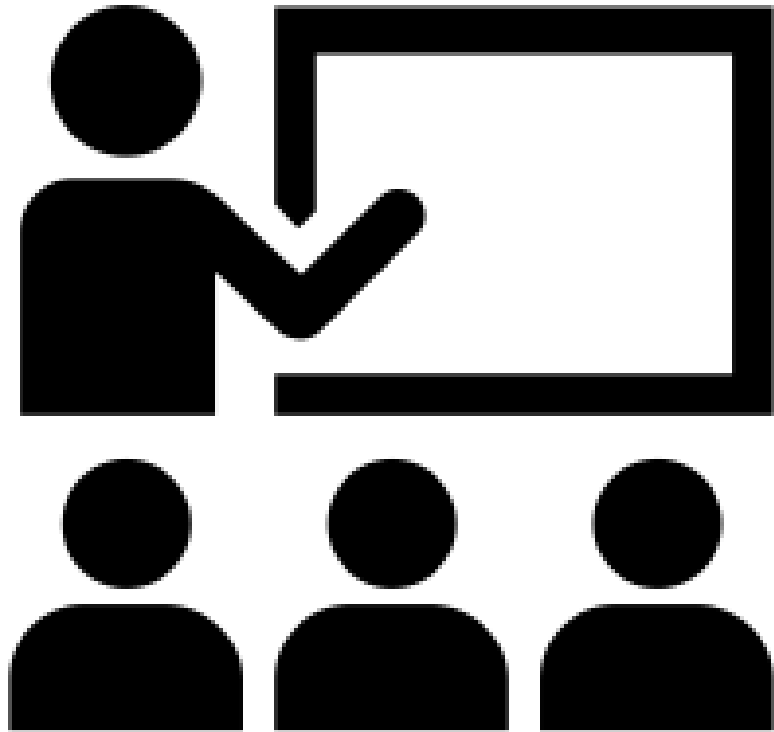




# Data Science: the changing role of a pricing actuary

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November 2019



Let me tell you a story...

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Introduction: how the modeling work evolved

How to achieve model acceptance

From model to implementation

After Implementation

Career in Data Science

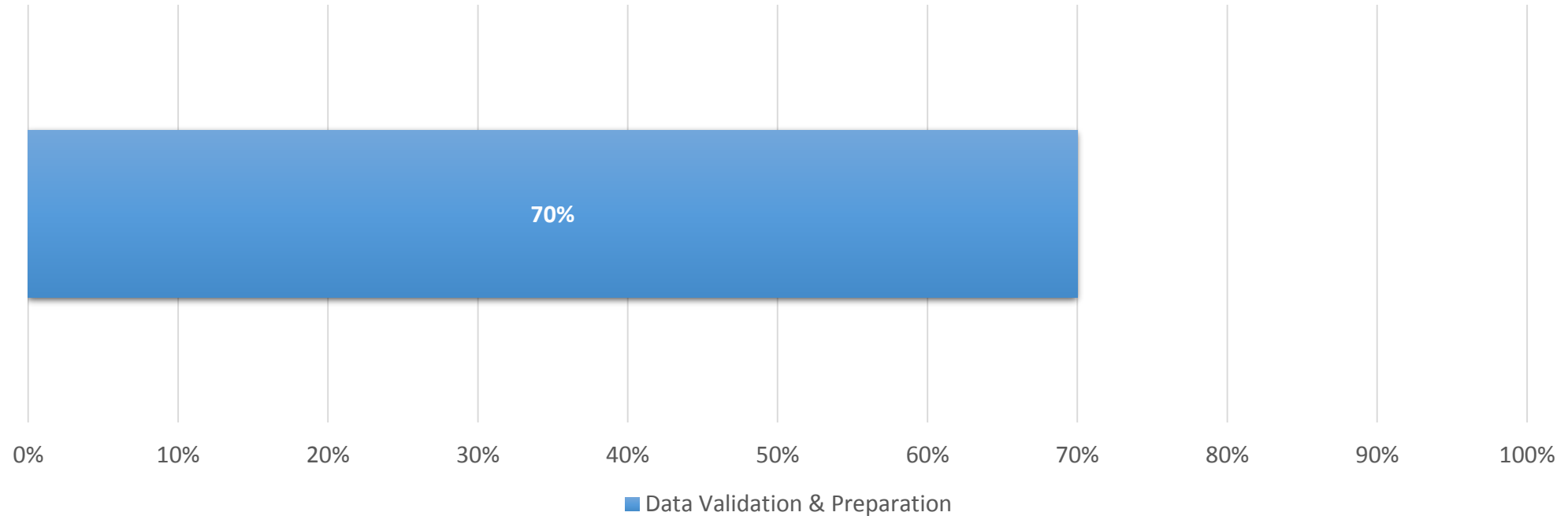
## AGENDA

---



# Traditionally, data preparation has been the key

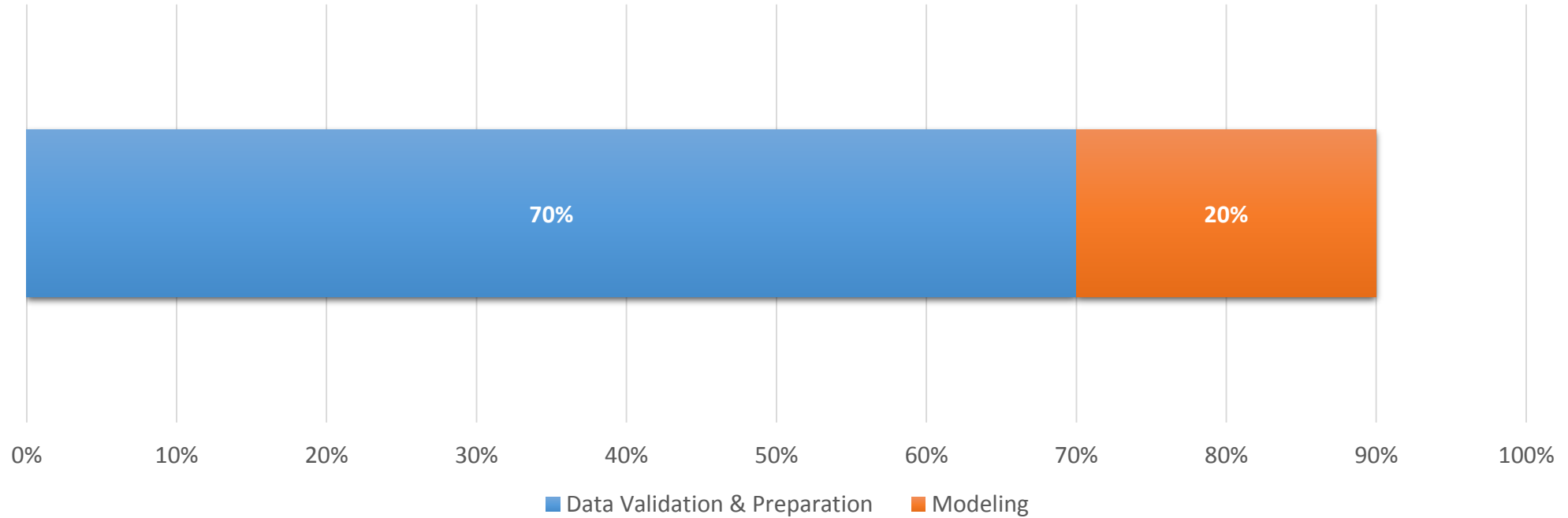
Time allocation for Pricing models





# Traditionally, data preparation has been the key

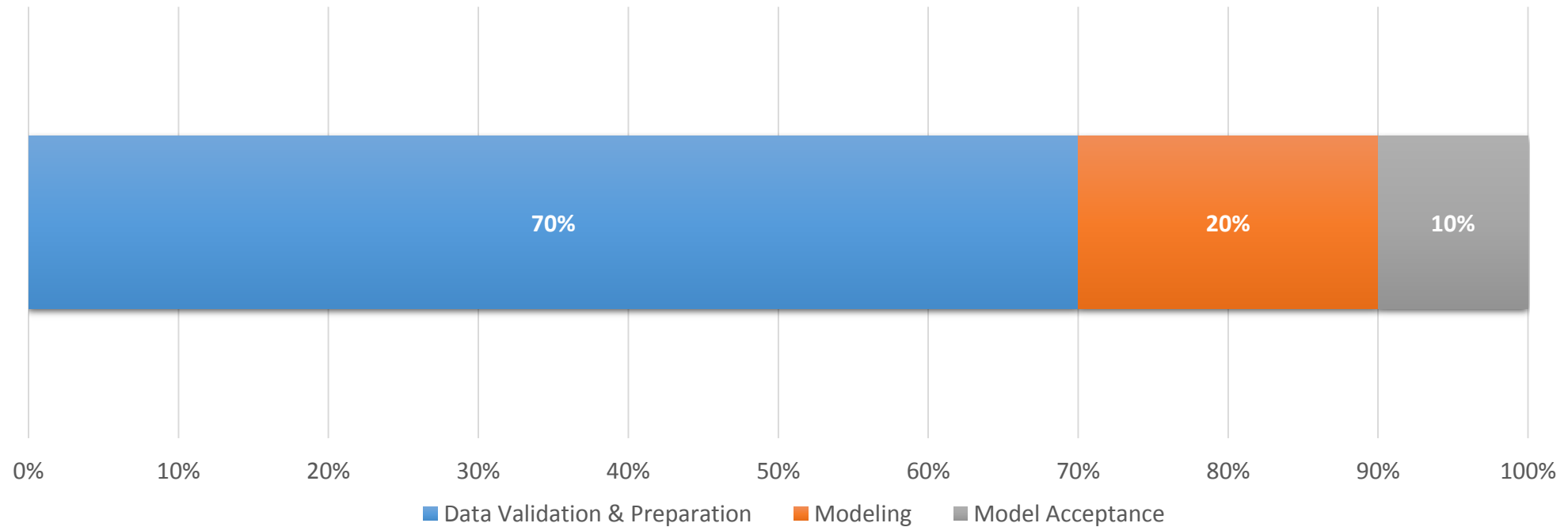
Time allocation for Pricing models





# Traditionally, data preparation has been the key

Time allocation for Pricing models



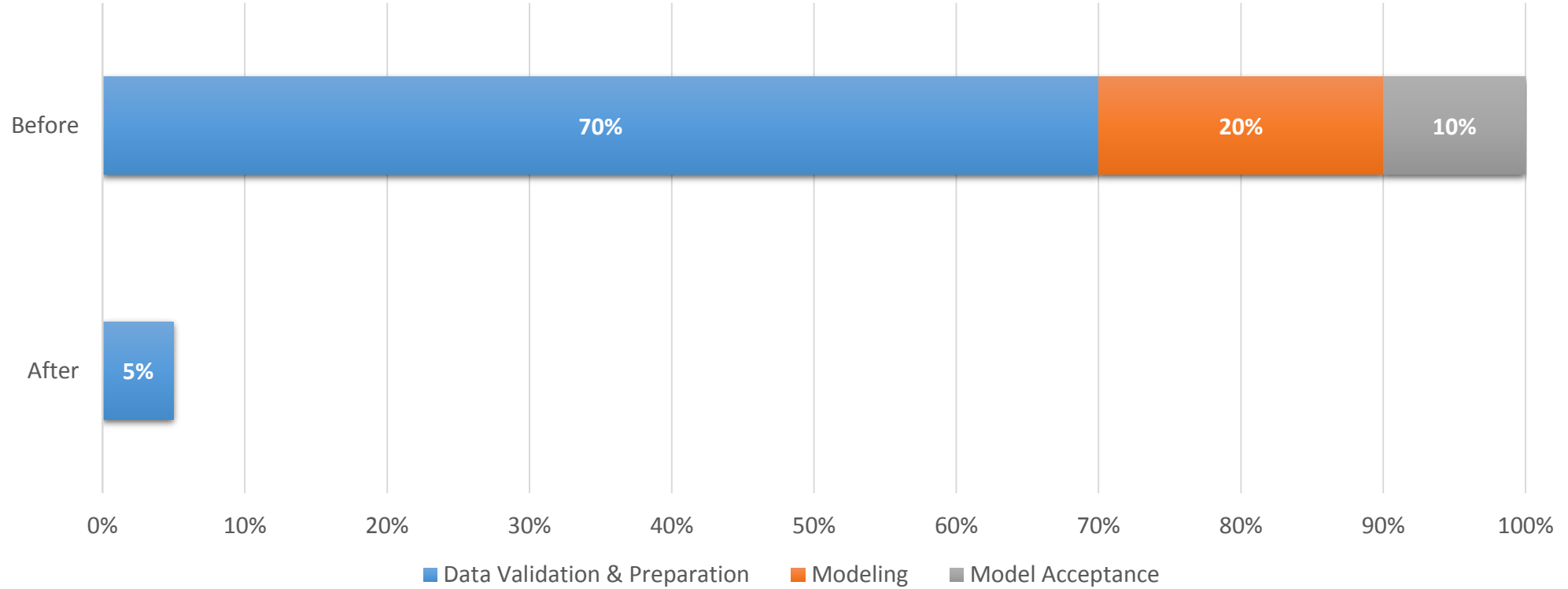
**How did that change  
today?**

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# What an ideal situation looks like?

