

# Cerence Studio

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AI for a World in Motion

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# Agenda

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Introduction

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Product Offering

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Key Roadmap Items

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Studio Long Term Vision

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# Introduction



# Introducing Cerence Studio

- Leading developer program for building voice- and AI-based virtual assistants for the automotive market.
- Gives carmakers and developers the ability to quickly and easily create customized voice, AI and natural language interfaces to power the next generation of in-car voice assistants.
- Gain access to the same foundational technology that powers voice capabilities in more than 325 million cars on the road today.
- Integrate Cerence's trusted voice and natural language technology, with full control and flexibility to make their experience unique and exceptional.
- Trusted by leading OEMs and tier-ones...



DAIMLER



Continental



# Significant Benefits for OEMs and Third Parties



## Own your Experience

Our easy to use UI will have you prototyping in no time to create a branded experience that you own!

## We're more than our Tools

Offering training, professional services and support, to help our customers succeed



## More Power to You

Studio's power tools are trusted by industry leading customers as well as Cerence R&D



## Choose your Path

Control your deployment cycle with Studio's Promotion Flow



## Keep it Fresh

Keep your solution fresh by adding more functionality and releasing updates post SOP

# Building great user experiences



Seamless

End users enjoy top-level menu access to Studio domains; Studio is transparent to the end-user



Natural

With Statistical NLU, users can express what they want naturally, and receive human-like responses thanks to NLG and other advanced dialog features



Delightful

Entertaining experiences that build a stronger connection with the end users and drive loyalty

# Real Ways of Making a Difference

Branded  
conversational  
Chatbots make your  
car your friend



Market new exciting  
features to your end  
users with a Studio  
domain



Enjoy an open  
platform that keeps  
striving to add 3<sup>rd</sup>  
party integrations



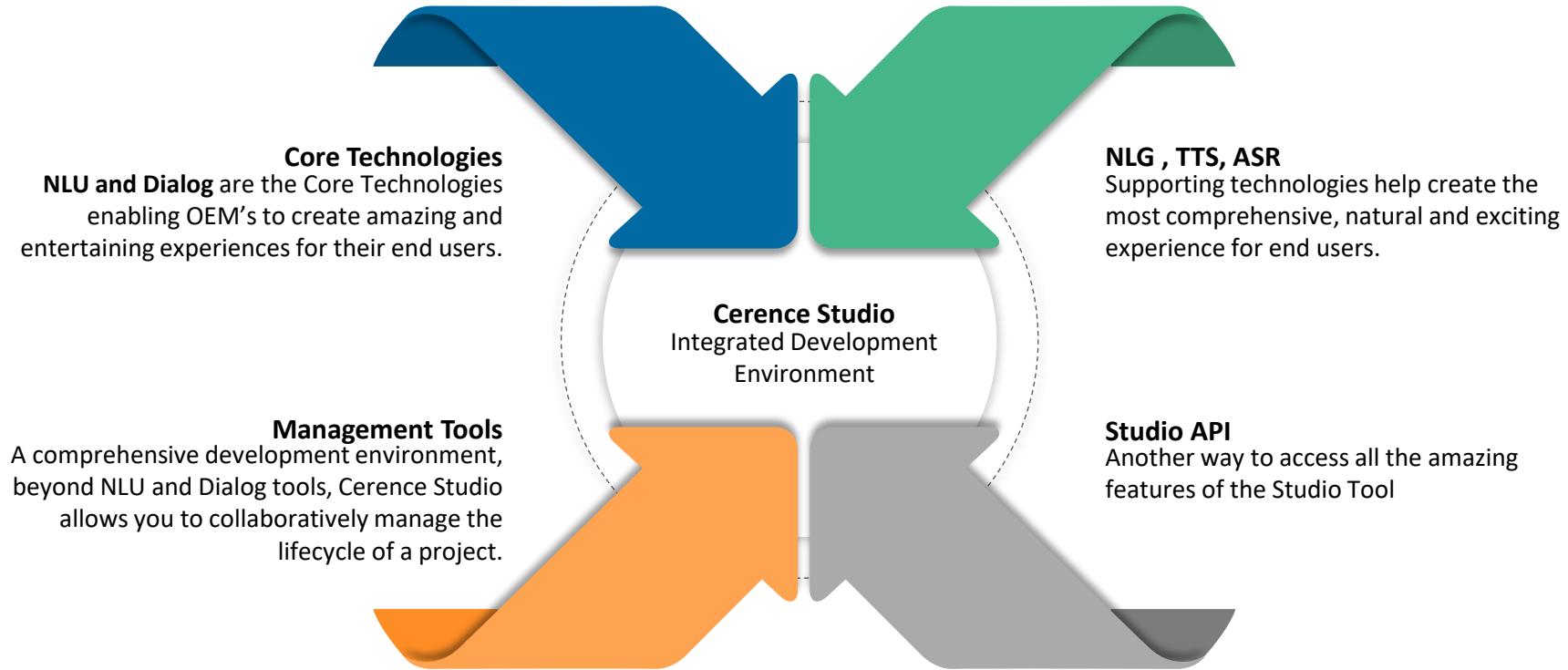
Understand your car  
without opening a  
single manual

