Prodapt powering global telecom

# Giving wings to your standard RPA bots

## Combine the power of RPA with NLP to improve the automation potential of service provisioning


**Credits**

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# More than 30% service provisioning orders contains unstructured data – limits automation potential of RPA

Digital service providers (DSPs) have started leveraging RPA to automate various processes in the order to activate journey. They are specifically using standard bots on the service provisioning process which is core of order to activate journey. However, they are not able to automate completely as it involves multiple levels of manual assistance in processing unstructured data and decision making.

**Various channels through which orders arrive**

- E-commerce
- Call center agents (Manual & unstructured)
- Retail agents (Hard copies)
- Door-to-door sales agents (Manual & unstructured)
- IVR requests
- Orders from in-house team (upselling/cross-selling)
- Enterprise orders with free text (port-in request from other carrier)

Existing order management portal

Bot collects order details from order management portal

**Path A** — **Orders with structured data**

**Standard RPA Bot executes the next steps to complete the automated services provisioning process**

**Path B** — **Orders with unstructured data**

**Significant amount of orders are unstructured**

Human FTEs from various teams are involved in validation & initiate the next best action

**Service provisioning process completion**

- *To process new connection installation*
- *To process billing validation*
- *To process connection transfer request*
- *<XXXX>*



**Processing unstructured data and performing end-to-end automation with standard RPA is a major challenge for DSPs**

# Unstructured data - Common challenges with standard RPA implementation

## Business Challenges

Standard RPA implementation is **not able to completely automate** service provisioning process, which results in **more processing time** and impacts **overall order to activate (O2A) cycle**

Decision making on certain tasks requires **human intervention,** which impacts the business

- RPA bot will be paused till an SME provides input for subsequent actions – **time consuming**
- Manual intervention increases the chance of human error **– risk factor**

## Technical Challenges

- Specifically under service provisioning process the response data is generally in **free-flowing/unstructured** format.
- Need **multiple regular expression scripts** to extract required strings from the unstructured text input
- Standard RPA bots accepts only **structured input**
- Standard RPA bots work on **rule-based correlation** for taking decisions

**Sample unstructured data in order portal that leads to automation fallout**

Unstructured input data

| BOID/BEX/Order | Phone # | Work performed |
|---|---|---|
| 040 / 7253 / I00363 | 3192XX5141 | 12/4/2017 MAcosta 120417/macosta/order cancelled need payment on need payment on 3192535128 |
| 619 / 6487 / T01759 | 9124871767 | 12/4/2017 MAcosta 120417/macosta/order updated to field again dup I order was cancelled /12/1/2017 AGajXXX 120117/N9987766/OC#2305105 Duplicate order (6487 I01727 619)Orcan form submitted# |
| 616 / 6742 / I02392 | 7067429276 | 12/4/2017 MAcosta 120417/amcosta/need payment on 7067428979 cancelled order |
| 065 / 6545 / I19659 | 9999999999 | 11/29/2017 JKwasnik 112917/j kwasnik pls see order 6545 f19671 065//released I order with new dd added to autodialer |
| 069 / 6234 / T61668 | 2707359199 | 11/6/2017 CHazelett 11/06/2017 CH OC2271678 NEW SVC/2707377849 IS MOVING/SEE 069 6234 T61607 PLEASE WORK/ADD TO AUTO DIALER 6234 T61668 RDY-ASGN 735-9199 SHEILA D JOY |

**80% of enterprise data today is unstructured - Gartner**

**Processing of unstructured data requires new innovative approach using NLP/NLU technologies**

Adobe Acrobat Document

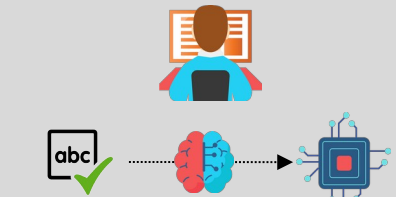
**Sources:** https://www.forbes.com/sites/forbestechcouncil/2017/06/05/the-big-unstructured-data-problem/#25954b71493a

# Steps involved in building an NLP/NLU-based decision engine to achieve complete automation in service provisioning

Significant amount of orders coming into the order management portal contain unstructured data. NLP-based decision engine can play a critical role in processing these unstructured data, derive insights and provide the next best action. The major steps involved in implementing NLP/NLU decision engine in a RPA project are listed below