Time allocation for Pricing models

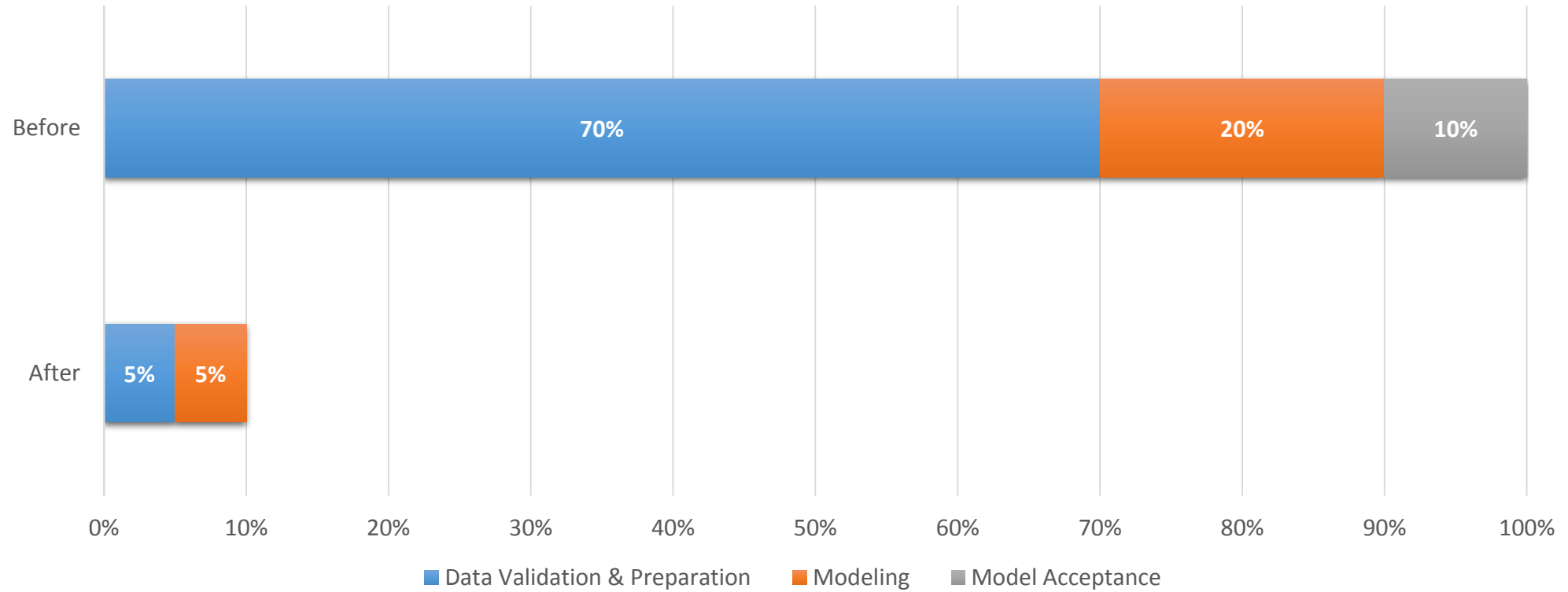






# What an ideal situation looks like?

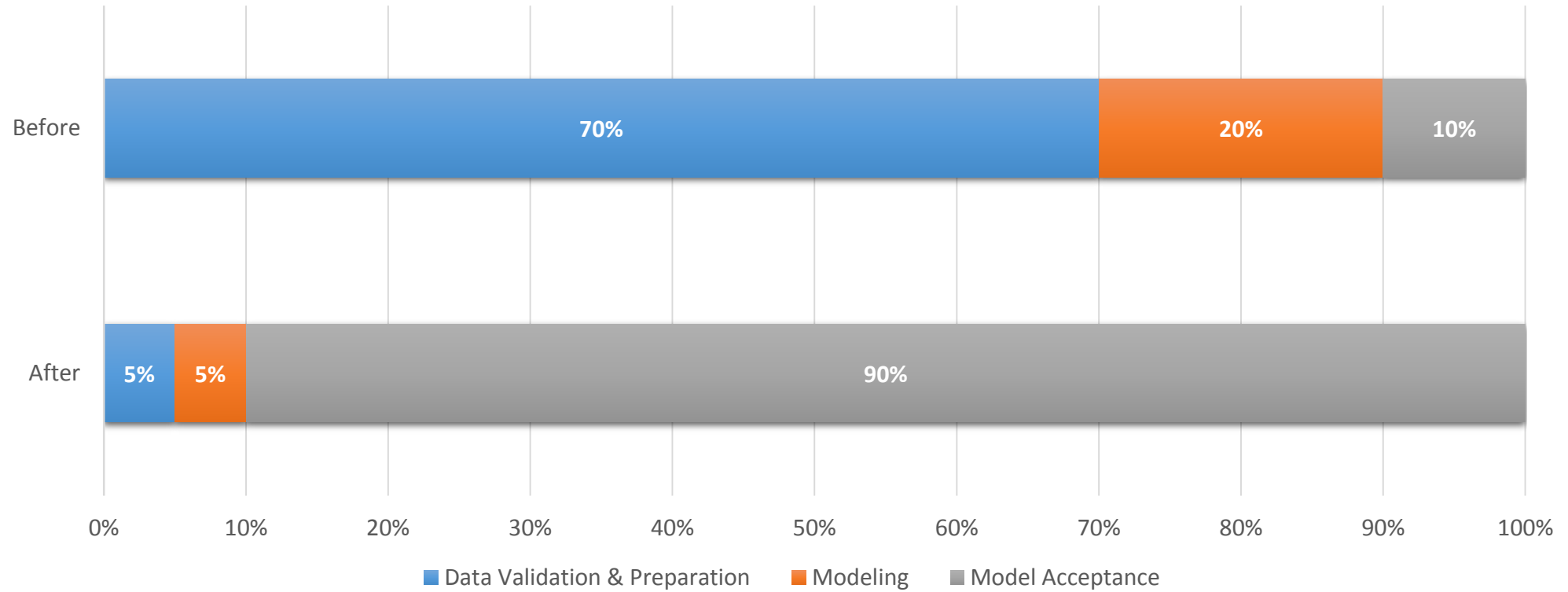
Time allocation for Pricing models





# What an ideal situation looks like?

Time allocation for Pricing models



# How is it changing?



Models much more complex and difficult to explain



Huge time saving through Automation & AI



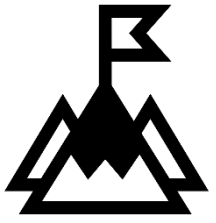
Actuaries are not the best modelers anymore



Shifting of the bulk of work to model acceptance

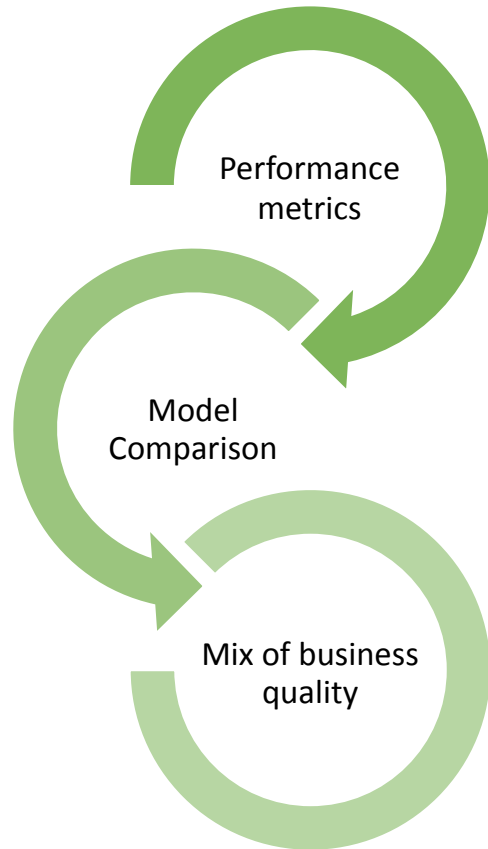


Actuaries have the perfect set of skills to support model assessment, acceptance & communication

