

FDA's Virtual Assistant: Utilizing Machine Learning for Automated Customer Service

Vannessa Williams¹; Kathryn Matto²; Deepa Youssef²; Terrence Autry²; Seema Habash²; Sarah Rodgers²; Kerry Cook²; Jeno Pizarro²; Tatiana Sokolova²; Solomon Taylor²;

¹FDA, Center for Drug Evaluation and Research, Office of Translational Sciences, Office of Computational Science, ²IBM, Strategy and Analytics

FDA Background

The **Office of Computational Science (OCS) Service Desk** is a reviewer's single source of information for **all 24** OCS supported tools and services.



The Service Desk received over **2,500 total requests** for support in 2018, a **111 percent increase** from 2016

Natural Language Processing



Hi Carla, I'm having trouble logging into my Janus Nonclinical account. Can you help me get in?

Hi Vannessa, I have sent a reactivation request to the team. Please check your email for follow-up. Do you need help with anything else?



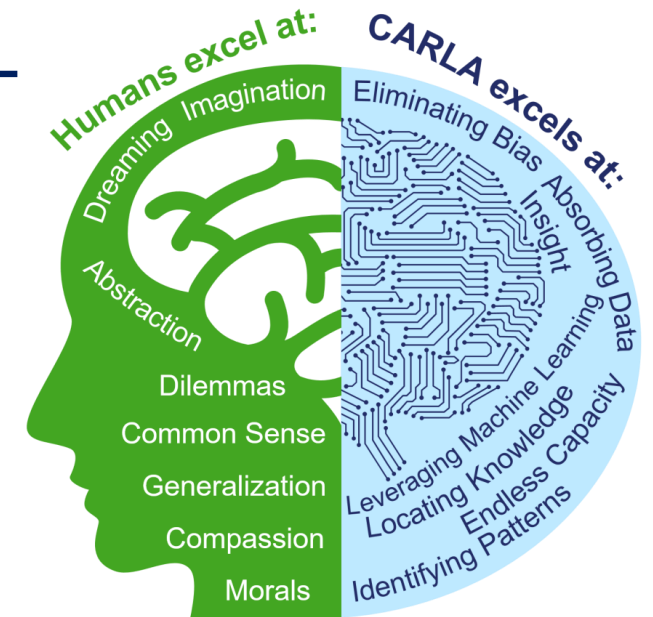
CARLA can interpret requests without the need for key words using Natural Language Processing.

CARLA creates a **partnership** with humans



to drive more **meaningful** work

CARLA



FDA's Future with CARLA



Reviewer technical issues will be resolved **faster**.



Analysts can focus on more **complex analysis** support requests.



Time will be spent on what **matters most**.



Service Desk

Medical Reviewer's Day

8:00

9:00

16:00

17:00

Before

Help Requested

Contact OCS Service Desk

Continuous Information Exchange

Work

After

Help Requested

Resolution Provided

Efficient and Effective Workday

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Background

The **Office of Computational Science (OCS) Service Desk** is a reviewer's single source of information for **all 24** OCS supported tools and services.



We received over **2,500 total requests** for support in 2018, a **111 percent increase** from 2016



We received **582 analysis requests** in 2018, an **increase of 152 percent** from 2016



We aim to provide **innovative, flexible, and reliable support** for OCS Tools and Services in support of regulatory review



We strive to **revolutionize data** for **faster decision making** by connecting artificial intelligence and data automation to clinical research



Medical Reviewer's Day

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Natural Language Processing



NLP 101:

NLP extracts meaning from input

Unstructured Natural Language input

CARLA is IBM's asset.

Tokenization

"CARLA"	"is"
"IBM"	"s"
"asset"	"."

Part of Speech Tagging (Penn Treebank Tagset)

"NNP" (Proper Noun)	"VBZ" (Verb, 3 rd per.)
"NNP" (Proper Noun)	"POS" (Possessive)
"NN" (Noun)	"SENT" (Punctuation)

Lemmatization (vs. Stemming)

"CARLA"	"be"
"IBM"	"s"
"asset"	"."

Input	Lemma
"Are we meeting"	Verb: meet
"our meeting"	Noun: meeting

Stemming –
"Verb: meet"
for both inputs

A Chat with CARLA:



Hi Carla, I'm having trouble logging into my Janus Nonclinical account. Can you help me get in?