**1 Building NLP/NLU decision engine**




Preprocessing unstructured data

Predicting next action

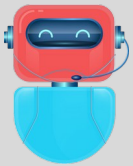
Decision engine

**2 Deploy NLP/NLU decision engine**

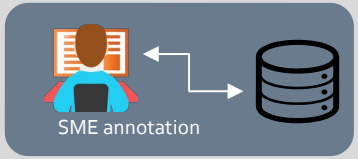
NLP engine predicts (based on the input text) the next action to be initiated

**3 Integrate with standard RPA bot**

API Service



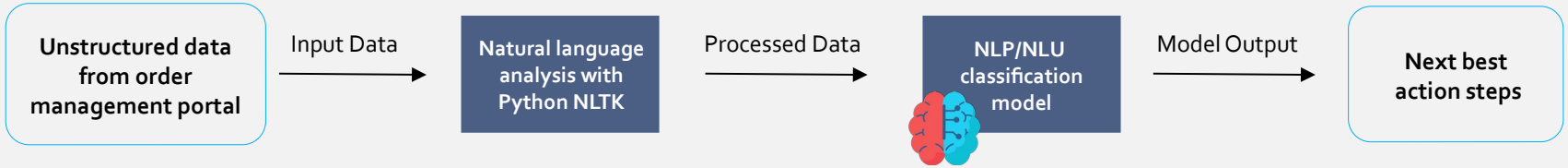
**4 Active learning framework with SME annotation**



# Building the decision engine using NLP/NLU – preprocessing unstructured data and predicting next action



## 1 Building NLP/NLU decision engine






### Stage 1

**Preprocessing unstructured data with natural language toolkit**

**Preprocessing** data by leveraging **NLTK** toolkit and developing a language model to dynamically interpret input text data

- *Vectorizing data: Bag-of-words*
- *Word cleansing*
- *Stop words removal*
- *Word lemmatization and categorization*

### Stage 2

**Predicting next action for bot with Classification techniques**

Using **SKLearn Library** to build classification models and predict next best action for bot to execute

**ML algorithms used in decision making**

- *Support vector machine, Random Forest, Gradient Boosting, K-Means and DBSCAN*

**Interoperate with the Python numerical and scientific libraries**

**Prediction accuracy of 75-80% can be achieved using above ML Models**

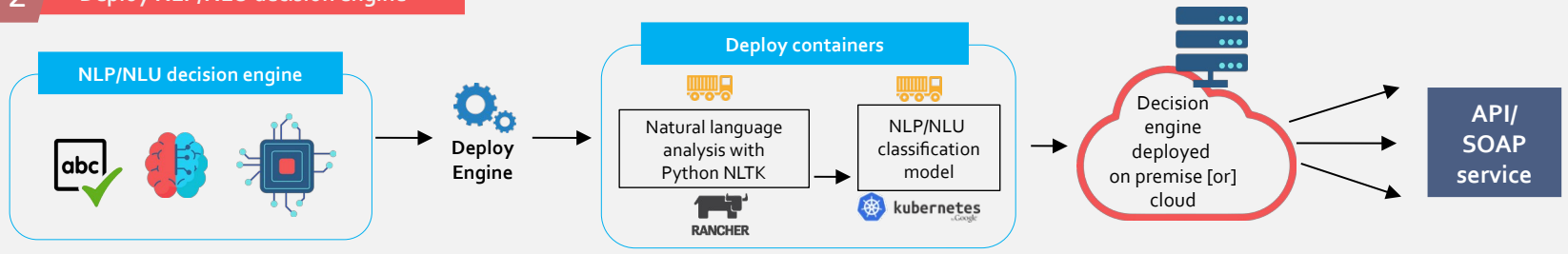
**Final output from classification model sample report**

- Cancel the order
- Check & work the order
- Hold the order until response
- Create the record in 2nd drop
- Check the billing/directory/order for active TN #
- Disconnect & create record in the location
- Proceed with change process