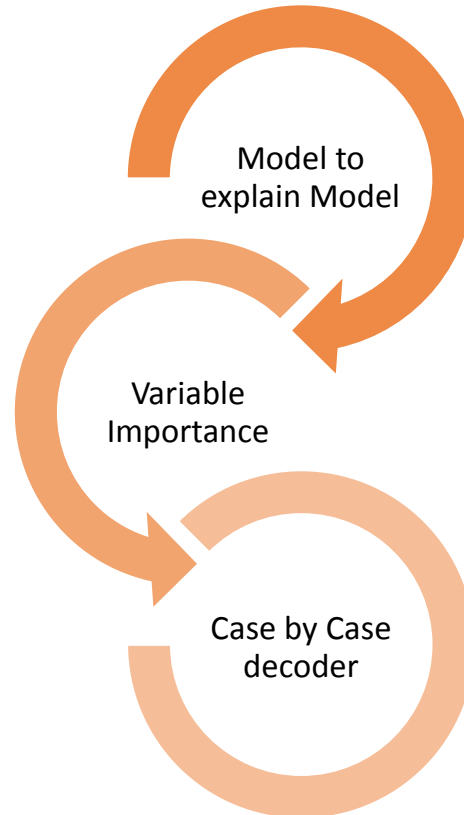


# How to achieve model acceptance?

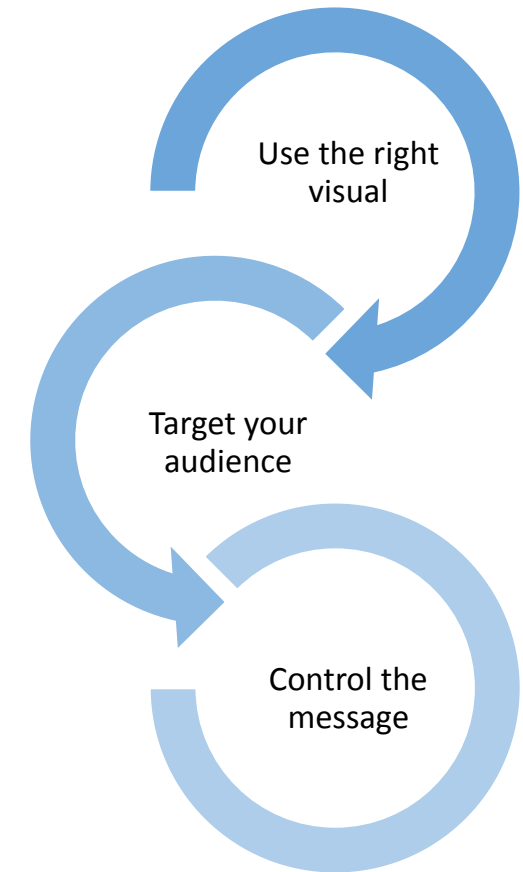
## Performance

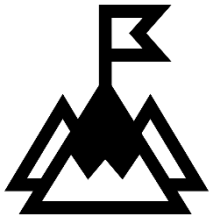


## Interpretation



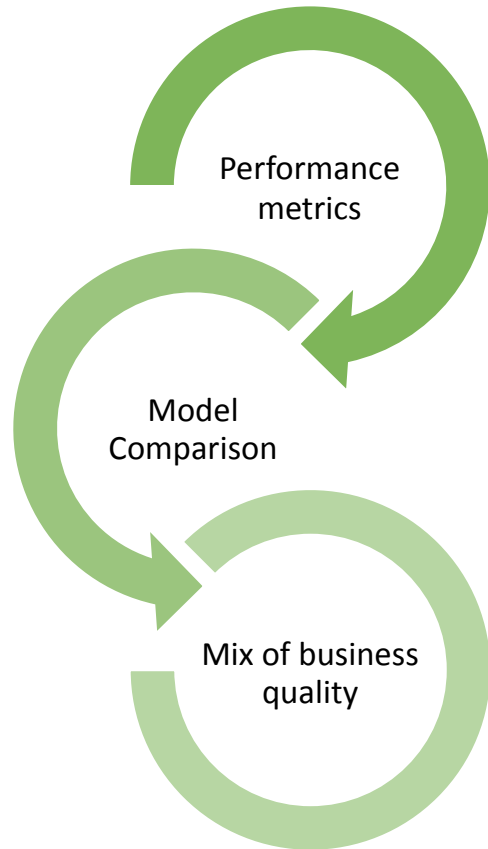
## Communication



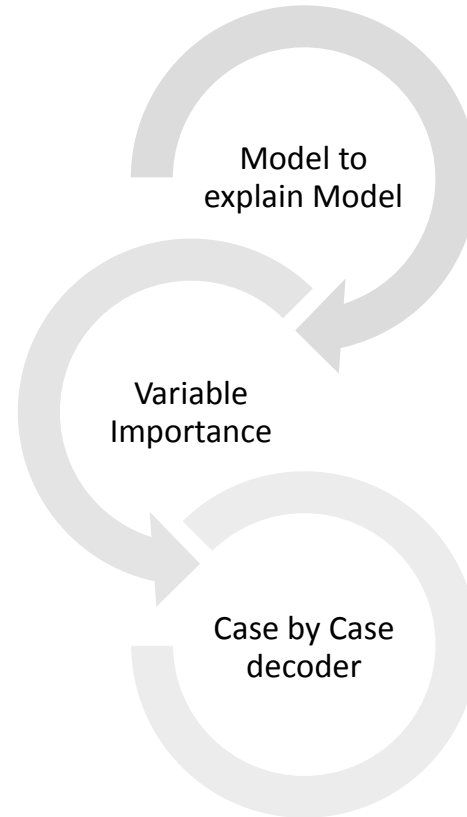


# How to achieve model acceptance?

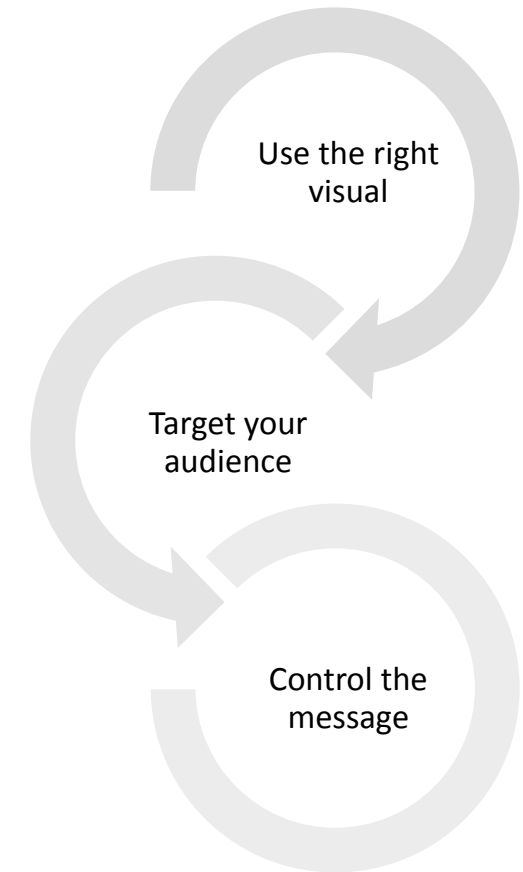
## Performance



## Interpretation



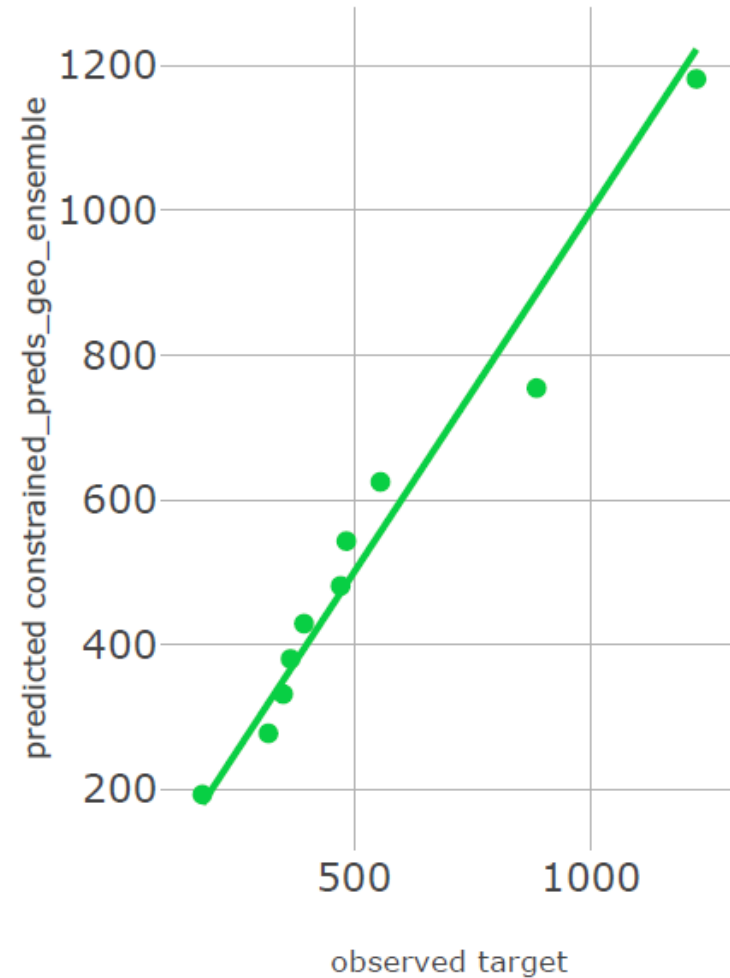
## Communication

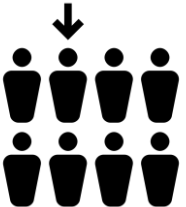


*Confidence in our models is a key acceptance criteria.*

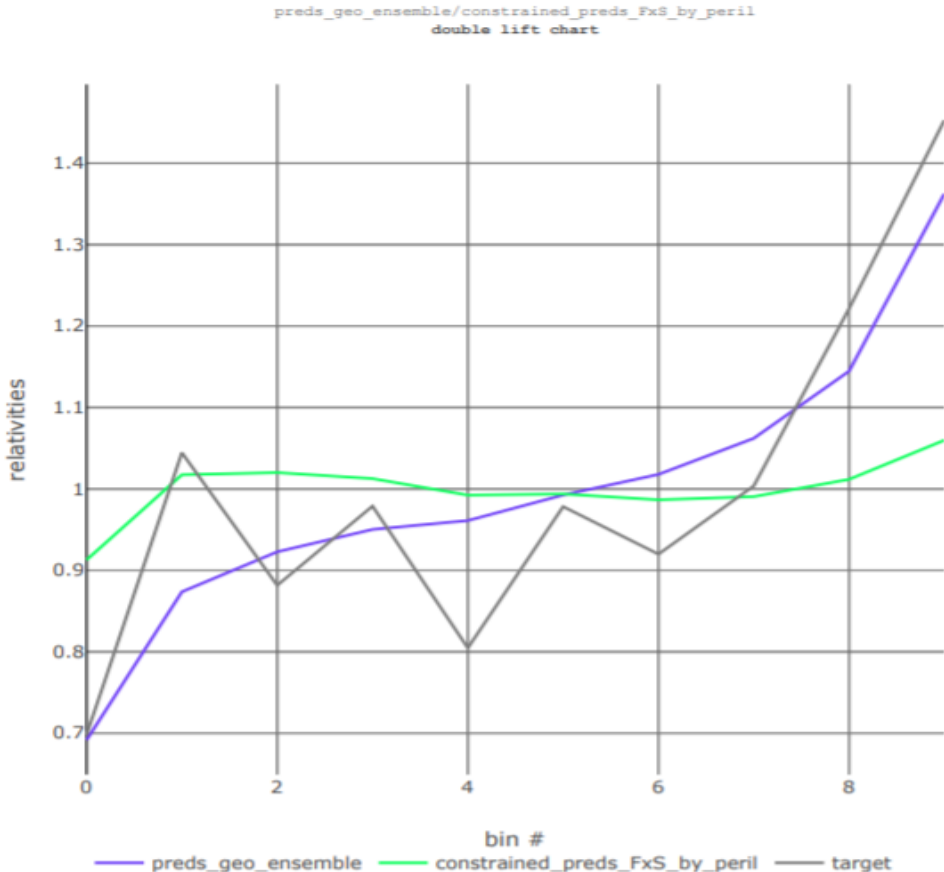


```
constrained_preds_geo_ensemble
observed v. fitted
'normalized_gini': 0.297, 'mae': 1023.1, 'rmse': 13480.7
```

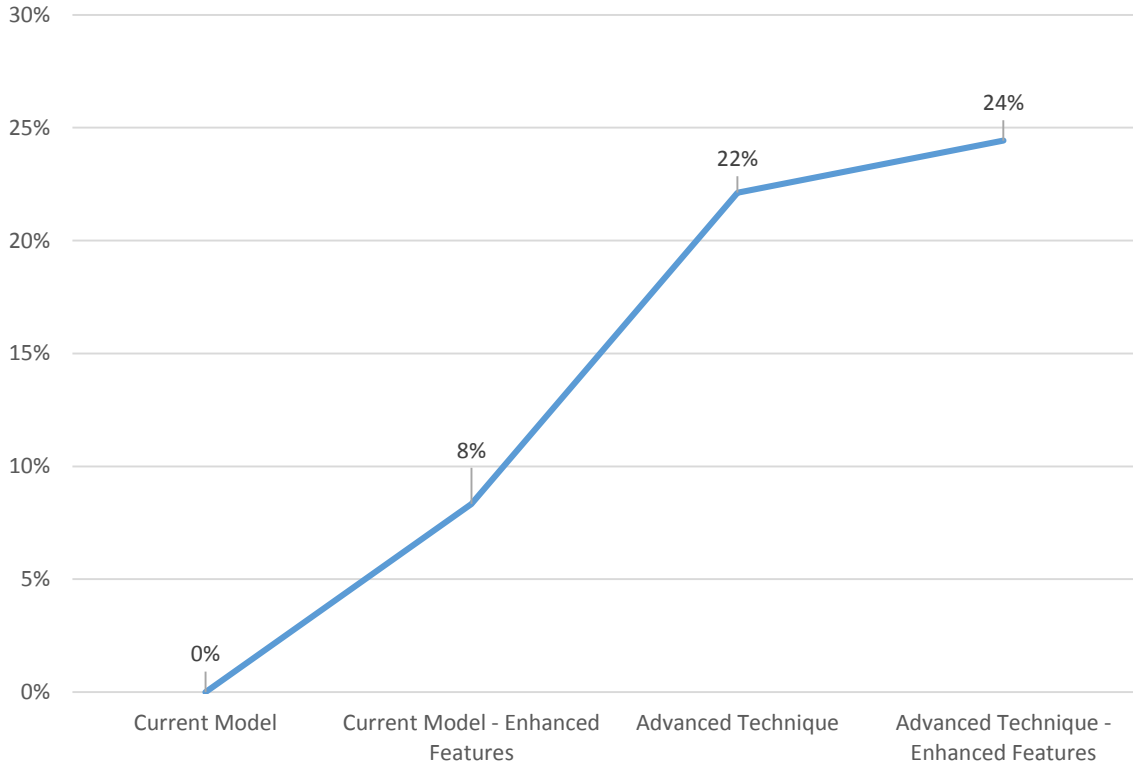


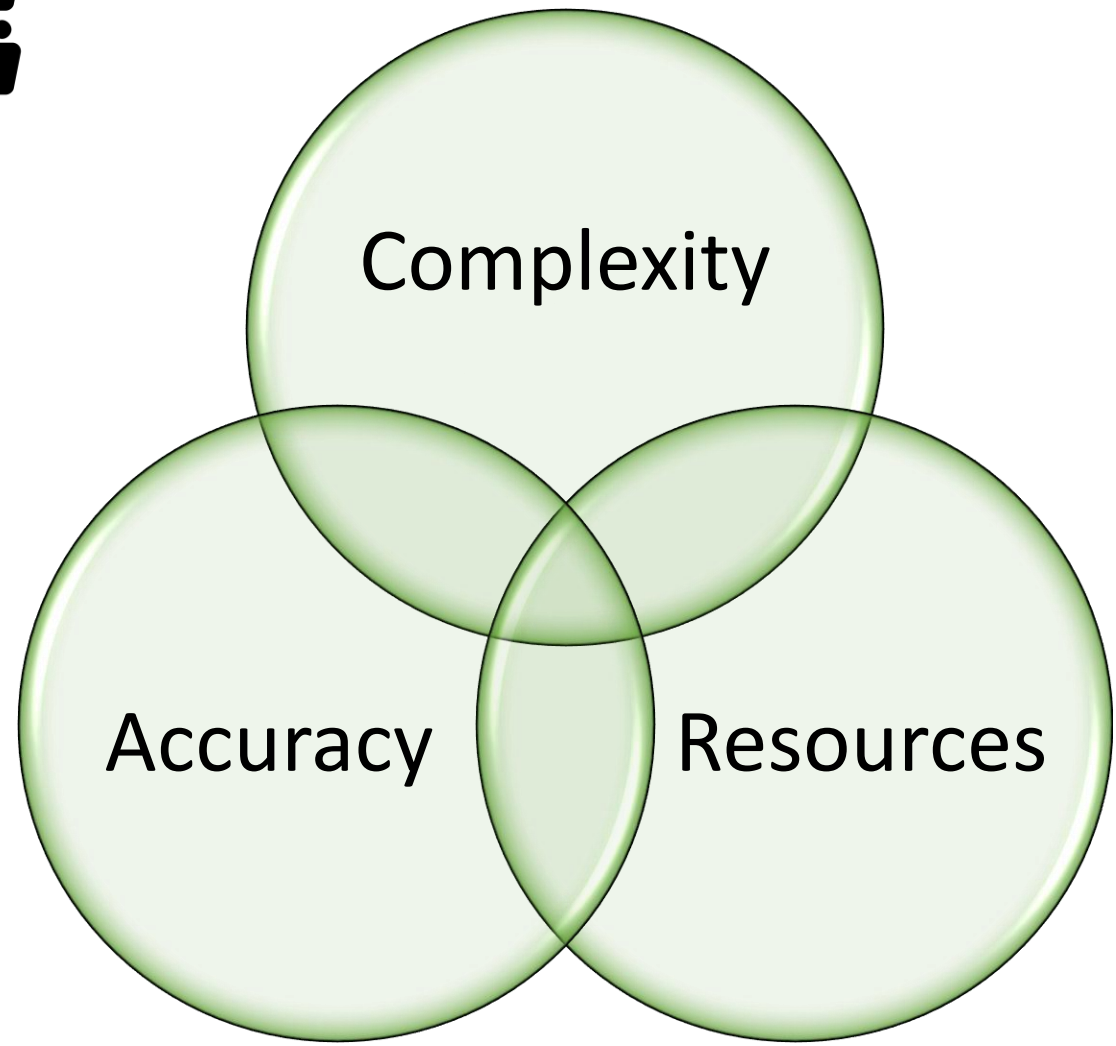
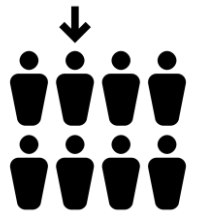


