASE CANDIDATE (RC)
STANDARDS – SKILL CONTAINS:
Skill has passed client QA
100% of scoped functionality
100% of GUI/visuals (Echo Show, Echo Spot, cards), skill is bug free as qualified by partner

Certification

The following section covers some basics of testing the experiences you've built.

HERE'S WHAT WE'LL COVER IN THIS SECTION:

1. Certification Overview
2. Project Management During Certification

1

Certification

Certification Overview

Certification Overview

CERTIFICATION TIMING

Before submitting for certification, ensure all bugs, issues, and feedback collected during the testing, QA and UAT process have already been resolved.

The certification phase usually takes 2-3 certification cycles, which equates to about 3-4 business weeks. This includes:

Example timeline for each certification cycle:

- 3-5 days for Amazon Certification team to test skill
- 2-3 days for you to make updates/fixes based on feedback and resubmit

This cycle repeats until the skill passes certification and is approved to go live.

Certification Overview

Below is a high-level breakdown of the certification process:

1. Partner, developer, or skill owner completes internal QA and reviews the certification resources and requirements:
   - Testing a Skill
   - Skill Pre-Certification Validator Tool
   - VUI and UX Testing for Custom Skills
   - ASK Submission Checklist
   - Account Linking: Set up test accounts for certification reviewers
2. Developer completes the testing processes included in the certification tab of the Alexa developer portal and submits the skill for certification.
3. Once skill is submitted, the certification team completes several tests to ensure the skill meets the functional, policy, and security standards that are required.
4. Once certification is complete, you will receive a notice that the skill was either rejected or approved, along with the specific feedback of both required and recommended changes.
5. The developer addresses the items called out in the certification feedback and resubmits the skill for certification using the Alexa developer portal.
6. Skills will be published as soon as they are approved by the certification team.

You can now control the publishing schedule of your skill with self-service skill publishing. This can be especially useful when coordinating your skill's availability with marketing efforts, back-end deployments, or an event like a holiday or a conference; just be sure to allow enough time for certification review before your publish date.

2

Certification

Project Management During Certification

Project Management During Certification

It is important to take note of the resources needed during the certification process from a team producing a skill. While most of the energy and time of the team will be spent during the design and development portions of the Skill Development Lifecycle, it is important to note that certification may highlight places where extra attention is required to release your skill.

Common areas of feedback from Amazon's Certification include:

1. Updates to the Interaction Model. Amazon will test each of the parts of your interaction model. They're looking for both functional code and a skill that's easy and enjoyable to use.

2. Updates to the Account Linking Process. If you're using account linking, make sure that you've followed all of the steps in the documentation necessary to ensure that your account linking implementation meets standards.

3. Testing the Skill's Fragility. In general, the Amazon certification team will attempt to mimic real world interactions with your skill by trying to break it. They'll say the wrong things at the wrong times, hoping that your skill gets them back on the right path, or at least fails gracefully. This is why an internal test plan that covers edge cases and random inputs can decrease the likelihood that they will find any errors.

For all of these reasons, it is important to note that you should have designers and developers ready to step back into the project all the way until the skill is released.

What Happens After Certification

The following section covers some basics of supporting a skill after certification. While we cover these topics from a mainly technical perspective, you should reference the Alexa Marketing and Advertising Guide for more detailed information on how to support the launch of a skill with marketing and advertising.

HERE'S WHAT WE'LL COVER IN THIS SECTION:

1. Technical Considerations During Promotional Periods
2. Skill Reviews
3. Road Mapping for Future Features

1

What Happens After Certification

Technical Considerations During Promotional Periods

Technical Considerations During Promotional Periods

After a skill is certified and is available for launch, most of the technical work is done. However, there are a few places you will want to watch your skill for performance during the first days and weeks after its release:

1. Promotional Consideration. Is any paid or other promotional consideration likely to drive traffic to the skill? If so, make sure to use scalable hosting resources and make sure that an internal development or IT team is standing by to troubleshoot any issues that may arise. Whether they are related to the traffic or perhaps new bugs found by real users, you will want to make sure that you have support during promotional periods.

2. First Week and Weekend. Depending on when you launch a skill, you may see large variations in traffic to the skill. In general, weekends see more customers on the Alexa service, so the first weekend should be monitored closely.

3. Ongoing Health Monitors. Review the skill's technical architecture and create health monitors for each critical component. Most cloud services, and all Amazon solutions for servers (Lambda, DynamoDB, EC2, etc.), allow you the ability to monitor health. Set health monitors with low thresholds initially so you are sure that all lines of communication from the health service to your team are working properly.