CARLA can interpret requests without the need for key words using Natural Language Processing.

Hi Vannessa, I have sent a reactivation request to the team. Please check your email for follow-up. Do you need help with anything else?



Yes actually. I was having a hard time loading data in JMP Clinical. Can you help?

Logs are captured and sent to the Service Desk, eliminating back and forth emails.

Please see [this guide](#) for a step by step walk through of how to load study data into JMP Clinical.



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CARLA



Innovative, cognitive, and scalable conversational framework



Version Control

- Create and manipulate multiple versions of workspaces



AI-Based Intent Conflict Resolution

- Easily discover duplicates and similar examples in multiple intents



Local (On-prem or embedded) installation

- with no external dependencies – *for data sensitive applications or lack of internet connectivity*
 - Available on FDA Intranet



Standard Functionality

- Intent classification (Machine Learning)
- Entity matching
- Configured dialog flows



Rich Output Types

- Output text, images, or options



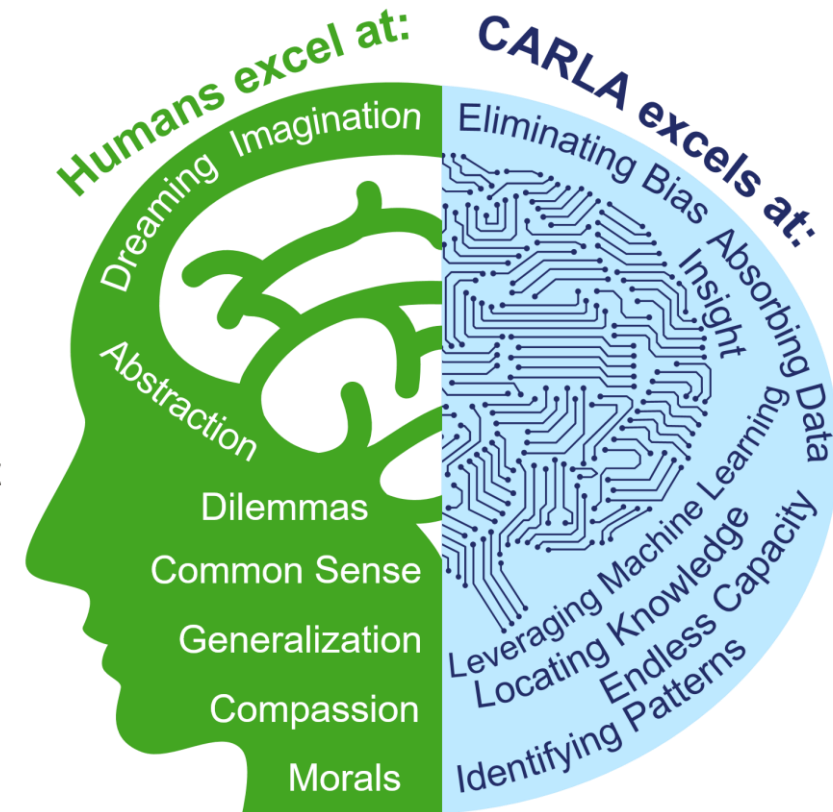
Connect to an agent

- With chat history



Enhanced Functionality

- Integrated Sentiment analysis of user input
- Slots, Folders, Actions, and Digressions



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FDA's Future with CARLA



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24/7 Assistance

Reviewers have the **flexibility** to receive support any time of day, any day of the week.

Data Privacy

CARLA is locally hosted on the FDA Intranet, keeping sensitive data **private, safe, and secure** from data breaches and attacks.

Growth Management

CARLA helps **manage the continuous growth** of support requests and responsibilities that the OCS Service Desk has been receiving.

Data Insights

Conversation logs are captured, compared against historical trends and analyzed to **identify patterns and solutions** for common reviewer questions.

Automation

CARLA can resolve Tier 0 & 1 requests **without human intervention**, increasing the efficiency of support requests resolved in a single day.



Resources

- OCS Website
- OCS Service Desk Website



OCS Service Desk

**Monday – Friday,
8:30 am – 5:00 pm EST**

Phone: (240) 402-0401

Email: OCSServiceDesk@fda.hhs.gov

Skype: OCS Service Desk – PST