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PHARMACEUTICAL MANAGEMENT SCIENCE ASSOCIATION

Unlocking the power of ML-powered recommendation engines for superior CX

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AGENDA

- Overview of Current Challenges
- Our Solution Approach
- Solution Deep-Dive
- Impact

Deciding what to stream on Netflix

That’s the average duration a sales rep typically has with an HCP in person

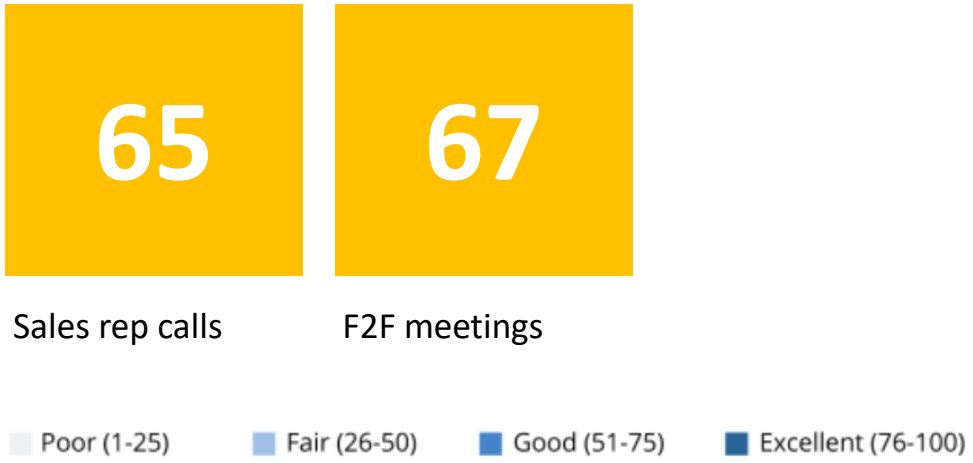
Less than Twenty minutes = The average duration of one sales rep-led HCP meeting

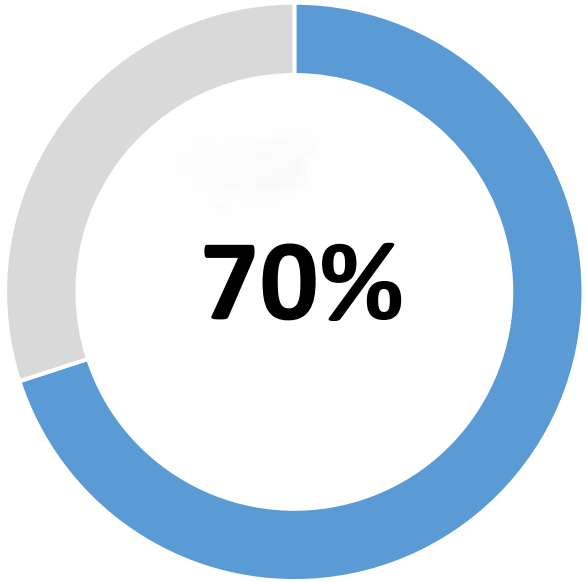
Sales reps have inadequate time to comprehensively understand HCP needs, personalize interactions, and deliver the important information they seek

**Source: Pharma Exec, Veeva Pulse Data*

Squeezed for time, sales reps struggle to provide excellent experiences

Customer Experience Quotient (CXQ) Scores (1 to 100) Based on HCP Interactions





HCPs feel that sales reps do not completely understand their requirements well enough to provide them with personalized experiences

The reps, on the other hand, are reaching out based on periodic call plan without the latest data or are missing context on the predictive recommendations

**Source: DT Consulting, State of Customer Experience in US*

**Source: Indegene's Digitally Savvy HCP Report 2021*

Our approach to move from ‘good’ to ‘excellent’ CX

Solve Challenges with traditional recommendation engines

- Lack of real time HCP data integration
- Black box models obscuring recommendation explanations
- Limited HCP data due to isolated promotional efforts
- Duplicated recommendations due to rule-based systems
- Low adoption due to change resistance

Good → **xAI Next Best Action Recommendation Engines** → Excellent

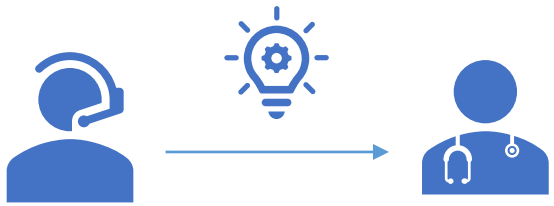
To provide sales reps with personalized, real-time recommendations using HCP data, helping them optimize their interactions with HCPs

Key pillars to deliver successful recommendation engine

- Ensures that these recommendations are not only backed by data but also **transparent** in logic
- Provides highly **contextual explainable recommendations** for every HCP engagement
- Prioritize robust **change management** practices to drive successful adoption in the organization
- Provides a seamless HCP experience by **integrating personal and non-personal engagement** channels

Enabled by

Explainable AI models	Omnichannel orchestration	Machine Learning Ops	Consolidated insights dashboard	Change Management
Builds trust in recommendations	Integrates channels for a holistic view	Ensures continuous enrichment of data workflows	Boosts transparency and adoption rates	To help with adoption and harness the full benefits



4 steps to deploy a recommendation engine →

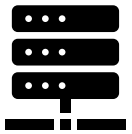
Assess Readiness	Plan and design	Model and Explain	Phase Roll-Out

Step 1: Assess Readiness

Understand current HCP segmentation

Based on demographics, practice settings, patient populations, prescription patterns, and historical interactions, needs, etc.