Customize  
responses for the  
end users depending  
on the situation

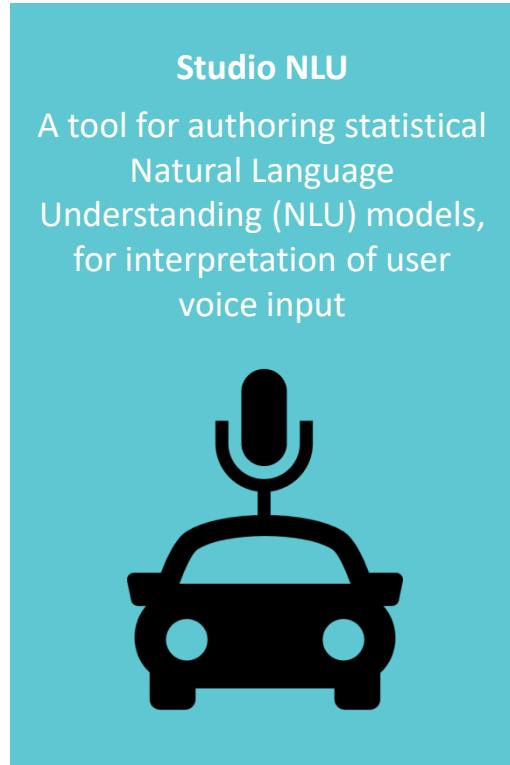
# Product Offering



# Product Offering



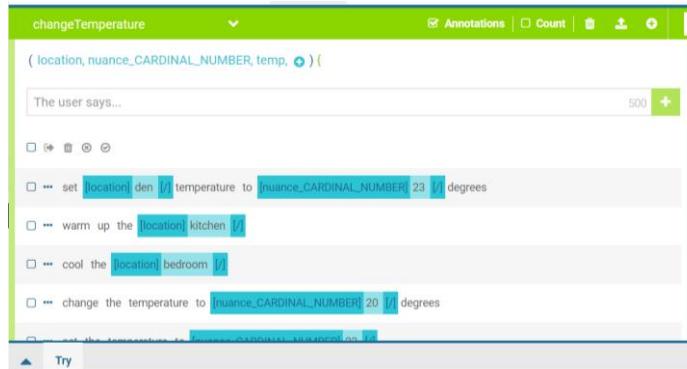
# Studio NLU



A tool for authoring statistical  
Natural Language  
Understanding (NLU) models,  
for interpretation of user  
voice input



# Define, annotate, train, test, repeat...



sample

## custom concept

predefined concept

# Studio Dialog

## Studio Dialog

The tools to define the conversation flow and the output responses of the assistant



Turn on the heat

What temperature do you want?



Comprehensive **decision making** for more natural conversation

Change\_Temperature ▾ Decision Table

Master Table: All conditions, all rows. Intent Settings: en\_US

Example User Phrase	nuance_CARDINAL_NUMBER	setting	Action	ID / On Screen Prompt
... 1 Turn on the heat	<input type="radio"/> Not Collected	<input checked="" type="radio"/> Collected	Ask user for missing concept(s)	WHAT_TEMPERATUR What temperature do you want?
... 2 23	<input checked="" type="radio"/> Collected		Complete the task	<input checked="" type="radio"/> Add response

Result\_Select ▾ Decision Table Intent Set

Master Table: All conditions, all rows.

