PMSA 2023 Fall Symposium

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NOVEMBER 9-10, 2023 FLAMINGO HOTEL **LAS VEGAS, NV**

Data Science Methodologies for Successful Design and Implementation of Dynamic Call Planning

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Agenda

- What is Dynamic Call Planning?
- Execution – Orchestration
- Data Science Methodologies
- Wrap-up
- Q&A

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What is Dynamic Call Planning?

Key Benefits & Lenses

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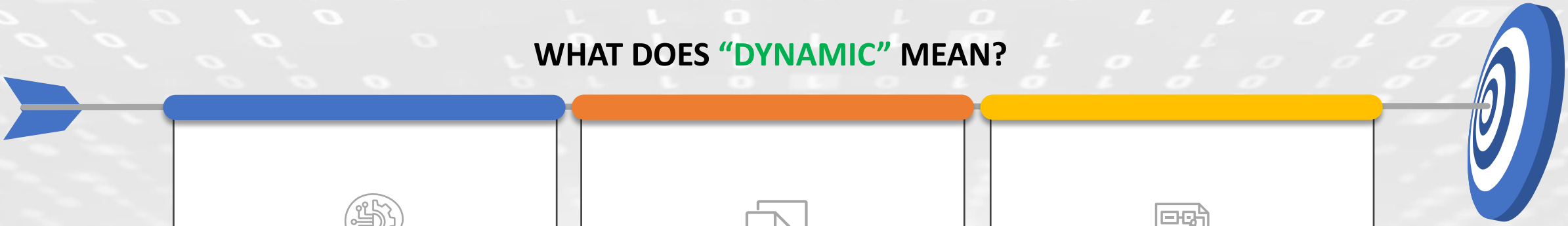
"*Dynamic*" Call Planning

Dynamic Call Planning | Dynamic Targeting | Dynamic Activity Planning | Dynamic Engagement Planning

WHAT DOES "DYNAMIC" MEAN?



SMART

AI-powered, ML-driven predictive analytics for better targeting

FAST

Frequent updates to utilize the latest customer insights

SMART & FAST

The ideal state

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Matching call planning approaches to selling environments




Selling environment	Patient-Hunting	B2B	Dynamic	Mature & Stable
Example	Oncology launch	Bill & Buy for a complex treatment	Growth brand with new indications	Older blockbuster in retail
Call planning objective	Find doctors with eligible patients	Account selling	Balance Share of Voice with faster insights	Share of Voice
Call planning approach	No call plan: KOL list, patient triggers	Account plans	Dynamic Targeting / Dynamic Call Plans	Traditional call plans

Next Best Action/Engagement can complement any of these models.

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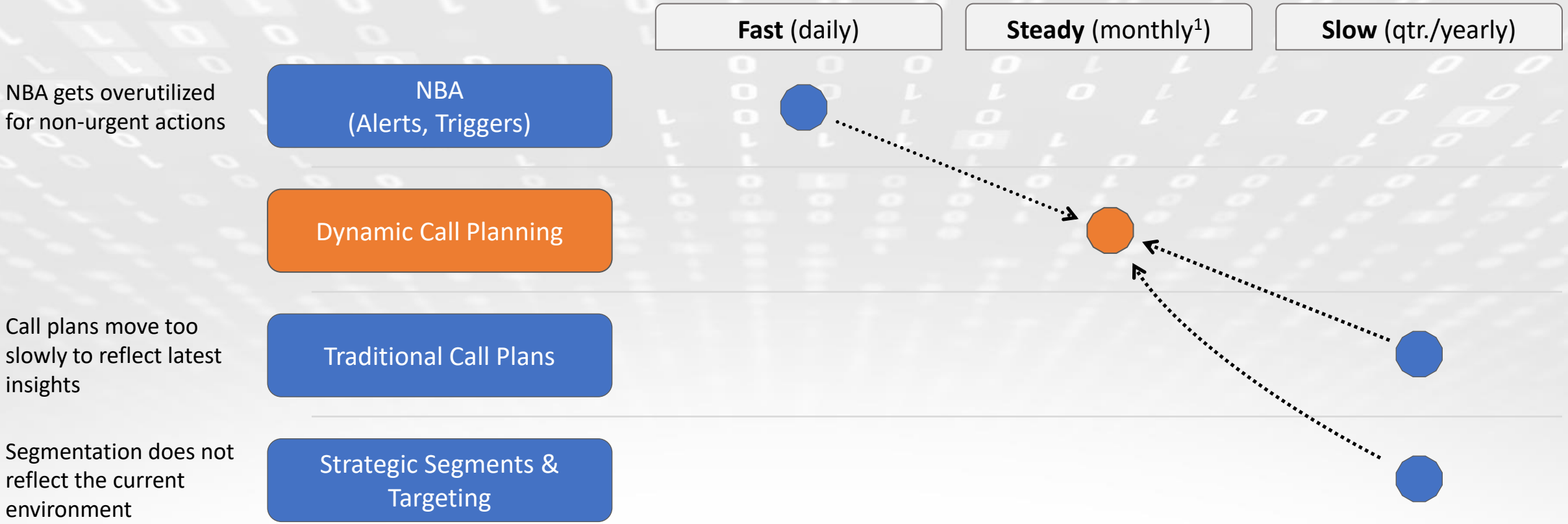
Dynamic Call Planning hits the timing sweet spot

The Timing Paradigm



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Note 1: In some instances, a fortnightly cadence is preferred (vs. monthly).

Key benefits

RESPONSIVE	Doctors' involvement in events and interactions are captured and acted upon on a near real time basis. 
SMART	Predictive machine learning algorithms are employed to better target promotionally responsive doctors. 
FAST	Doctors' profiles updated and insights published frequently. 
REP INFORMED	Inputs from the field become critical and are leveraged fully. 

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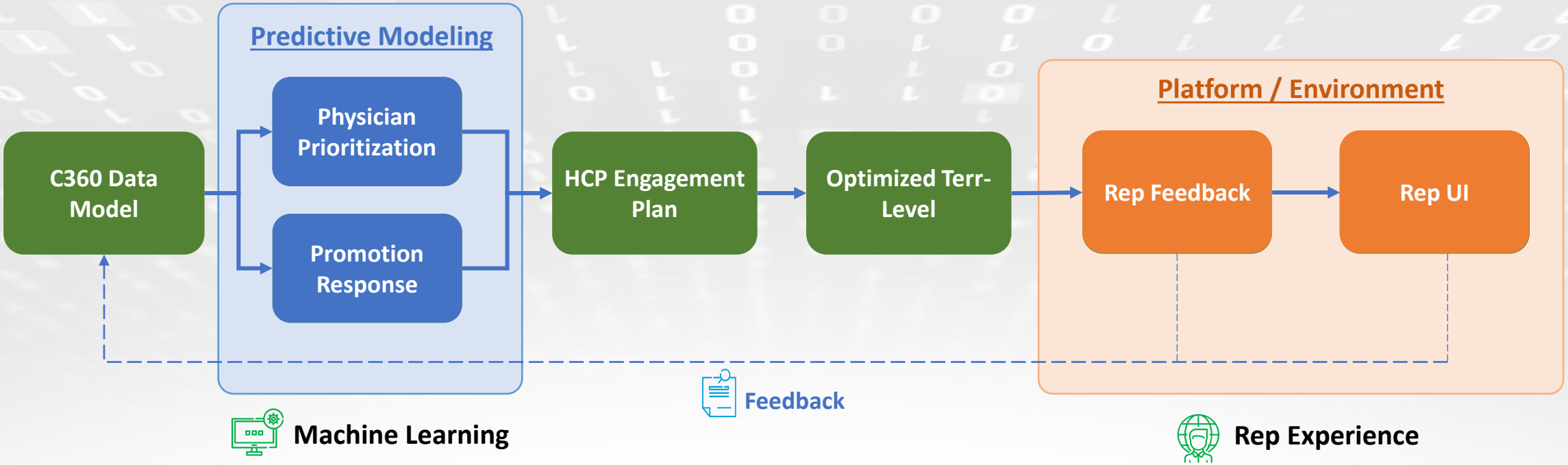
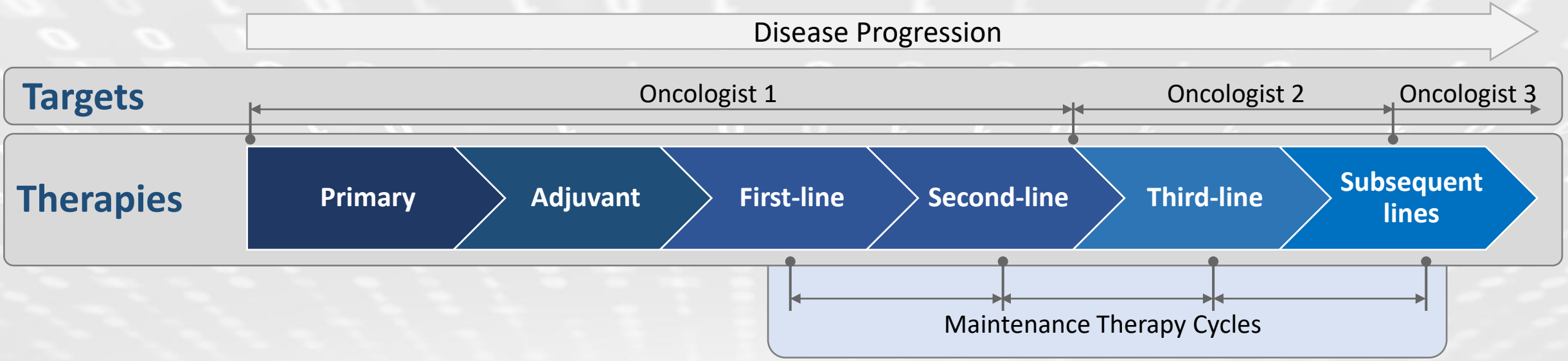
Success in Dynamic Call Planning requires both ML algorithms and a great rep experience



