DSPT
DATA SCIENCE PORTUGAL

Marketing Analytics

Or... How to turn your customers into happy (paying) consumers.

Nuno Cravino

DSPT meetup #45 @ Braga, 4th December 2018

Who Am I?

Nuno Cravino

Head of Data Science
@ MOG Technologies

Post. Graduation in Computational Statistics
Bsc. Computer Science
Bsc. Philosophy

A data oriented computer scientist with an added background in the humanities.

Head of Data Science at MOG Technologies, a smallish software company focusing on delivering products to some of the biggest content producers/distributers in the world. My current work is on useful operational analytics in post-production environments.

Worked at a major telco in Portugal improving customer knowledge, doing propensity modeling, optimizing the best offer to each customer, helping with new marketing campaings, supporting corporate efforts into Big data, etc.

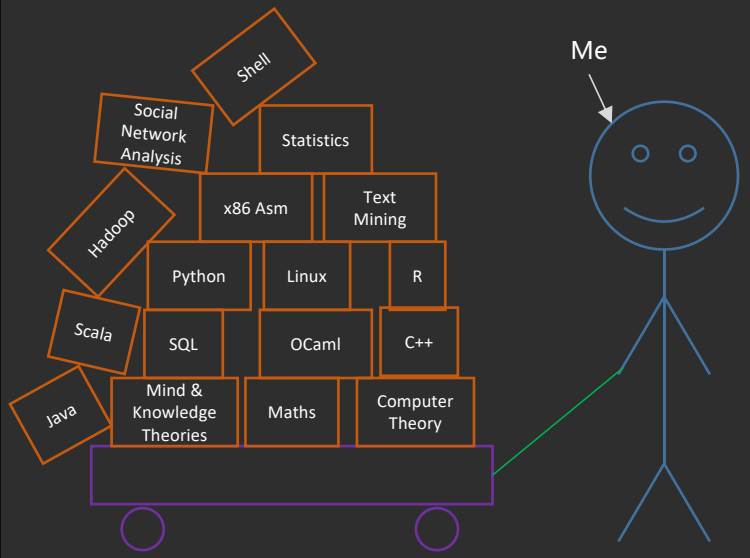
Worked in Research and Startups dealing with a variety of topics ranging from wifi-based location systems, text mining, to social network analysis, ontology modeling, databases, etc.

Very much into pragmatic functional programming (OCaml/SML), experimenting with microcontrollers, learning different approaches in logic, statistics, and computation theory... and playing roguelike games.

The path walked (I)

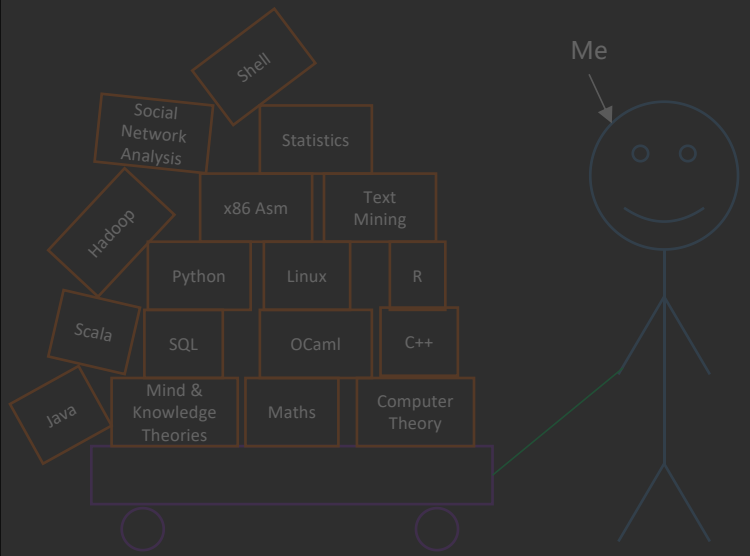
It all started with an opportunity and a yearning to learn

The path walked (II)



I was a computer scientist working on some stat modeling & some data processing tasks

The path walked (III)



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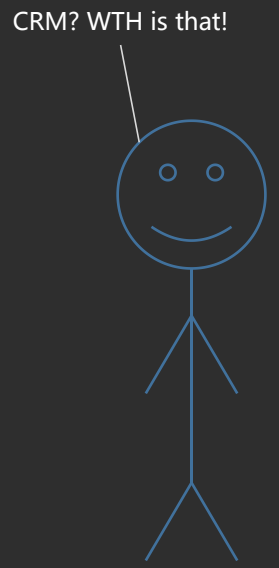

An opportunity emerged for me to leave engineering behind to join a CRM unit and start modeling consumer behaviour!

The path walked (IV)

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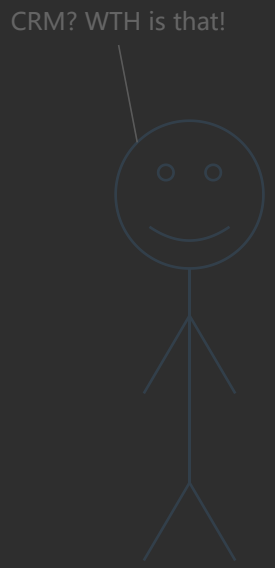

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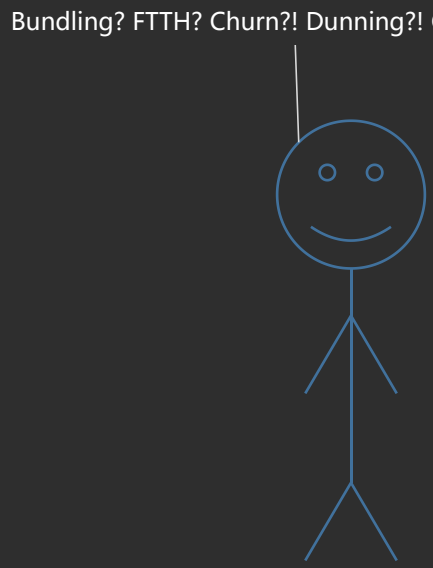


I learned that I could not remain a simple computer scientist... I had to learn about the business as much as I could... and had some very good teachers along the way.

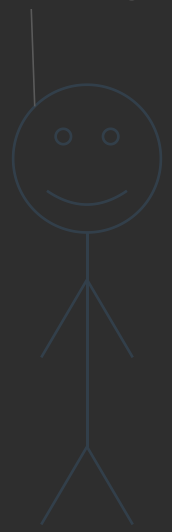
The path walked (V)

I was a computer scientist working on some stat modeling & some data processing tasks

CRM? WTH is that!

An opportunity emerged for me to leave engineering behind to join a CRM unit and start modeling consumer behaviour!

Bundling? FTTH? Churn?! Dunning?! Gross Sales?!



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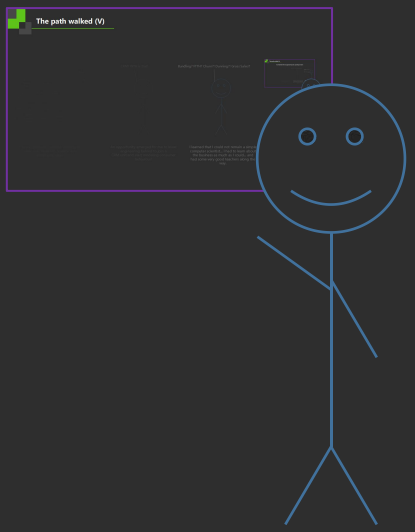

And now I am here to show you how can one be not just an engineer working with machine learning and data, but also delve into more business-oriented topics!

What do you mean by marketing analytics? (I)

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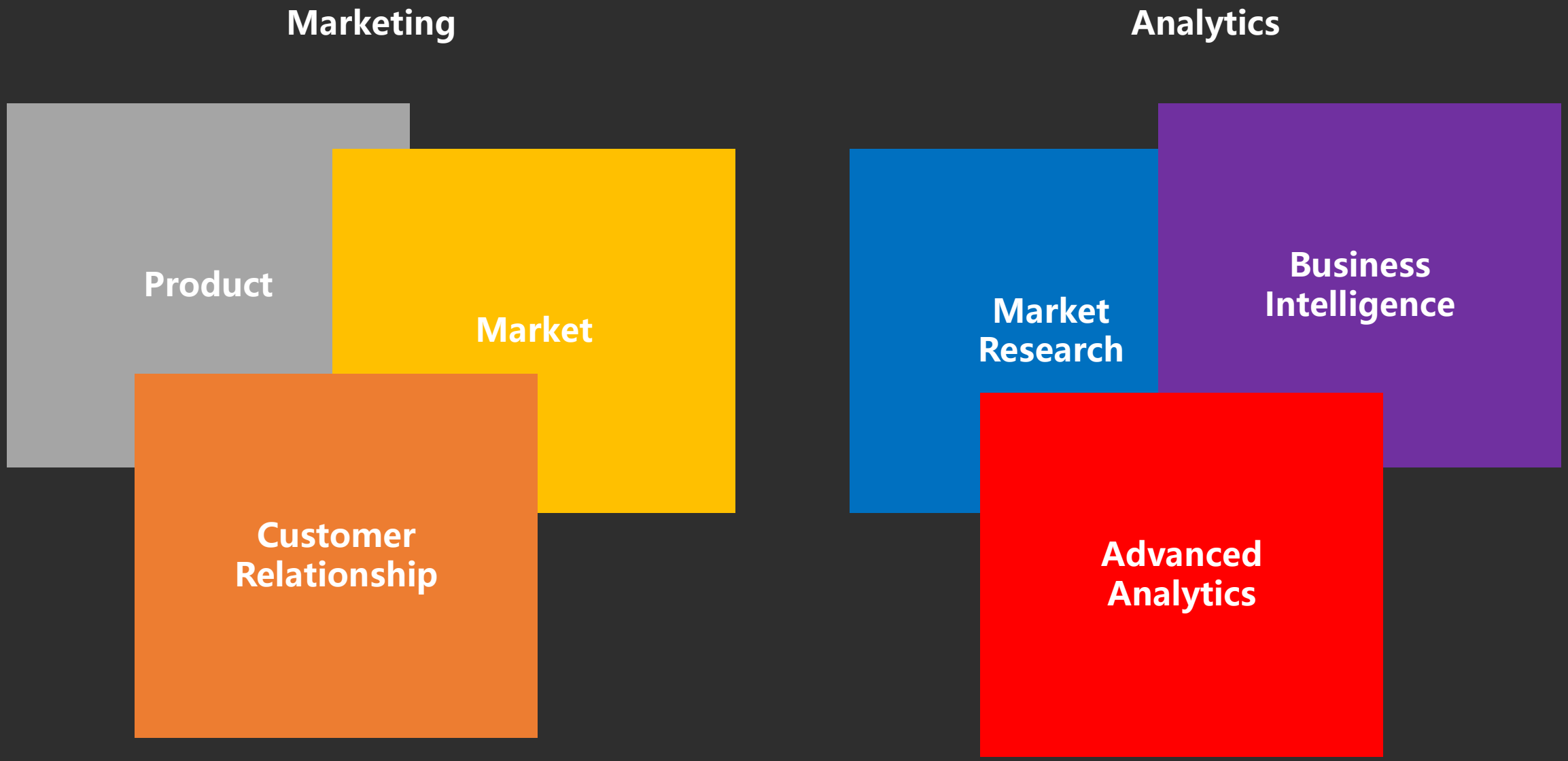


What do you mean by marketing analytics? (II)

Marketing

Long term market-consumer-product vision

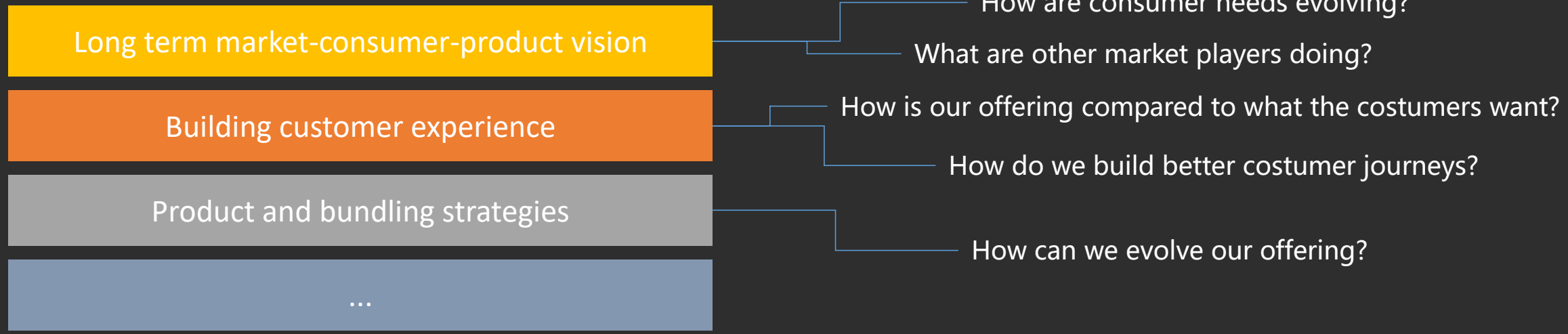
Building customer experience

Product and bundling strategies

...

