Accuracy, Trust and Explainability: The Trinity for Business Forecasting?

Simon Spavound
Data Science Team Lead at Peak
simon.spavound@peak.ai

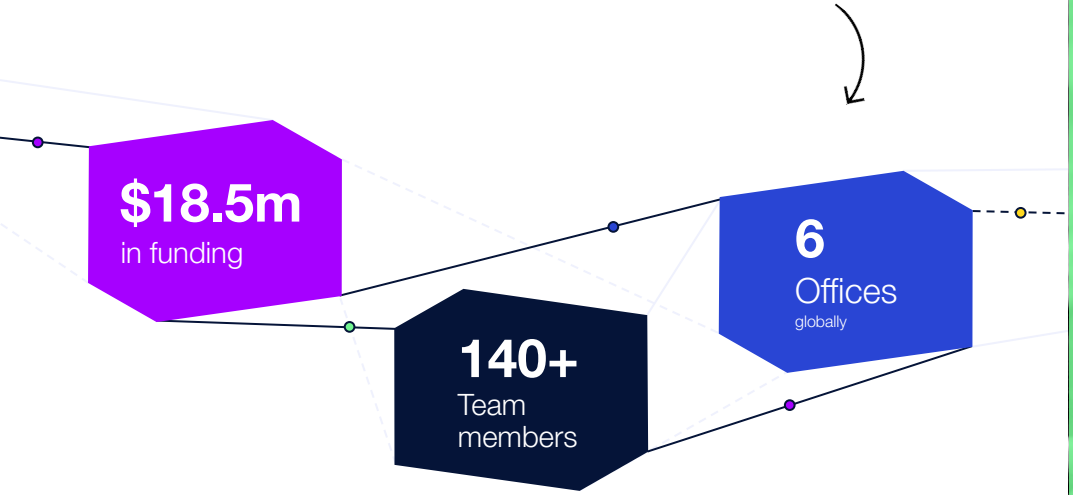
About Me

- Data Science Team Lead at **Peak**
- Previously brief stint as an academic mainly focussed on teaching econometrics and data analytics
- Completed PhD at Lancaster University Economics Department - main interest has always been **time series econometrics**
- Work mainly on Demand problems; primarily **forecasting** and **optimisation**
- Clients have included a market leading concrete manufacturer, a global retail brand and several others

DO GREAT THINGS WITH DATA

ABOUT

Peak help the smartest companies in the world use AI to make better decisions. By harnessing the power of your data and CODI, our AI System, we help supercharge the people in your business to improve business efficiency and productivity



EXTERNAL RECOGNITION

Gartner COOL VENDOR 2020

THE SUNDAY TIMES 100 BEST SMALL COMPANIES TO WORK FOR 2020

aws partner network Advanced Consulting Partner

2020

PEAK CUSTOMERS INCLUDE

PEPSICO

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PRETTYLITTLETHING

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What is this talk about?