Example User Phrase	isBestConfirmed	isListResultsConfirmed	isNavConfirmed	CD_Query_Meta	relaxationState	CD_Sorting	CD_Query_Results
... 1		▼	▼	▼	▼	▼	▼
... 2	Not Collected	▼	▼	▼	is None	>= One returned	> One returned
... 3	Not Collected	▼	▼	▼	is None	>= One returned	> One returned
... 4	is true	▼	▼	▼	is None	▼	> One returned
... 5	is true	▼	▼	▼	is None	▼	One returned
... 6	is false	▼	▼	▼	is None	>= One returned	> One returned
... 7	▼ Not Collected	▼	▼	▼	is Mandatory	>= One returned	> One returned
... 8	▼ Not Collected	▼	▼	▼	is Mandatory	>= One returned	> One returned
... 9	▼ is true	▼	▼	▼	is Mandatory	>= One returned	> One returned
... 10	▼ is false	▼	▼	▼	is Mandatory	▼	> One returned
... 11	▼	▼	▼	▼	is Negotiable	>= One returned	> One returned
... 12	▼	▼	▼	▼	▼	>= One returned	One selected
... 13	▼	▼	▼	▼	is Negotiable	>= One returned	> One returned
... 14	▼	▼	▼	▼	is Mandatory	▼	One returned
... 15	▼	▼	▼	▼	▼	▼	One returned
... 16	▼	▼	▼	▼	is Negotiable	▼	One returned
... 17	▼	▼	▼	▼	is None	▼	One returned

# Source Control/Change Management Tools


**NLU Import/Export Source File**

Ability to develop NLU models offline and import to Studio.

Ability to export, edit and reimport


**Dialog Import/Export Source File**

Ability to export the Dialog models , compare files, apply changes and import


**Cloning & Versioning Support**

Ability to clone projects and commit different versions as progress is made


**Dialog Merge**

Ability to merge data such as Decision tables, Client Data, and the NLU ontology into a target project and check for errors

Project Data	Description	Download File
NLU Model (all data)	Edit Offline	.trsx
NLU Concept Literals	Add concept literals offline	
NLU Samples	Add samples offline	
Dialog Model JSON (all data)	Export for backup purposes	.json
Dialog Model DLSX (all data)	Edit offline	.dlsx
Client Data	Edit and translate offline	.csv
Decision Tables	Edit and translate offline	.csv
Client Data	Edit and translate offline	.csv

# Collaboration Tools



Projects created in a namespace are shared with all the users in the group

The admin of the namespace can edit and add users

When creating a project you select the Namespace it should belong to

A screenshot of a web-based application interface for managing users and roles. The top navigation bar includes a back arrow, the BMW logo, and the word "BMW". Below the navigation, there are three tabs: "USERS" (selected), "ROLES", and "PROMOTION DETAILS". A search bar labeled "Search user by name or role..." is present. The main content area displays a table of users with columns for Last Name, First Name, and Role. To the right of the table is a user profile card for "admin".

Last Name	First Name	Role
approver	dialog	member, Dialog Appr
admin	company	member, Company
approver	nlu	member, NLU Appr
Mortier	Luc	owner, member, ps,
zeng	robin	member
rou	wei	viewer

**Details**

Last Name	admin	First Name
Email	company.admin@bmwtes.t.com	Last Logged In
Roles	member <span>(X)</span> Company Administrator <span>(X)</span>	

# NLU Tools for Collaboration



Ability to export Ontology, Literals and Samples as separate files



Several users can work on the same project in varying roles

Add new member

User

Search a user...

Role

admin – Can perform all actions on the project ...

admin – Can perform all actions on the project except delete the project and invite other members.

owner – Can perform all actions on the project.

viewer – Can see the project details but cannot edit them.

Export .trsx file

Which type of data would you like to export?

**Ontology** (Concepts, Intents and their relationship hierarchies)

**Concept Literals** (e.g. Montreal, Paris, Seattle, etc. for the List Concept City)

**Samples**

Cancel Export

# Dialog Tools for Collaboration

## Export .dlsx file

Which type of Dialog data would you like to export?