What do you mean by marketing analytics? (II)

Marketing



What do you mean by marketing analytics? (III)

Analytics

- Robust modeling of market and behaviour
- Automation of reporting & data related tasks
- Distilling information from large amounts of data
- ...

What do you mean by marketing analytics? (III)

What can we learn from the way our costumers use their services?

What are the segments that represent our customer base?

Which kind of customers are missing from our customer base?

How to assess our business performance in different dimensions?

What traditional reporting tasks can be made more efficient?

Why do service problems happen? Can we act proactively?

How can we improve the way we communicate to our customers?

Analytics

Robust modeling of market and behaviour

Automation of reporting & data related tasks

Distilling information from large amounts of data

...

What do you mean by marketing analytics? (IV)

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- Long term market-consumer-product vision
- Building customer experience
- Product and bundling strategies

Analytics

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What do you mean by marketing analytics? (IV)

Marketing

- Long term market-consumer-product vision
- Building customer experience
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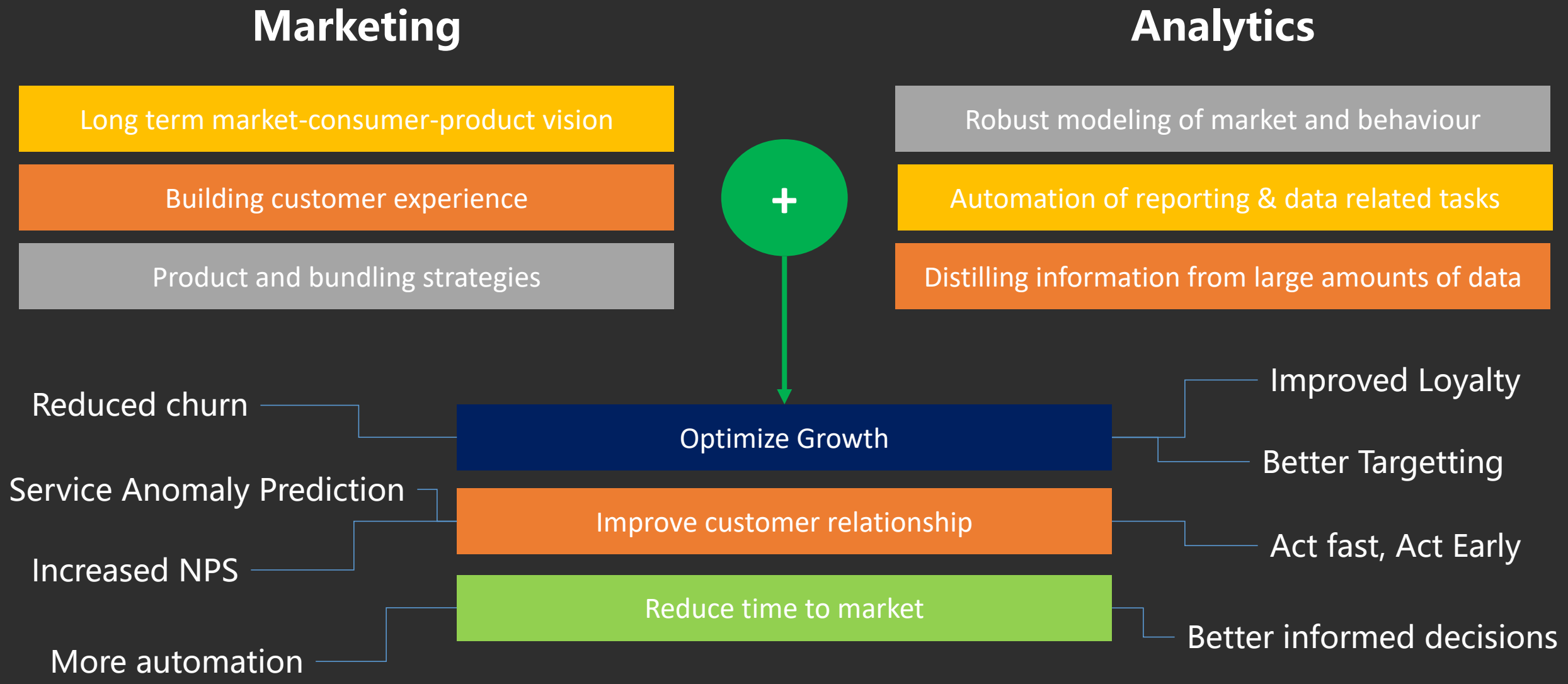
+

Analytics

- Robust modeling of market and behaviour
- Automation of reporting & data related tasks
- Distilling information from large amounts of data

- Optimize Growth
- Improve customer relationship
- Reduce time to market

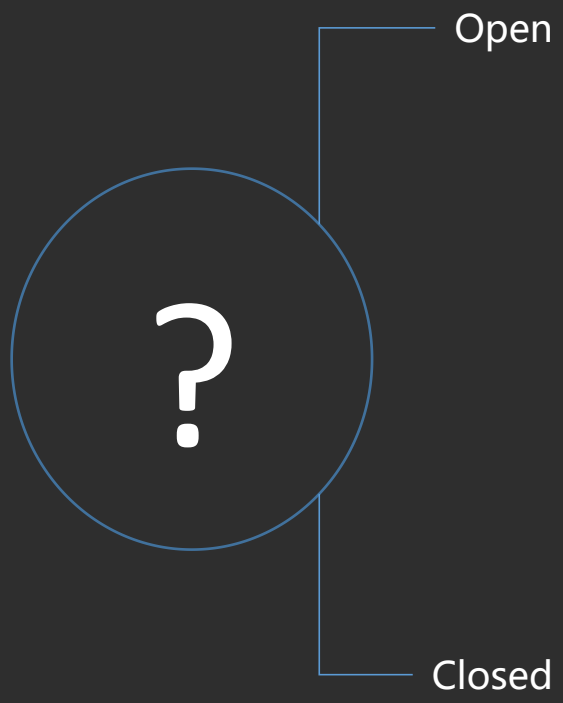
What do you mean by marketing analytics? (IV)



The life-cycle of analytics in marketing (I)

Business Question

The life-cycle of analytics in marketing (I)



Business Question

The life-cycle of analytics in marketing (I)

Business Question

- Open
- Closed
  - Have a specific problem in mind
  - There are at least intuitions over what is the end goal
  - Model propensity, optimize shelf allocation, compute coupons, a specific report
  - Provide immediate & measurable business impact

The life-cycle of analytics in marketing (I)

Business Question

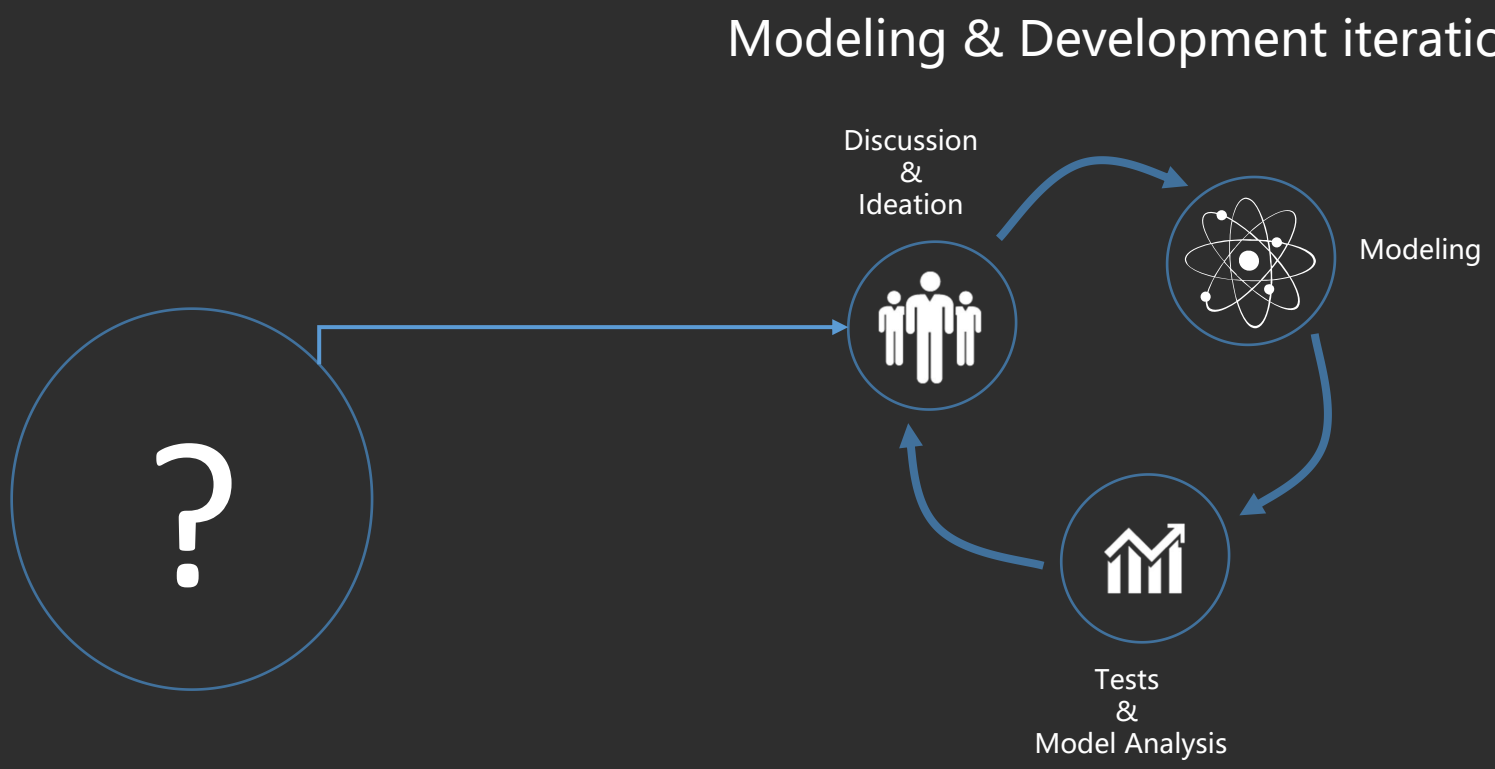
Open

- Strategic and/or exploratory
- Increase the body of actuable knowledge
- Mining of usage patterns, customer attributes, segments, etc
- Provide leverage to more focused projects