# Best model for the need

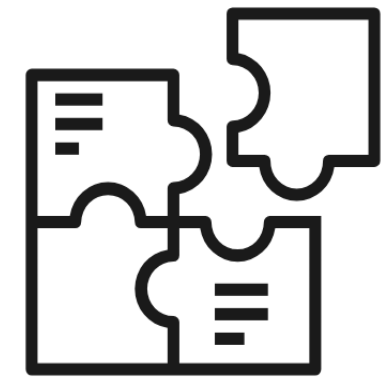


% Improvement through Advanced Modelling  
Out of Time Performance



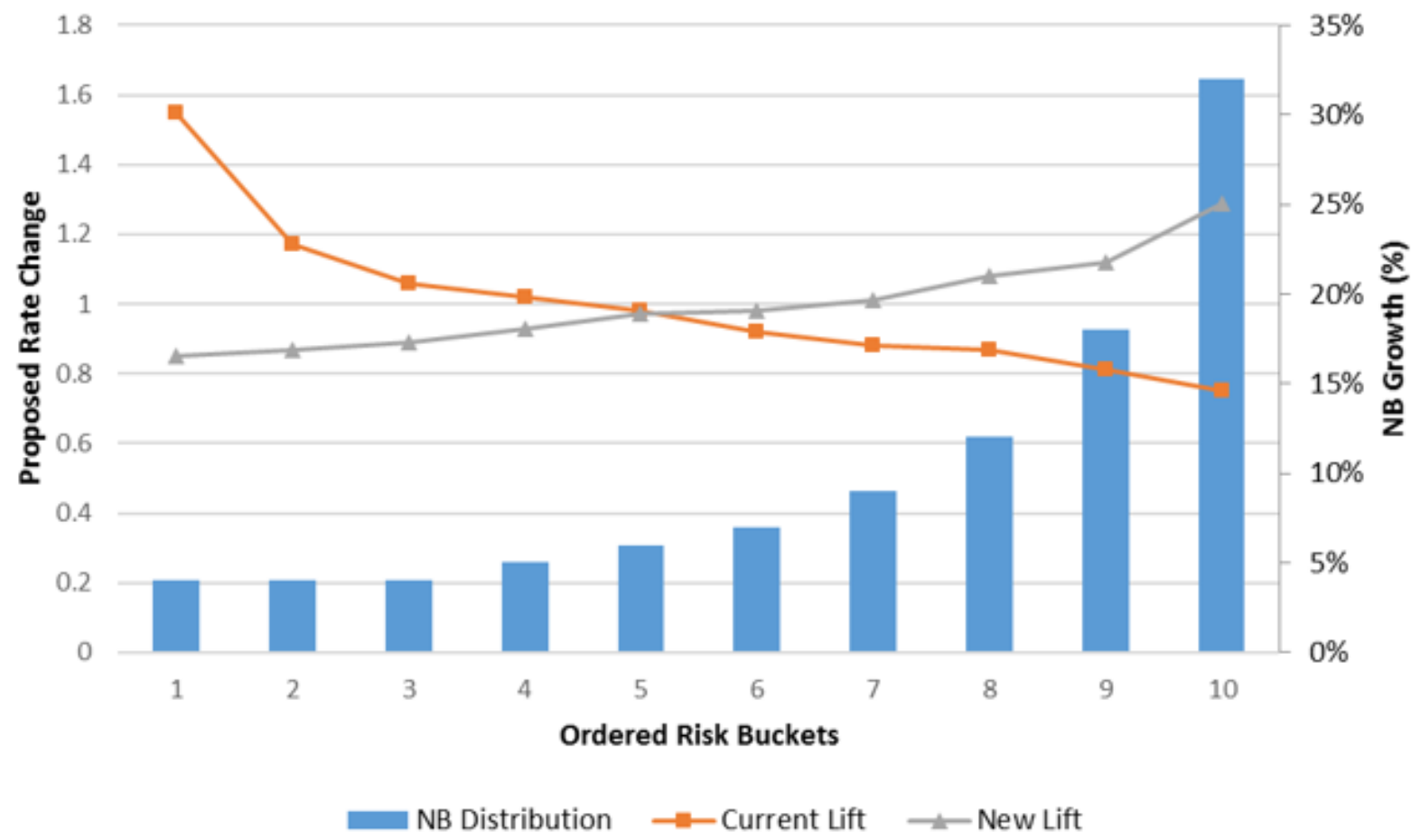


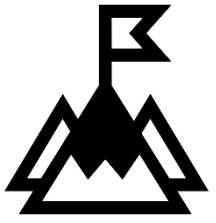
*Complexity does not always mean a superior **solution***





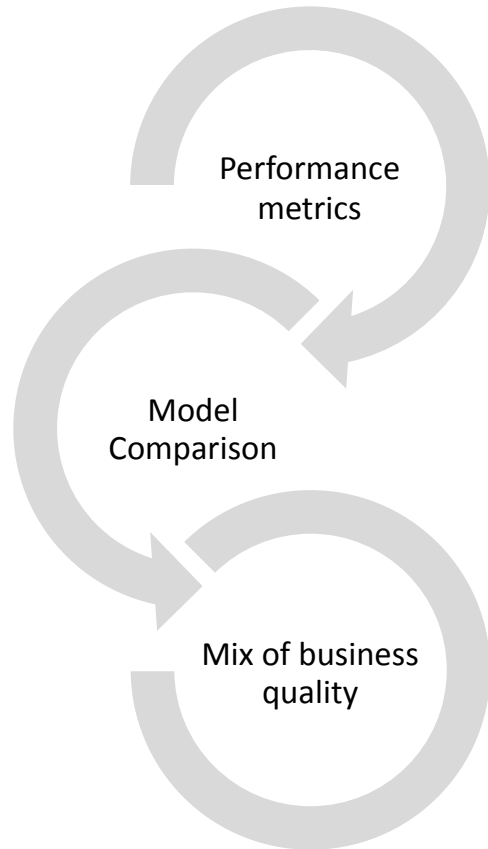
# ⚠️ You have an anti-selection problem, we have the *solution*.