Dynamic Call Planning – The Oncology Lens



Message	**"Action Set"**	Channel-Message Combination
"Action Period"	Constraints	HCP-specific optimization

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Reference: Argiles G, Arnold D, Prager G, et al. Maximizing clinical benefit with adequate patient management beyond the second line in mCRC. ESMO Open 2019;4:e000495. doi:10.1136/esmoopen-2019-000495

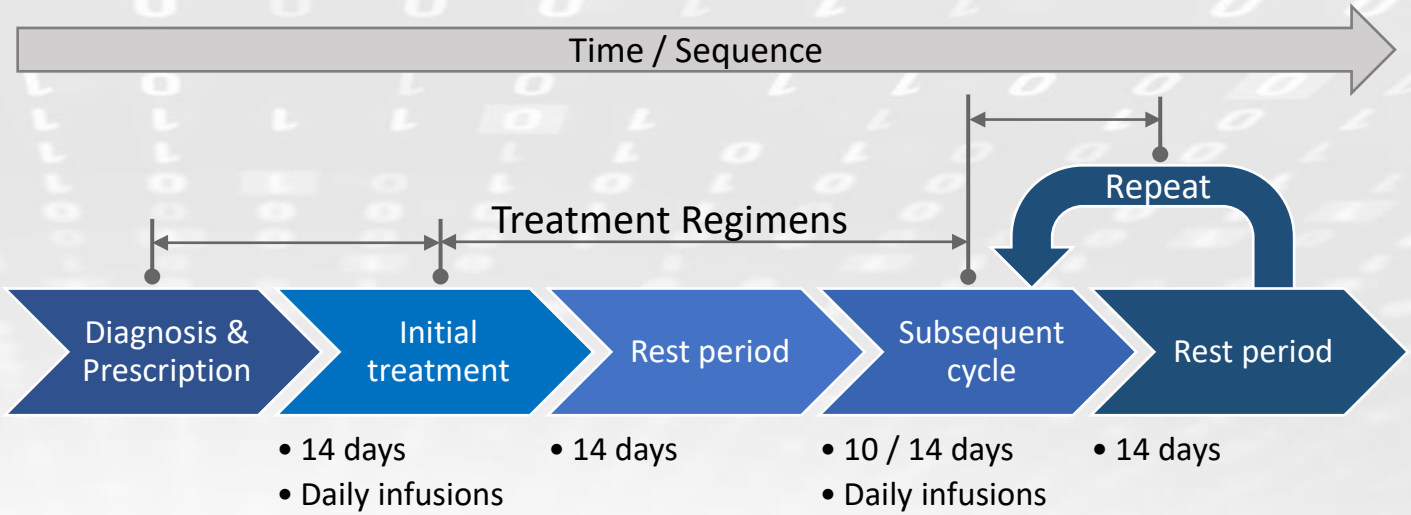
Dynamic Call Planning – The Rare Disease Lens

Using ALS[1] as an example

What is a rare disease?

- US definition: <200k Patients; 1 in 1,659
- Across most countries: 1 in 1,500 to 2,000
- Examples: Rare cancers, ALS, Huntington's Disease
- ~7k diseases; No approved treatment for 95% RD
- Orphan Drug Act 1983; Rare Diseases Act 2003

Treatment Plan for ALS – Radicava® (edaravone)



- The FDA approved Radicava® as a treatment for ALS on May 5, 2017.
- The recommended dose is 60mg, administered via 60-min IV infusion.

Note: In the US, Radicava® is manufactured and distributed by Mitsubishi Tanabe Pharma America Inc. The dosage and plan shown above were obtained from FDA records, as well as from the Radicava® microsite (https://www.radicava.com/); 1 – ALS – Amyotrophic Lateral Sclerosis, a rare disease with an incidence rate of around 1 in 50,000 (ref. The ALS Association).

Identification of Sufferers of Rare Diseases Using Medical Claims Data, Jieshi Chen & Artur Dubrawski; https://ojphi.org/ojs/index.php/ojphi/article/view/7607

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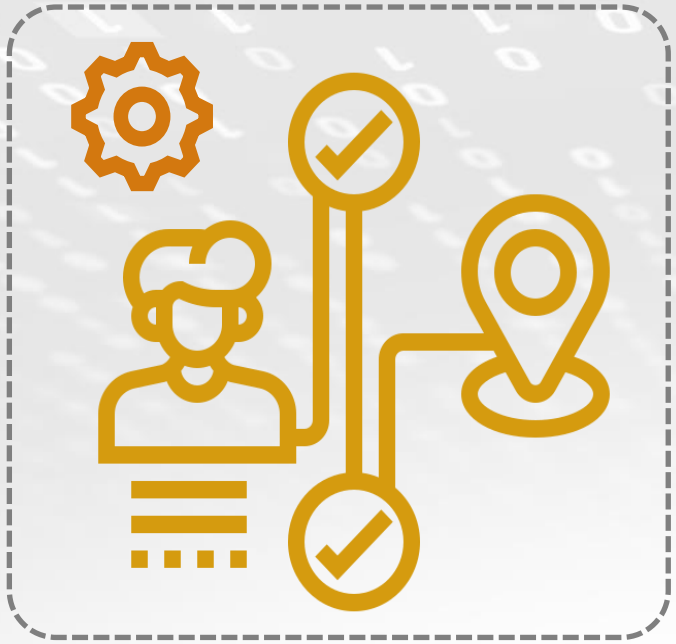
What we are trying to achieve

Orchestration Algorithms



Guide & Recommend

- Best Customer
- Best Channel
- Best Content/Message
- Every Day

Veeva CRM

Medscape

doximity

salesforce marketing cloud

tableau

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Different channels present different challenges in controlling activity

Type	Examples	Ability to control
Digital Controlled	• Direct Email • Company Portal • Brand Microsite	• Very high control • Instant
Digital 3rd Party	• Doximity • Medscape • Epocrates	• High control for target lists • Infrequent; longer lead-time
Field Teams	• Reps • MSLs • KAMs	• Varying levels of control • Typically, daily or weekly

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Execution

Orchestration in the field

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Marketing plans are typically static for longer periods of time for large segments of customers

Time

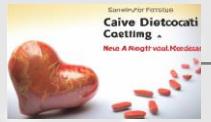
First Movers

Early BRAND writers should be met with messaging that continues to reinforce prescribing habits and address reimbursement

- Email
- Epocrates
- Doximity

Email 1: Clinical Trial → Email 2: Patient Cases → Email 3: Efficacy/MOA Video





Non-Writers

This is a priority segment to improve perception of BRAND

- Email
- Epocrates
- Doximity

Email 1: MOA Video → Resend Email 1 → Email 2: Clinical trial → Resend Email 2



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Images generated by OpenAI's DALL·E 2, May 17, 2023