Logic

- Decision tables
- Intents and client data
- Responses types and IDs

Response content

Locale-specific

- Response content
- NLG Lexicon
- NLG rules



Ability to export Dialog Logic and Dialog data as separate files for localization



Several users can edit same dialog simultaneously, and receive notification of changes

The screenshot shows the Dialog Studio interface. At the top, there's a navigation bar with tabs like Studio, Call\_App, dialog, Develop, Manage, Try, and a user profile. Below the navigation is a search bar with 'Decision Table' typed in. The main area displays a 'Master Table' with columns: Example User Phrase, CONTACT, R\_QUERY\_CONTACTS, FULLNAME, and resource\_OPTION. There are five rows labeled 1 through 5. Row 1 has a note 'Not Collected'. Rows 2, 3, and 4 have notes 'None returned'. Row 5 has a note 'One returned'. A 'Intent Settings' button is also visible. To the right of the table is a 'Console' window showing a list of recent actions: 'Request Lima created new row 5' (July 31, 2020, 11:48am), 'Request Lima deleted row' (July 31, 2020, 11:48am), and 'Request Lima created new row 6' (July 31, 2020, 11:49am). A small note at the bottom says 'Request Lima created new row 6'.

# Deployment Tools

-  Streamlined process so you can quickly deploy your models all the way to go live
-  Deploy in 3 easy steps:  
Go to Apps, select application -> Create Configuration -> Request Promotion
-  Move to non-gated environments with just a click of a button
-  Get notified about requested and approved promotions

Dashboard for your projects Learn to get started manage your apps M. Talbot 9+

MY\_APP1 M1000\_31\_3

Age	Context Tag	CONFIGURE & DEPLOY	APP ID	MEMBERS
2 days	M1000_31_3	 Override		
4 days	M1000_31_2			

**Configuration**

1 day ago	Nov 5, 2018	Config_v1
▶ NavigationProject	Project ID 7748	
ASR	NLU	Dialog
Version	v1	v1

Sandbox	CVT/QA	Pre-Production	Production
<input checked="" type="checkbox"/> Sandbox	<input checked="" type="checkbox"/> US East	<input checked="" type="checkbox"/> US East	<input type="checkbox"/> US East
<input type="checkbox"/> US West	<input type="checkbox"/> US West	<input type="checkbox"/> US West	<input type="checkbox"/> US West
<input type="checkbox"/> Western Canada	<input type="checkbox"/> Western Canada	<input type="checkbox"/> Western Canada	<input type="checkbox"/> Western Canada

**Sandbox:**  Sandbox  
**CVT/QA:**  US East  
**Pre-Production:**  US East  
**Production:**  US East

**Sandbox:**  US West  
**CVT/QA:**  US West  
**Pre-Production:**  US West  
**Production:**  US West

**Sandbox:**  Western Canada  
**CVT/QA:**  Western Canada  
**Pre-Production:**  Western Canada  
**Production:**  Western Canada

**Sandbox:** Request Deployment  
**CVT/QA:** Request Deployment  
**Pre-Production:** Request Deployment  
**Production:** Request Deployment

# Highlights



## Auto Augment ASR

The unique vocabulary featured in your samples will be automatically added to the ASR model



## Extending Dialog with Scripting

Augment your Dialogs with scripts to implement business logic and content integration



## NLG

Construct responses, based on dynamic context and data, in a natural way while respecting language and grammar rules



## Statistical NLU

Allow users to express themselves naturally, leveraging the statistical NLU power of Studio, and avoid the shortcomings of grammar-based solutions



## Language Coverage

A vast array of possibilities with support in over 25 languages



## Arbitration Support

With Arbitration, any Studio NLU domain is accessible to users at the top-level speech menu, for an ideal user experience

# Key Roadmap Items



# Modular Arbitration Cloud Solution(MACS)

State-of-the-art arbitration solution to enable top-level menu access

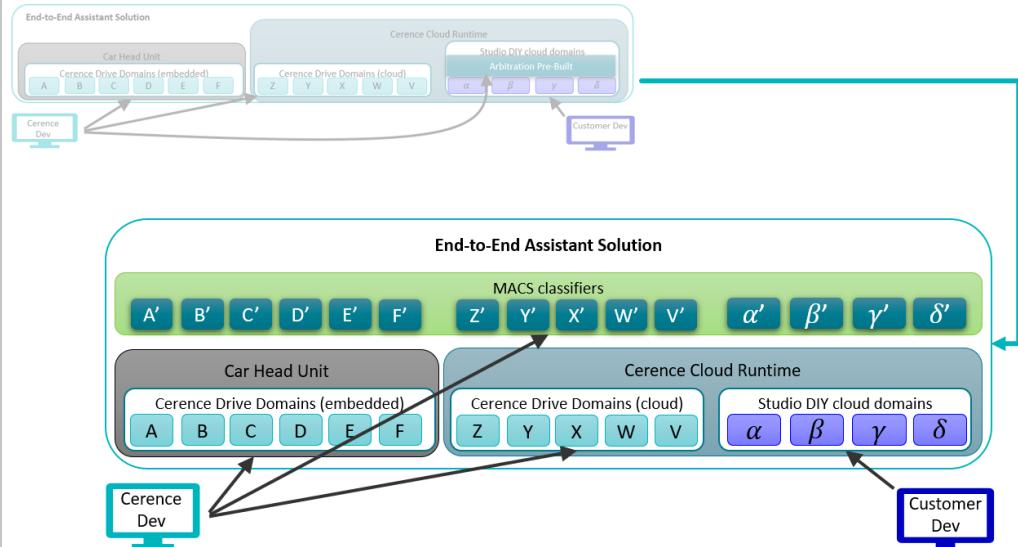
MACS Classifiers replace legacy pre-built arbitration