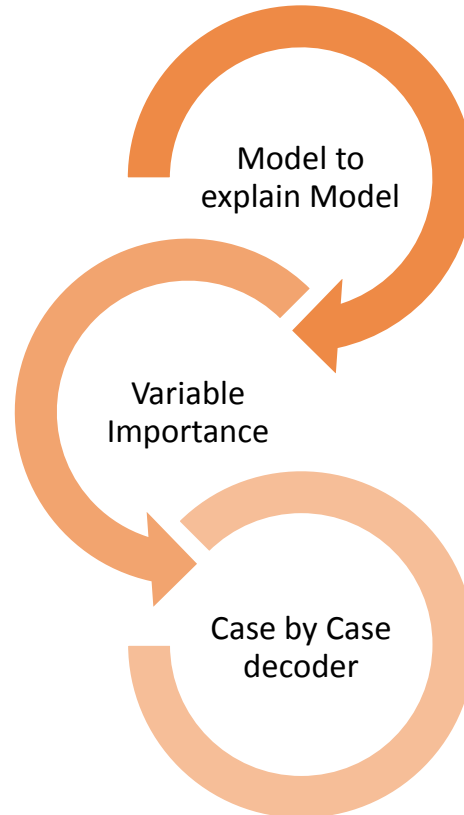


# How to achieve model acceptance?

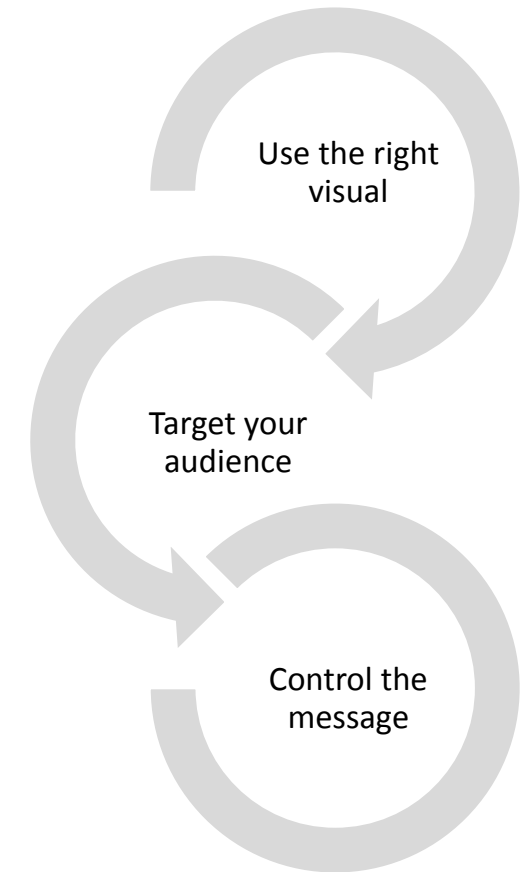
## Performance

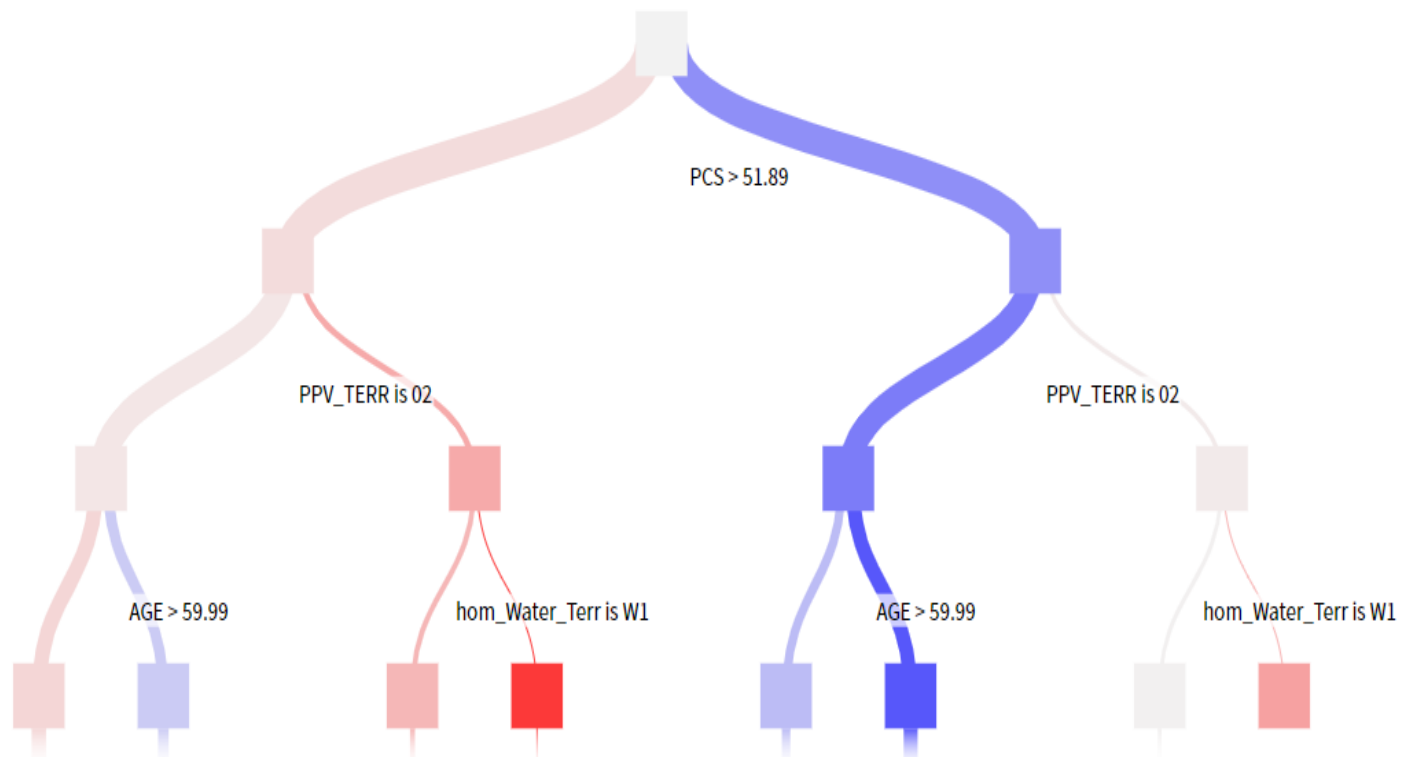


## Interpretation



## Communication





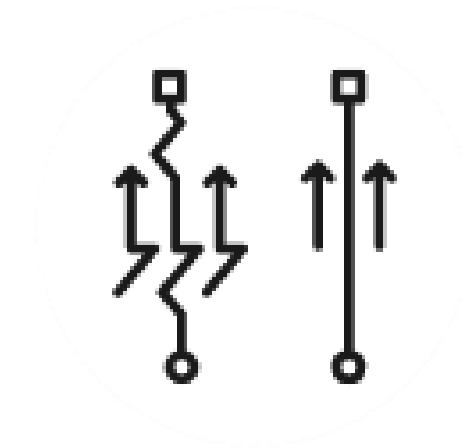
PREDICTION
-0.30

DECISION RULES
PCS > 51.89
▼
PPV_TERR is not 02
▼
AGE > 59.99

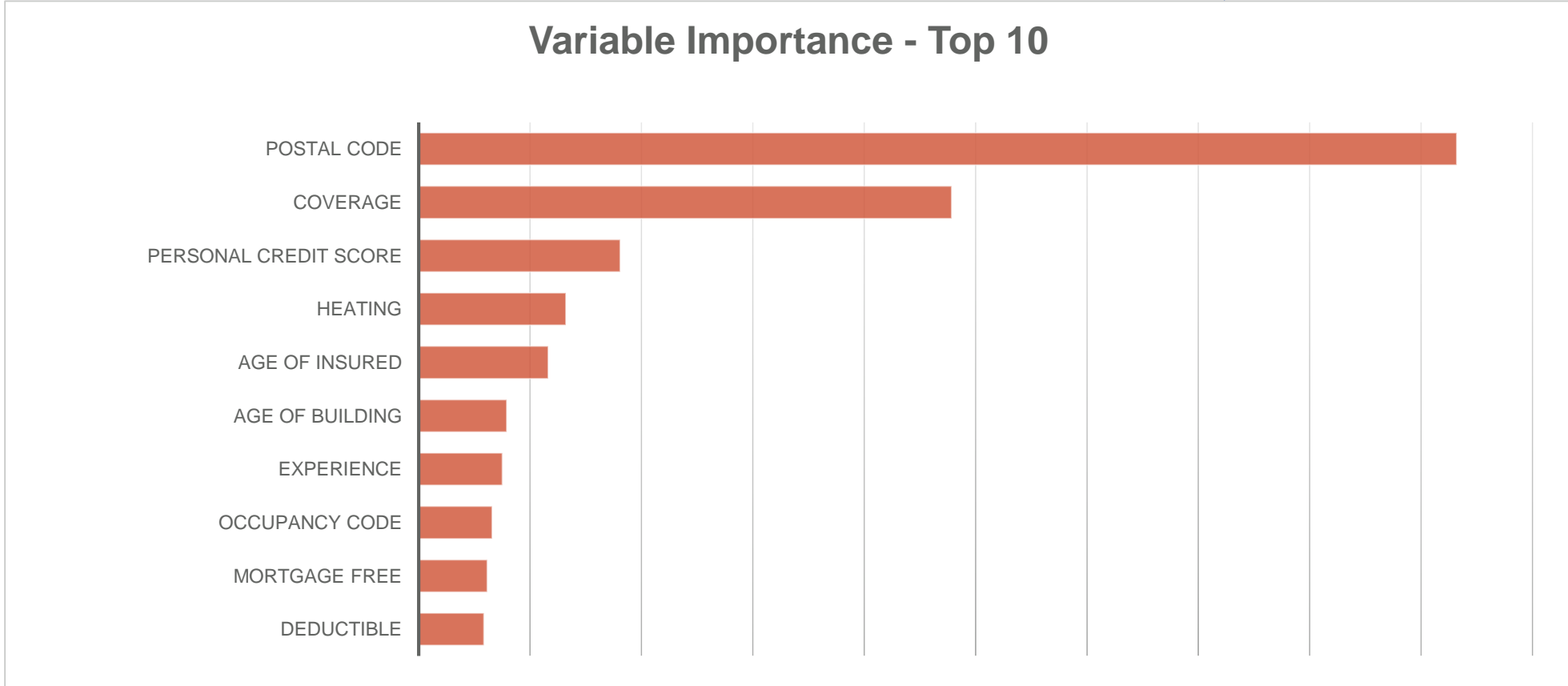
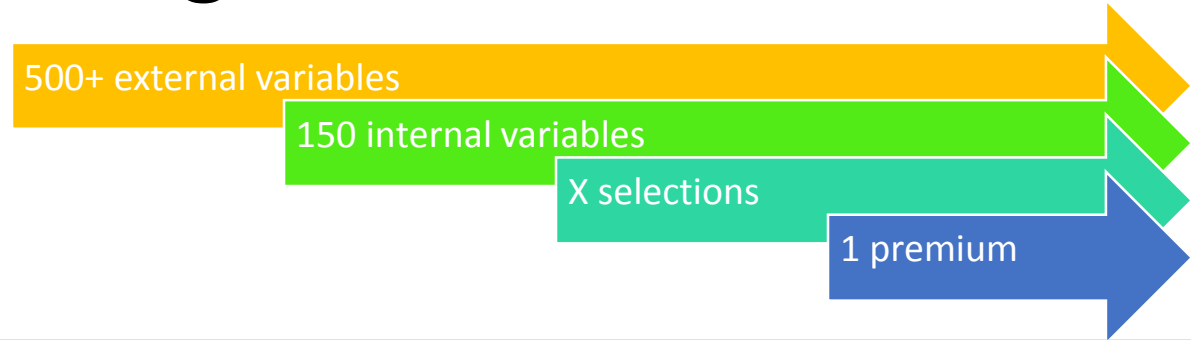
SAMPLES
4,805 (25.33%)



Simplified view of the model to understand major trends

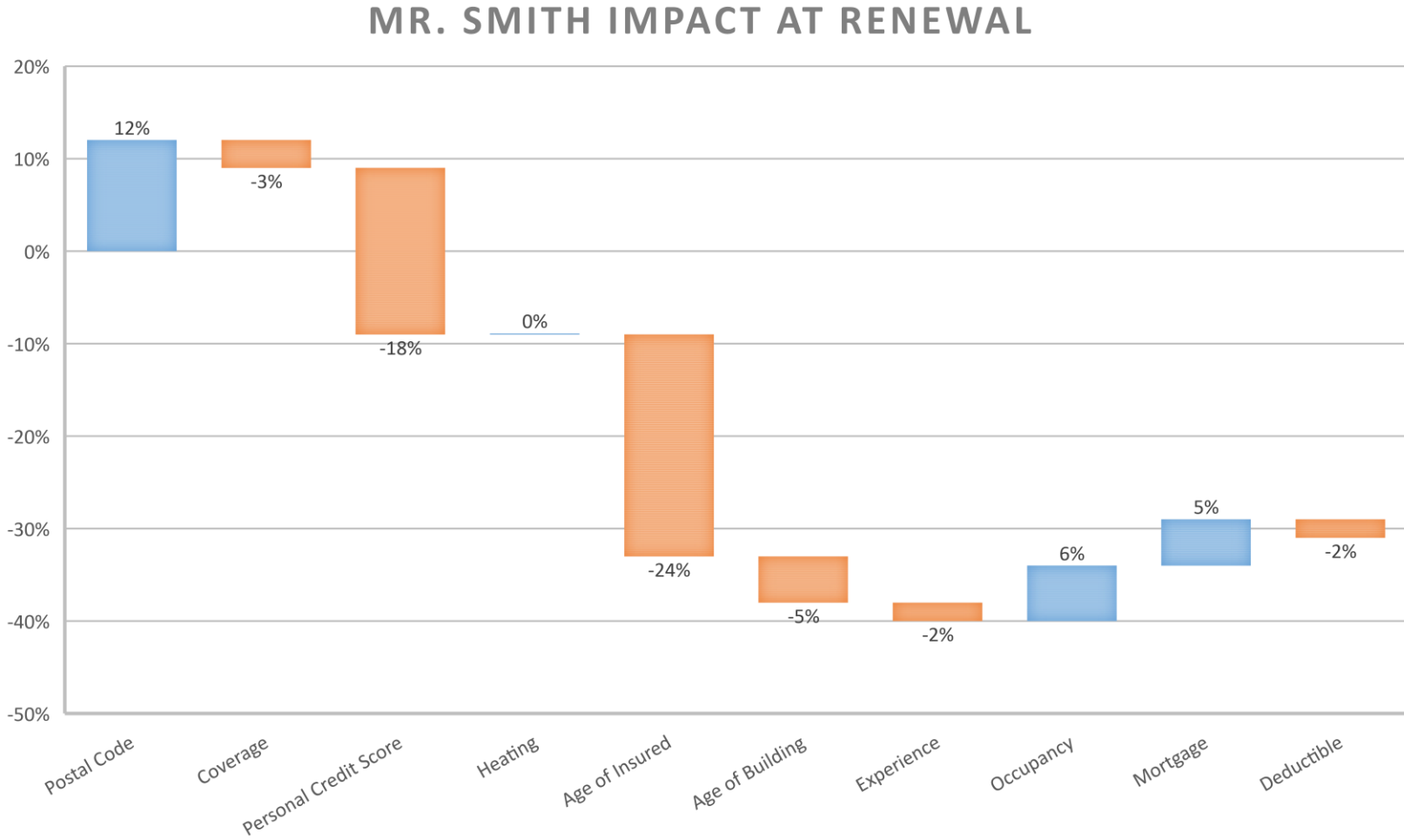


# It is all about segmentation! What drives the model?

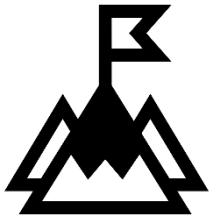




# Understand each case is a must to explain outliers

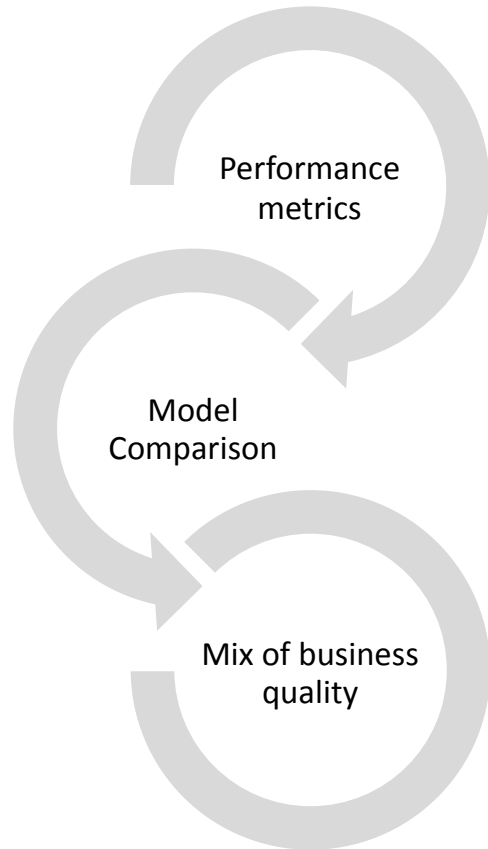


- The presentation of the results are as important as the results itself in the process of convincing stakeholders that the proposed model is the right thing to do.
- Avoid long list of bullet points in PowerPoint Presentation. Your audience is likely to focus on the reading of your list instead of focusing on what you are saying. It would also be difficult for the audience to understand what is the key points that the presenter is expecting to get from the list.
- If you are in a big room, there is a significant chance that one or many people in the room would struggle to read the full contents of your slides. This is particularly true if you are using small font. Think about people that are in the last row of the room and make sure you are not creating frustration. You want your audience to stay focus on your message.
- *The layout of your report elements impacts reader comprehension and guides them through the report page. How you place and position elements tells a story. The story might be “start here and then look here” or “these three elements are related to each other.”*
- *In many cultures, people scan from left-to-right and top to bottom. Position the most important element in the top-left corner of your report. Organize the rest of the visuals in a way that leads to logical navigation and comprehension of the info.*
- *Position elements that require the reader to make a choice to the left of the visualizations the choice will impact: slicers, for example.*
- *Place position-related elements close to each other. Proximity implies the relationship of the elements.*
- *Another way to convey relationships is to add a border or color background around related elements. Conversely, add a divider to distinguish between different sections of a report.*
- *Use white space to visually chunk sections of the report page.*
- *Fill the report page. If you have too much white space, make your visualizations larger or make the canvas smaller.*
- If you have read until this bullet point, clap your hands
- *Be intentional with sizing your report elements. Don’t let space availability dictate the size of a visualization.*
- *Make important elements larger than the others or add a visual element like an arrow to draw attention.*

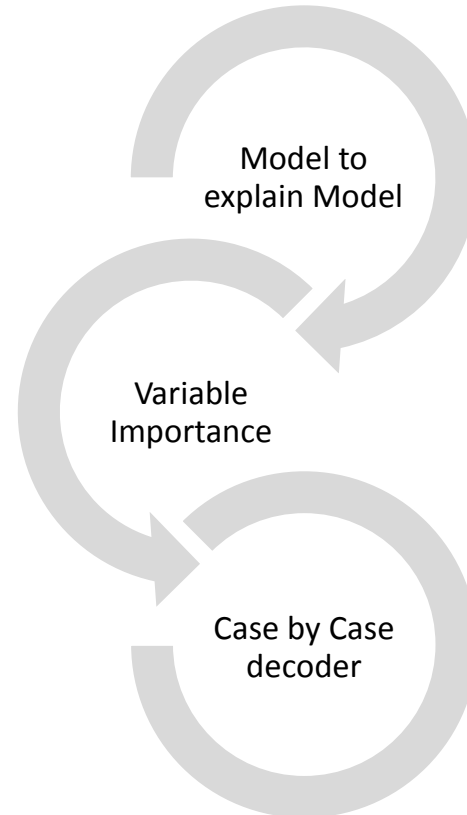


# How to achieve model acceptance?

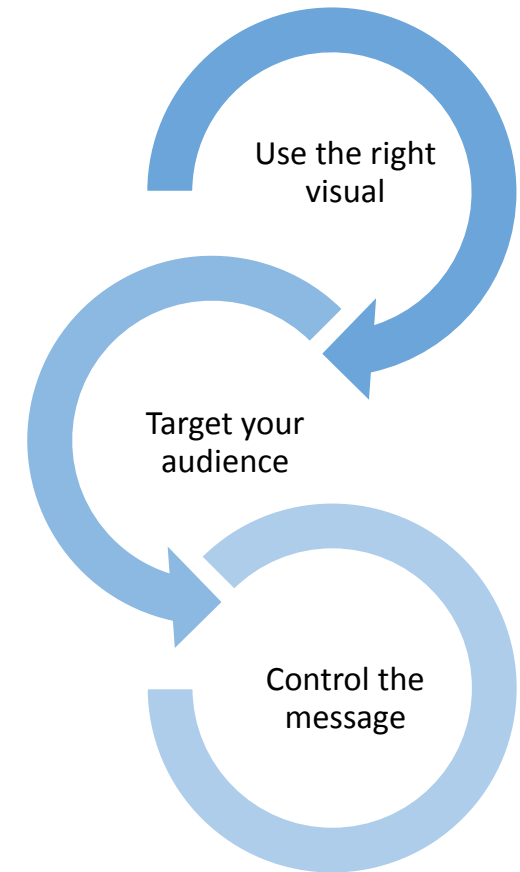
## Performance

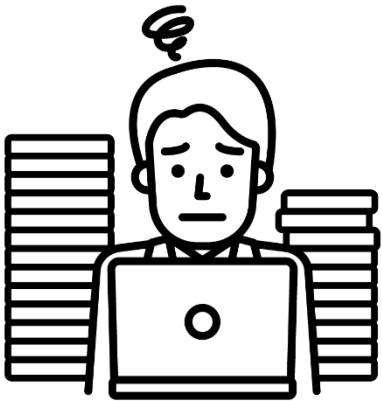


## Interpretation



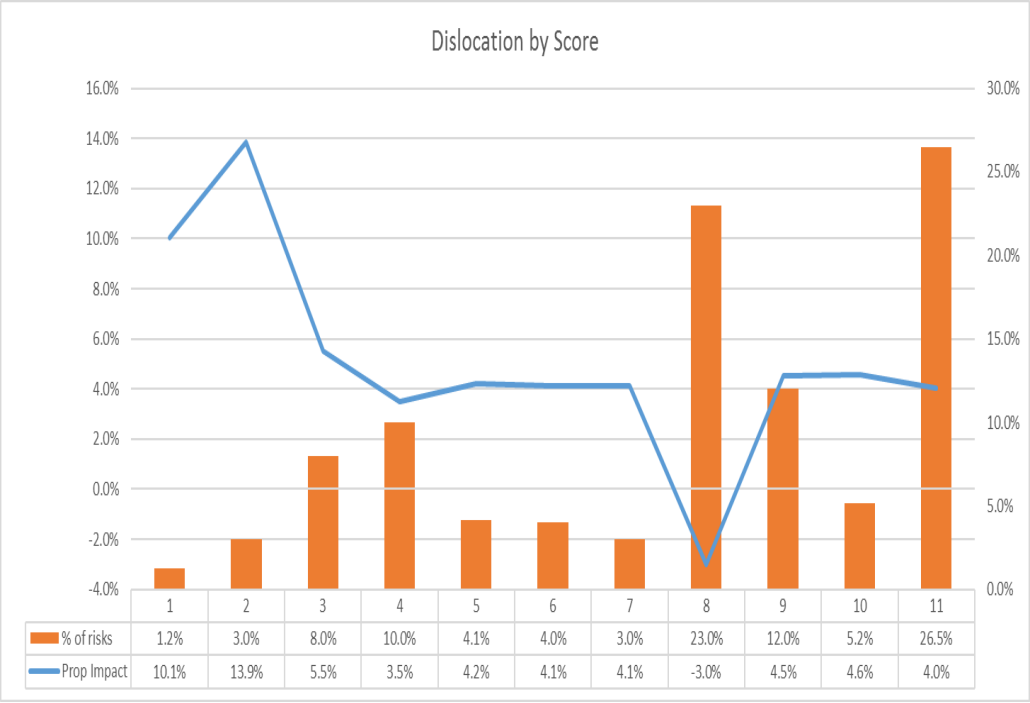
## Communication





Vs.