Closed

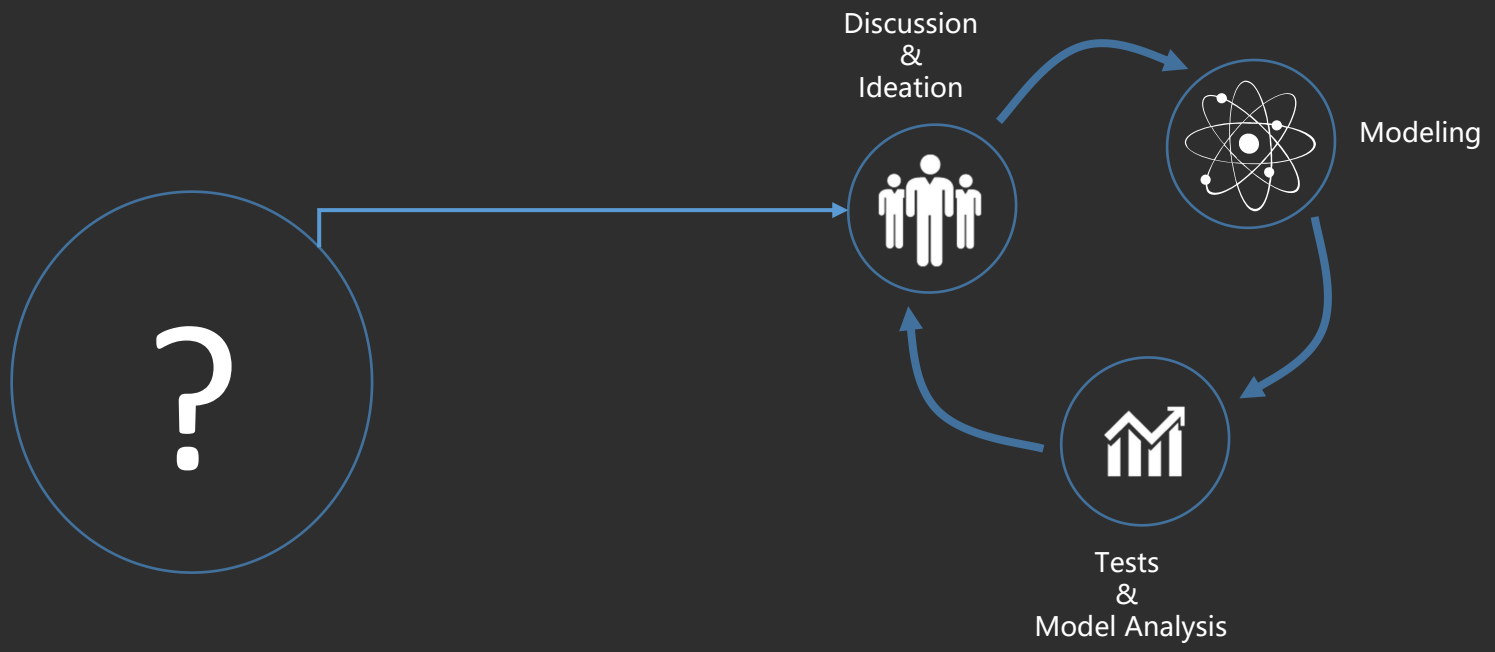
- Have a specific problem in mind
- There are at least intuitions over what is the end goal
- Model propensity, optimize shelf allocation, compute coupons, a specific report
- Provide immediate & measurable business impact

The life-cycle of analytics in marketing (II)



The life-cycle of analytics in marketing (II)

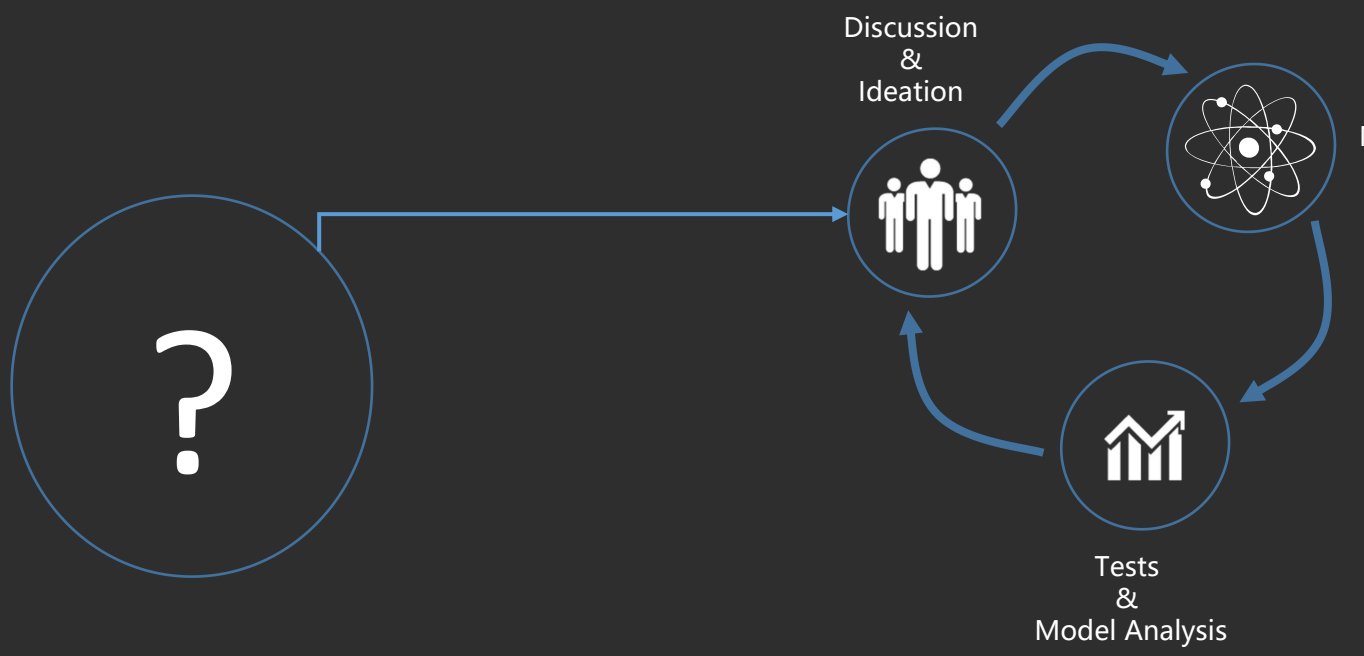
Modeling & Development iteration



- Discuss & brainstorm requirements with all stakeholders
- Prepare data, design and test models that meet the requirements
- Test the model in on-going operations
- Iterate until the final result is accepted by the stakeholders

The life-cycle of analytics in marketing (II)

Modeling & Development iteration



- Machine learning over interactions, product, service quality, etc
- Optimization models (operations research)
- Classical statistical modeling of pricing, market evolution, etc
- Robust experiments to help decision making

- Discuss & brainstorm requirements with all stakeholders
- Prepare data, design and test models that meet the requirements
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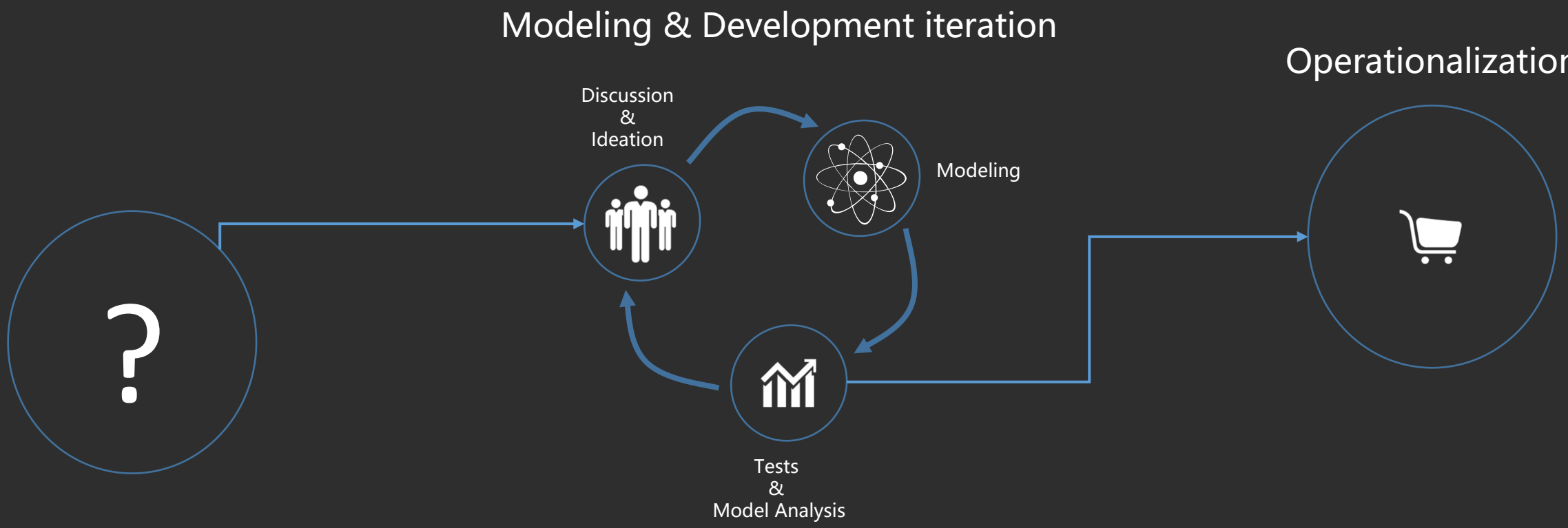

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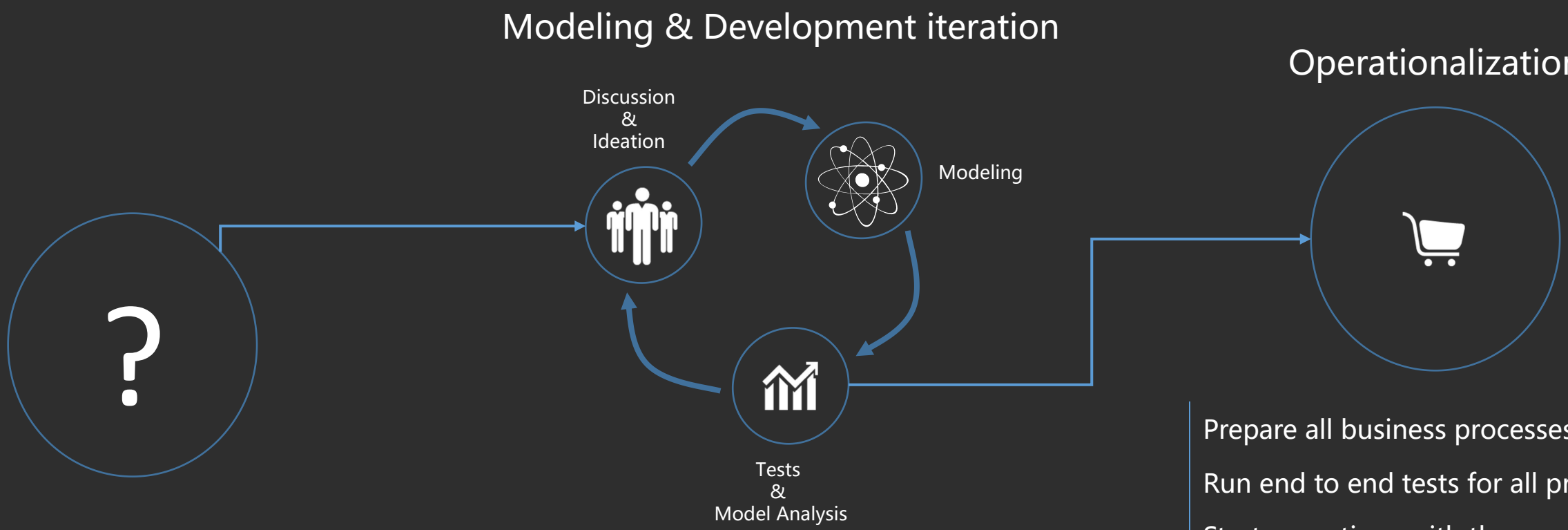
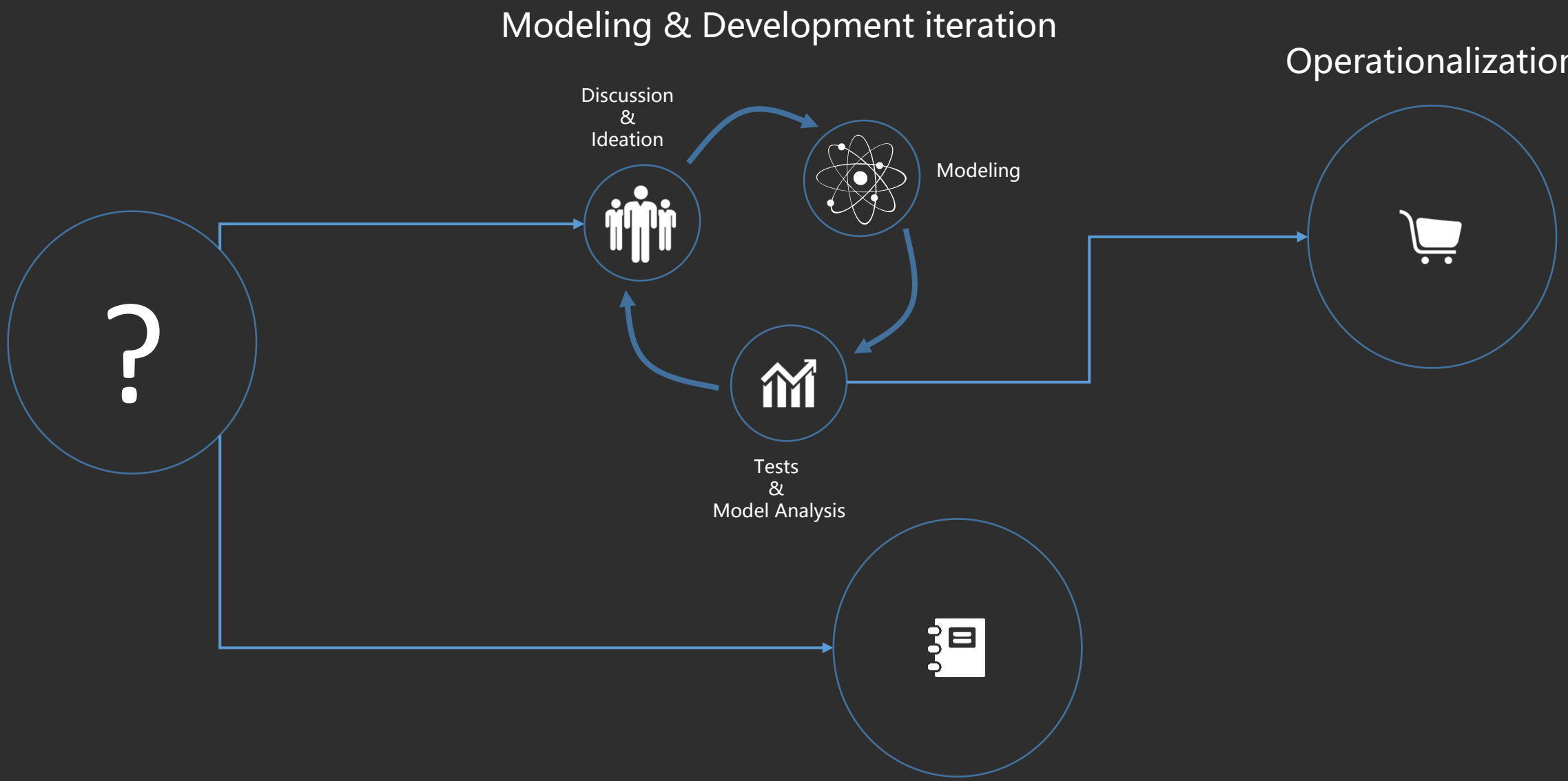