Improved Classification between Cerence and Customer Domains

Easy and intuitive GUI interface

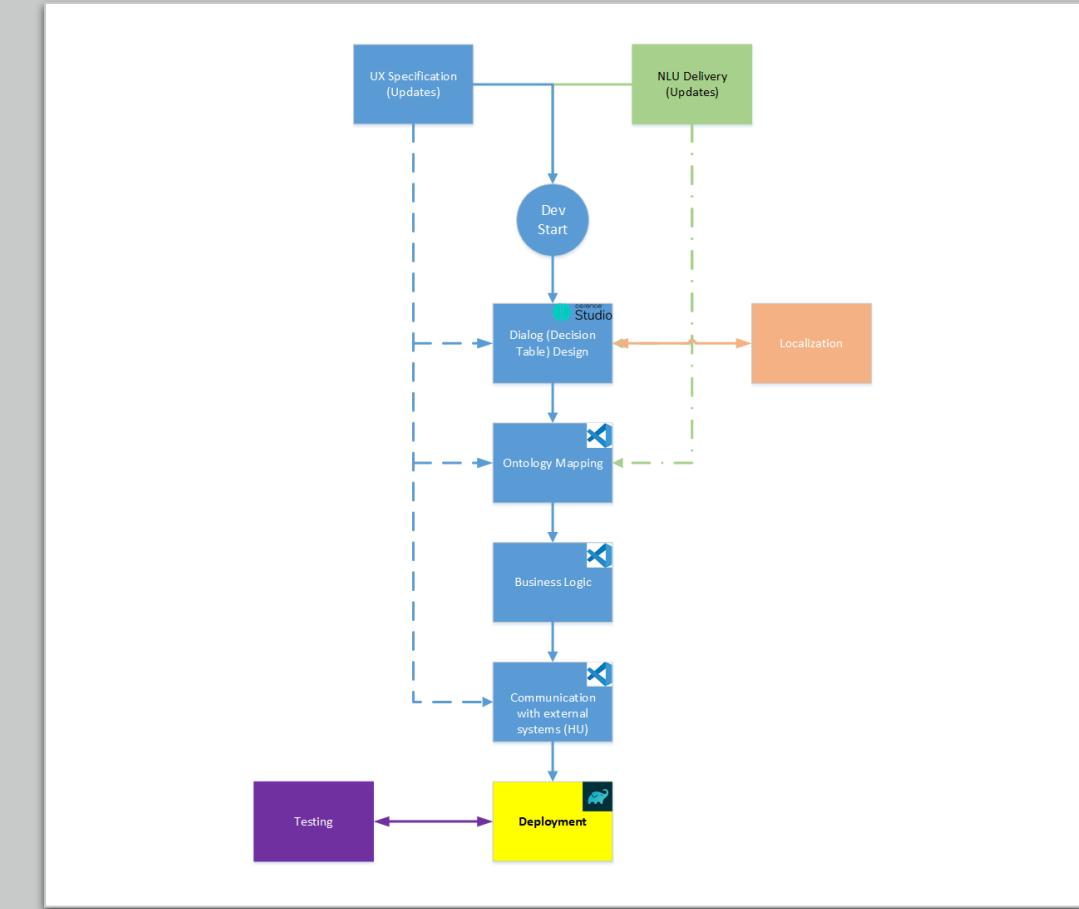
Access via API endpoints

*Legacy View vs MACS View*



# Studio Dialog for Embedded

- Same tools as used by Cerence R&D and PS for Embedded development
- Optimized for CDFW, running NCE as dialog engine
- Dialog design and development using Studio
- Using TypeScript for business logic implementation – MS ‘VS-Code’ IDE
- Integration tools between Studio and VS-Code plugins
- Furthering Integration with Studio in 2021