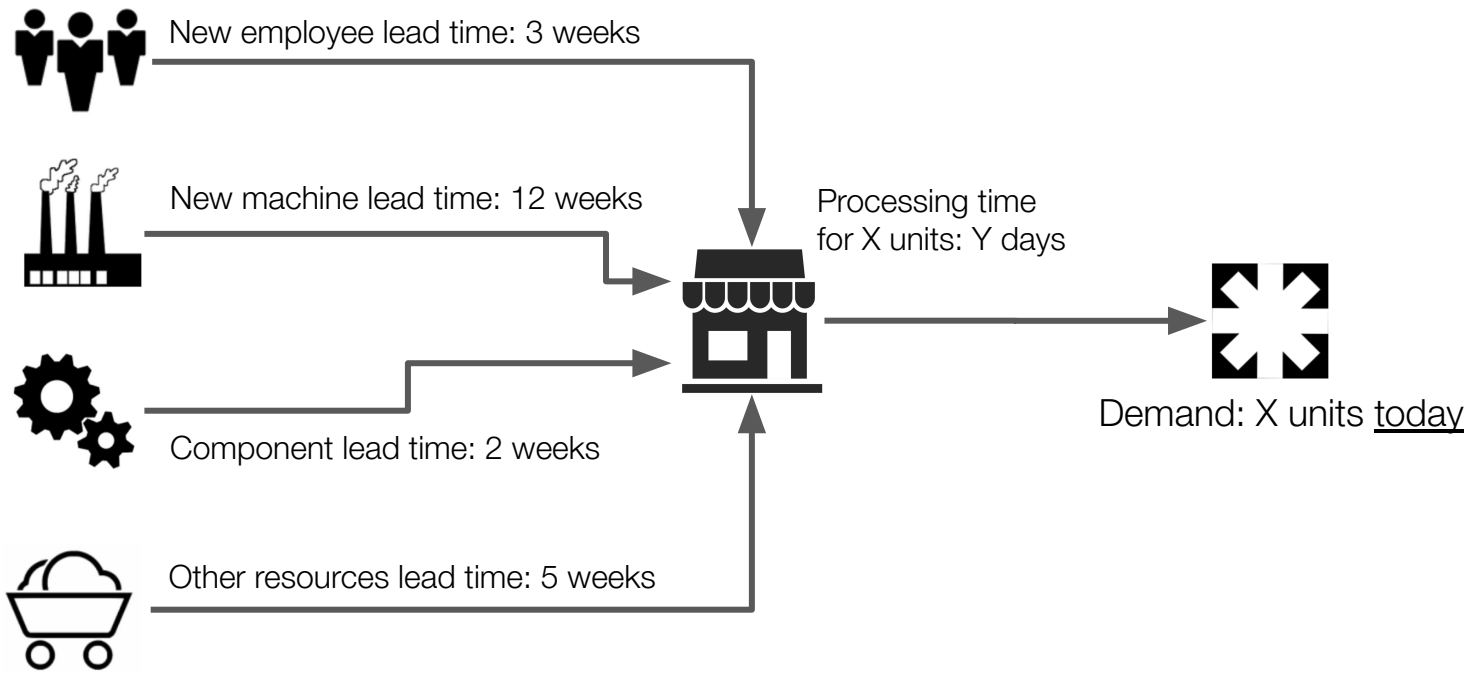
- Many in this audience will be involved in **forecasting** in some way or other
- Could be research or practice, or a student looking to get into the field
- Many people who want to get into forecasting focus purely on minimising **some measure of accuracy.** Accuracy is a **necessary** but **not sufficient** condition for success
- This talk will discuss how I think companies and individuals should be deploying decision making systems using a broader set of criterion:

  Accuracy, Trust and Explainability: The Trinity for Business Forecasting?

Running a Modern Business...

For many businesses, satisfying demand **today**…

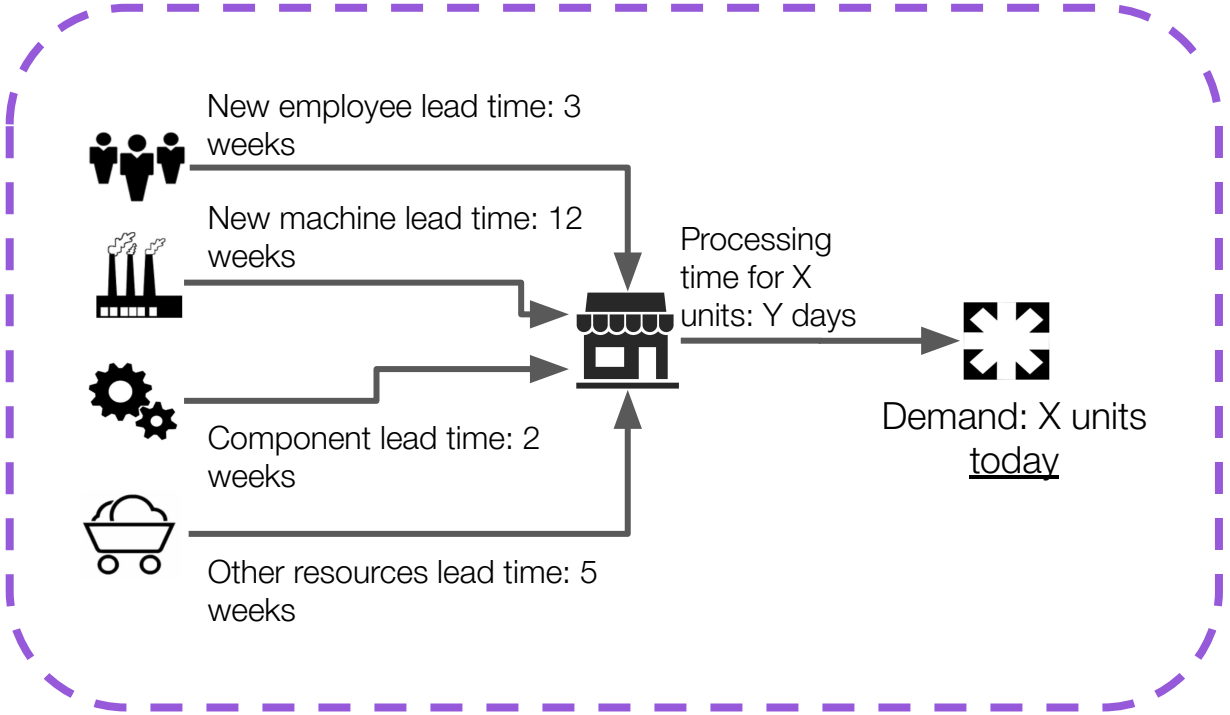
Running a Modern Business involves a lot of decisions