2

What Happens After Certification

Skill Reviews

Skill Reviews

Customers are able to provide a rating and review for skills similar to any other product available on Amazon. The reviews are visible on the skill description page and will have an impact on the number of customers that decide to enable the skill.

Considerations for skill reviews:

1. Reviews affect discoverability. Alexa provides users with recommended skills via voice and within the skill listings of the Alexa companion app. Skills that are consistently rated higher will be more likely to be recommended by Alexa.
2. Asking users for reviews. It is not recommended to frequently ask users to review the skill. The skill should not ask a user to review the skill.
3. Responding to reviews. There isn't yet a tool in the developer portal to allow skill developers to directly respond to skill reviews. Comments can be added to any review under the brands Amazon.com account, and developers wishing to respond to reviews could do so by leaving a comment. Remember to keep comments helpful and personalized to the user's specific comments. Accounts adding comments in bulk or without variation on multiple reviews may get flagged as spam.

3

What Happens After Certification

Road Mapping for Future Features

Road Mapping for Future Features

Once your skill is launched in its first version, you've moved from product development to product maintenance. Now, it's your job to maintain, grow, and nurture this new touchpoint for your brand. The following are some places you'll want to remember to look when considering where and how to invest time into the skill after launch.

Reviews: After your skill is live, real users will start to read the reviews section of the skill store to see how customers are rating or reviewing your skills. Reviews are the best place to gather bug reports and feature requests.

New Features: Check the Amazon blog regularly. Have any new features been released that would be good use cases for your skill to leverage?

Additional Resources & Best Practices

HERE'S WHAT WE'LL COVER IN THIS SECTION:

1. Best Practices for Project Managers
2. Best Practices for Developers
3. Helpful Resources for Developers
4. Keeping Up With New Features

1

Best Practices & Resources

Best Practices for Project Managers

Best Practices for Project Managers

Every different type of digital product that a project manager might produce (a website, an app, an API, etc.) will have its own unique development cycle and processes. The following are some collected best practices to guide those producing a skill.

1. Agile Is Your Friend. While any development methodology can successfully produce a skill, because of the tricky nature of interaction model design, the way that you will want to test your design flow, and the newness of voice, the entire development process tends to be collaborative throughout. Often, developers will be giving insight to user experience designers and vice versa.
2. QA is a group effort. While in most traditional digital builds the role of Quality Assurance can be regulated to one person who checks a website or mobile app for functionality, voice may require more hands on deck. Since people have different ways of talking and communicating to a skill, the best QA often happens when there are multiple people able to contribute to checking skill functionality.
3. Timelines can vary widely, as in many projects, but a typical timeline for a skill of moderate complexity should budget at least a week for voice design, a few weeks for technical development, a couple of weeks for QA, and up to four weeks to move through the Amazon Certification process.

2

Best Practices & Resources

Best Practices for Developers

Best Practices for Developers

Like project managers, developers will also face unique challenges while developing a skill. The following are best practices and tips aimed at helping developers prepare to build a skill.

1. State management is your biggest job. Because the Alexa service takes care of the natural language processing part of skill development, your biggest job as a developer is managing state. There are open source frameworks online for NodeJS developers, but simple classes for managing state can be created from scratch as well. Either way, managing state is handled within a skill.

2. Use the Alexa model to pass data. With each request that is sent to your skill code (in the form of a JSON object), you have the ability to append data to the Alexa model, which will be passed back and forth with each request. For many types of interactions, including state management, this is preferable to some other type of persistence like a database.

3. The Developer Portal is a great place to test your skill functionality. While a full pass at testing the utterances within the interaction model is recommended on physical Echo devices, testing happy paths and basic skill logic is often faster using the Test panel in the Developer Portal.

4. For best practices on handling the interaction model, see the section in this Skill Delivery Framework titled Development: Code Source Control Best Practices.

3

Best Practices & Resources

Helpful Resources for Developers

Helpful Resources for Developers

USING AUDIO IN A CUSTOM SKILL

Custom skills can use their own audio to enhance and customize the experience.

1. SSML Audio is used for sound clips less than 90 seconds. Up to 5 sound clips can be used in the same SSML response, and there are specific .mp3 audio format requirements that must be used.
2. AudioPlayer is used for audio longer than 90 seconds, or streaming audio.
3. Alexa Skill Kit Sound Library includes hundreds of sounds that skill developers can use in their skills for free.

