



Forecast Value Added Analysis: Why and How

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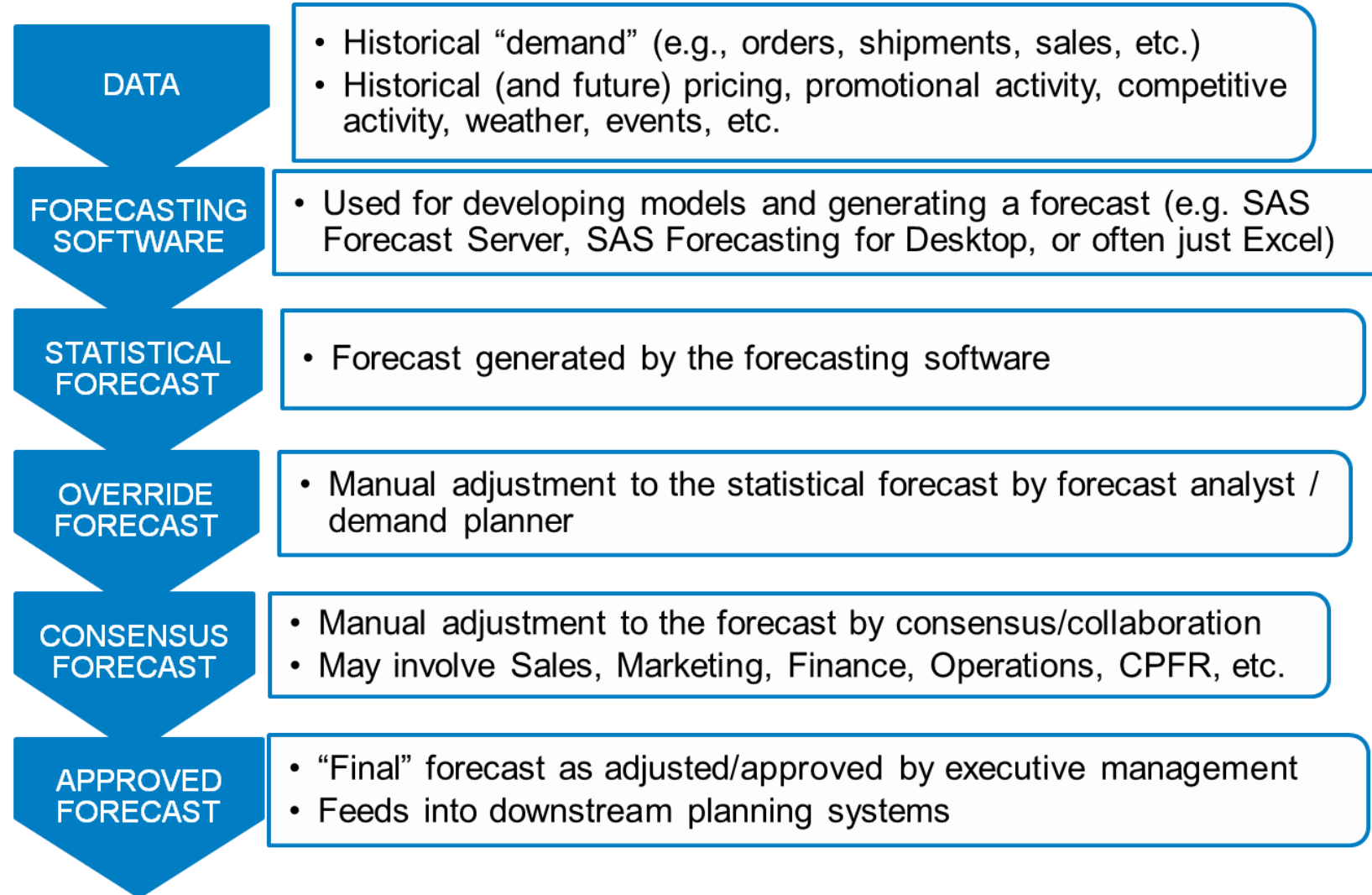