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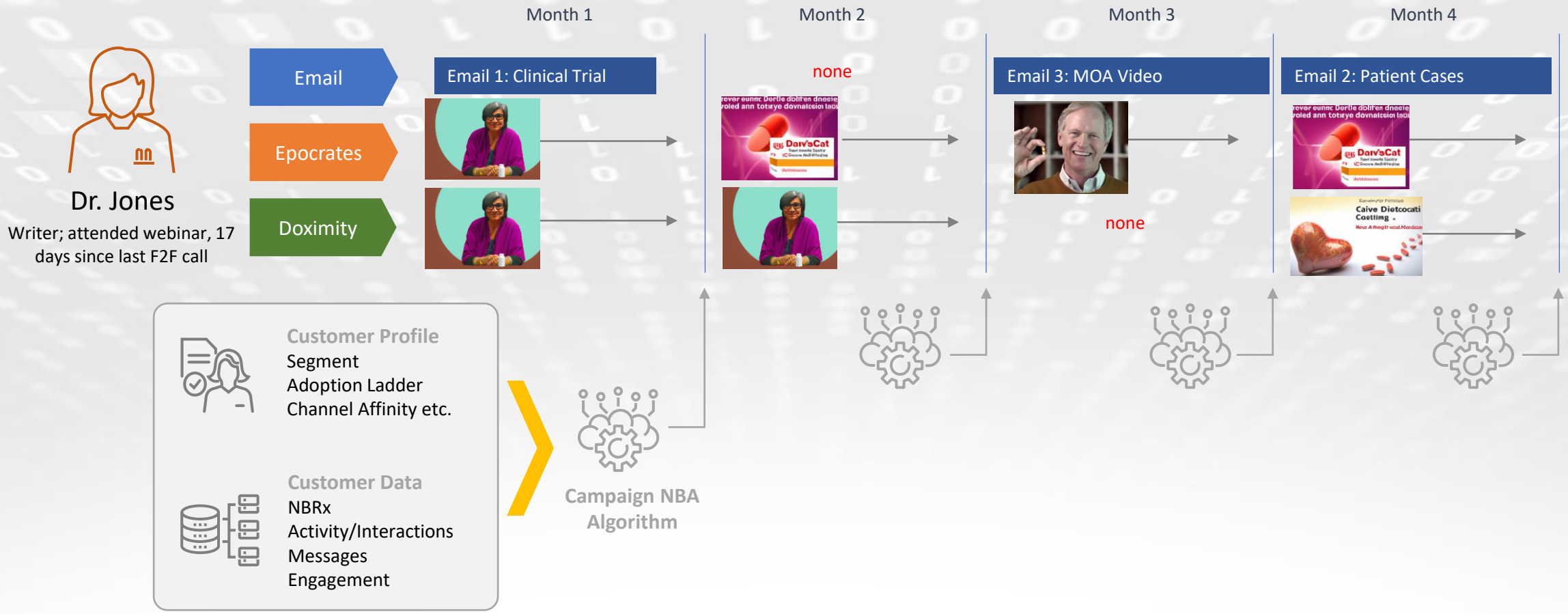
In Dynamic Call Planning, ML algorithms optimize content and channels on a frequent basis



Illustrative & Simplified

In Dynamic Call Planning, ML algorithms optimize content and channels on a frequent basis (contd.)

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Data Science Methodologies

Our Guiding Principles

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Guiding Principles

Not just about algorithms

Preference for simplicity

Demystify

Ensure transparency; avoid blackboxes

Consistent with brand strategy

Constrained by guardrails & business rules

Guide & recommend vs. dictate

Rep – an indispensable partner

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Data Science Methodologies

The Nuts & Bolts

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Traditional vs. Dynamic Call Planning

	Traditional Call Planning	Dynamic Call Planning
Segmentation	• Executed semesterly/yearly • Unable to capture short-term segment switches	• Refreshed weekly/fortnightly • Captures short-term segment switches
Promotion Response	• Executed semesterly/yearly • Aligned to longer term brand strategy	• Refreshed fortnightly/monthly • Identifies short-term directionality
Omnichannel Optimization	• Executed semesterly/yearly • Provides macro-level “optimal mix” guidance	• Refreshed fortnightly/monthly • Short-term “best sequence” determined

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Finding & Prioritizing Targets

Segmentation

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K-Means Clustering / Segmentation – Unsupervised ML Algo.

Segmenting the entire target universe based on 2 variables – avg. income within HCP's zip, and scripts written in a month

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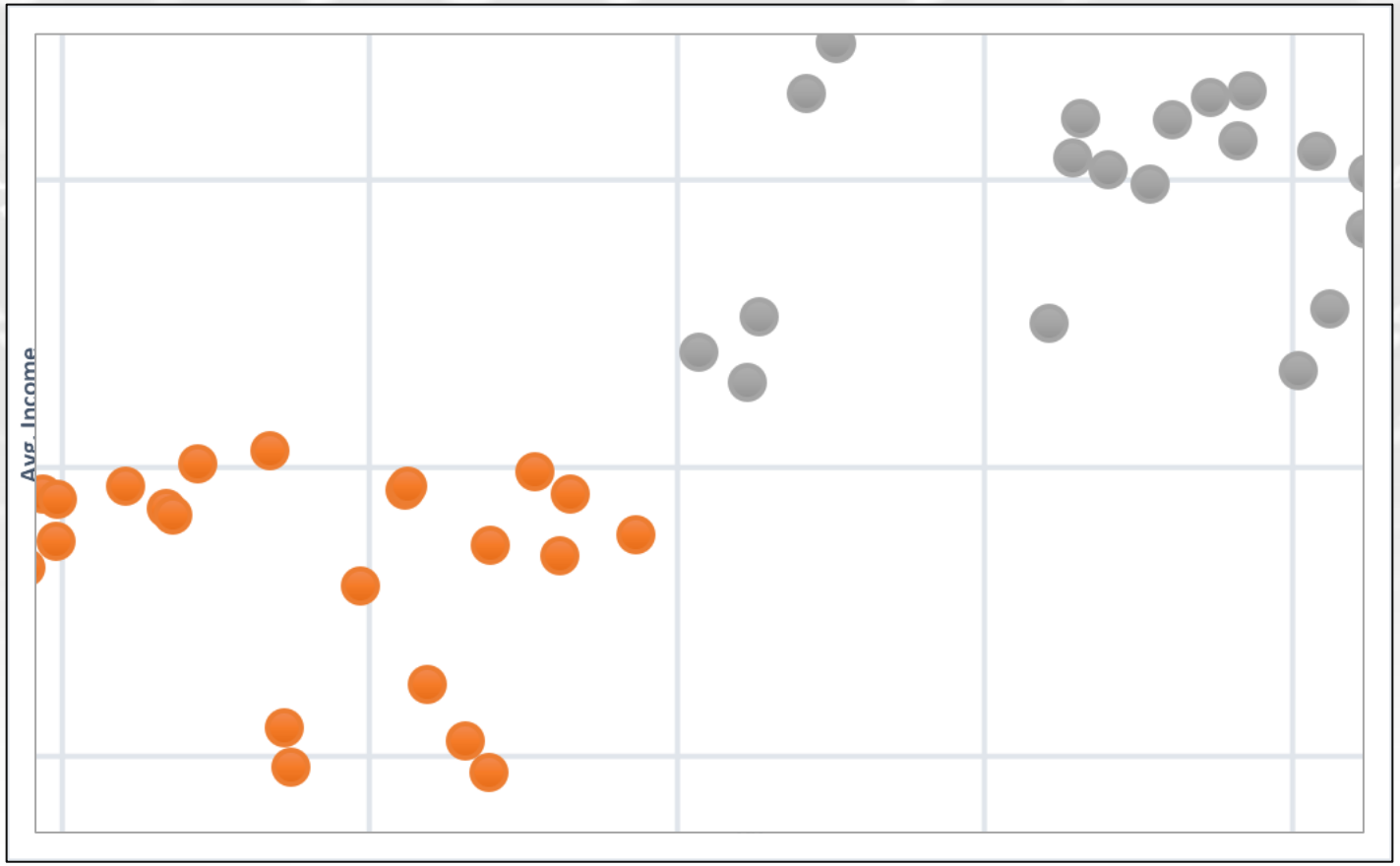
K-Nearest Neighbors – Supervised ML Algorithm

Determining segment membership for new targets, and for existing ones whose characteristics have evolved