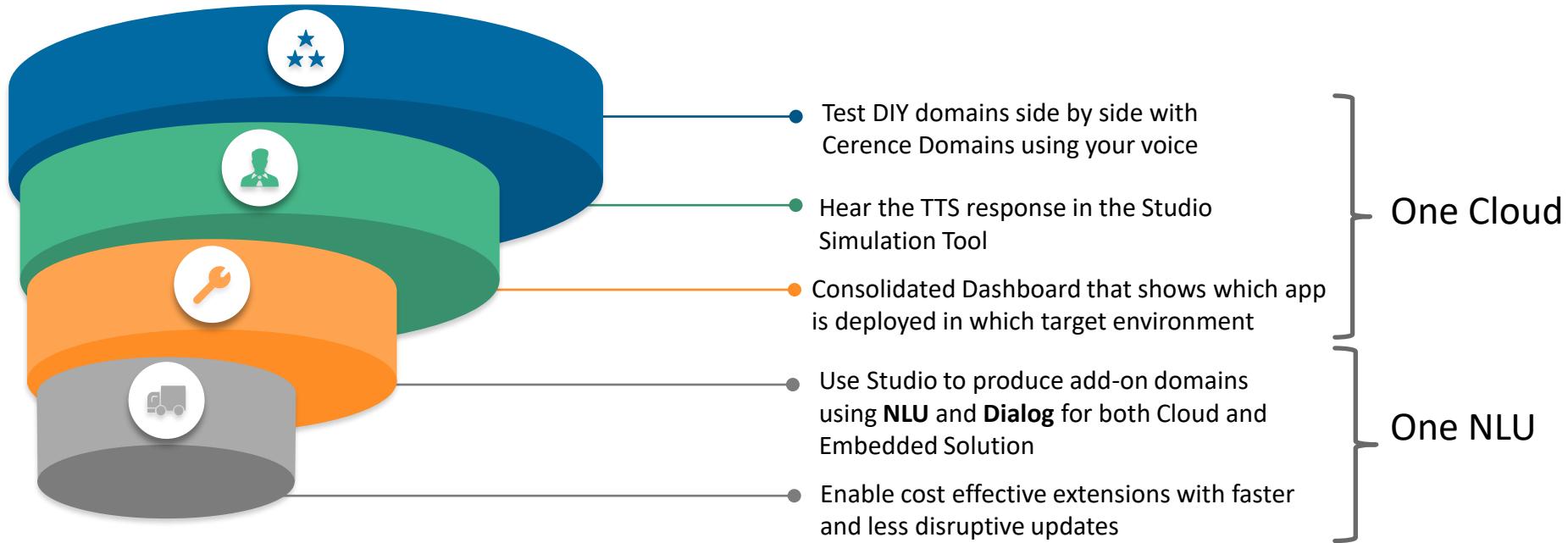
# Alexa Skills Integration - POC

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# Studio

# Studio in One. X

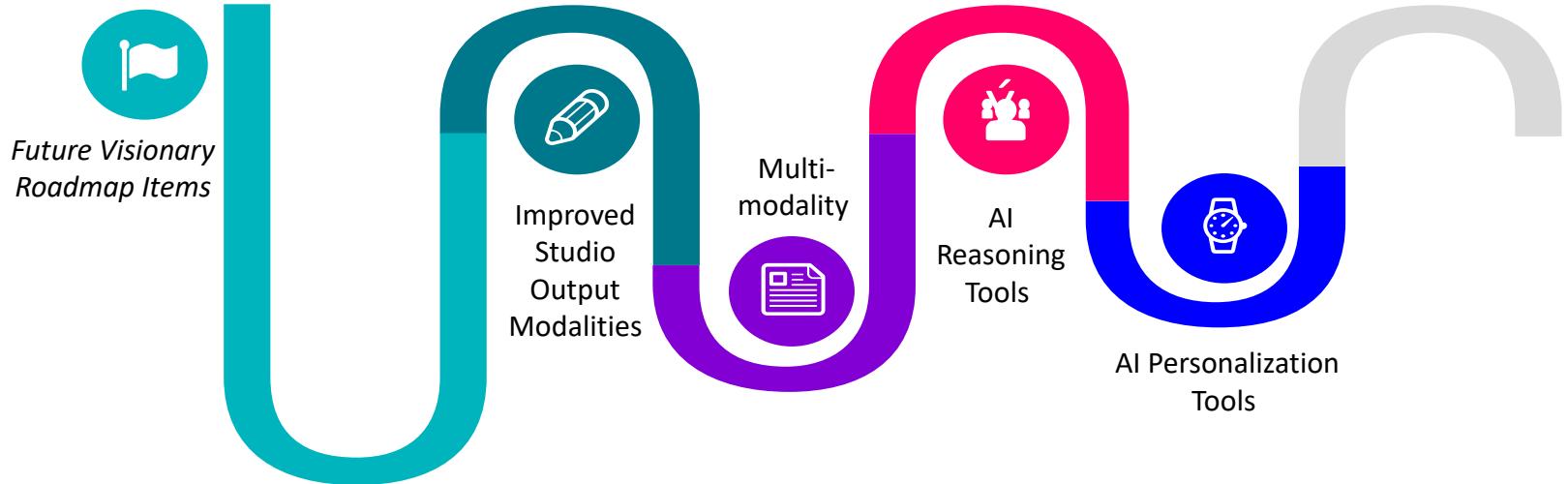


## Other Interesting Features in the Pipeline

- **TTS Markup**
  - Improve the ability to play TTS Prompts in Studio
- **NLU Bootstrapping Features**
  - Allow Studio customers to generate quality NLU training samples faster using tooling that will help expand data
- **Develop Mobile Sample Apps using Studio**
  - Integration with the new CSDK to support Android and IOS platforms

# Studio Long Term Vision





#### Improved Studio Output Modalities

Enrich interactions with multimedia (audio, images, video) for example the introduction of the “Sound of BMW” feature in the car

#### Multi-modality

Managing multi-modal interactions, e.g.:

- Rules for combination of speech, gaze and gestures
- Adjust dialog behavior to emotional state
- Adjust dialog behavior to cognitive load