*Forecasting is a Huge Waste of
Management Time*

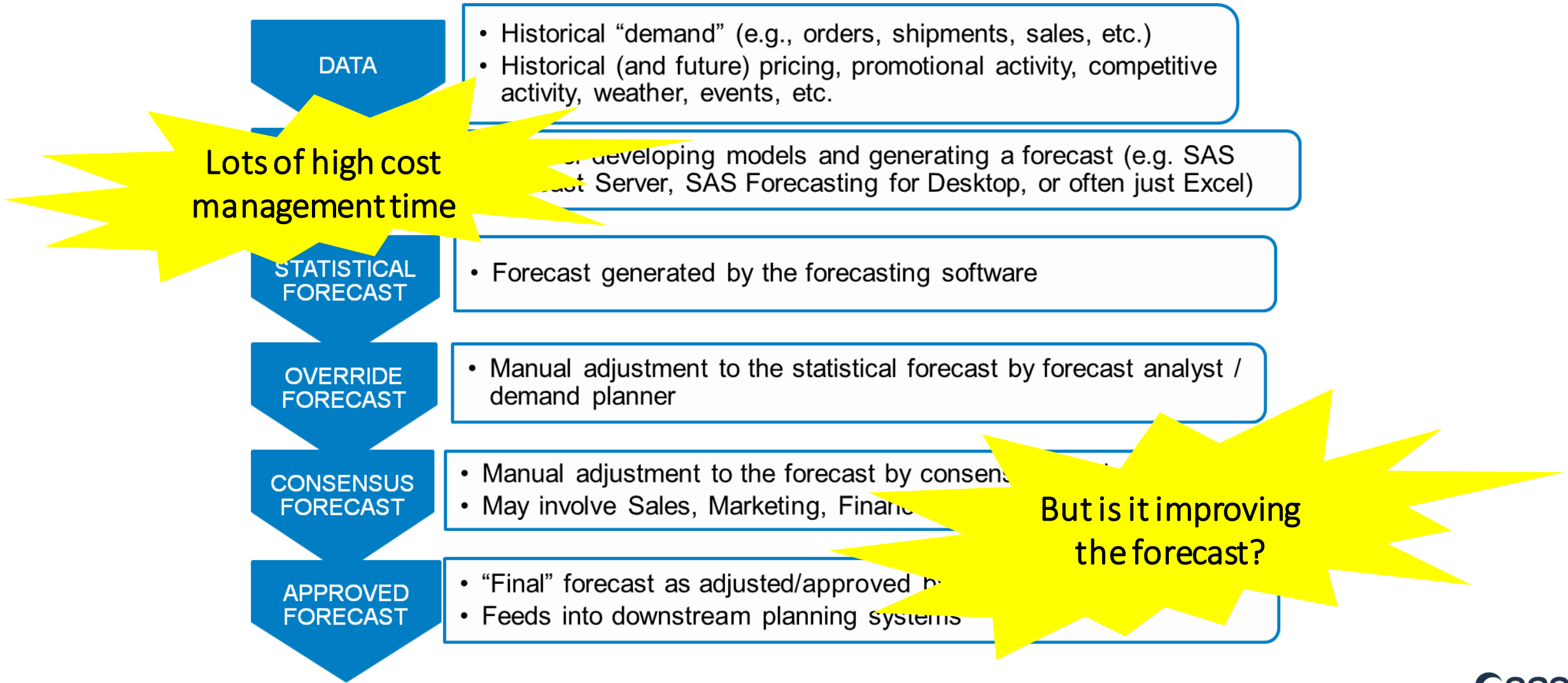
Objective of the Forecasting Function

*To generate forecasts as accurate and unbiased
as you can reasonably expect them to be ...
and do this as efficiently as possible*

Typical Business Forecasting Process



Typical Business Forecasting Process



Failings of Traditional Metrics

- Dozens of forecasting performance metrics available
- Traditional metrics like MAD or MAPE tell you the size of your forecast error
- But...the traditional metrics by themselves are not sufficient for properly evaluating performance:
 - They do not indicate what error you should be able to achieve (no account of “forecastability”)
 - They do not measure the efficiency of your process

Definition of FVA

Forecast Value Added \equiv

The change in a forecasting performance metric that can be attributed to a particular step or participant in the forecasting process

What is FVA Analysis?

- The application of scientific method to forecasting

H_0 : Your forecasting process has no effect

- FVA Analysis attempts to determine whether forecasting process steps and participants are improving the forecast – or just making it worse

Naïve Forecast as a Placebo

Analogy: Evaluating a new drug by comparing to a control group (receiving a placebo)

- Naïve forecast serves as the placebo in evaluating forecasting process performance
 - Provides a reference standard for comparisons
 - Is the forecasting process “adding value” by performing better than the placebo?

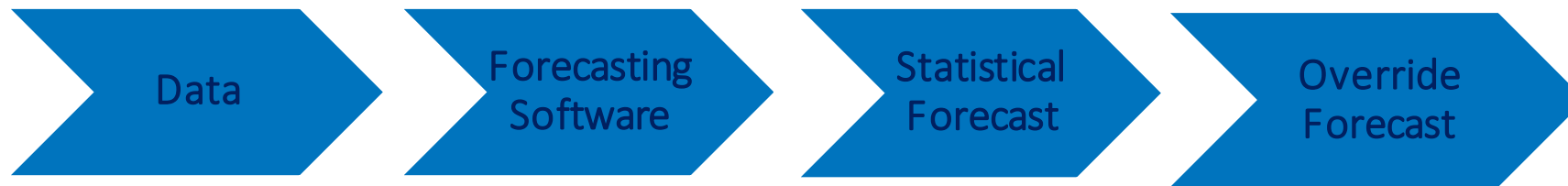
Sidenote: “Lean Forecasting”