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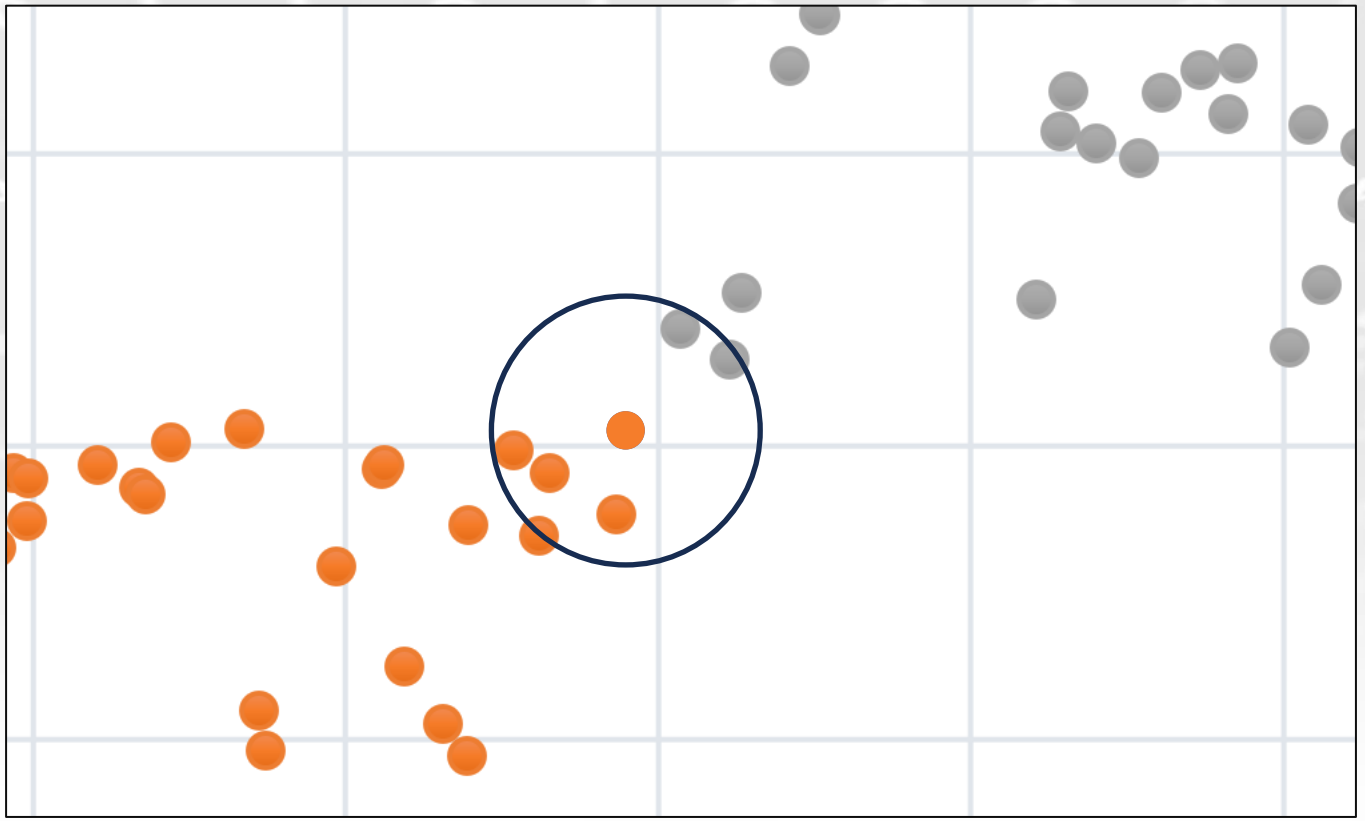

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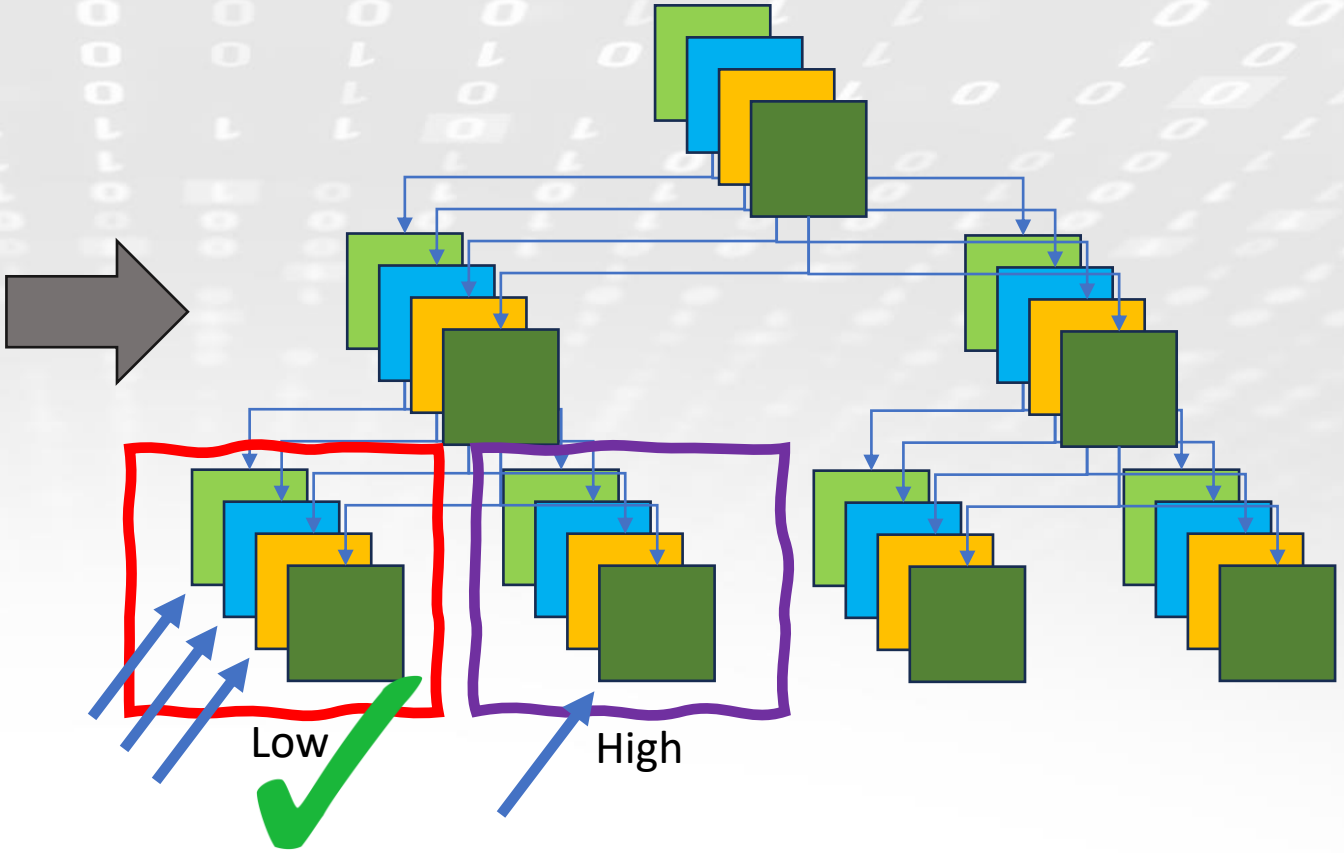
Random Forest – Supervised ML Algorithm

Segmenting 64 new physicians into “high” and “low” buckets based on monthly script volume

9	16	26	43	42	7	4	2
19	5	29	15	30	18	4	46
14	42	4	28	26	47	39	7
26	12	13	8	37	50	17	49
5	21	13	47	18	18	46	30
36	16	1	22	41	6	48	42
49	18	13	34	13	26	25	37
26	1	16	50	47	9	37	8