Score	# of risks	% of risks	Total Premium Curr	Total Premium Prop	Avg Curr prem	Avg Prop Prem	Prop Impact
0	278	1.22998%	354,234.39796	389,837.57330	1,274.22445	1,402.29343	10.0507%
1	620	3.00000%	822,046.13988	936,070.76415	1,325.88087	1,509.79156	13.8708%
2	812	8.00000%	1,086,940.99767	1,146,773.72600	1,338.59729	1,412.28291	5.5047%
3	898	10.00000%	1,173,060.31278	1,214,136.93865	1,306.30324	1,352.04559	3.5017%
4	935	4.13680%	1,275,111.34645	1,328,728.25505	1,363.75545	1,421.09974	4.2049%
5	968	6.00000%	1,317,131.52741	1,371,193.32280	1,360.67307	1,416.52203	4.1045%
6	1,046	3.00000%	1,442,793.28016	1,501,997.38510	1,379.34348	1,435.94396	4.1034%
7	1,219	23.00000%	1,652,720.48688	1,737,281.30780	1,355.80024	1,425.16924	-3.0000%
8	1,319	12.00000%	1,810,427.53228	1,892,233.37240	1,372.57584	1,434.59695	4.5186%
9	1,168	5.16768%	1,628,575.15060	1,702,882.41215	1,394.32804	1,457.94727	4.5627%
10	12,627	24.46553%	17,488,329.08942	18,189,887.17980	1,384.99478	1,440.55494	4.0116%





It's awesome, Gini of 32%, lift of 9.1!

The Audience:





# What do you need to consider?

<b>Audience Desired Outcomes</b>	<ul style="list-style-type: none"><li>• what defines success for them?</li></ul>
<b>Business Application</b>	<ul style="list-style-type: none"><li>• what is the impact on the day-to-day operation?</li></ul>
<b>Ownership / Stakeholders</b>	<ul style="list-style-type: none"><li>• who is responsible for oversight?</li></ul>
<b>Limitations / Constraints</b>	<ul style="list-style-type: none"><li>• what will prevent success?</li></ul>
<b>Strategic Alignment</b>	<ul style="list-style-type: none"><li>• are we delivering results that support audience goals?</li></ul>



## Hearsay

*This model  
has no effect  
on our ability  
to write more  
new business*

## The Audience

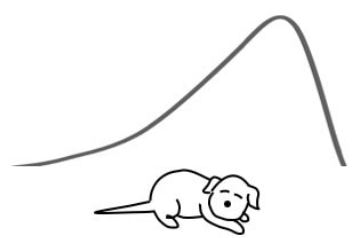




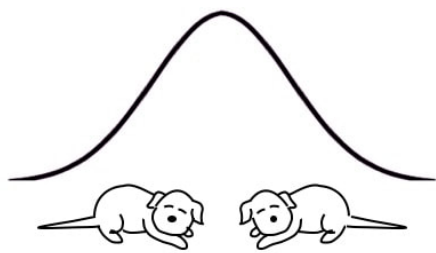
# Simple stories are intuitive, **but can mislead**

## Impact distribution

Skewed Left,  
Negative Skewness



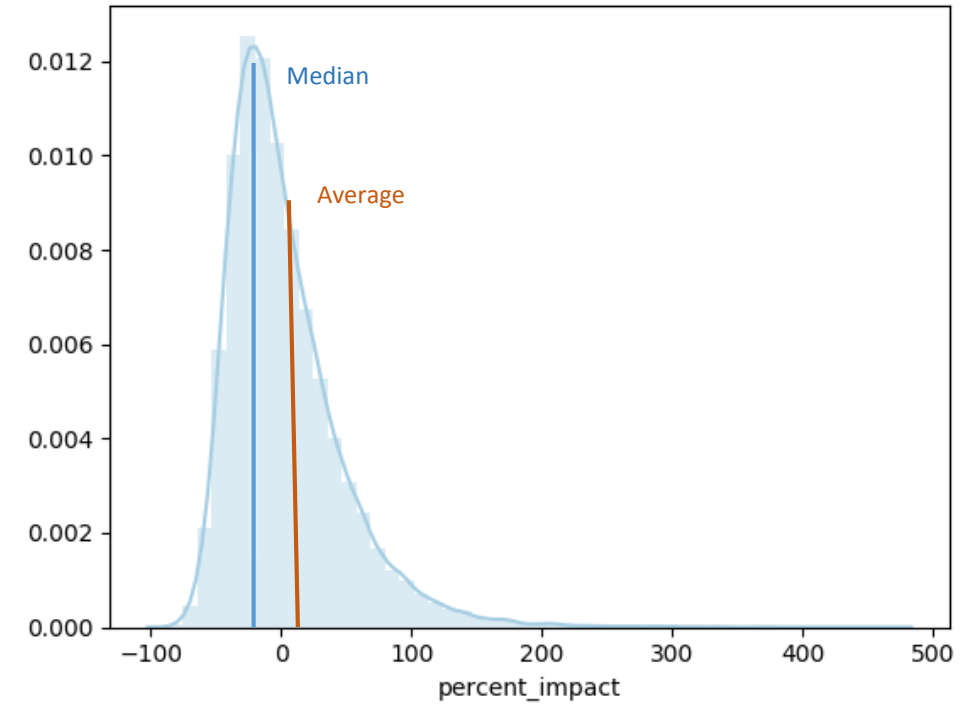
Skewness = 0



Skewed Right,  
Positive Skewness

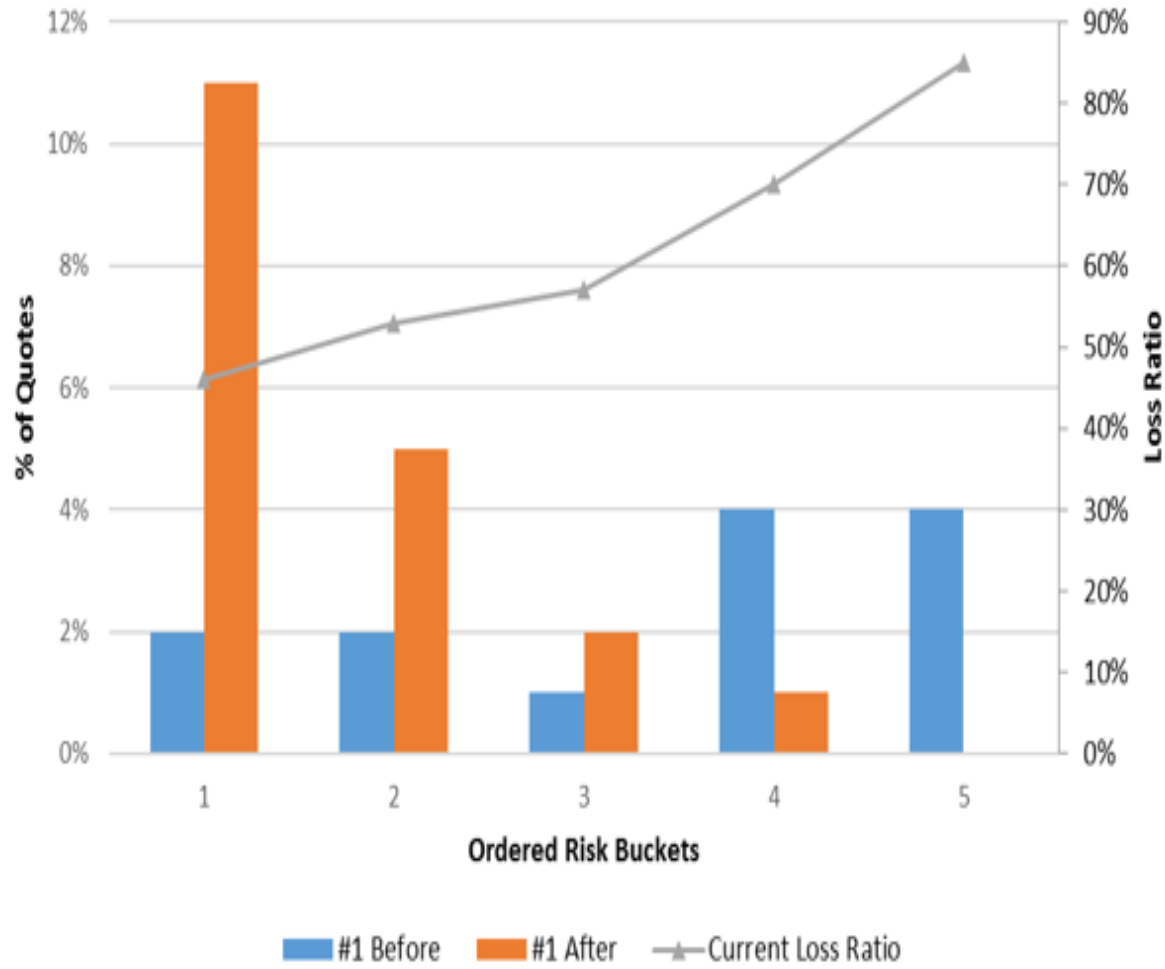


Reproduced by permission of John Wiley and Sons  
from the book, Statistics from A to Z -- Confusing Concepts Clarified



The curse of skewed distributions!

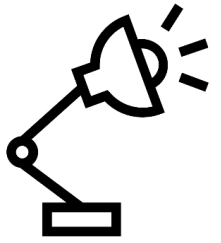
# Your message



# The Audience







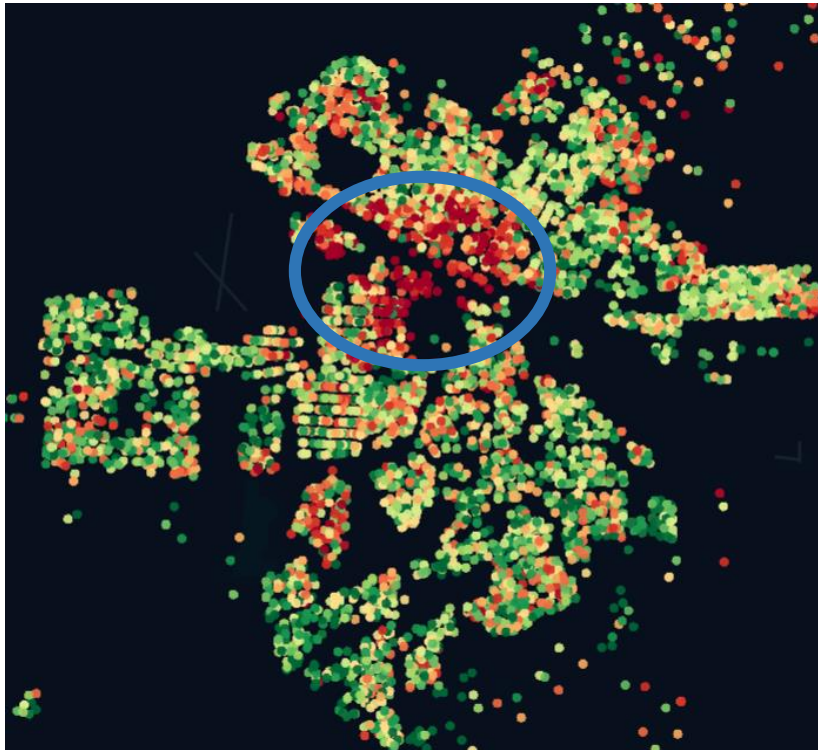
**Fact**

- **10% of the book will face significant rate increase**

**Concern**

- **Clients will leave**
- **Brokers will lose confidence in our rates**

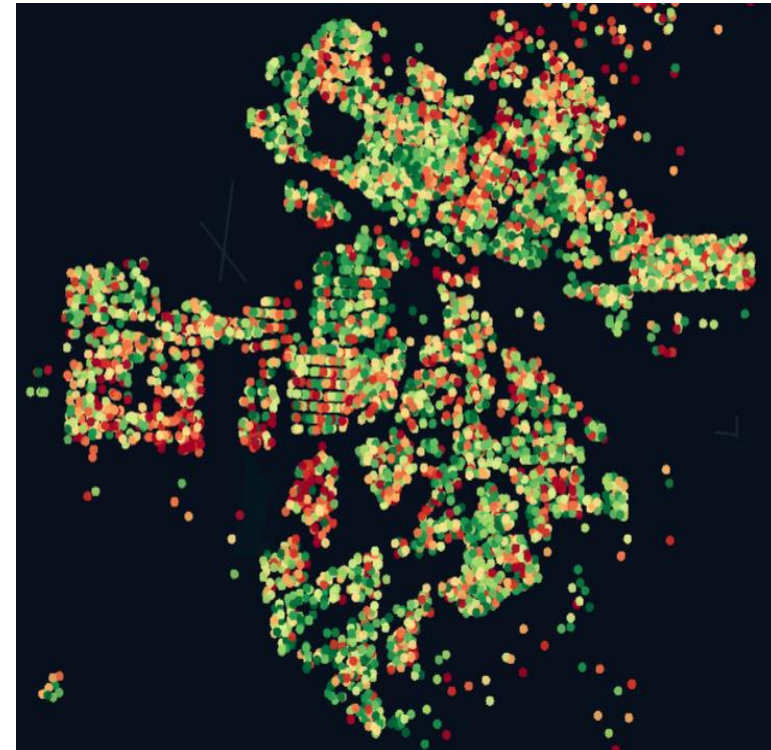
**Dislocation**



**Current Competitive**



**New Competitive**





**From model to  
implementation**

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# Data Failure Examples

Data manipulation

Insured has incentive to lie (eg. Annual KM, Conviction, etc.)