- FVA is consistent with a “lean” approach to forecasting -- identifying and eliminating process waste
 - Non-value adding activities should be eliminated from the process
 - Non-value adding resources should be re-directed to more productive activities

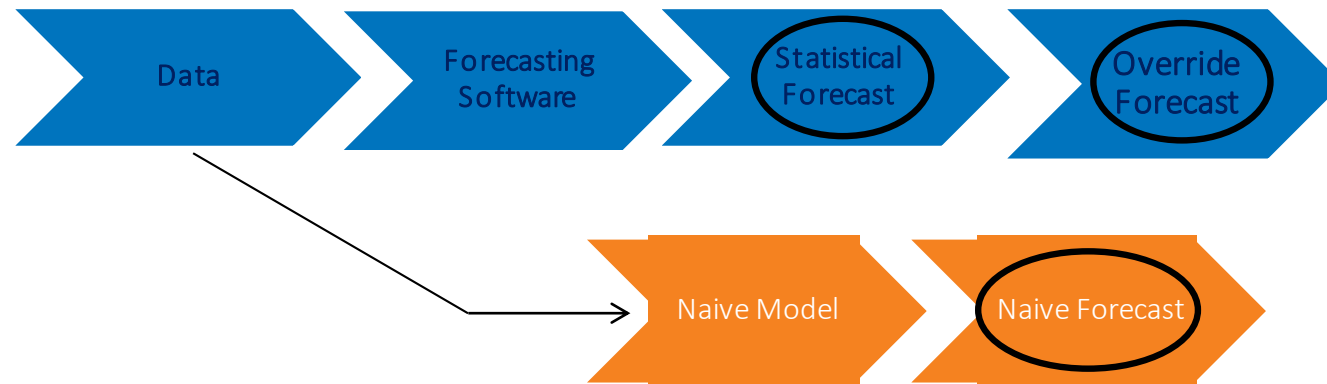
“FVA is the lean manufacturing mind-set applied to forecasting...” Tom Wallace

FVA Analysis: Simple Example

- Consider a very simple forecasting process:



FVA Analysis: Simple Example



- FVA compares performance of the statistical forecast to the performance of the analyst's override forecast
- FVA also compares both to a naïve forecast