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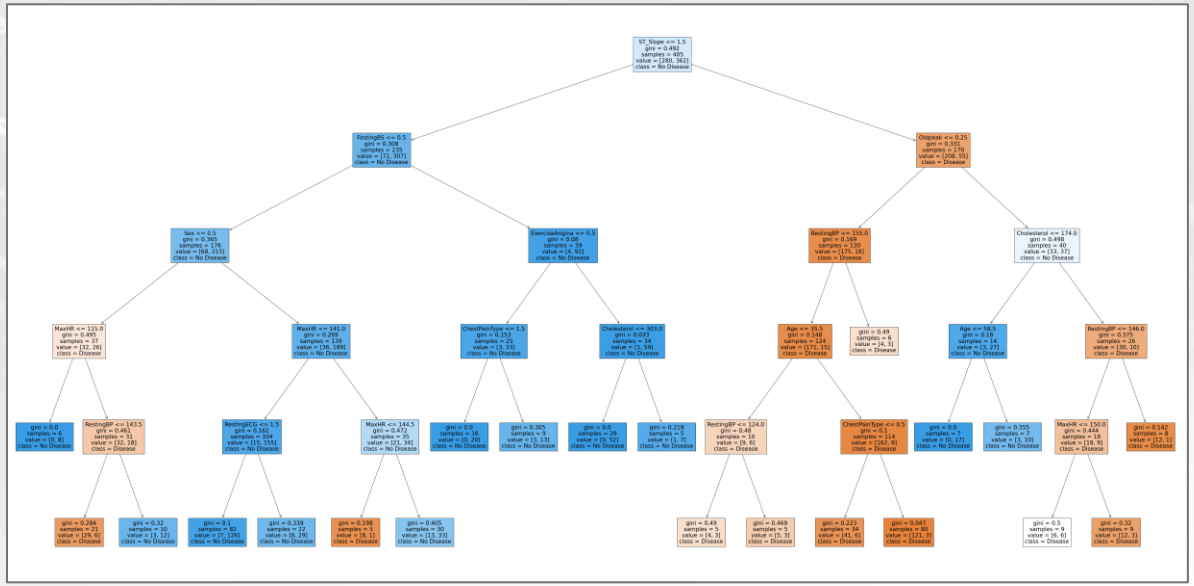
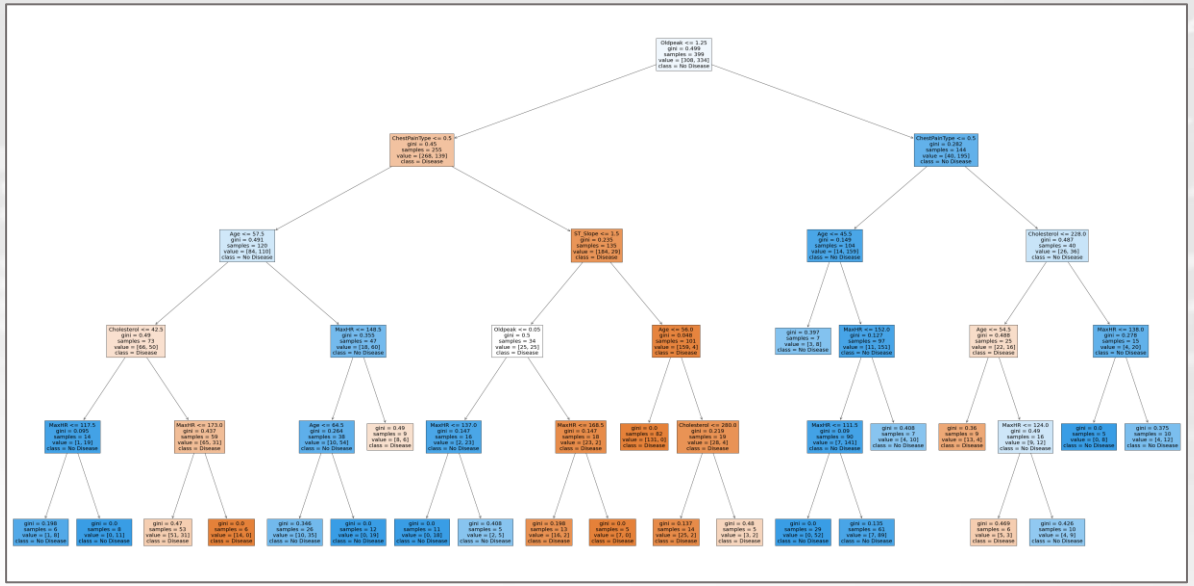
Random Forest – actual decision trees

Decision Tree #5



Decision Tree #20



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Actual Results Shown

Selecting the "Champion Model" for Segmentation

Simple & Intuitive	Accuracy & Repeatability	Computing Power & Time	Other Factors

• KNN is intuitive and easy to interpret
  • Non-Blackbox nature helps drive buy-in
	• KNN is more accurate[1]
	• Both are repeatable
		• Random Forest consumes significant computing power
		  • Takes longer to execute
			• Random Forest requires careful selection / determination of hyperparameters

Consider "lookalike analysis" if data is scarce.

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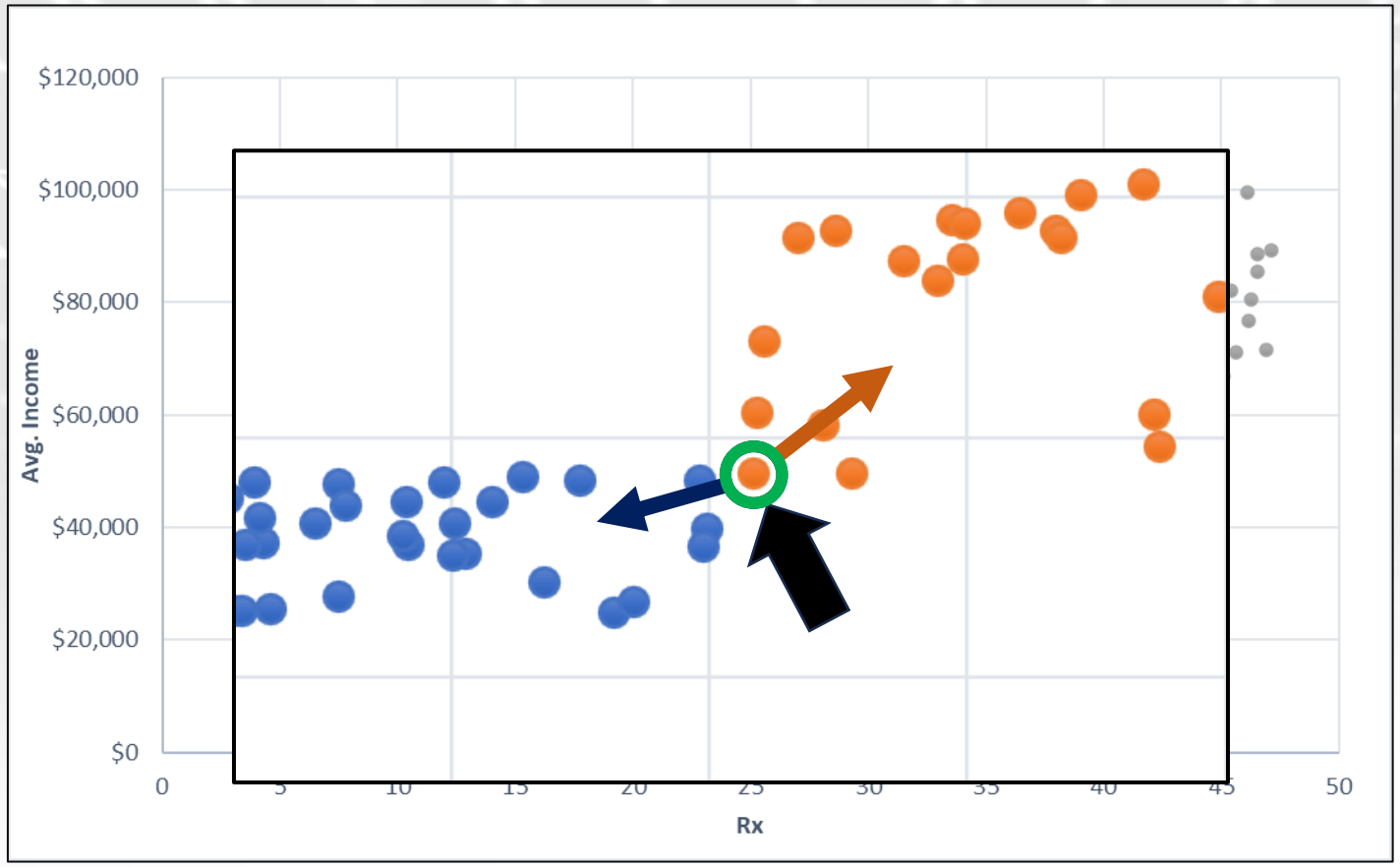
1 – https://ieeexplore.ieee.org/document/9845146. Note that in certain circumstances, Random Forest could be more accurate.