Prepare all business processes

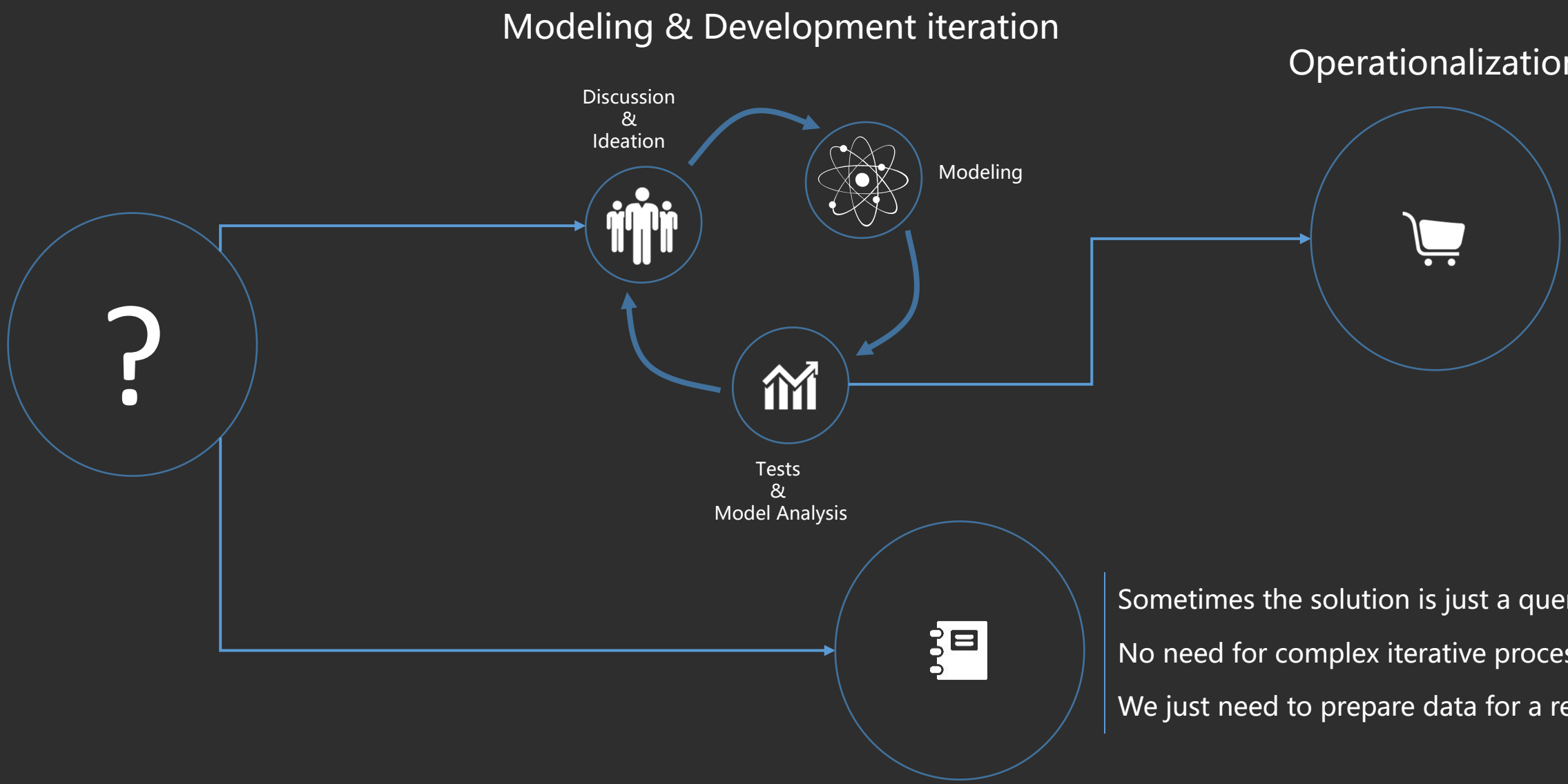
Run end to end tests for all processes

Start operations with the new processes

The life-cycle of analytics in marketing (IV)

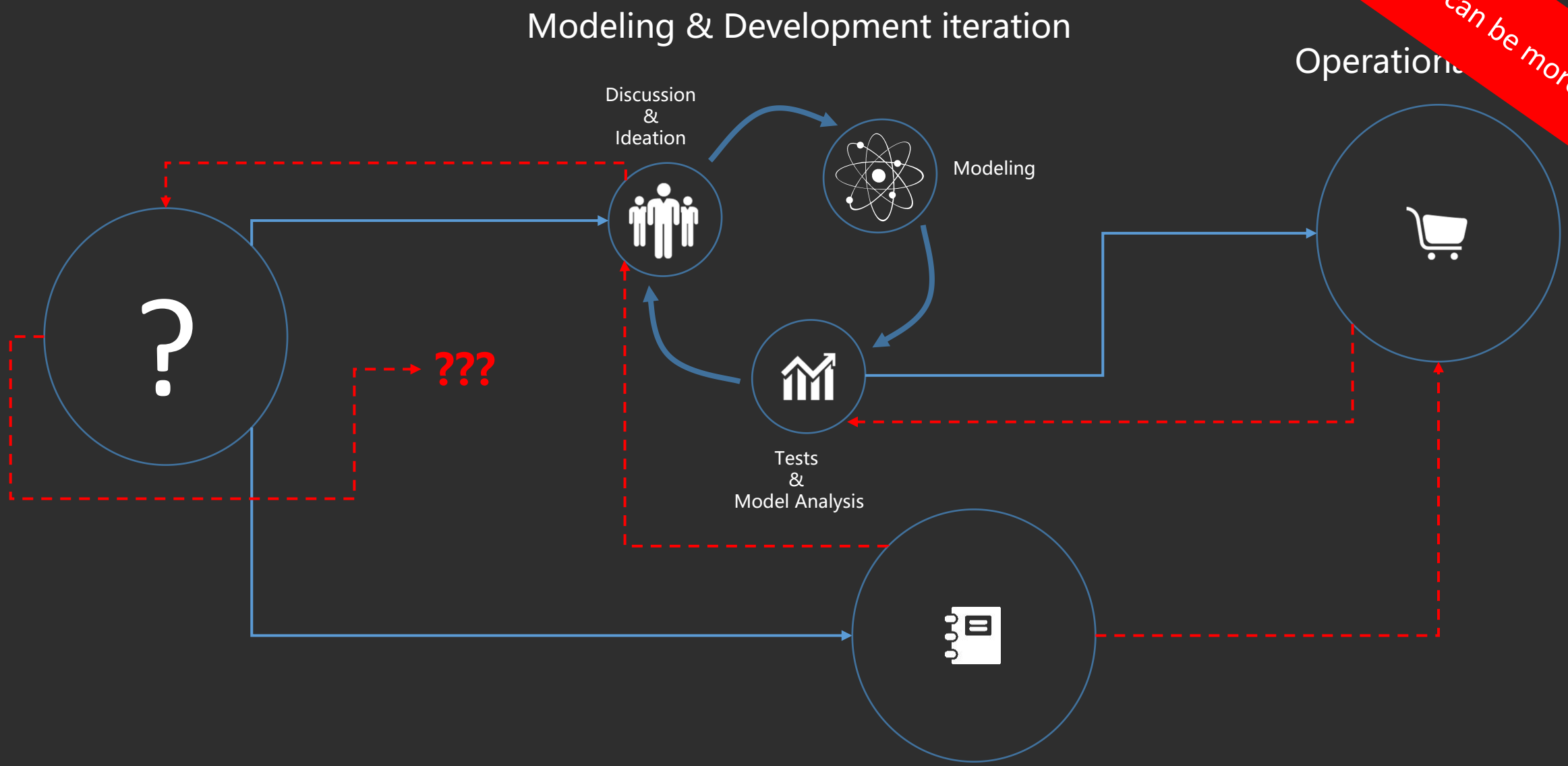


The life-cycle of analytics in marketing (IV)



The life-cycle of analytics in marketing (V)

Warning: Reality can be more complex



Analytics Use Case Analysis: Market Micro-Segmentation (I)

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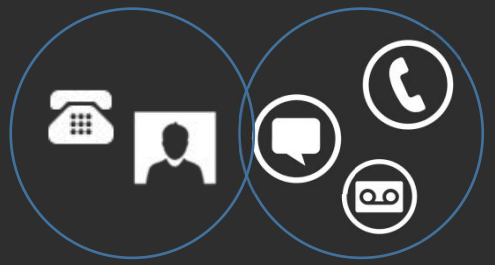
Traditionally it starts with a survey

- Surveys can be biased
- We might not ask the right questions
- The customer will tell us what he thinks we want to hear

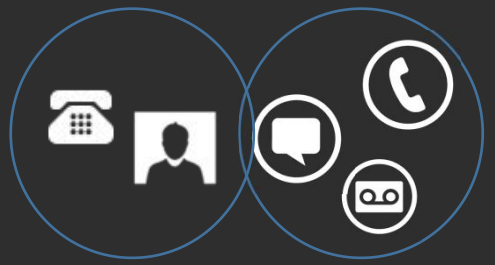
Analytics Use Case Analysis: Market Micro-Segmentation (II)



We can see how the costumer uses our products and how he interacts with us

- Allow us to get more granular segments
- We might need to process huge amounts of data
- We can create models based on past interactions to help us

Analytics Use Case Analysis: Market Micro-Segmentation (II)



- Service usage aggregation per some timeframe
- Creation of variables that tell us about the subscription of services or products bought
- Cross referencing usage data with other sources to infer what customers like
- Mining techniques over interaction data over multiple channels