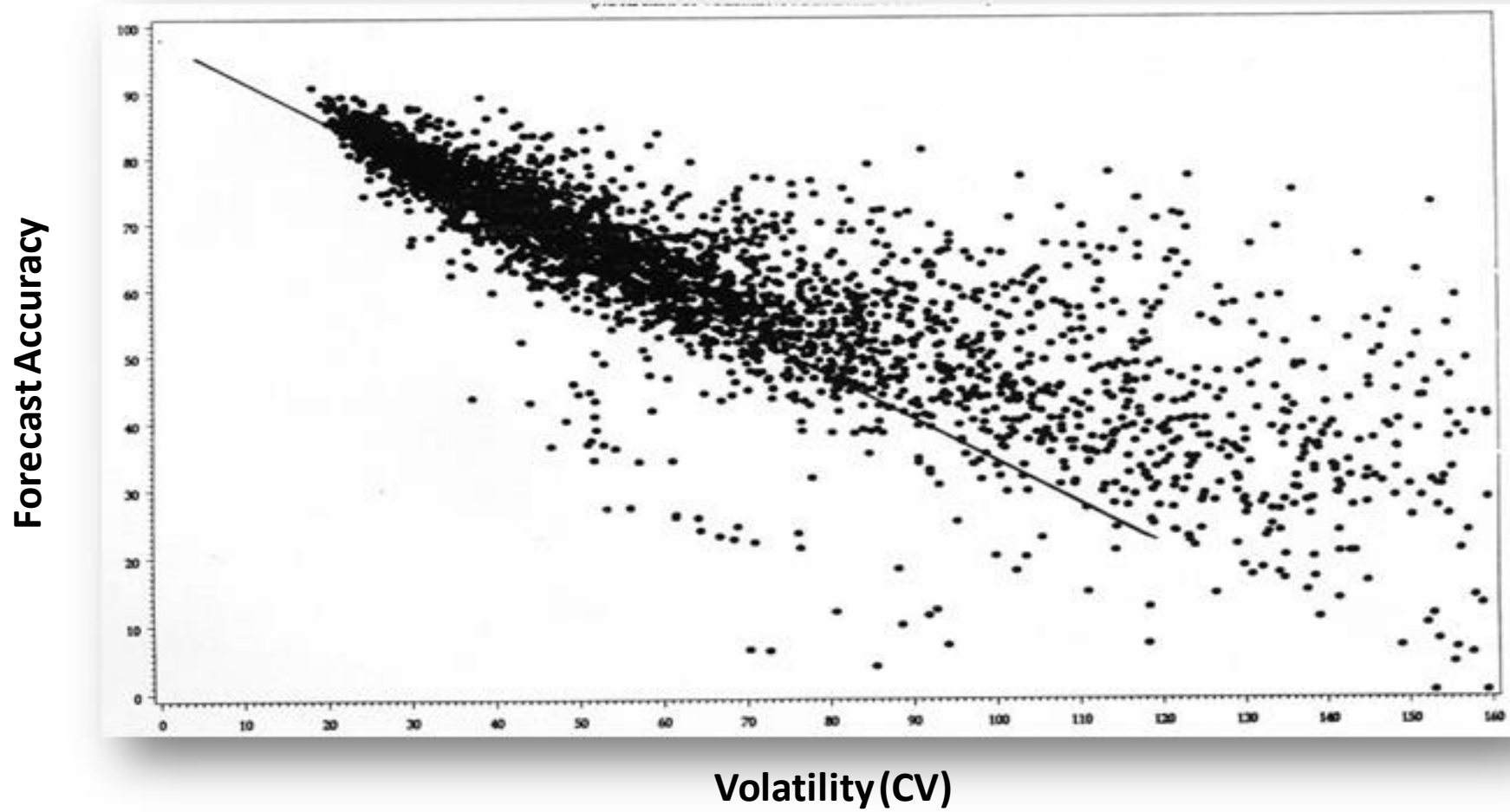
FVA “Stairstep” Report

Process Step	Forecast Accuracy	FVA vs. Naïve	FVA vs. Statistical
Naïve Forecast	60%	-	-
Statistical Forecast	65%	5%	-
Analyst Override	62%	2%	-3%

Source: Schubert & Rickard of Newell Rubbermaid, IBF conference presentation 2011.