Explore available data sources and data quality



- Gather data on potential patient cohorts (based on APLD data, current treatment journey, disease stages, etc.), other internal and external datasets mapped to HCPs
- Feedback from reps based on past recommendation dismissal and approval trends, or changes related to new HCP activity
- Assess data quality of the different sources identified

Analyze salesforce structure

Analyze how the company's sales force is currently structured and mapped to the company's existing promotional strategies

Assess system integration and data governance

- Understand the end to end data flow across different systems
- Assess the data catalog maturity, data format, and frequency of datasets provided by vendors

Step 2: Plan and design

PLAN

Build a roadmap

- **Development plan:** Outline the technical aspects of enhancing the decision engine, including algorithms, data sources, and integration methods
- **Operational framework:** Develop efficient operational procedures for seamless decision engine functioning
- **Scalability plan:** Design strategies for scaling up the system's capabilities to handle increased load and complexity
- **Quality assurance:** Implement rigorous testing protocols to ensure the reliability and accuracy of the decision engine's outputs

Implement adoption strategies

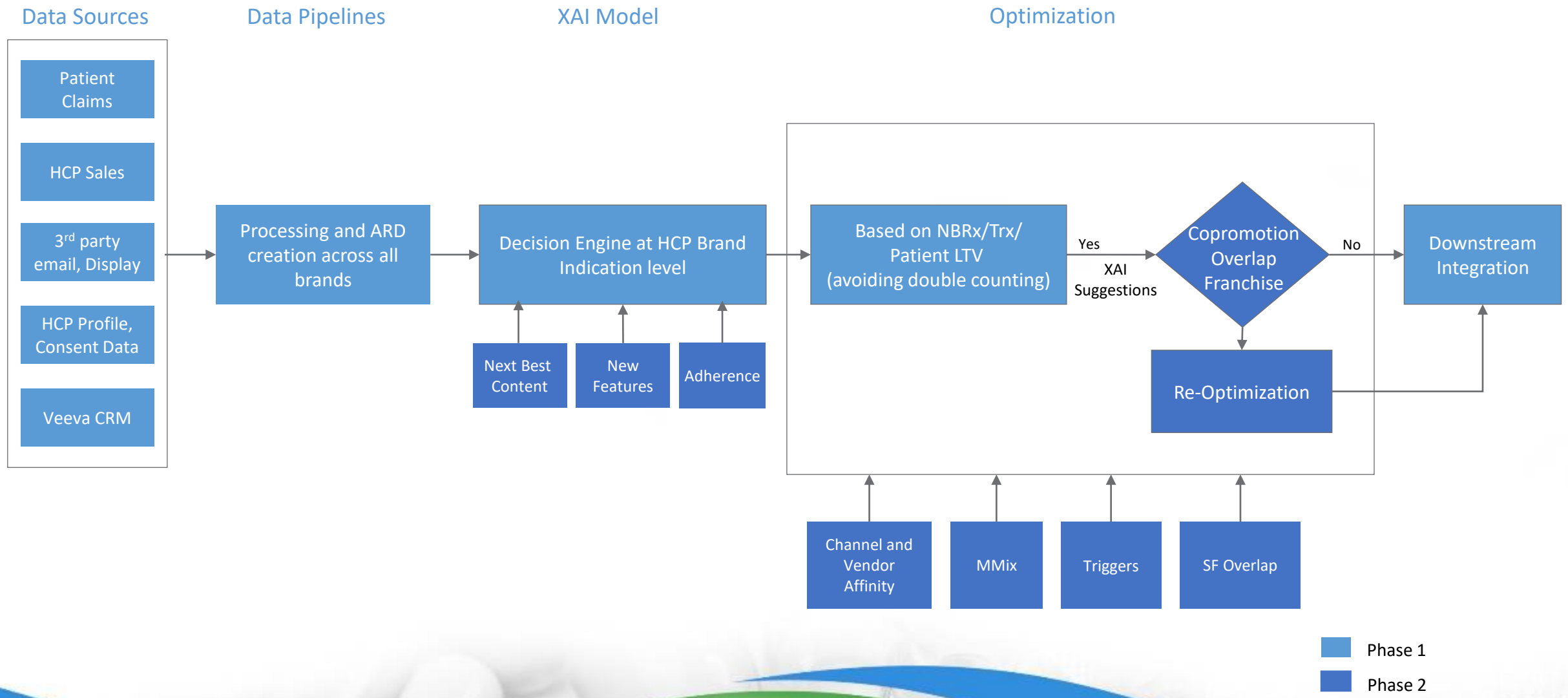
- **Explore strategies to boost adoption rates,** integrating change management techniques
- **Consider** introducing the engine to a limited subset (e.g., 50%) of the sales force in the initial phase.