FLASH BRIEFINGS

Flash briefing skills can either be read by Alexa (plain text only, no SSML), or each briefing can be provided as an .mp3 format audio file.

1. Flash Briefing Skill Feature
2. Flash Briefing Skill API Reference
3. Flash Briefing Skill Certification Checklist
4. Tips for audio clip content
5. Avoid common volume issues with audio flash briefings by reviewing the Audio Loudness Guide.

Helpful Resources for Developers

BUILDING A SKILL

1. Alexa documentation starting point
2. Set up AWS Lambda or another cloud-based hosting service
   - Creating a Lambda Function
   - Lambda FAQ
   - Debugging AWS Lambda Code Locally
3. Review sample code in Node.js or Java
   - Alexa Skills Kit Samples
4. Code your skill
   - ASK Node in SDK
   - ASK Java SDK
   - Handling Requests
   - Built-In Intents
   - Alexa Github
   - ASK Sample Skills
   - Alexa Cookbook
5. Account Linking
   - Linking a User's Account
   - Login with Amazon & Alexa Account Linking: 5 Steps to Seamlessly Link Your Alexa Skill with Login with Amazon
   - Facebook
   - Google (API Overview)
   - Example
   - Best Practices for Linking to Your Skill
   - Troubleshooting

Helpful Resources for Developers

TEST YOUR SKILL

1. Add your skill to the developer portal
   - Registering Skills
2. Set up AWS Cloudwatch logging for Lambda, and other services like DynamoDB, as applicable
   - Auto-Scaling DynamoDB
3. Before submitting for certification, test your skill using the service simulator in the Developer Portal and on an Alexa device
   - Testing a Skill
   - Review the ASK Submission Checklist & VUI and UX Testing for Custom Skills
   - Use the Beta Testing Tool for internal UAT
   - Account Linking: Set up test accounts for Alexa Certification teams

OBTAINING VENDOR AND CUSTOM IDS

1. The Vendor ID (and related Customer ID) can be obtained from the developer portal. Log in to developer.amazon.com, then go to https://developer.amazon.com/mycid.html.
2. For anyone who will be testing the skill and already has an Amazon account, they can obtain their customer ID from the Amazon retail site(s).
3. Login to amazon.com
4. Then go to https://www.amazon.com/gp/profile/

Helpful Resources for Developers

MISCELLANEOUS RESOURCES

1. AWS Promo Credits
2. Add User to Developer Account
3. Changing Company Name / Developer Name
4. Using Audio in a Custom Skill:
    - SSML Audio (for sound clips less than 90 sec)
    - AudioPlayer (for audio longer than 90 sec or streaming)
5. Alexa Announcements
6. Alexa Forums
7. Alexa Blog
8. Alexa Lists Integration
9. Device Location
10. Providing general and contextual help

Helpful Resources for Developers

MORE HELPFUL RESOURCES FOR DEVELOPERS

1. ASK Docs - The Alexa Skill Kit documentation covers everything you need to know to build skills for the service.
2. Alexa Blog - A great source for new product releases, best practices, and tutorials for developers. Includes a great "How To" category.
3. Alexa Developer Spotlight - A section of the general Alexa blog that profiles developers. The developer spotlight is often a good source for seeing how others approach the development of skills.

4

Best Practices & Resources

Keeping Up With New Features

Keeping Up With New Features

Part of the fun of development for the Alexa service is keeping up with all of the latest features available to developers. Often, a feature or piece of functionality that you'd like to see supported is something that other developers have raised to the Alexa development team. For a taste of this, interesting new features released in 2020 included:

1. Live Skill Updates - Select updates to live Alexa skills can now be made almost instantly.
2. Smart Home Live Debugger - Smart Home Live Debugger Now Supports Proactive Discovery and Delete Events.
3. Skill Analytics - New Smart Home Analytic Metric.
4. Shared Slots – You can now share custom slot types between your skills.
5. Automated Locale Distribution (Console) - Give Alexa permission to publish qualified live skills to all locales of the same language.
6. And more! - Available on the Alexa developer blog.

Many announcements with new features and functionality happen in the space of a month, so keeping abreast of the latest available to you as an Alexa developer is important. The Alexa blog linked in each of the examples above is a great source for keeping track of each of them. The latest Alexa Announcements are available via a newsletter subscription on the Alexa developer website.

amazon alexa