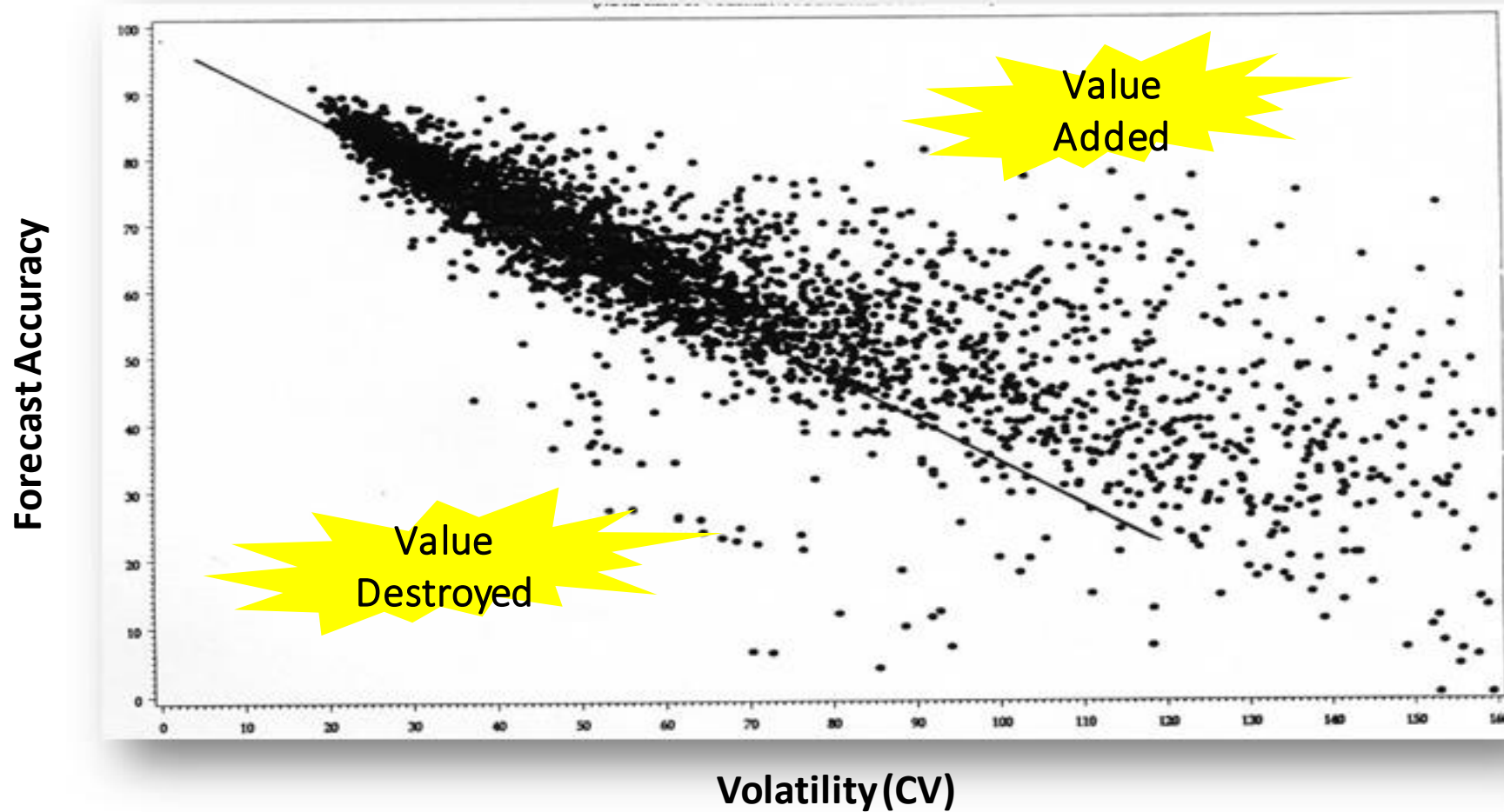
- Can report on an individual time series, or an aggregation of many (or all) time series
- Doing better than naïve → your process is “adding value”
- Doing worse than naïve → you are simply wasting time and resources