For many businesses, satisfying demand today…

Requires processes and planning a long time in advance

Peak helps business make *better decisions*



Thousands of decisions to be made

Peak background roundup

- At Peak we deploy various types of **machine learning systems** to help businesses make **better decisions**

- These decisions can take place in all parts of modern large enterprises:
  - **Production Planning**
  - **Logistics**
  - **Warehouse Operations**
  - And many more including more **Customer focussed** outputs

- We have deployed different type of **machine learning solutions** to help companies make better decisions for these problems

- Let's have a look at **Forecasting Systems** in particular

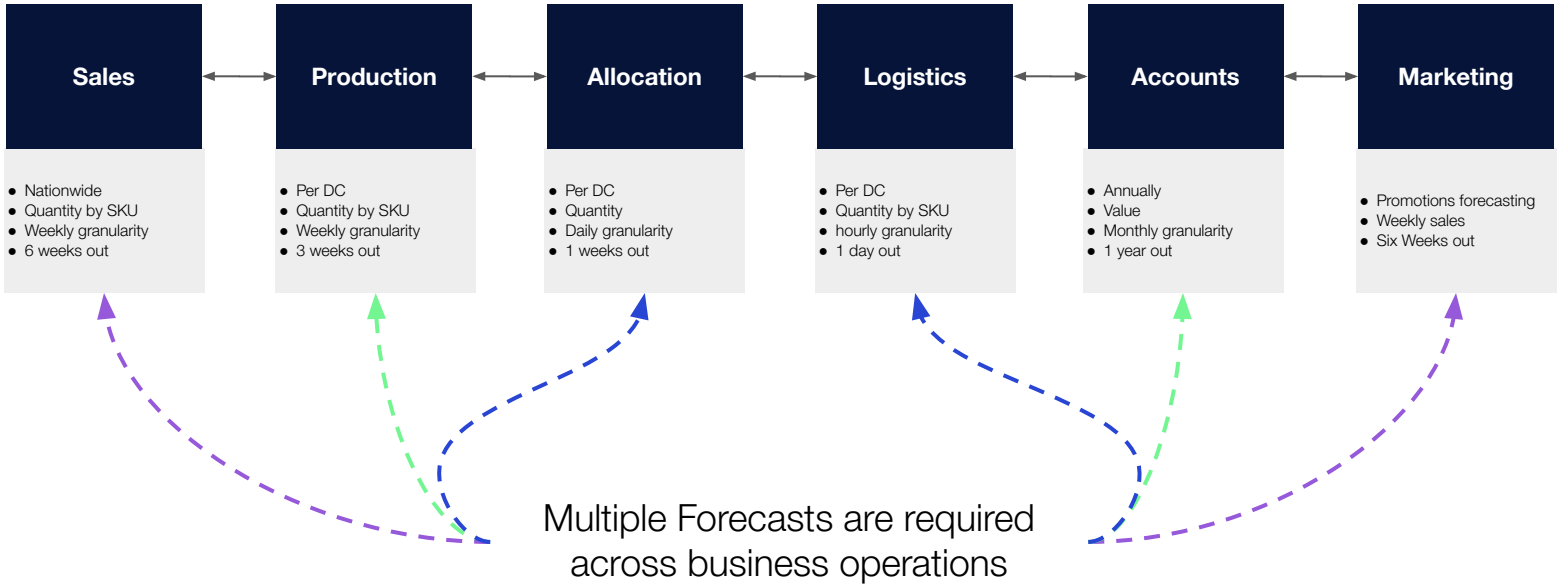
Quick Definition on Forecasting System

- Best to define what I mean by **Forecasting System**
- Not necessarily the **technology** employed (could be **Excel** spreadsheet to an **ERP**)
- Nor is it necessarily the **statistical/machine learning technique** which matters
- Forecasting system is more expansive : includes the **people**, the **process**, through to the **decisions** that are being made off the back of it
- Crucially forecasting is often a form of **insight** upon which businesses make decisions