# Deploying the NLP/NLU-based model on premise or cloud platform



## 2 Deploy NLP/NLU decision engine

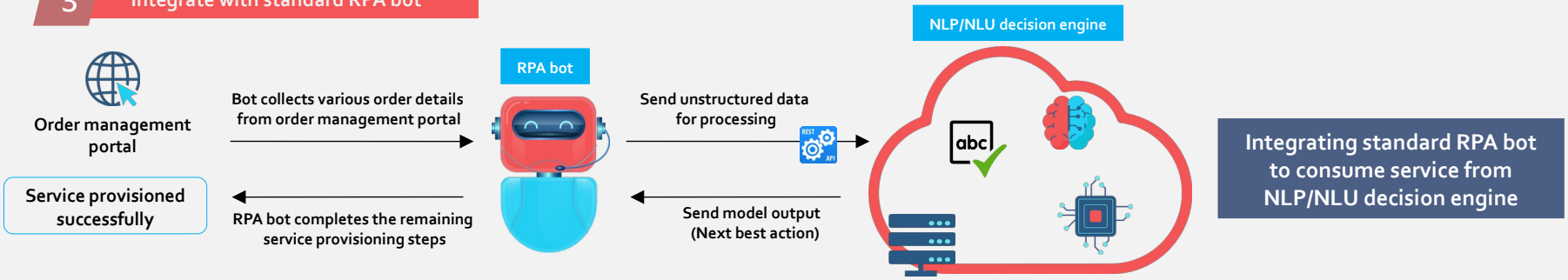



**Fine tuning the decision engine**

- *Fine tune the hyper parameters to improve the accuracy*
- *Retrain the model with latest data set*

**Deploying NLP/NLU-based decision model on premise/cloud platforms and exposing it as API/SOAP service**

## 3 Integrate with standard RPA bot




**Integrating standard RPA bot to consume service from NLP/NLU decision engine**

# Neural networks based active learning framework to validate the decisioning capability and improve prediction accuracy



## 4 Active learning framework with SME annotation

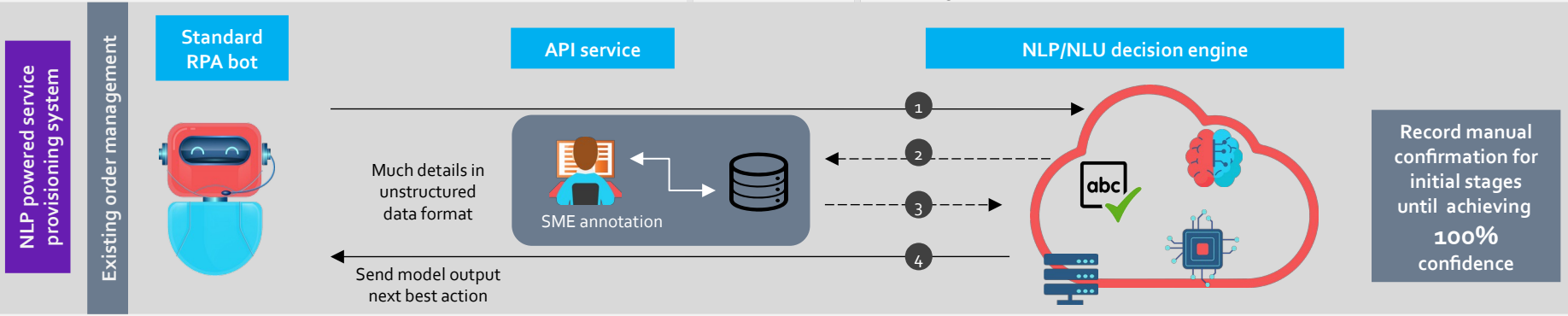
### Why take step-wise approach

- Completely replacing the manual intervention with NLP-based engine in one go may not be a wiser approach. The model must be trained for significant amount of time to increase the confidence level.
- This requires DSPs to build **active learning framework,** where both NLP/NLU decision engine and manual SME validation co-exist to increase the prediction accuracy.

### Process flow involved in active learning framework

1. Standard RPA bot provides the unstructured captured data from existing service provisioning portal to the decision engine
2. NLP/NLU decision engine predicts primary/secondary action steps to be taken & gives input string for human annotation
3. SME performs the manual annotation and the final annotated response are fed back to the decision engine for its learning and appropriate prediction
4. Right prediction results with next best action are given to standard RPA bot to complete the remaining service provisioning steps
5. Active learning framework improves the prediction over a period of 3-4 months






**Eventually once the NLP powered intelligent RPA bot gets trained enough to handle different scenarios, the manual validation step can be avoided to achieve maximum automation potential.**

# Key takeaways

**3x improved order processing efficiency** by removal of SME dependencies

**Prediction accuracy can be improved to 85-90%,** using active learning framework

**Reduce manual efforts to 80%** by leveraging NLP/NLU decision engine along with standard RPA capabilities

**Faster order fulfillment** results in superior customer experience (CX)

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THANK YOU!