Segmentation – finer points



- "Bouncy" physicians
  - Apply thresholds
  - Scoring – tie-breaking
- Significant change in segment membership
  - Establish guardrails
- Follow a step-by-step approach
  - Freeze some variables
  - Start small

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Allocating Effort

Promotion Response

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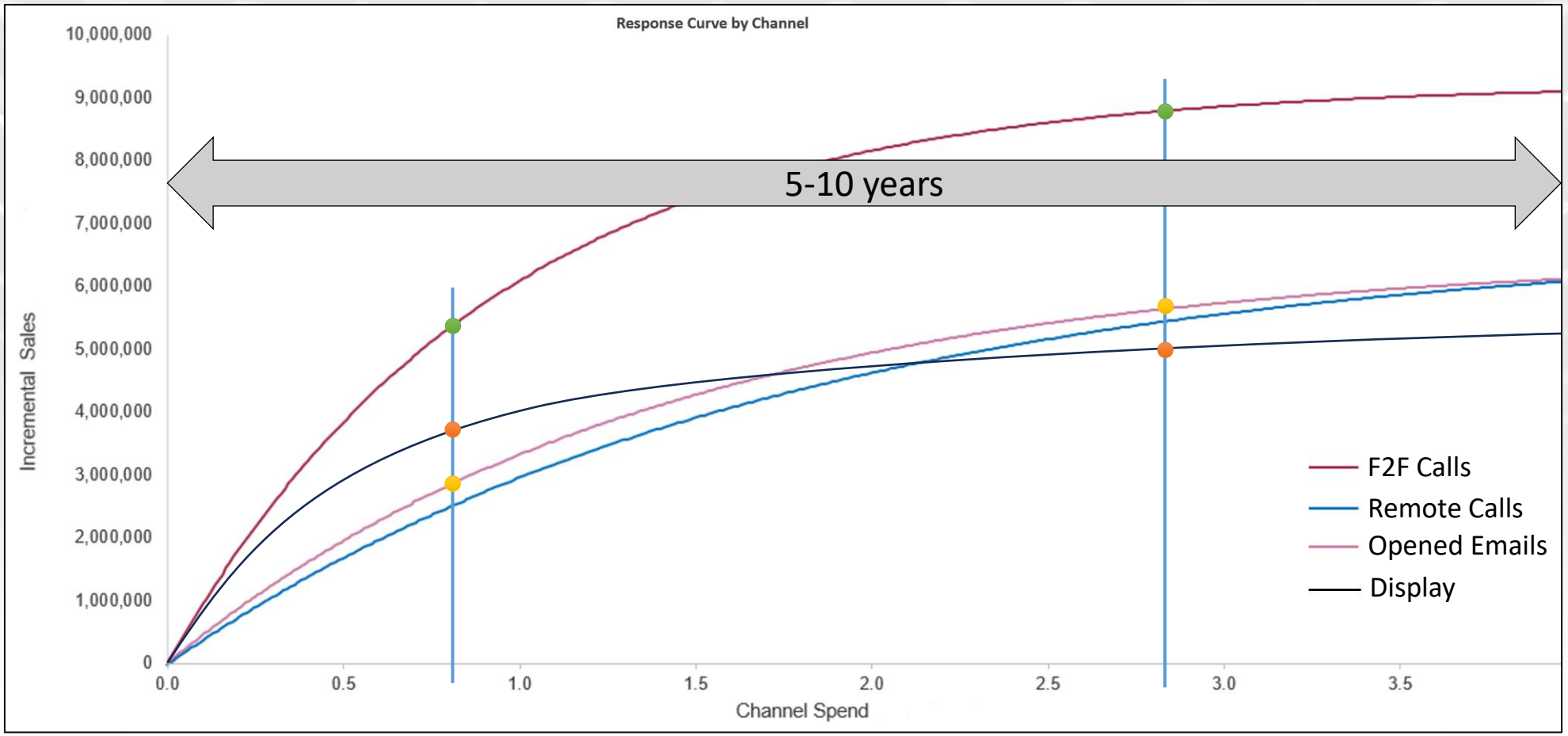
Promotion Response – Long-term

Aligned to brand strategy; built semesterly or yearly

$$Response = A_0 + k + A(1 - e^{-Cx})$$
$$k = A_1 NRx_1 + \lambda_2 NRx_2 + \cdots$$
$$x = PDE + \lambda_1 PDE_1 + \lambda_2 PDE_2 + \cdots$$



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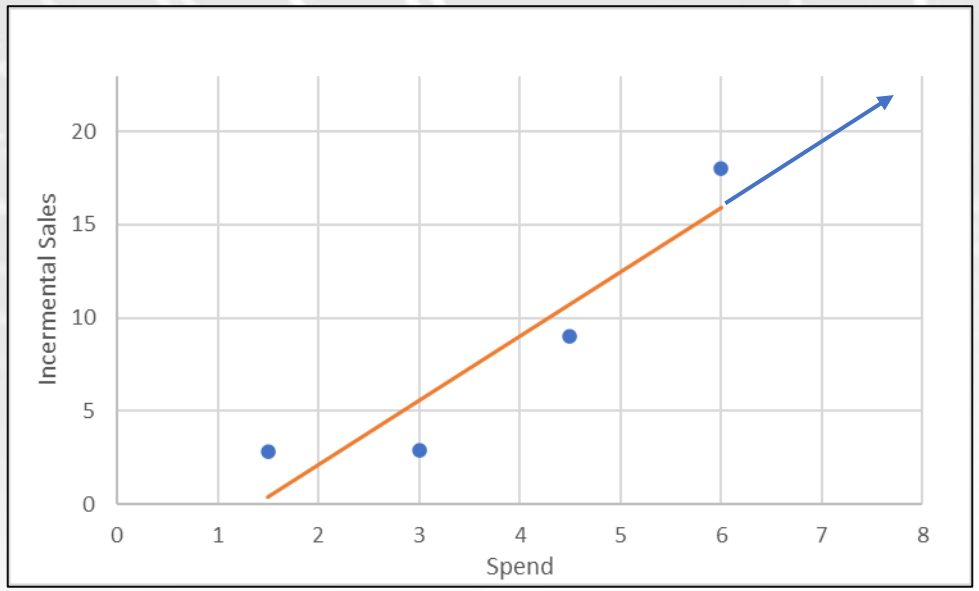
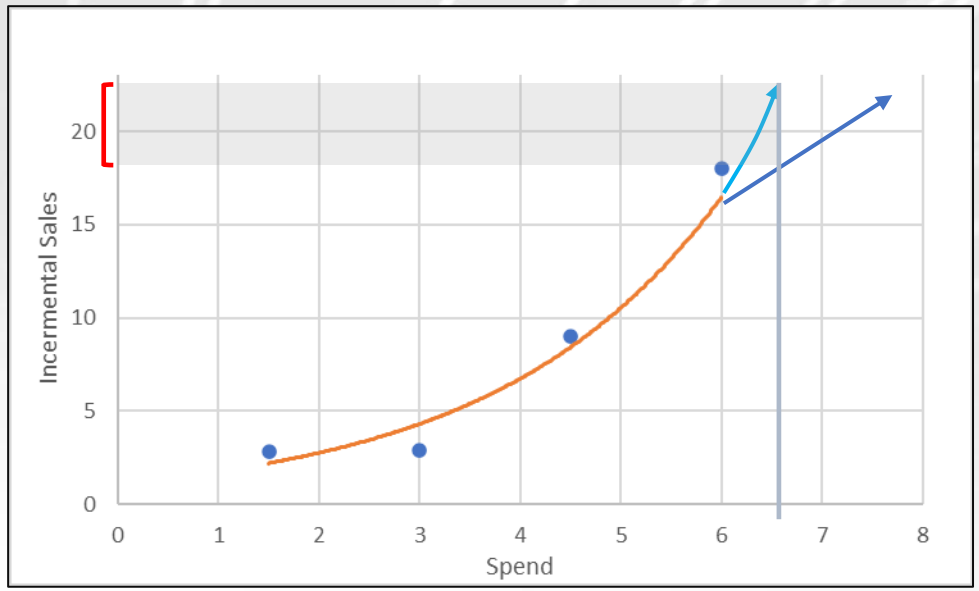
Promotion Response – Short-term

Directional guidance to facilitate Dynamic Call Planning initiatives

Linear Regression



Random Forest Regression



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Selecting the “Champion Model” for Short-term Promotion Response

Random Forest Regression is usually preferred

Availability of Limited Data

- Random Forest can work with limited data
- Linear Regression requires a larger number of datapoints

Detecting Short-term Trends

- Random Forest can extract short-term trends
- Linear Regression “averages out” points

Other Factors

- Some of the factors discussed earlier apply

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Sequencing Channels Optimally