Status Quo

- Most (if not all) major companies have ***some*** forecasting capability deployed now
- What is stopping companies being effective and making the most out of existing **Forecasting Systems**
- The word on the street is often around difficulties with ***forecasting accuracy***

How Businesses *Actually* Use Forecasts



Issues with Status Quo

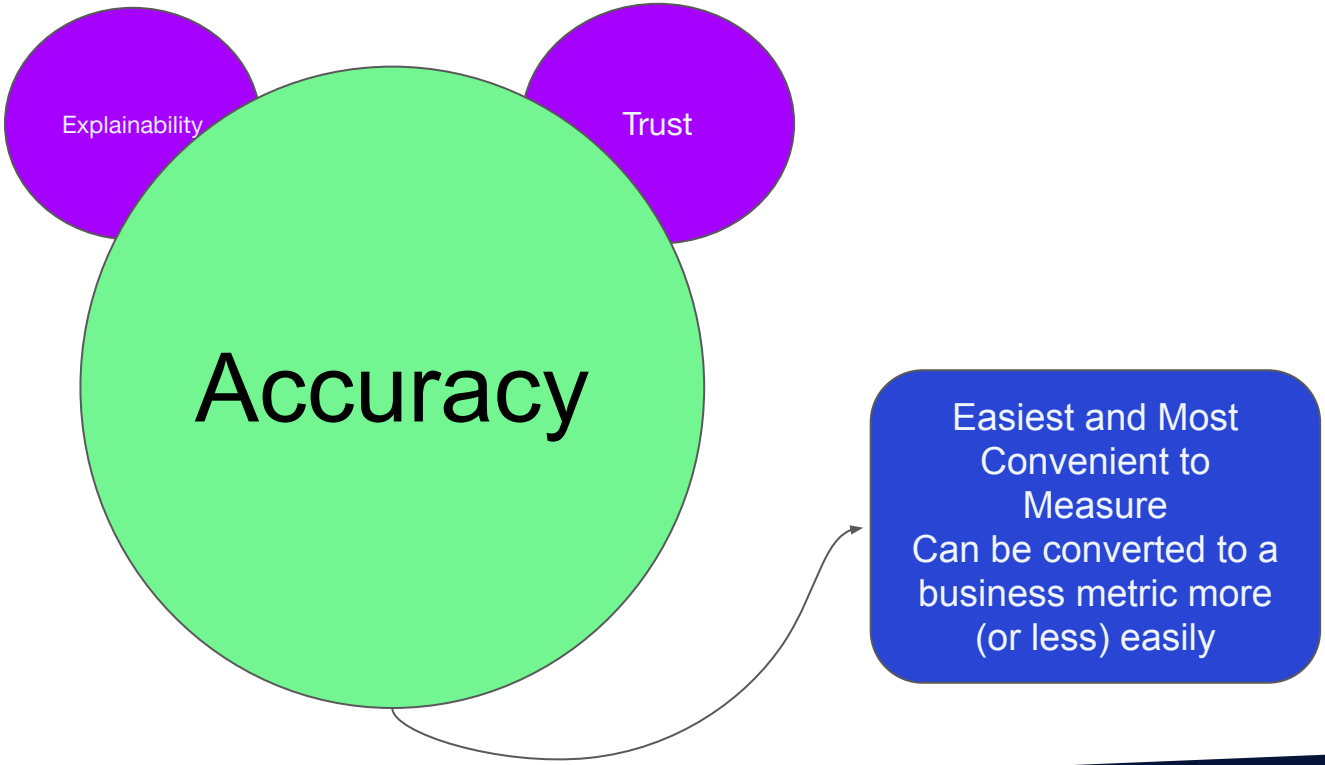
- Separate operational units may have different forecasting systems (again **technology, people,** and **process**) to help the varying decisions they have to make
- **Operational confusion** makes the operating the forecasting system as a whole more difficult
- Businesses operate as **silos** - information sharing between business operation units is difficult
- The overall outcome leads business decision makers yearning for more accurate systems thinking this is the **panacea** they need:

"Alexa tell me exactly how many products I need to produce in week 32 of 2025"

Forecasting by itself is not enough

- There are improved technical approaches which can help with this to improve forecasting accuracy
- The advances made in recent years **could** and **should** be deployed to help businesses improve their decision making capability
- ***Yet businesses deploying state of the art forecasting systems are still not happy with the outcomes***
- Why?