We can see how the costumer uses our products and how he interacts with us

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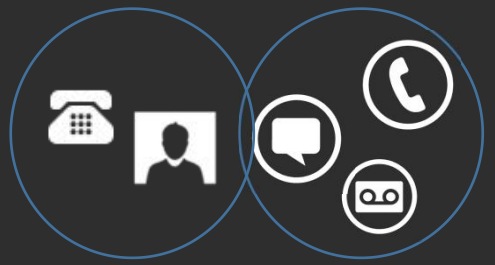
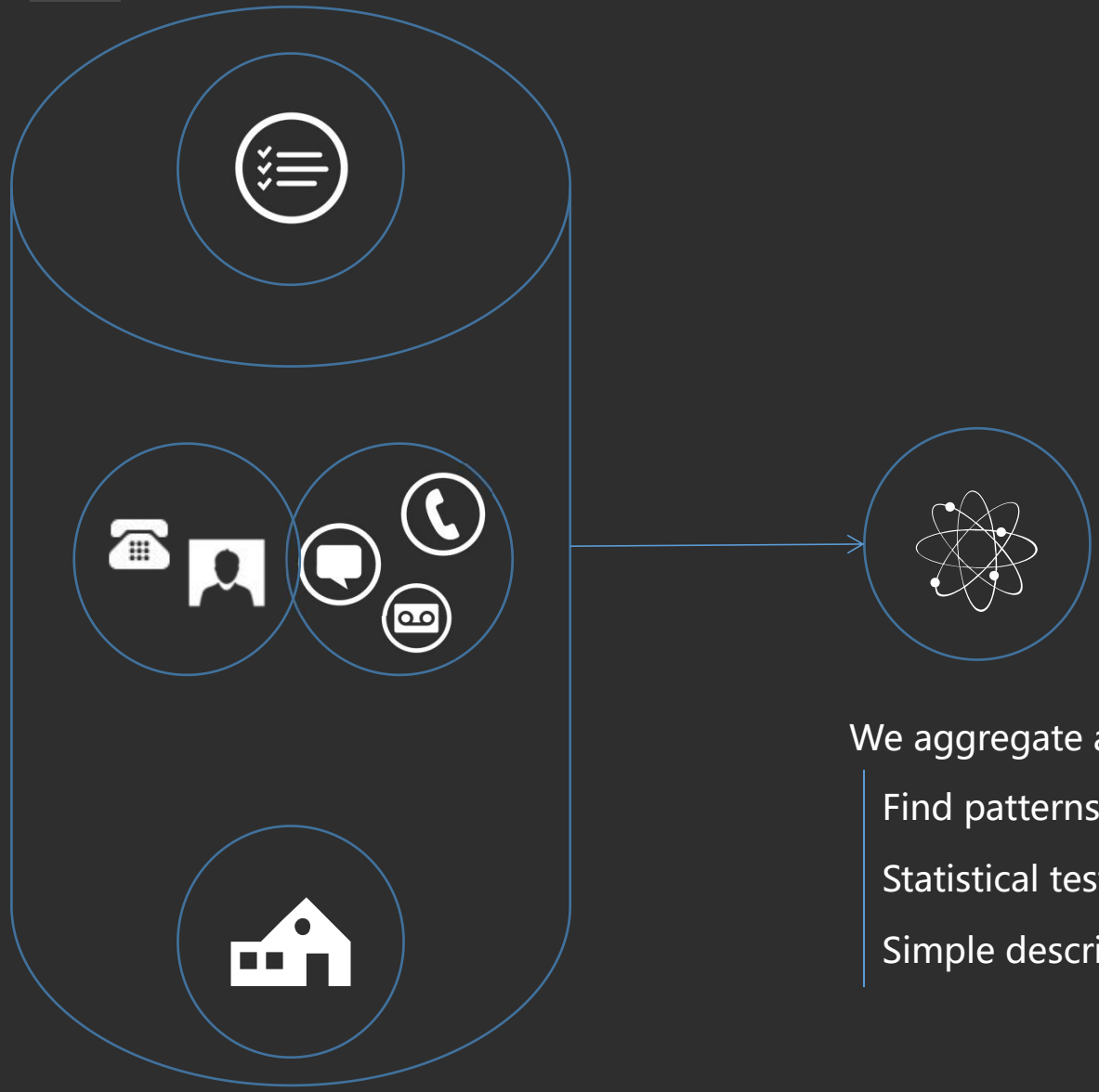


We can add statistical data from other sources

- Census data with geo-economical variables
- Market research data
- Allow us to access data we wouldn't have otherwise

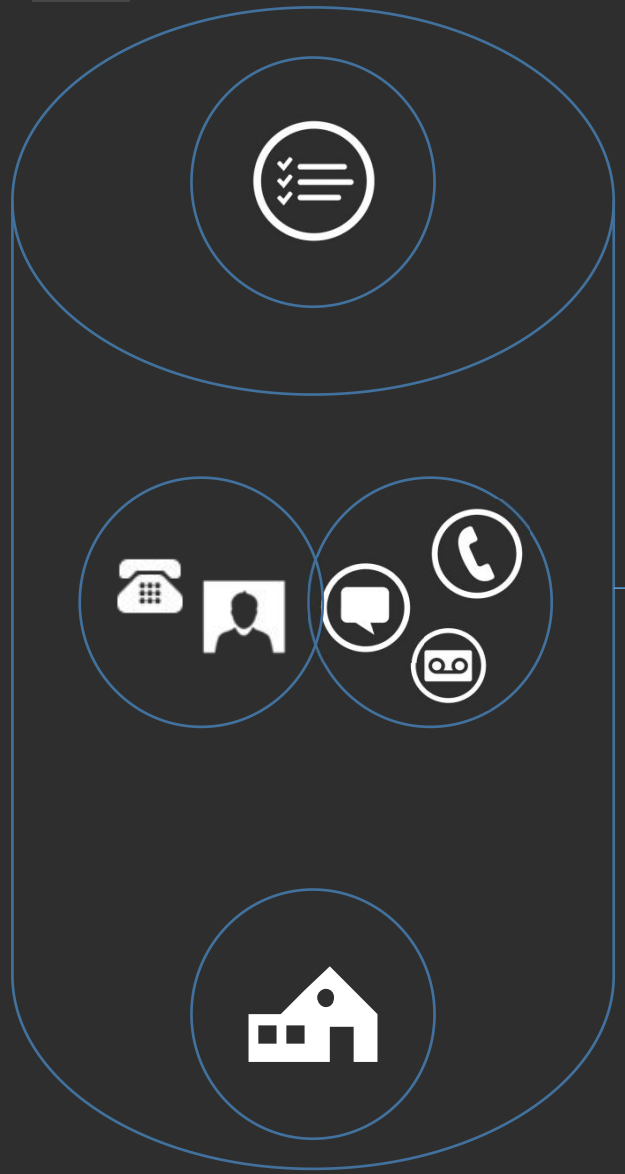
Analytics Use Case Analysis: Market Micro-Segmentation (IV)

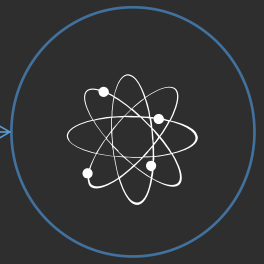


We aggregate and apply descriptive techniques

- Find patterns: PCA, Factor Analysis, Complex Network Analysis, ...
- Statistical testing for significance
- Simple descriptive analytics: mean, medians, variances, ...

Analytics Use Case Analysis: Market Micro-Segmentation (IV)





- Needs knowledge of business processes to detect and control their effects
- One must be careful to prevent self-fullfilling data prophecies: using data to infer itself
- There might be a need to transform the data until you're able to detect a pattern

We aggregate and apply descriptive techniques

- Find patterns: PCA, Factor Analysis, Complex Network Analysis, ...
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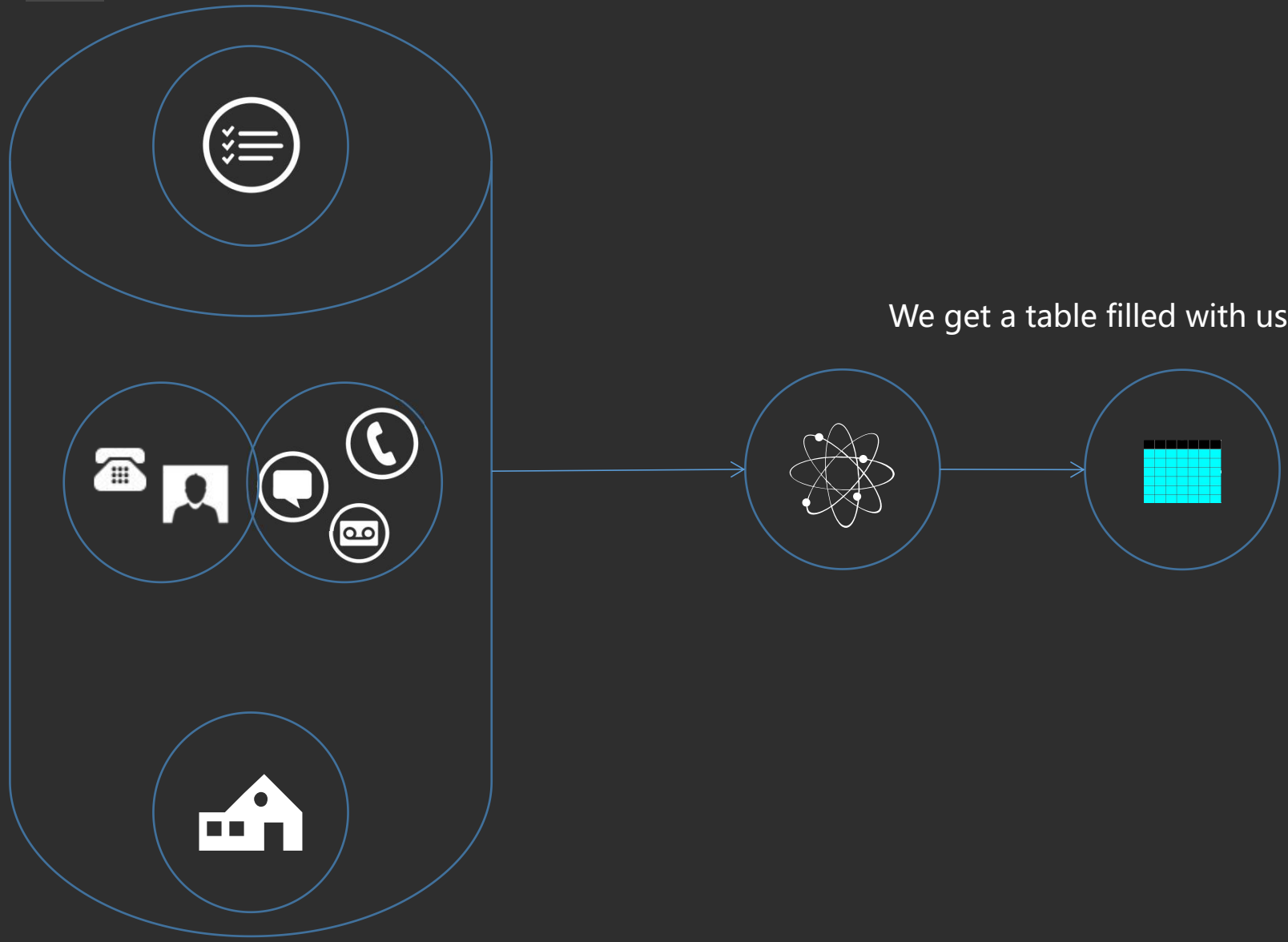
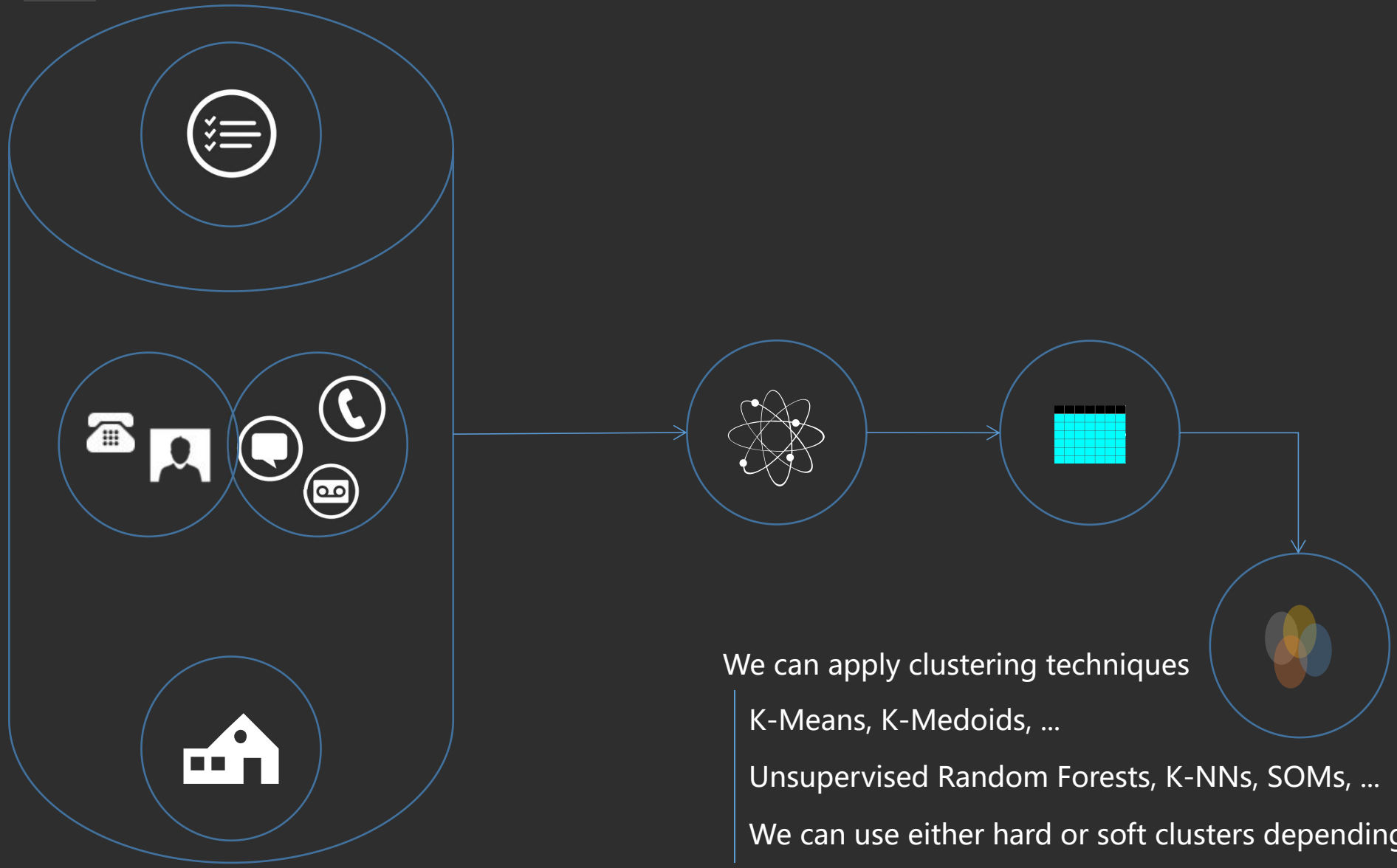
Analytics Use Case Analysis: Market Micro-Segmentation (V)