Default value

System provide a value that will be recorded if not updated

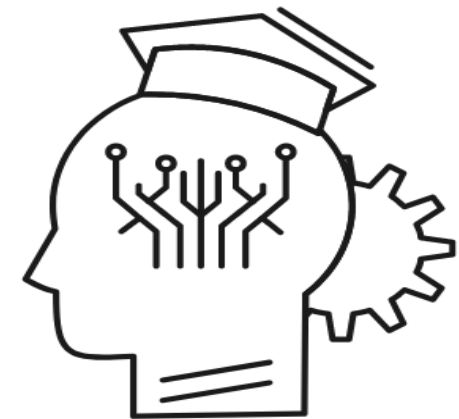
Outdated information

Loyal client are not contacted every year

Biased Data

Some questions are asked to specific profiles

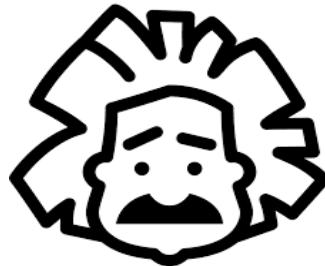
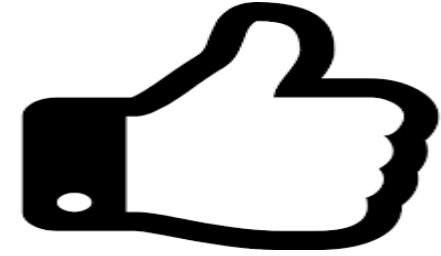
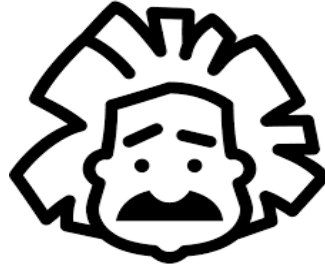
***Actuary's business knowledge is essential to avoid bias caused by data failure***





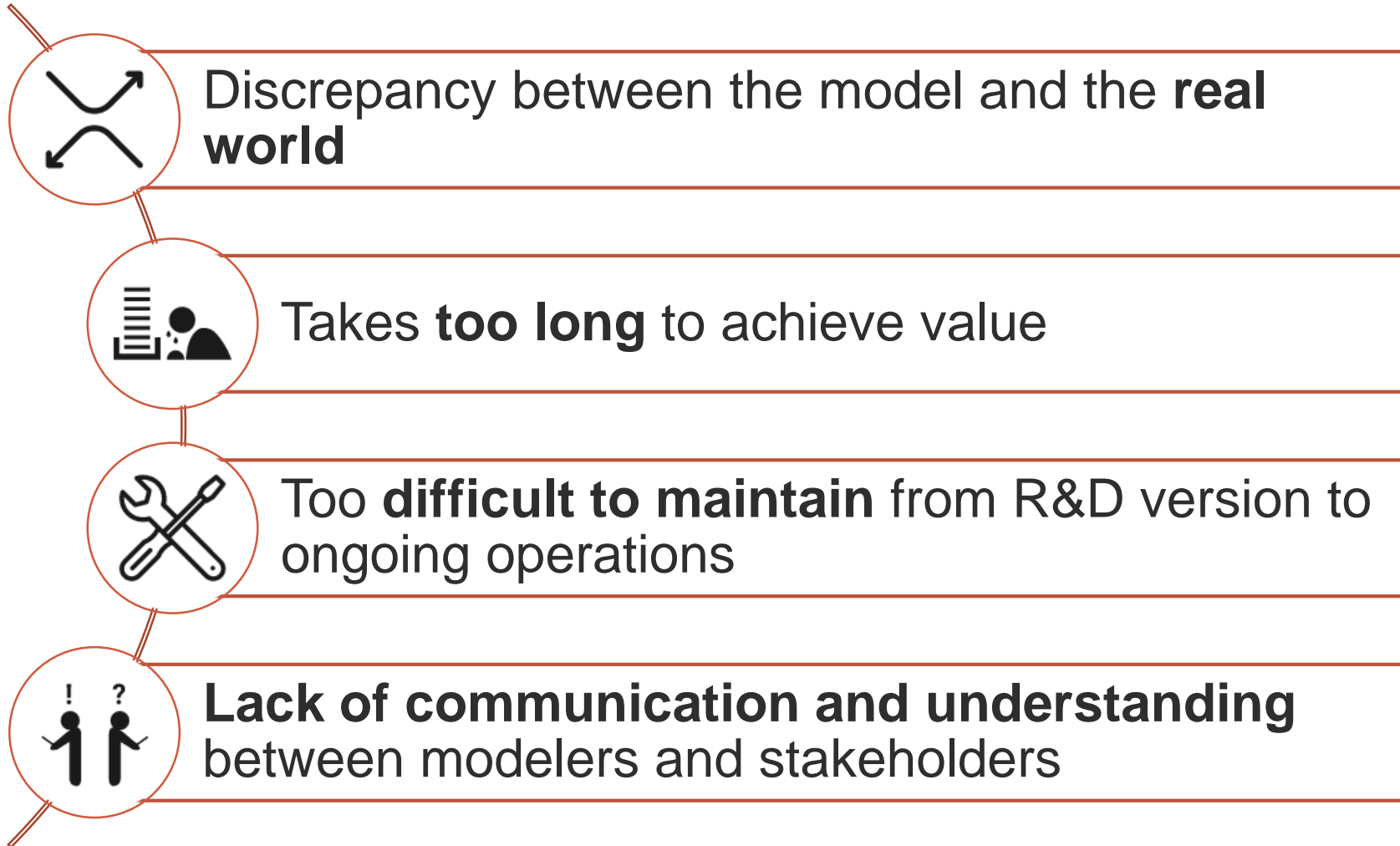


# What if data is not clean?





# Why implementing a model would fail?



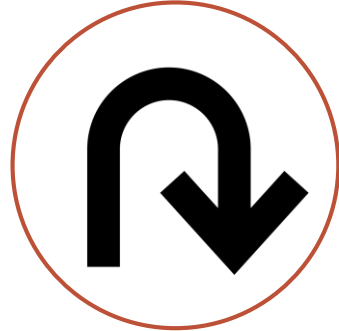


# Challenges: from model to implementation



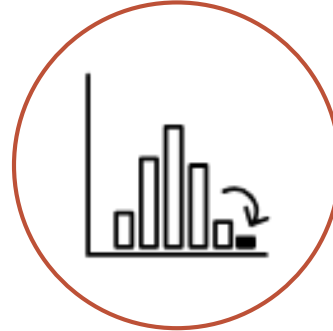
No Data

Ex: New product



Reversal

Ex: Surcharge for a discount



Extremities

Ex: Building Age over 130



Counterintuitive

• Ex: 20 yrs old better than 25





## Post implementation: Monitoring

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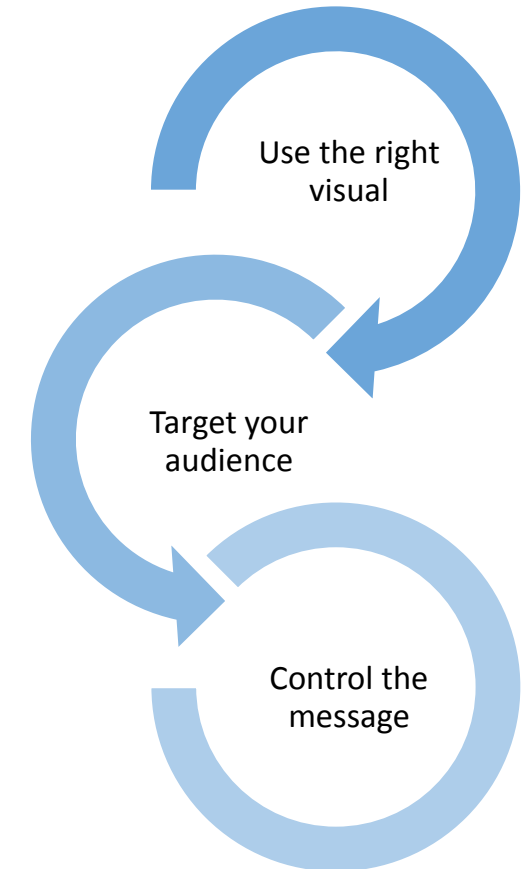
# Measurement proves the benefits

**Business case** for your work and justification for your team

Justification for **investment** (client or internal)

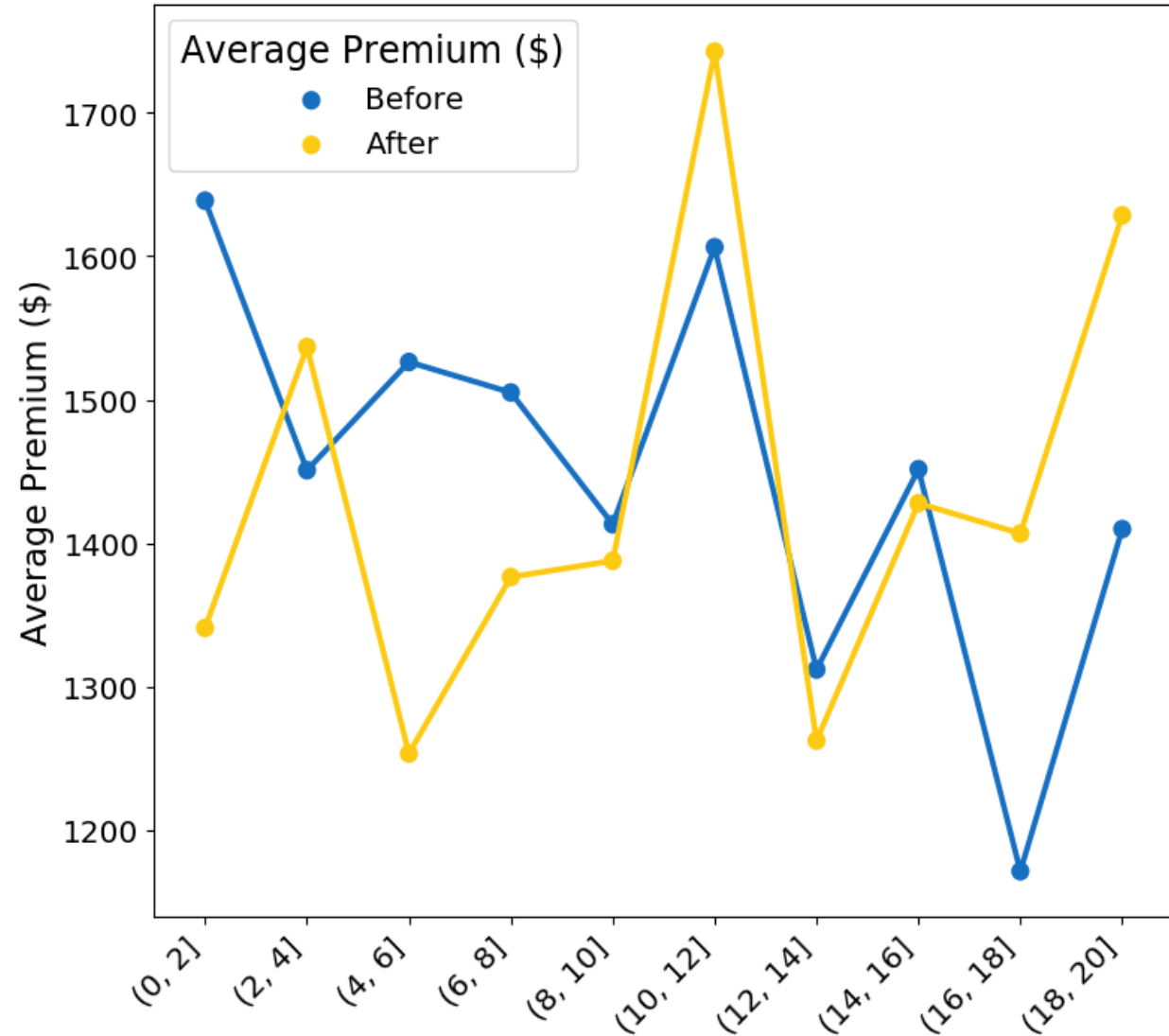
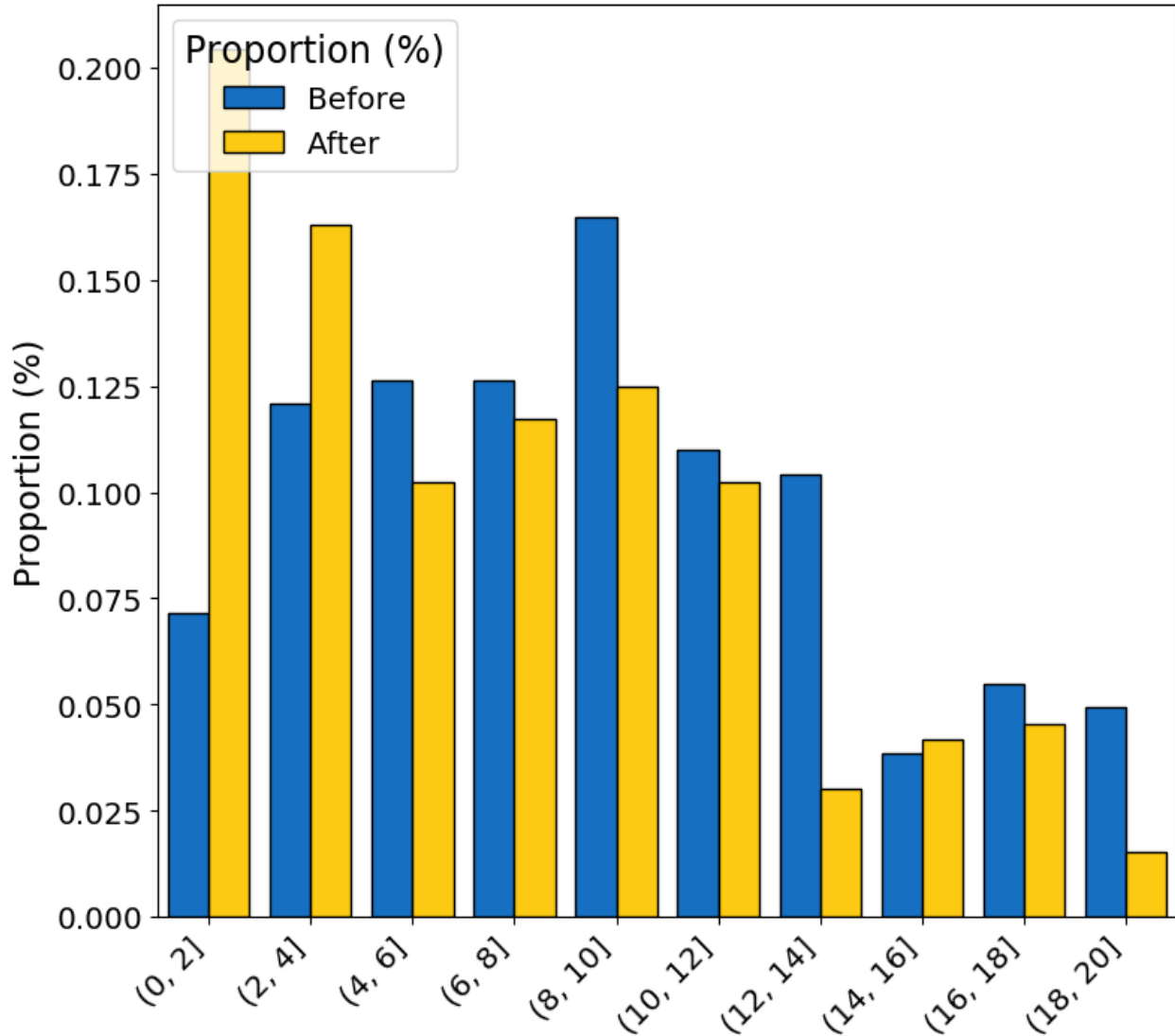
**Proof** points for future modeling projects