Accuracy: the Elephant in the Room



What Causes *Mistrust*?

Answering the **wrong question**

Broken Leg Cues

Black Box solutions

Questions Around Individual SKUs

So why is *trust* important?

- **Lack of Trust** manifests itself in multiple ways
- The worst is non acceptance i.e. **Total Failure**
- Anecdotally I believe this is one of the reasons that Machine Learning systems in general are seen as **overhyped** and **prone to failure**

Trust in Forecasting System Design

Trust your own instinct. Your mistakes might as well be your own, instead of someone else's

Billy Wilder

- Lack of trust may lead end users making many many **judgemental adjustments** in their forecasting systems
- Or they fall back on more **rudimentary** forecasting approaches
- Judgemental adjustments can paradoxically be made worse if different Silos within a single organisation also **do not trust each other** due to **conflicting goals**
- **Bad overall system design (i.e. including KPIs) can make things much worse**

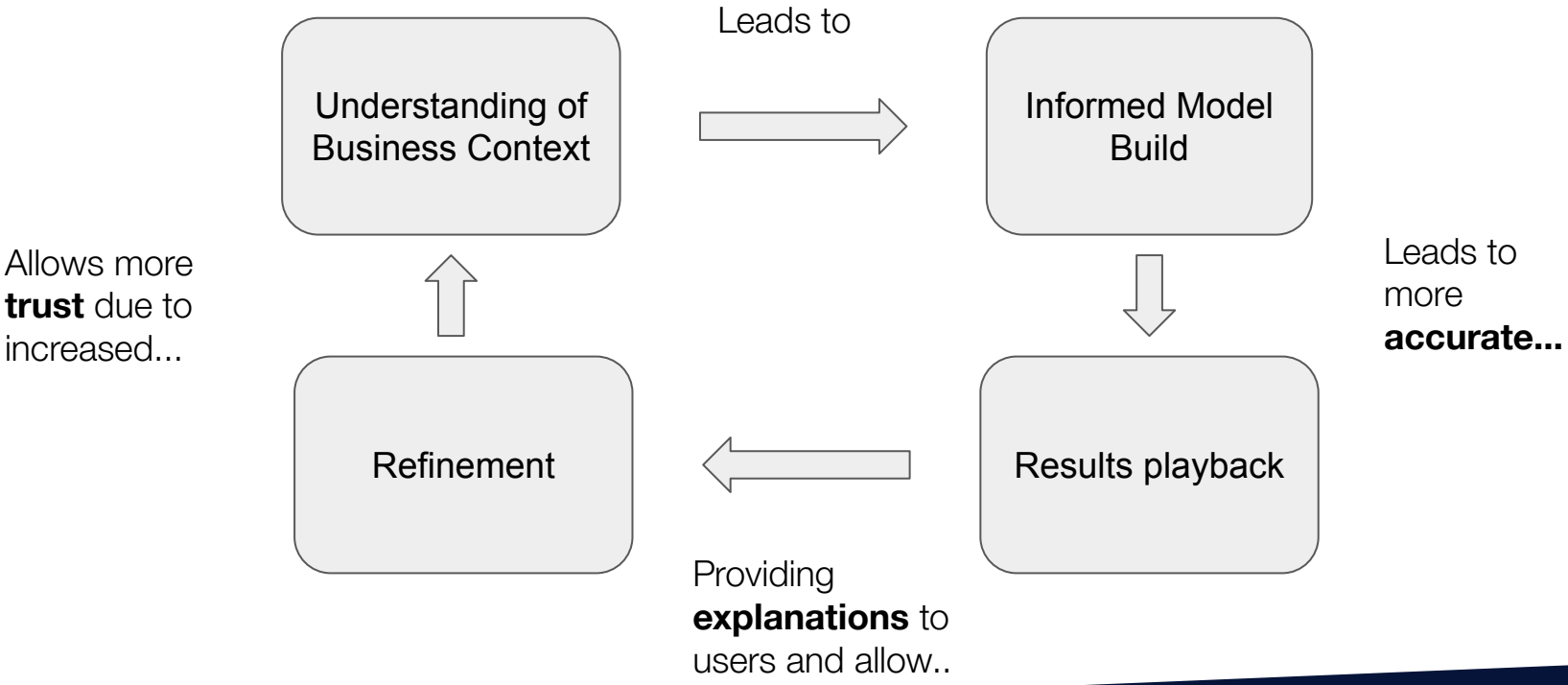
So how can Explainability help?