#### AI Reasoning

Tools for customizing Reasoning and Knowledge by using external data to improve user experience

#### AI Personalization

Personalization tools that use data to make specific suggestions based on the user's interest and behavior.

# Thank you.

# Enhancing your Dialogs – Natural Language Generation

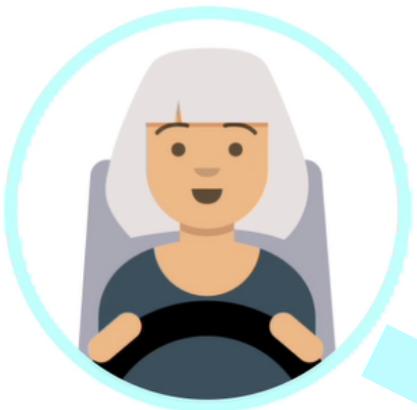
- Variations: random, escalation
- Syntactic agreement
- Capitalization & punctuation
- NEW: Lexica with wildcards



# Enhancing your Dialogs – Dialog remote scripting service (cloud only)

It begins with  
the booking  
request

Book me an appointment to get  
my oil changed next Friday.



Speech recognition starts  
the process and feeds  
into the to NLU

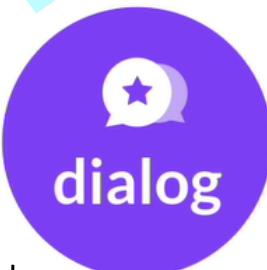


NLU reaches to Dialog  
where a call is  
generated to collect  
missing data



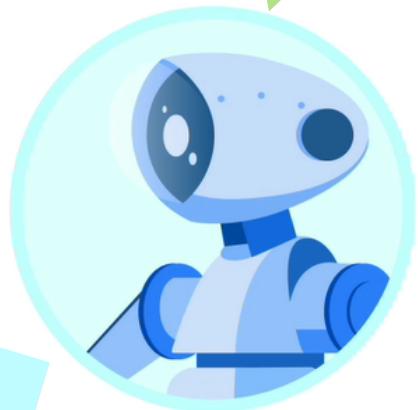
Cerence API is deployed to  
collect missing data from a:

Website  
Database  
Script



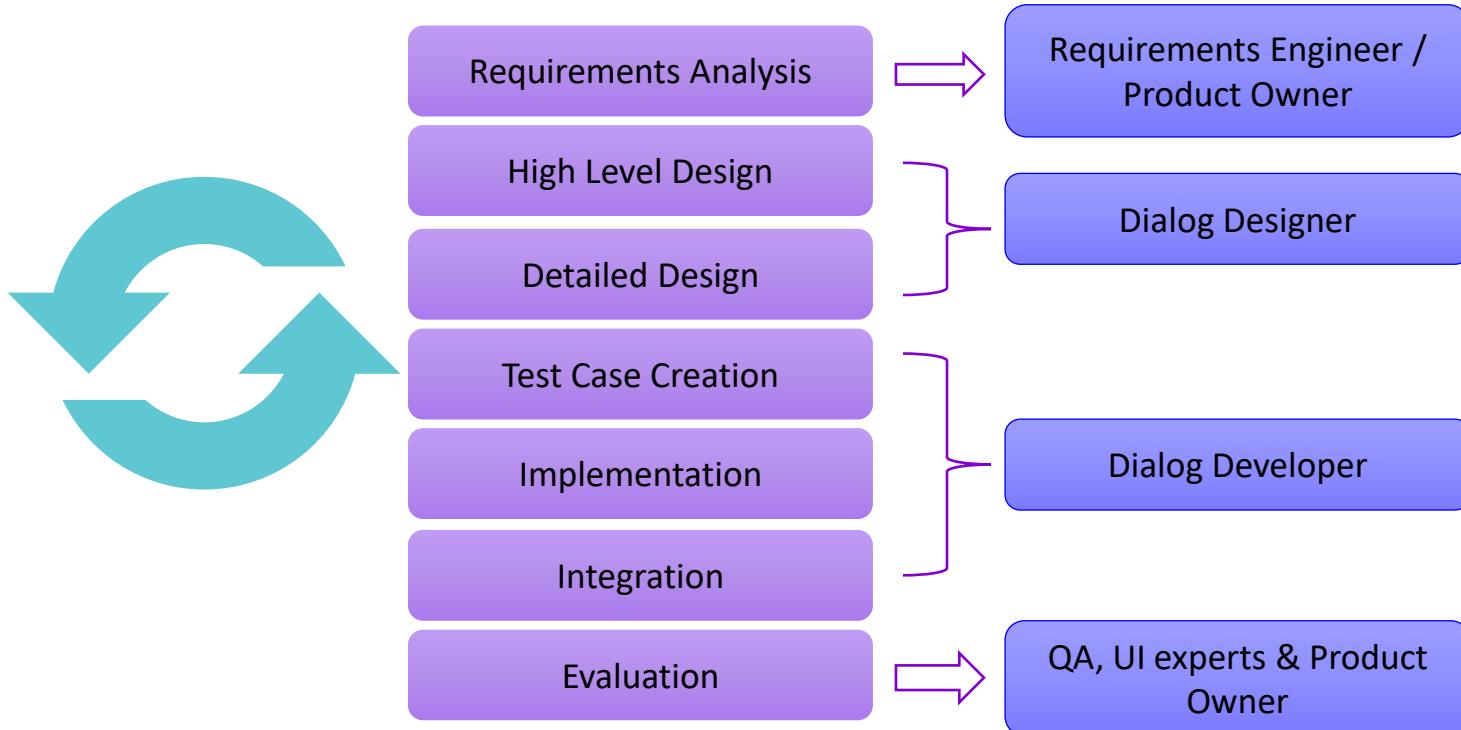
It returns the data to  
Dialog that will process  
it into a response to the  
customer

Sure, how about next  
Friday at 10 am?



# The Process of Building a Dialog Application

Requirements to design to implementation and testing





## Situation Design

Context around the users current situation and their requests.

+ add data spec

### Concepts Specified

Concept combinations the user may choose to include in their request.

no concepts

flight number

carrier ID

+

flight ID

origin city

+

destination city

+

arrival time

origin airport

+

destination airport

carrier ID

+

flight ID

+

departure time

### Situational Data

Information that can be leveraged to guide the dialog.

Ex. Device and external data, Session information

Car data

navigation data

- ◆ navigation on
- ◆ airport as destination

GPS data

find match results

0 results returned

1 result returned

2+ results returned

status code

A - active

C - cancelled

D - diverted

### Error scenarios

Errors that the user might encounter while using the system, e.g. no traffic data available, etc.

flight not found

no status available

diverted

*Image for  
illustration  
purposes  
only*





Let's talk.