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A graph is worth a million dollars

The effective use of visualizations in reserving

CLRS 2022 St. Louis

Jamie Mackay

wtw

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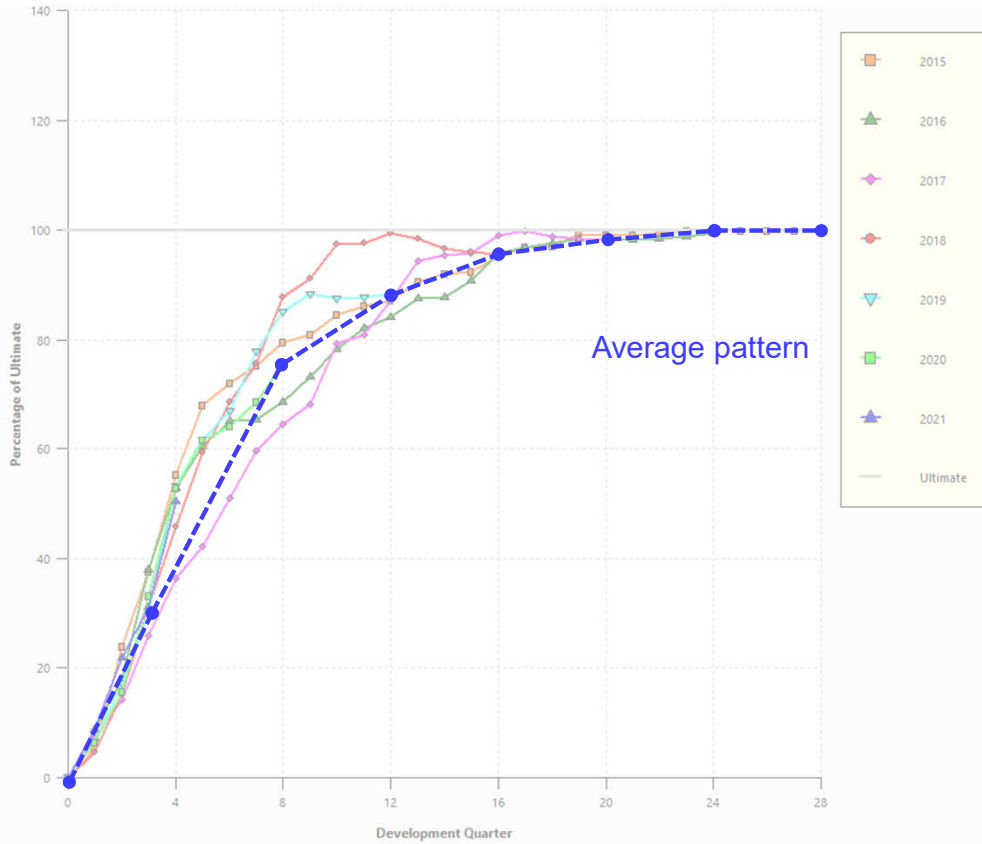
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Introduction

Reserving
Target Operating Model

There's a huge amount of opportunity to improve the way that we do reserving:

- using powerful new approaches
- leveraging new data sets
- using automation

Machine-led selections

Intelligent automation

Rules-based

Individual claims

Operational time

MCMC

Bootstrapping

GLMs

Munich chain ladder

BPA

Cape Cod

Average cost per claim

macros

Bornhuetter-Ferguson

Benktander

ELR

Chain ladder

The problem gets worse as granularity increase, datasets grow, and models become more complex

We often don't squeeze enough insights out of here, and often communicate even the basics poorly

There's a huge amount of opportunity to improve the way that we do reserving:

- using powerful new approaches
- leveraging new data sets
- using automation

Effective visualizations are a powerful tool:

- Allow you to consume and interrogate vast amounts of data
- Identify trends earlier
- Reduce risk of missing things altogether
- Improve oversight of process
- Improve oversight of assumptions and selections
- Identify key risks

- Identify outliers
- Provide important context
- Deploy resources where needed
- Focus judgmental insight
- Inform drivers of change
- Reduce friction of communication
- **Increase confidence in analysis**