- Explainability in this context again is **broader**
- Like ***Beauty* Explainability** is in the ***Eye of the Beholder***
- This means that in some cases a **Simple Moving Average** will have as many Explainability issues as **Neural Network**
- **Explainability** can be as much as demonstrating how the system works and crucially understanding where it does not and mitigating those issues as much as possible
- What does this form of explainability crucially help with? **Trust**

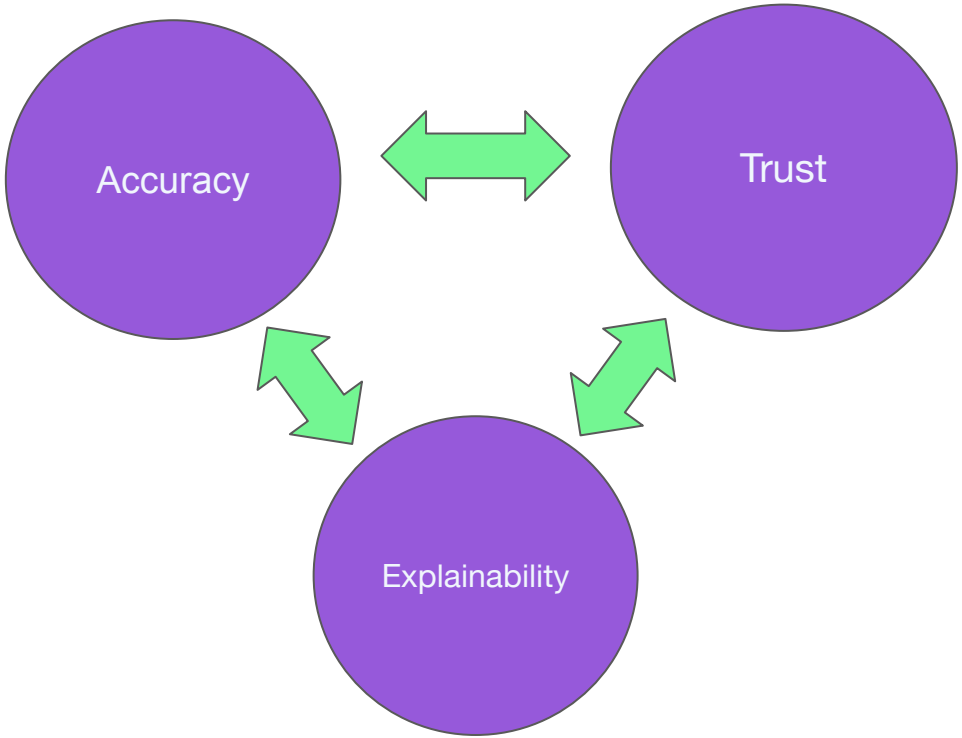
What can help with Explainability

- Explainability can be seen in different ways
- Users will have many (**many**) questions and forecasters need to be able to explain the **why**
- Overall goal of explainability is doing enough to get **user acceptance** for a model and that you are empowering the user to make better data-driven decisions
- Could do an entire session on **explainability**

Explainability/Accuracy/Trust Cycle



The Proposed Trinity



Concluding Remarks

- Implementation of ***successful*** forecasting and decision systems is ***hard***
- Excessive focus on accuracy alone is **a necessary but not sufficient condition** for overall success in helping make better decisions
- If systems are not adopted then accuracy becomes purely theoretical
- More consideration should be placed on **explainability** and **trust** in automated decision making capabilities within business

Peak is Hiring

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Thanks for Listening
Any Questions?

Dr. Simon Spavound
Data Science Team Lead
simon.spavound@peak.ai