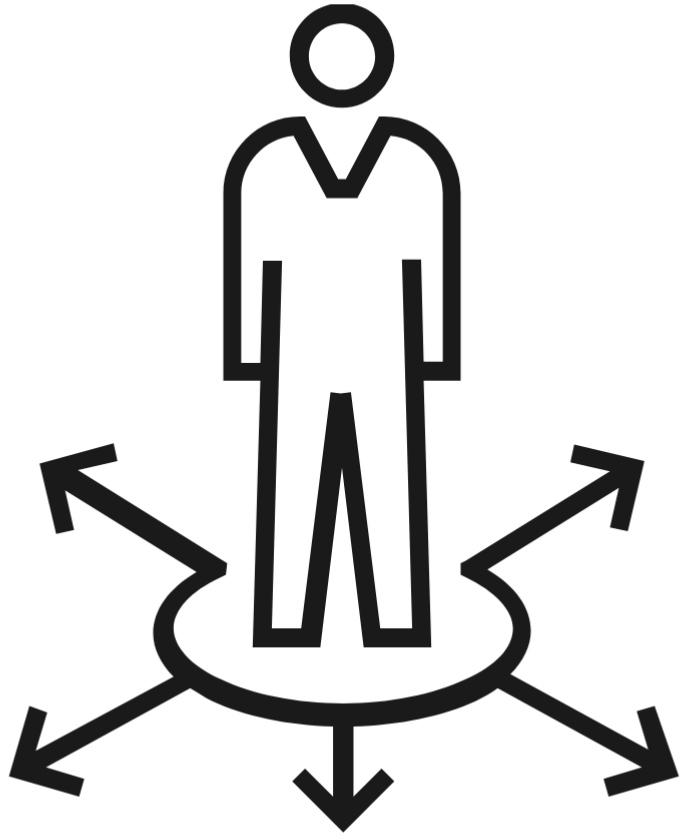
Communication tools still apply!





# Quality score to monitor the book





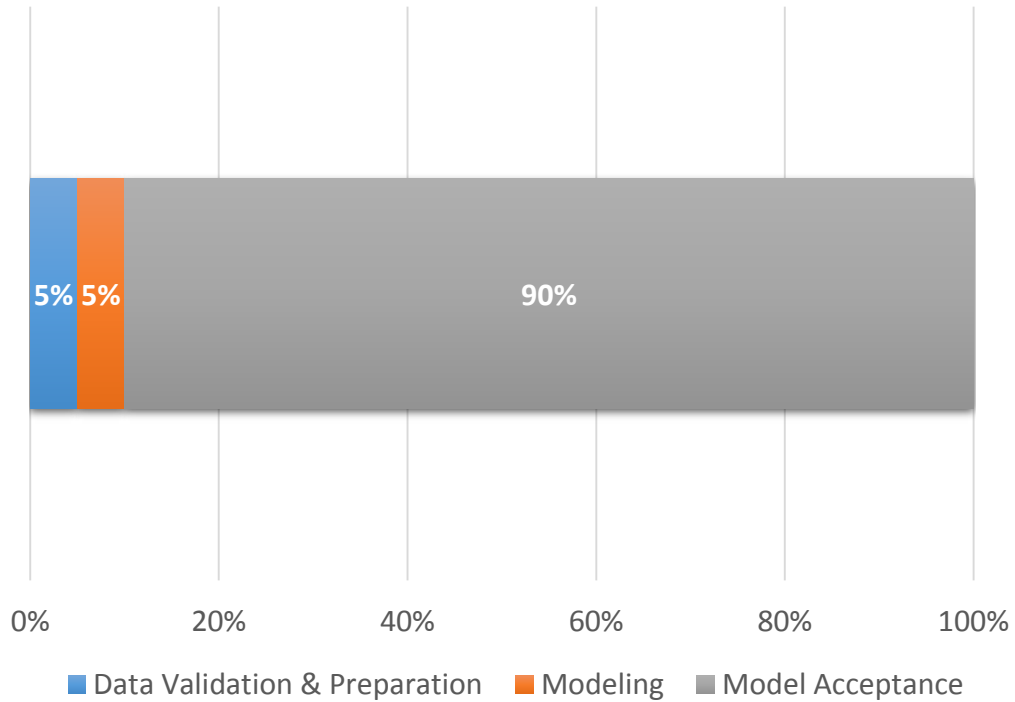
## Career Opportunities in Data Science

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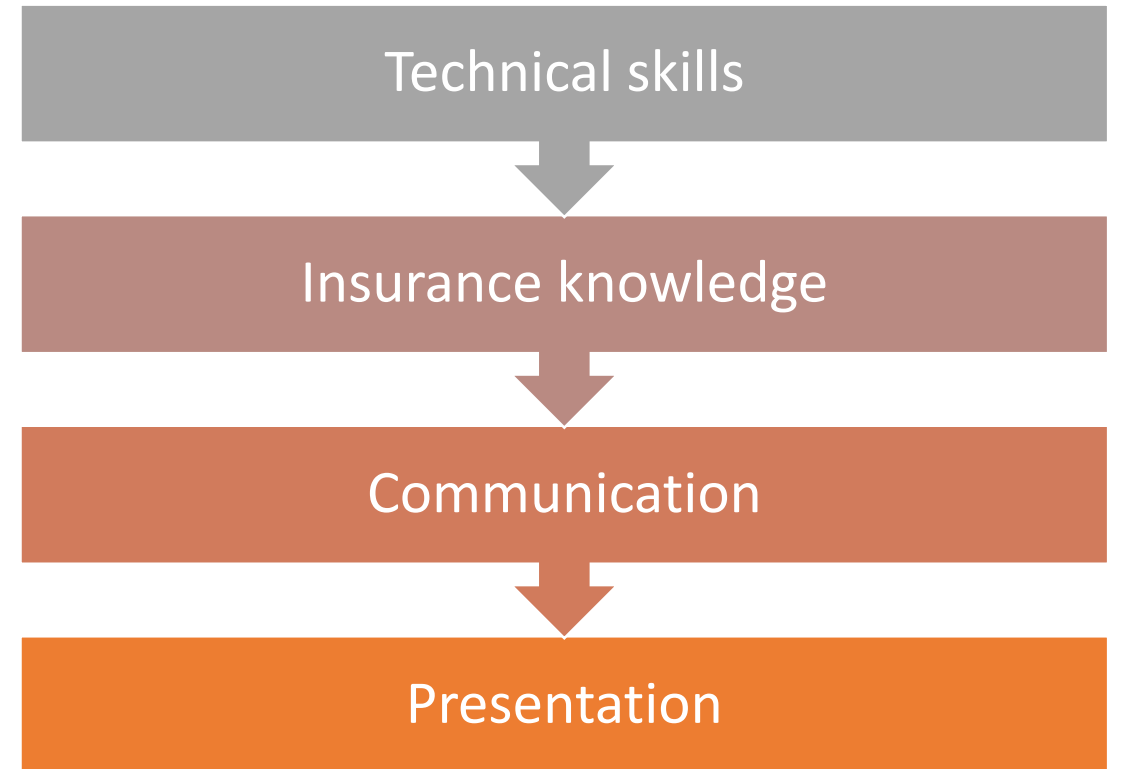


# Let's look again the time allocation...

## Time allocation for Pricing models



## Skills required?







# Is it important to complete the actuarial exams?

Technical skills



Insurance knowledge



Communication



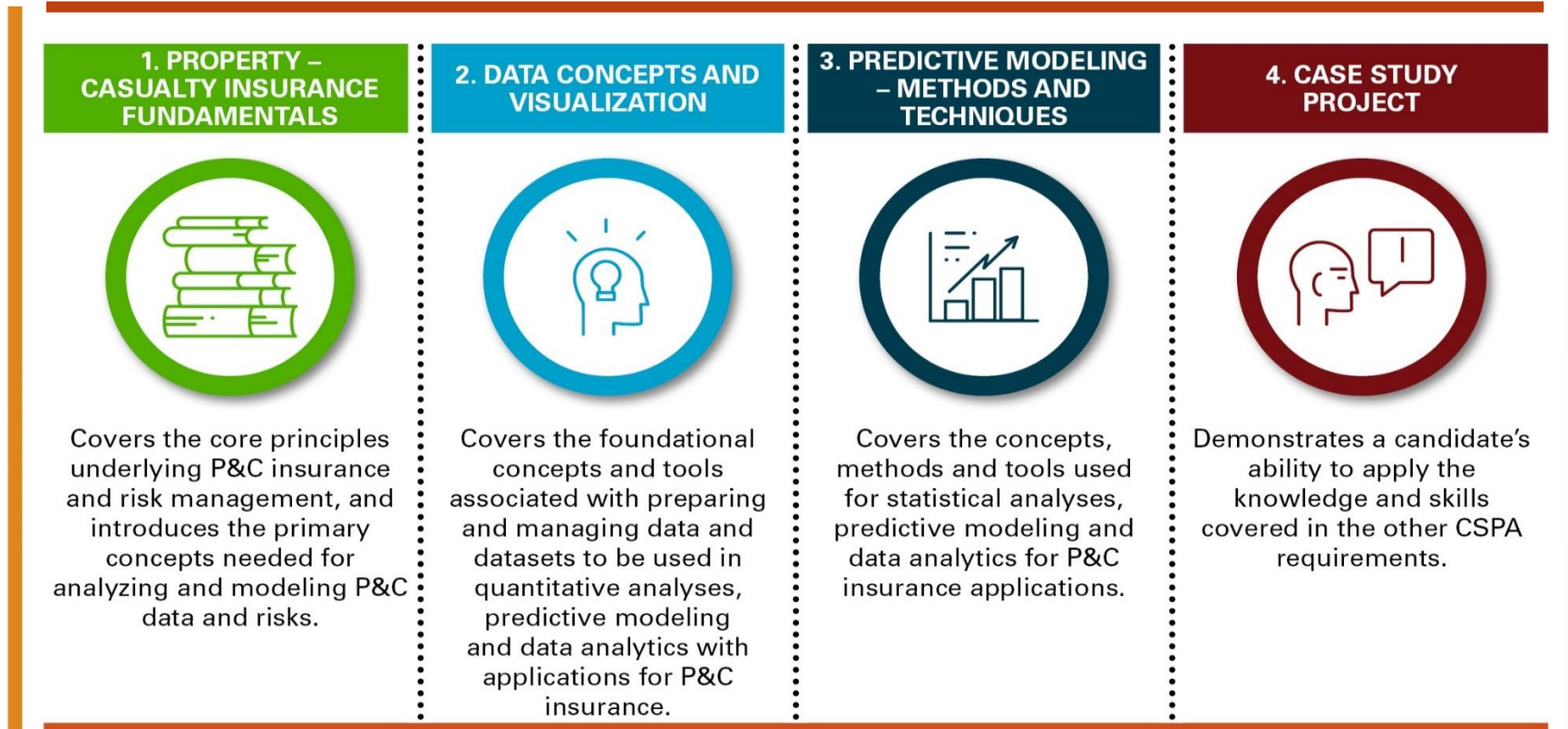
Presentation



**Yes**, but this is not **enough!**



# Certified Specialist in Predictive Analytics (CSPA)



Online course on Ethics & Professionalism also required

# Thank you

Any questions?

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