Visualize with Comet Chart



Reducing volatility will likely result in better forecasts

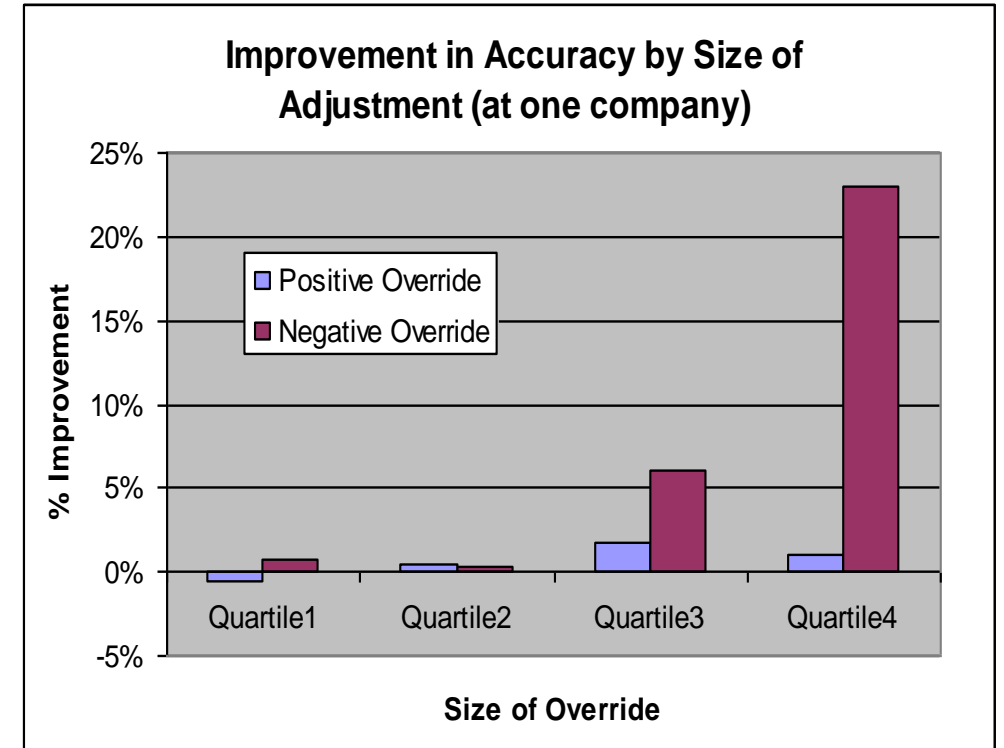
Visualize with Comet Chart



Reducing volatility will likely result in better forecasts

Related Academic Research

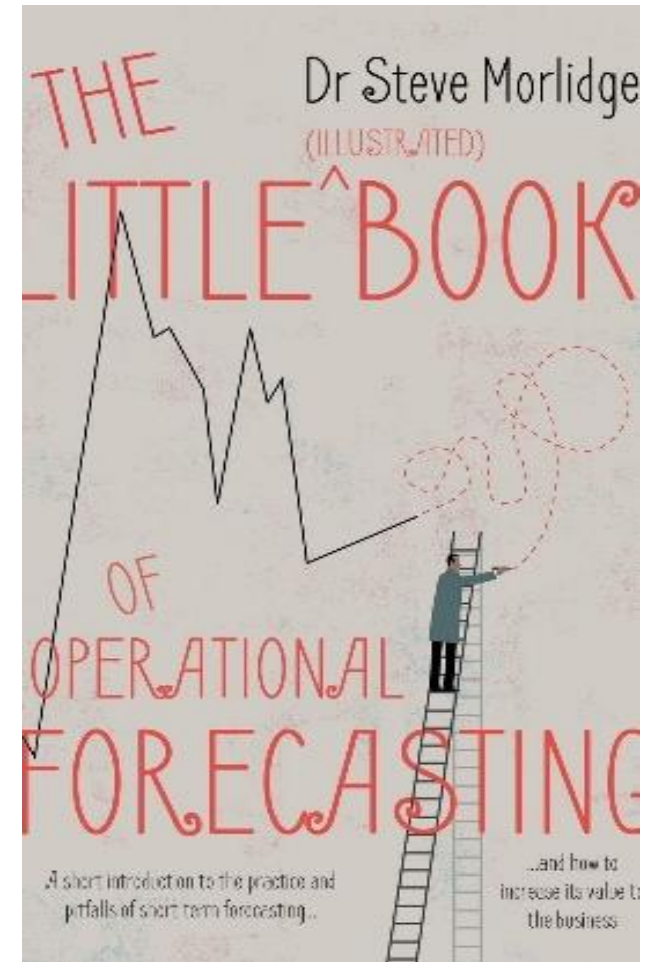
- Studied 60,000 forecasts at four supply chain companies
- 75% of statistical forecasts were manually adjusted
- Large adjustments tended to be beneficial
- Small adjustments did not significantly improve accuracy and sometimes made the forecast worse
- Downward adjustments were more likely to improve the forecast than upward adjustments



Source: Fildes & Goodwin, "Good and Bad Judgment in Forecasting." *Foresight*, Fall 2007.

Morlidge Research: The 52%

- Series of ~~enlightening~~ disturbing articles published in *Foresight* (starting Summer 2013) by Steve Morlidge of CatchBull
 - Studied 8 supply chain companies
 - 300,000 real life forecasts
 - 52% were less accurate than the naïve no-change forecast!
- Subsequent study of over 20 companies found that routinely, 30-50% of forecasts are less accurate than naive



Industry Adoption of FVA Analysis

- The FVA “mind-set” has been applied at companies in a variety of industries, including:
 - Cisco
 - Intel
 - Newell Rubbermaid
 - AstraZeneca
 - Amway
 - Union Pacific Railroad
 - Moen
 - Yokohama Tire (Canada)
 - Tempur-Pedic
 - Wholesale Tire Distributors
 - Air Products & Chemicals
 - Nestle

They've approached the analysis in a variety of ways...

Industry Adoption of FVA Analysis

- **Premium Home Furnishings**

- Salespeople challenged to “beat the nerd in the corner” by improving the nerd’s statistical forecast

- **High-Tech Manufacturer**

- Half of forecasts failed to beat a naïve model
- Naïve models less biased

- **Automotive Supplier**

- Management overrides made slight improvement to forecast... but benefits may not outweigh the costs of overriding