We get a table filled with useful variables

Analytics Use Case Analysis: Market Micro-Segmentation (VI)



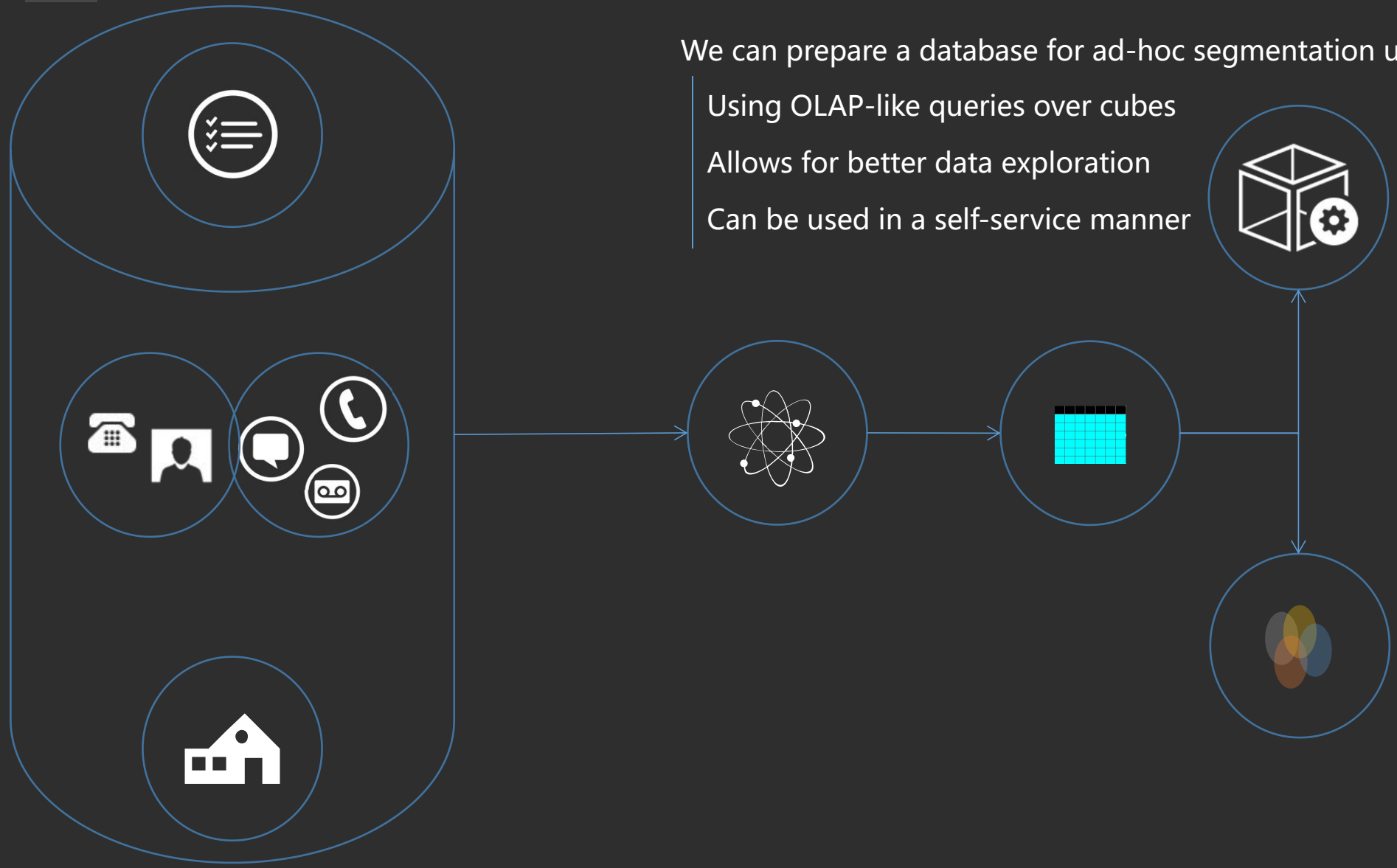
We can apply clustering techniques

- K-Means, K-Medoids, ...
- Unsupervised Random Forests, K-NNs, SOMs, ...
- We can use either hard or soft clusters depending on what we're segmenting for

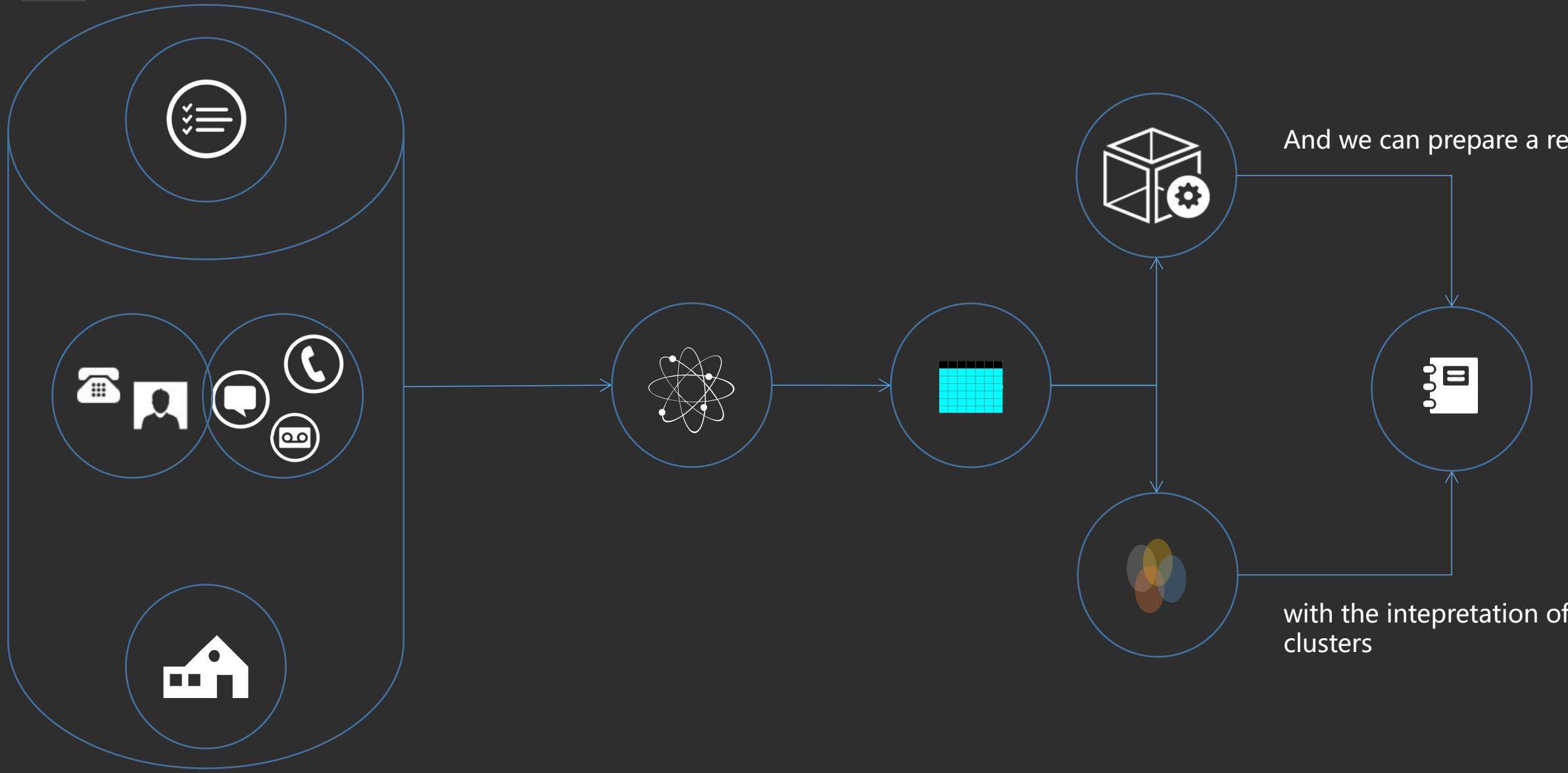
Analytics Use Case Analysis: Market Micro-Segmentation (VII)

We can prepare a database for ad-hoc segmentation using arbitrary decision cuts

- Using OLAP-like queries over cubes
- Allows for better data exploration
- Can be used in a self-service manner



Analytics Use Case Analysis: Market Micro-Segmentation (VIII)



Analytics Use Case Analysis: Market Micro-Segmentation (IX)

Preparing our Report

Analytics Use Case Analysis: Market Micro-Segmentation (IX)

We should give a semblance of a face to our clusters

- What are the most distinguishing features of the cluster?
- What range of values do the most important variables take?
- What kind of services this costumers use or have?