Omnichannel Strategy

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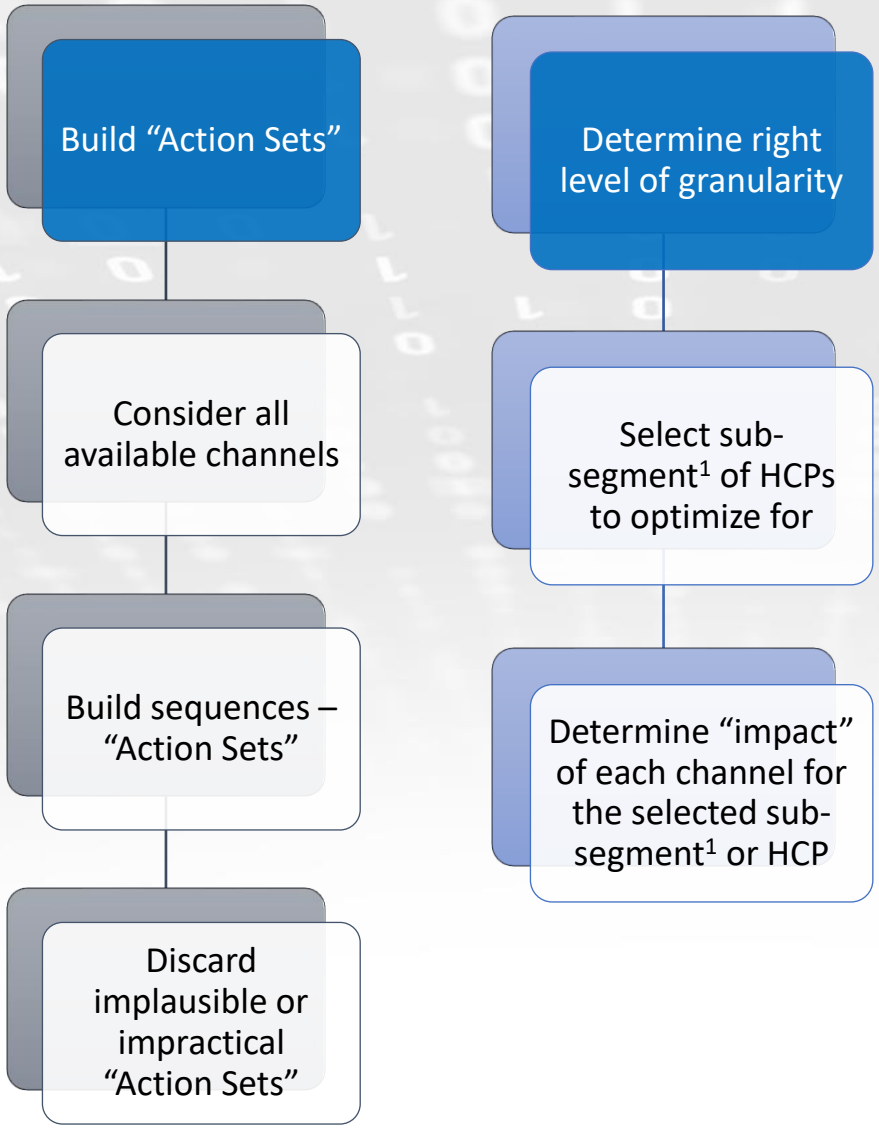
Setting it all up



Set constraints

- Max frequency for each of the selected channels
- F2F calling capacity of a rep
- HCP-specific constraints
- Time period
- Maximum total exposure for each HCP
- Others

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Note 1: In many cases, such modeling is done for individual HCPs.

Sample ML output showcasing ROI on tactics

Optimizing "action sets" to determine best promotional sequences

		Timeframe of Analysis[1]						
HCP ID	Actual / Simulation	Week 1	Week 2	Week 3	Week 4	Promotion cost ($)	Rx predicted	ROI
130015228	Actual	Call	None	RT Email	None	4.5	5.3	2.36
130015228	Actual	None	Display	None	None	3.4	2.2	1.29
130015228	Actual	Call	CRM Email	None	None	2.9	1.1	0.76
130015228	Actual	CRM Email	RT Email	None	Display	3.3	6	3.64
130015228	Actual	CRM Email	CRM Email	None	None	6.5	3.9	1.20
130015228	Actual	Call	CRM Email	None	None	3.9	4.3	2.21
130015228	Actual	None	Display	Call	RT Email	1.7	2.5	2.94
130015228	Simulation	Call	None	RT Email	CRM Email	7.3	1.3	0.36
130015228	Simulation	Display	Display	None	Display	3.5	0.1	0.06
130015228	Simulation	Call	None	RT Email	RT Email	3.9	4.3	2.21
130015228	Simulation	None	None	Call	None	1.7	5.5	6.47

Action Period

Action Sets

Determining top "action sets"

- Analyze historical promotional sequences for each HCP
- Shortlist plausible sequences
- Determine impact/ROI for each
- Rank/score
- Select the best plausible sequence
  - Model learns with each iteration
- Utilize trained model to generate future "action sets"

1 – This analysis assumes one promotional tactic per HCP per week for a four-week period ("action period") for calculating ROI, which is typical. However, the "action period" could be a fortnight, a week, or any other period of time.

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Best sequence analysis: ML-based simulation used to identify sequences with maximum impacts

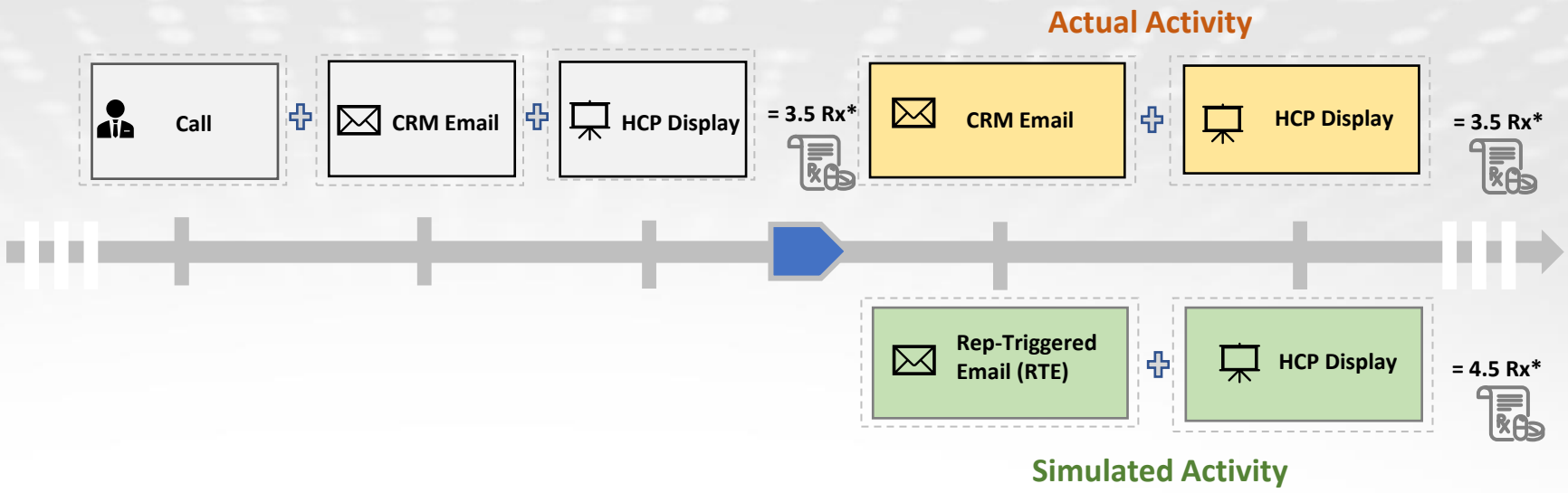
Models that learn channel interactions, sequencing, and content *from historical data*

Sequence Learning (ML-based)

- ML models are trained on multiple factors – recent activity, complex channel interactions, historical promotions/engagements and content.
- Once trained, the models score simulated channel sequences ("action sets") to determine those with maximum impact/ROI.

Dr. John Doe
Brand X writer

- Script data shows ***3.5 Rx*** written over the prior "*action period*" when ***CRM Email*** was followed by ***HCP Display***.
- Simulation suggests ***4.5 Rx*** when a ***Rep-Triggered Email (RTE)*** is followed by an ***HCP Display***.



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*Note: HCP response or impact can be measured in terms of Rx, profit, ROI, patient count or any other metric that the client/pharma company deems fit.