Case Study: Newell Rubbermaid

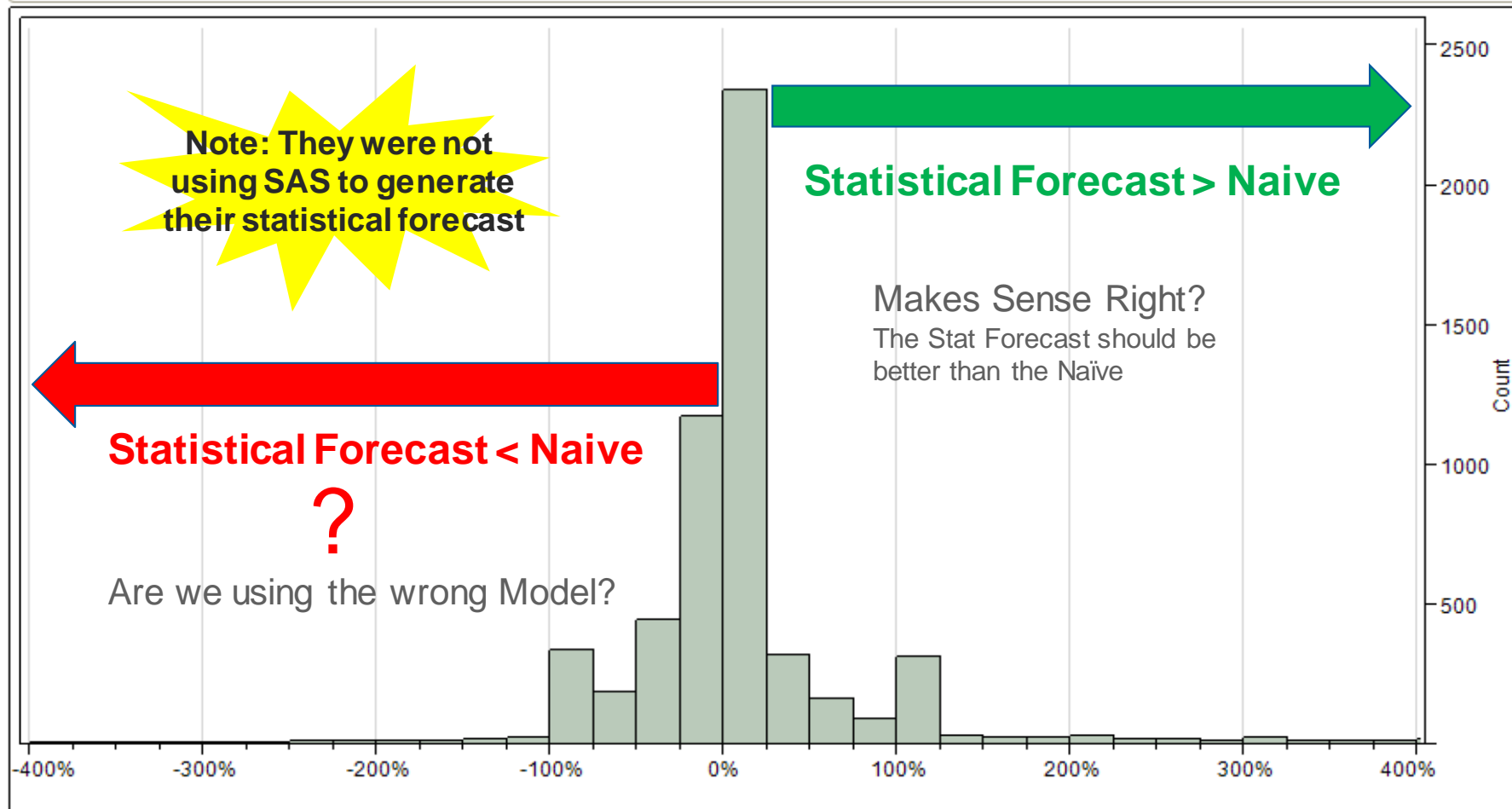
- **Observed:**
 - Naïve forecast accuracy 60%
 - Statistical forecast accuracy 65% (+5% “value added”)
 - Judgment forecast accuracy 62% (-3% “value subtracted”)
- **Recognized that the Stairstep report was not enough**
- **May need more information...such as**
 - How many periods of data
 - How big is the average difference
 - What is the variability in the differences
 - Direction of adjustments (positive or negative)

Shouldn't jump to conclusions based on a few data points – avoid the “flaw of averages”

Newell Rubbermaid: Stat Value Added

$$\text{Stat Value-added\%} = \text{FA\%}(\text{Stat}) - \text{FA\%}(\text{Naïve})$$

FVA% (Stat - Naive)