Preparing our Report

Analytics Use Case Analysis: Market Micro-Segmentation (IX)

- Has a smartphone with heavy data usage
- Same calls everyday with long duration
- Communicates with international destinations

- Likes cat videos and sports programs
- Prefers to use video on demand
- Rarely uses the phone to call anyone

Preparing our Report

- Heavy TV usage, watches gardening programs at night
- Heavy phone user to plenty of different people
- Wakes up early in the morning to use the internet

Analytics Use Case Analysis: Product Propensity Modelling (I)

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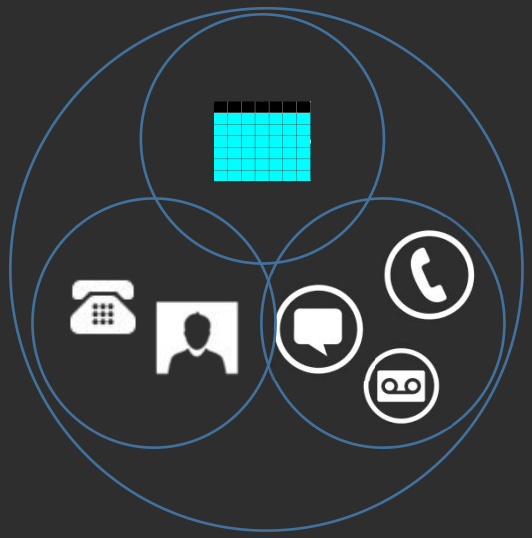
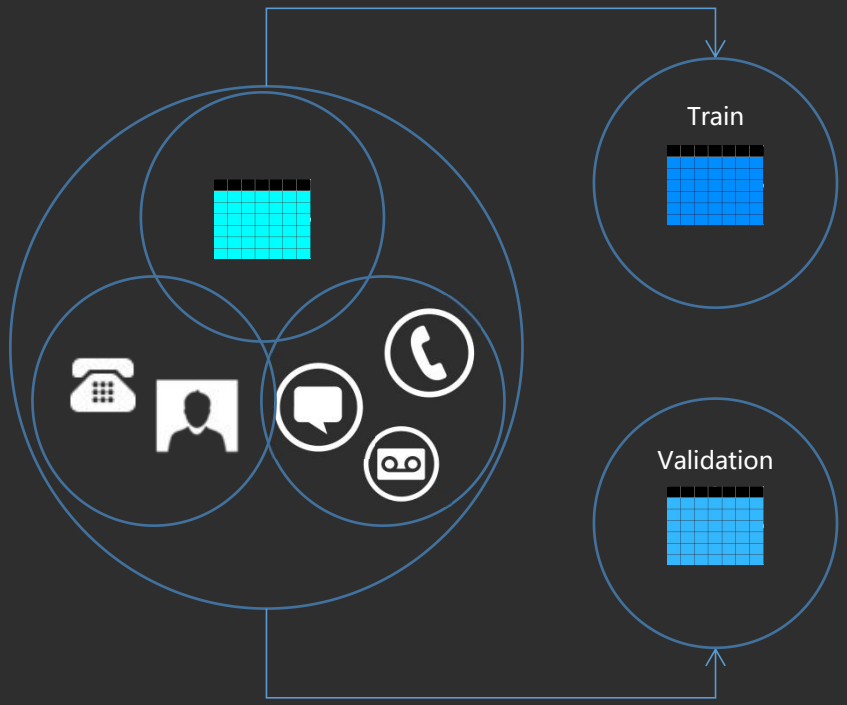


We start with sales interactions, service usage, and plenty of other variables (i.e. segmentation variables)

- Aggregate the data according to the type of campaing that is going to be performed
- Check the data for errors
- Identify what is the event we're modelling

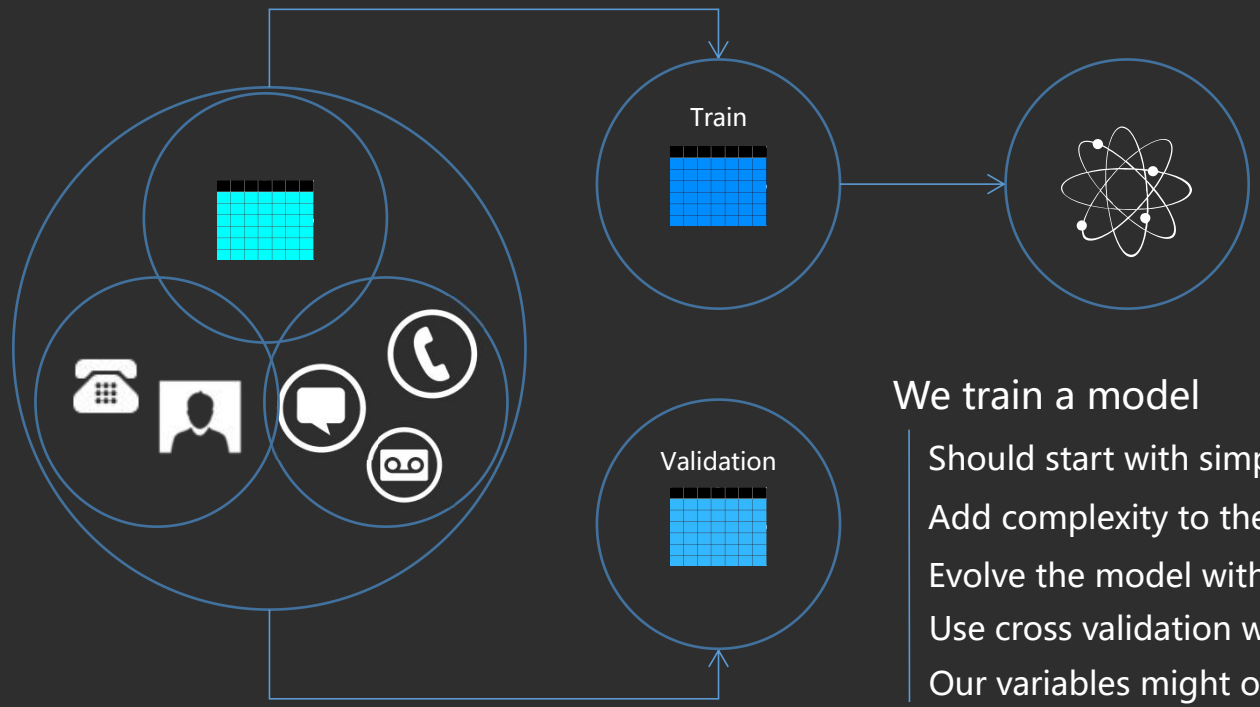
Analytics Use Case Analysis: Product Propensity Modelling (II)



We prepare a training set and a validation set

- The validation set should be in a different timeframe than the training set
- We should be modelling the same event for every customer or at least an equivalent event
- We could do some SMOTE, oversampling, undersampling if we really need the balance the dataset

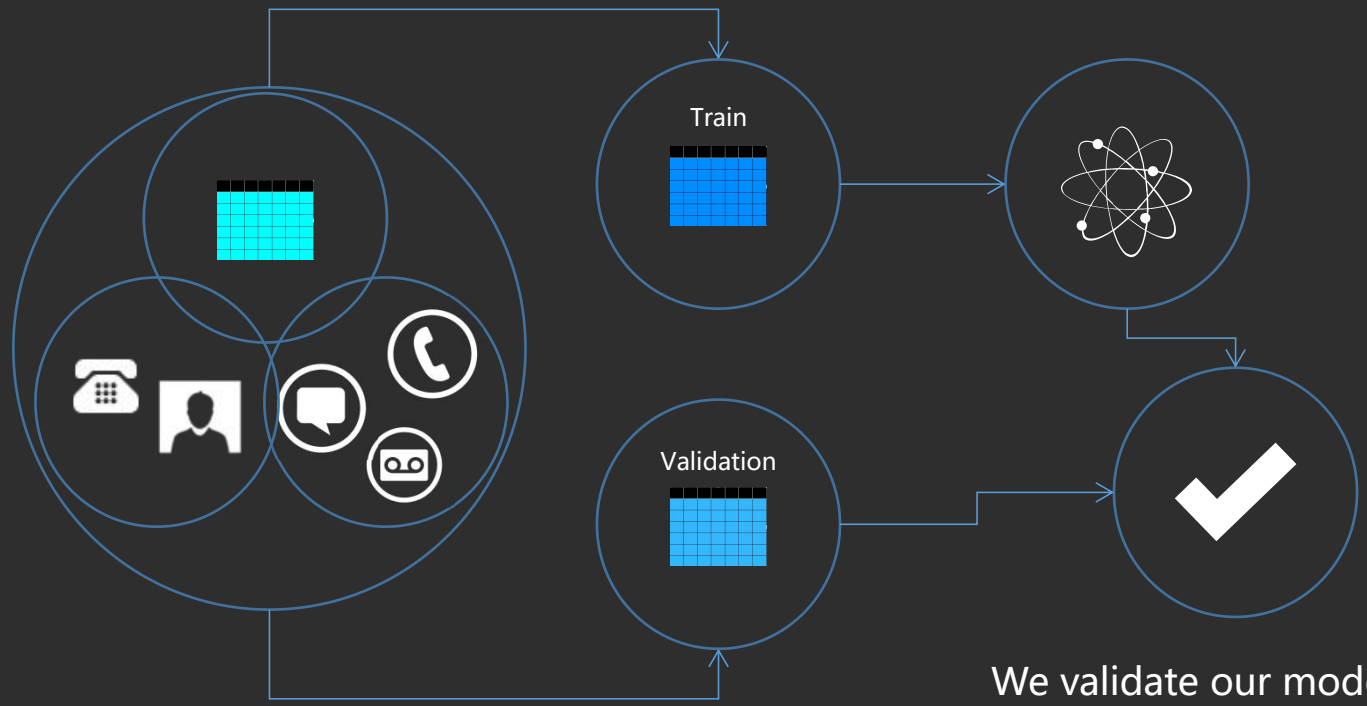
Analytics Use Case Analysis: Product Propensity Modelling (III)



We train a model

- Should start with simple models like boosted logistic regressions or trees
- Add complexity to the data processing steps (PCA, ICA, etc)
- Evolve the model with more advanced techniques if you really need that extra performance
- Use cross validation with custom splits to prevent overfitting on time based datasets
- Our variables might only explain a small part of the variance of the sample but that small part might be enough to increase our sales if we focus on high propensity customers

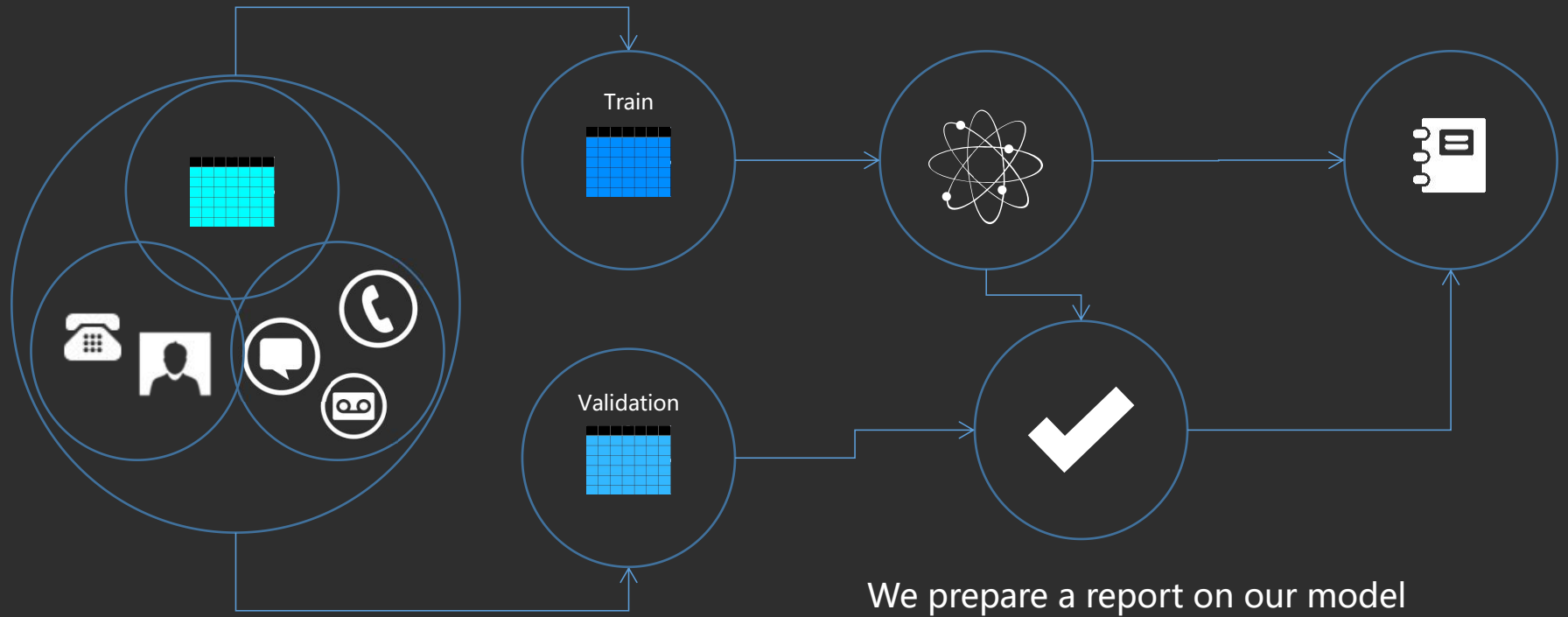
Analytics Use Case Analysis: Product Propensity Modelling (IV)



We validate our model

- Look at your variables! Do they make sense in terms of what you're modelling?
- Are you taking into account possible business process artifacts that are affecting the model?
- Is the performance difference not significant between CV and validation?
- Is the performance metric correct for what you're modelling?