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Wrap-up

Key Takeaways

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How to get started? – A Roadmap

Towards achieving a soft landing and maximizing the chance of success

General direction of progression

Evaluate Preparedness	Establish the Organization	Set Boundaries	Build the Process	Start Small Go Slow	Tie Loose Ends
C360 Data	Define key roles & responsibilities	Business rules	Digital backbone	NBAs	Consultants, vendors & stakeholders as partners
Platform Ecosystem	Involve/hire the right people	Guardrails / Constraints	Feedback loop	List of new targets every fortnight / month	Craft the right messages; fine-tune
CRM, feeds, etc.	Incentivize the right behaviors Reward / Recognize	Thresholds	AI/ML, I&A Update freq.	Limit to rep-driven channels F2F, RTE	Build trust, gain support, drive buy-in / adoption

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Note: The above is a general simplified roadmap, presented in the form of a checklist, of key factors that a pharma company may need to consider as it starts thinking about implementing Dynamic Call Planning. Hence, it is not exhaustive. Since Dynamic Call Planning is a highly-specialized process and given that every company is different, such a solution would need to be customized to address specific needs.

Our learnings

One size does not fit all	Customer 360° is key	Platform & Environment	Digital Data Backbone	Collaboration & Partnerships
• Fast: Action Periods, frequency/cadence • Smart: Selection and fine-tuning of data science approaches	• HCP profiles built and updated over time • Segment personas dictate tactics	• Well-designed and easy to use platform(s)/app(s) • Ensure transparency, efficient issue-resolution/ticketing workflow	• Always-on and in-sync systems • Support for downstream processes	• External: data vendors, consultants and others • Internal: all relevant stakeholders and teams

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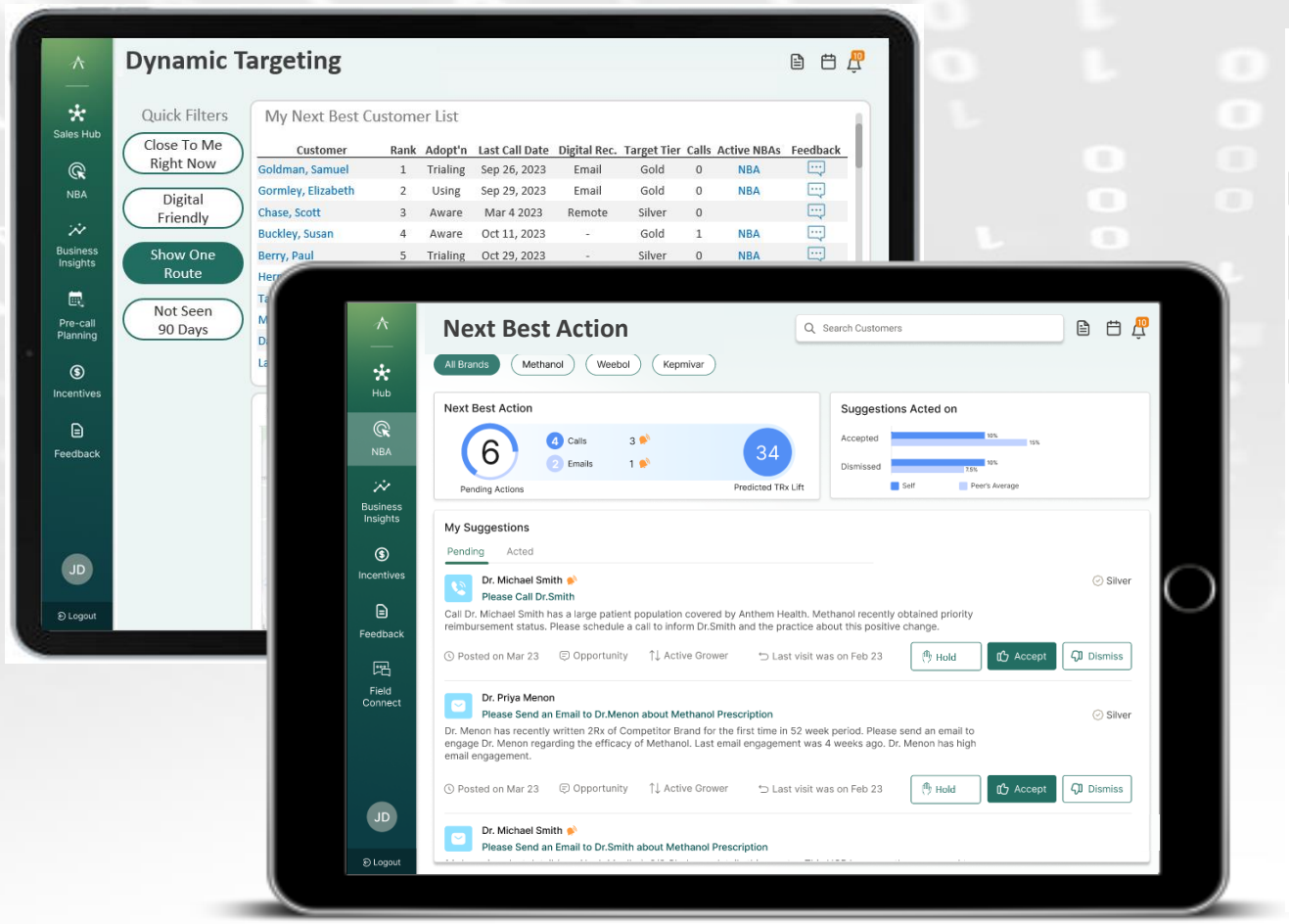
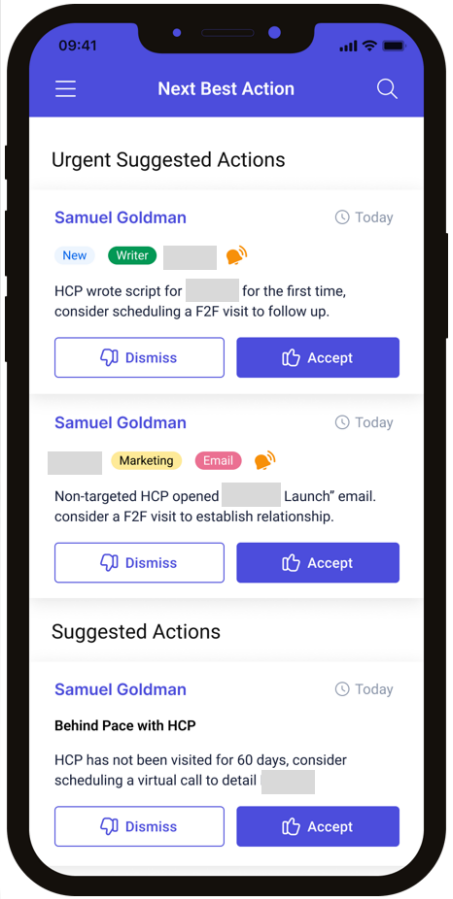
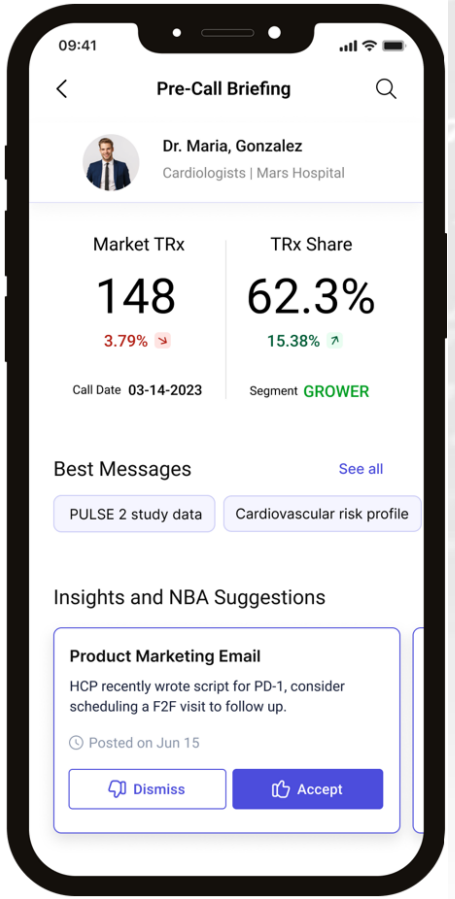
Platform & Environment – an example







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Thank you.

Credits:

Asheesh Sharma, Sr. Principal; David Wood, Sr. Principal; Mani Sethi, Principal; Sanjay Srivastava, Principal; Ashvin Bhogendra, Principal; Charles Rink, Principal; Vineet Rathi, Principal; Neha Jain Pulyani, Sr. Director; Kimberly Mosquera, Director

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