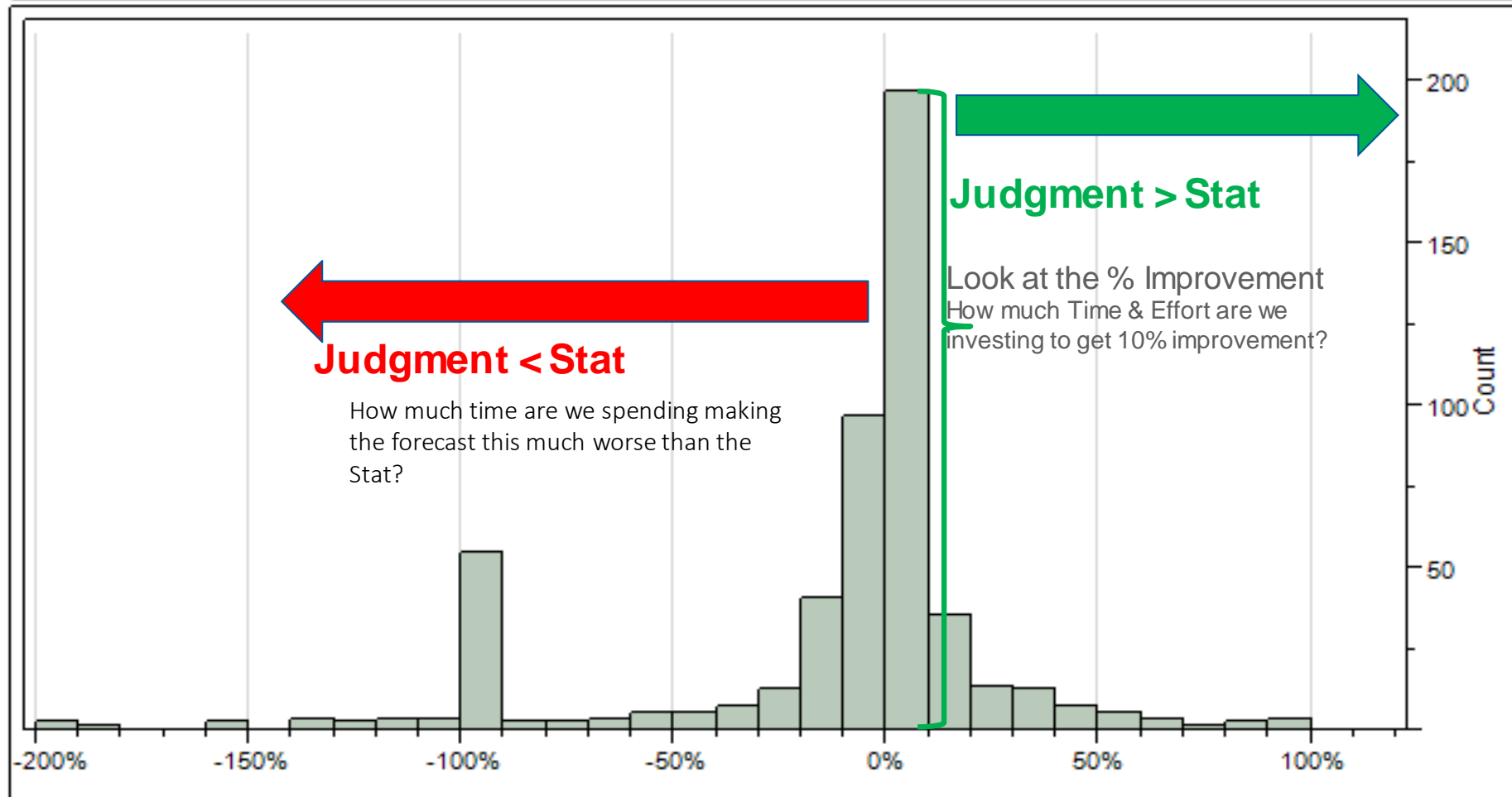


Source: "Forecast Value-Added" presented by Ryan Rickard of Newell Rubbermaid, February 2012.

Newell Rubbermaid: Judgment Value Added

$$\text{Judgment Value-added\%} = \text{FA\%}(\text{Judgment}) - \text{FA\%}(\text{Stat})$$

FVA% (Dec-Feb)



Source: "Forecast Value-Added" presented by Ryan Rickard of Newell Rubbermaid, February 2012.

Industry Adoption of FVA Analysis

Interview with Sean Schubert, Lean Six Sigma Black Belt (formerly of Newell Rubbermaid)

Q: What's your favorite forecasting tool?

A: Forecast Value Added Analysis (FVA) is a great way to highlight potential gaps in your forecasting process and to learn more about your business. By tracing your forecast accuracy (or error) from a naïve forecast to your stat forecast and then to your final forecast, which includes any judgmental overrides, you can highlight what's improving the forecast and what's hurting the forecast. Once you know that, you'll find that the easiest way to make the forecast better is to *stop making it worse!*

Source: *Foresight: The International Journal of Applied Forecasting* (Summer 2012)

Industry Analyst Coverage of FVA

- Lora Cecere (SupplyChainShaman.com) frequently advocates for FVA

Focus on Planning Excellence. A large food manufacturing company has fourteen poorly implemented JDA instances. The technologies, implemented by a large system integrator, degraded the forecast by 31%. The implementation focused on implementing the technologies versus driving process excellence. The demand technology lacked backcasting testing (use of history to tune the forecasting engines), and the organization was not holding themselves accountable for Forecast Value Added measurements. The leadership team openly admitted that they did not know how to measure and manage demand.

Source: Lora Cecere, “The March of the Lemmings” on SupplyChainShaman.com, posted June 3, 2019.

FVA Analysis: Interpreting the Results

- Be cautious in interpreting your FVA results
- Don't draw conclusions without sufficient evidence
 - One period of data is not enough!
 - Over short time periods, observed results may just be due to chance
- May have small variation in results depending on metric used (MAPE, forecast accuracy, etc.)
- Graphical presentation can be helpful

For more discussion see: Paul Goodwin (2018), *Profit From Your Forecasting Software*.

Summary: Why use FVA Analysis

- Identify and eliminate non-value adding activities
 - Streamline the process by eliminating wasted efforts
 - Direct resources to more productive activities
 - Achieve better forecasts
- May find that statistical forecast or naïve model are sufficient – further process activities are not adding value

By eliminating those activities that are just making the forecast worse, you can get better forecasts for free!