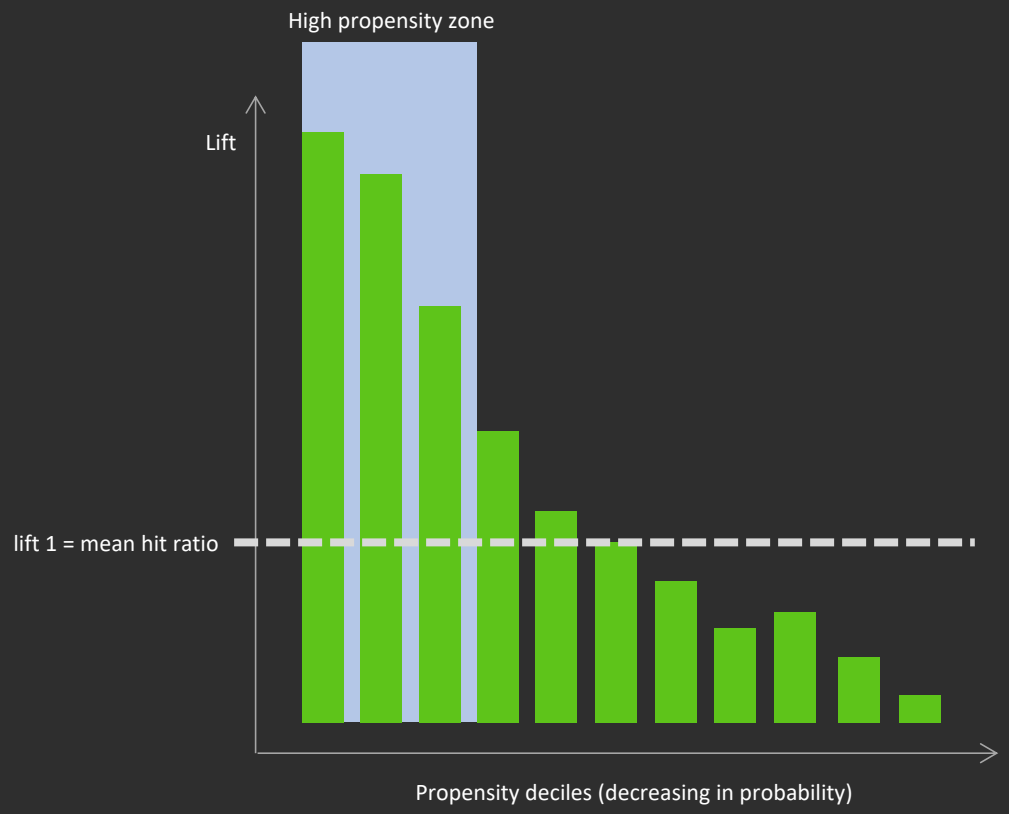
Analytics Use Case Analysis: Product Propensity Modelling (V)



We prepare a report on our model

- What are the most important variables? What are their ranges in each target level?
- How does the lift curve looks like?
- Can we divide our lift curve?
- Can we create a story that tells us why a costumer subscribe a certain service?

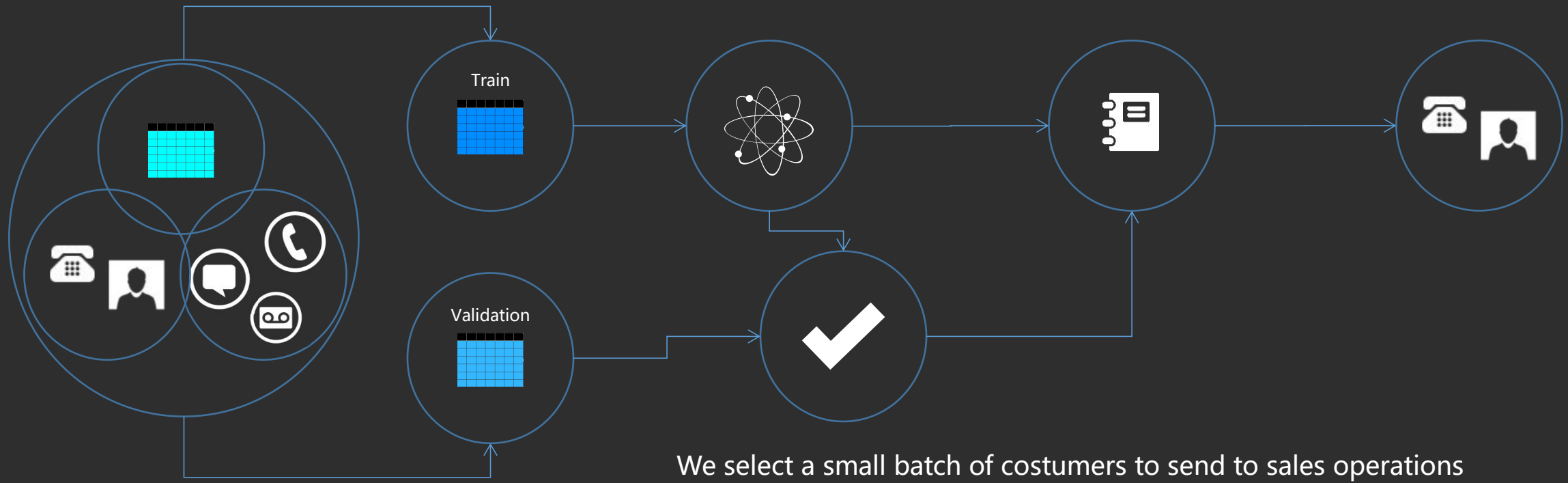
Analytics Use Case Analysis: Product Propensity Modelling (VI)



We can analyse the model lift in equally spaced propensity deciles

- This allows us to further describe the way the model is describing our event
- It allows to separate higher propensity customers from others
- Allows the use of less accurate models by focusing where the model works best

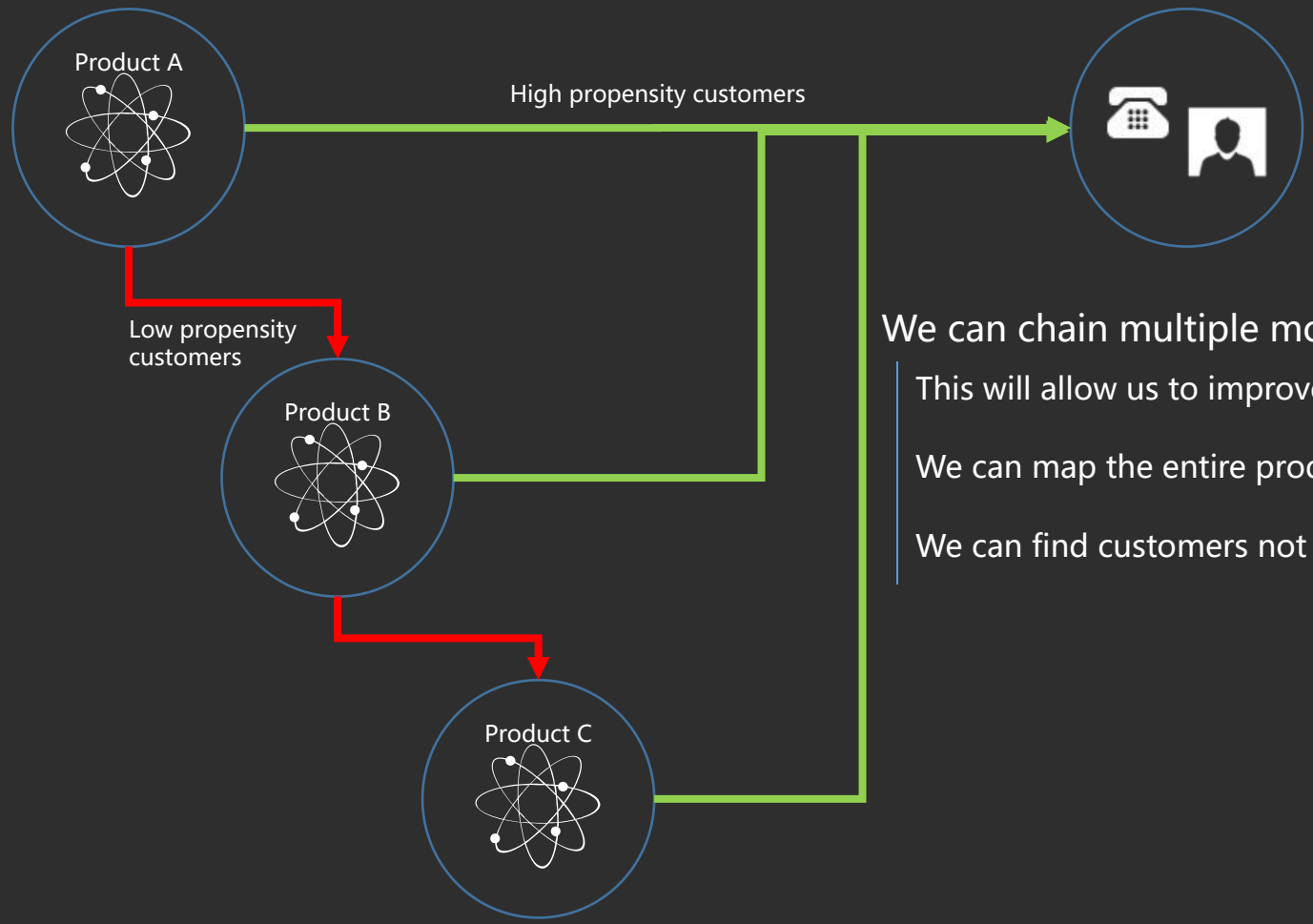
Analytics Use Case Analysis: Product Propensity Modelling (VII)



We select a small batch of costumers to send to sales operations

- This allows for further validation and model tuning
- It will create credibility in the model in other stakeholders
- Will allow for the identification of process problems that might prevent operationalization

Analytics Use Case Analysis: Product Propensity Modelling (VIII)



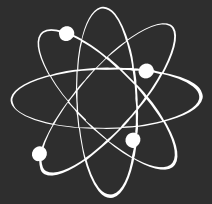
We can chain multiple models

- This will allow us to improve customer targetting with the best offering
- We can map the entire product line onto the customer base
- We can find customers not served with the current product line

Final Considerations

Final Considerations

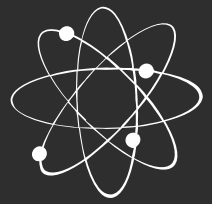
Marketing + Analytics



It's a powerful combination

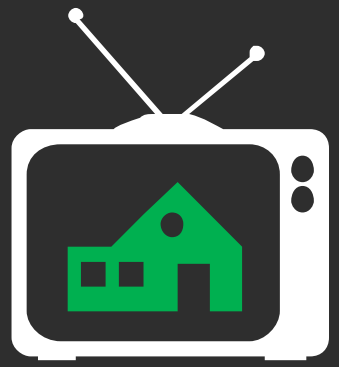
Final Considerations

Marketing + Analytics



It's a powerful combination

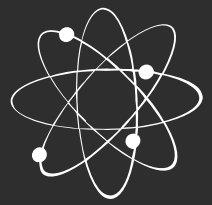
It can be spooky to the customers



We're looking at them in ways they don't usually understand

Final Considerations

Marketing + Analytics



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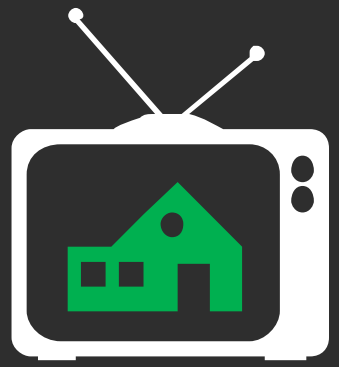

We're looking at them in ways they don't usually understand

Keep comfortable levels of privacy

Just like you'd like to have for yourself

Marketing Analytics

DSPT
DATA SCIENCE PORTUGAL

Questions?

Thank you!