DESIGN

Boost engine transparency

- **Integrate an Explainable AI** model to offer clear and comprehensible insights into the decision-making process
- This transparency **enhances confidence in the recommendations** generated by the engine

A glimpse of what the comprehensive framework could look like



Step 3: Model and Explain

1. Create an analytics-ready dataset (ARD) that includes data like:

- Patient comorbidities
- Payer plan details
- Prescription fills over 2 years
- HCP referrals and community clusters
- HCP activity across personal and non-personal channels

2. Transform the ARDs into Model-Ready Datasets

- Aggregated features at the HCP level
- Target variable

3. Training of the XAI model using ensemble techniques

Train the model with the objective of providing recommendations that are focused on engaging HCPs in a way that leads to an increase in new prescriptions

- Select the best-performing model based on test dataset accuracy
- SHAP values were utilized to infer key features

4. Implement rigorous validations prior to finalizing the model

- Implemented semi-automated testing to align with agile ways of working

Algorithms Used:

Predictive Model – XGBoost

Optimization Model – CVXPY

Step 3: Model and Explain

5. Optimize recommendations across personal and non-personal channels

Leverage:

- HCPs' channel preferences
- Field intelligence
- Sales rep feedback

6. Disseminate recommendations to downstream teams

Seamless integration into the Veeva CRM system

Other data sources to leverage:

- APLD claims
- Lab and speciality pharmacy data
- Speaker programs
- Sales force call activity
- NPP channel engagement
- Rep alignment
- Internal MDM
- HCP demographics
- Veeva CRM

Step 4: Phase Roll-Out

A) Soft launch initiation

- Implement a soft launch phase for a subset of the sales force
- Conduct surveys and focused group discussions with pilot representatives
- Gather feedback actively to understand initial implementation challenges

B) Feedback Analysis and Implementation

- Analyze feedback received during the soft launch phase
- Incorporate feedback insights into the change management strategy
- Utilize feedback data to transition into a national launch phase

C) Scaling and NPP Recommendations Rollout

- Scaling the roll-out to all sales reps
- Implement recommendations from NPP channels
- Extend these recommendations to third-party vendors involved in the process

D) Performance Tracking

- Track insights and performance metrics on a consolidated dashboard
- Monitor the progress of the national launch based on the implemented changes

Impact

I would have never reached out to that HCP if not for decision engine recommendations. He is really interesting – Field Sales Rep

Measurement in-progress

- **Reps Adoption:** Rep adoption of dynamic data-driven recommendations
- **Measuring the Customer Experience:** Targeted engagement with HCPs for better CX
- **Improvement in QoL of patients:** Reduction in time from diagnosis to treatment

Thank you!

Step 3: Modeling and Explain

xAI Model

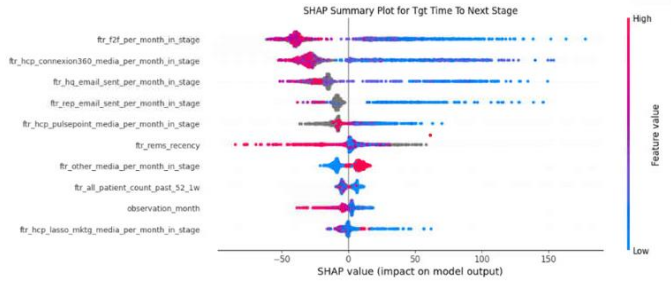
Model Evaluation

Explored various models (R^2 value) such as

- Multi-linear Regression (0.57)
- Random Forest (0.64)
- Light GBM (0.68)
- **XGBoost (0.74)**

Final Model

- Leveraged XGBoost model due to performance
- Performed Hyperparameter tuning on max_depth, colsample_bytree etc
- Visualized results using SHAP plots

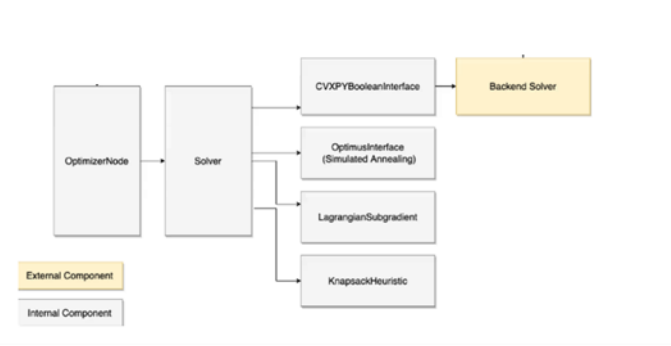


Optimization

Explored following optimization approaches

- CVXPY Solver
- Knapstack Heuristic
- Optimus Interface
- Lagrangian Subgradient

- Build CVXPY Solver for easy formulation and solving of convex optimization, resulting in optimal solutions



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