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Polling questions

The importance of context

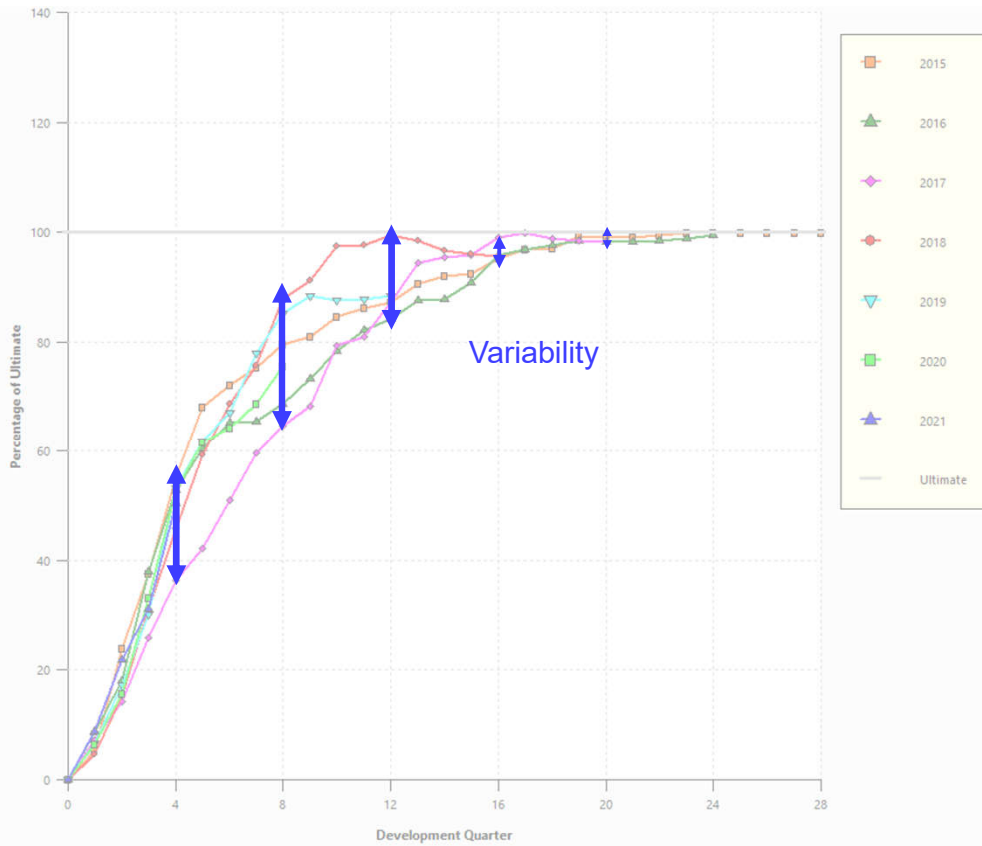

The all-origin loss development graph is a hugely useful graphical tool

It tells us:

- Our average pattern (used to develop our losses)
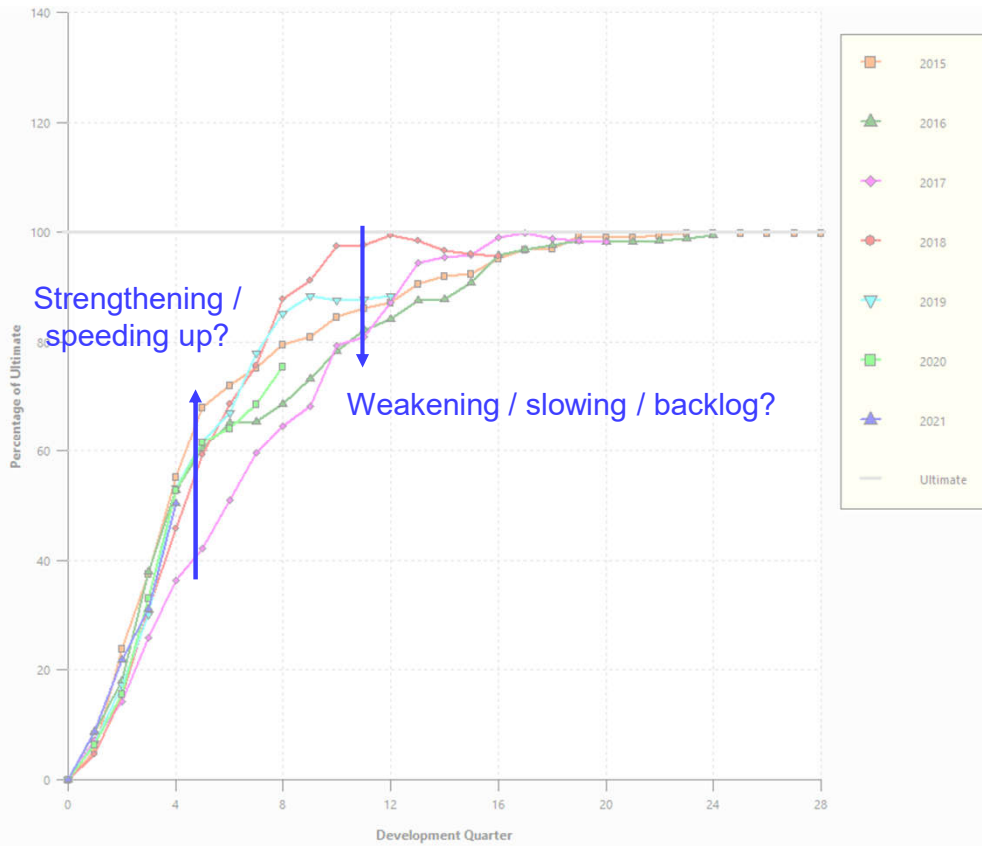
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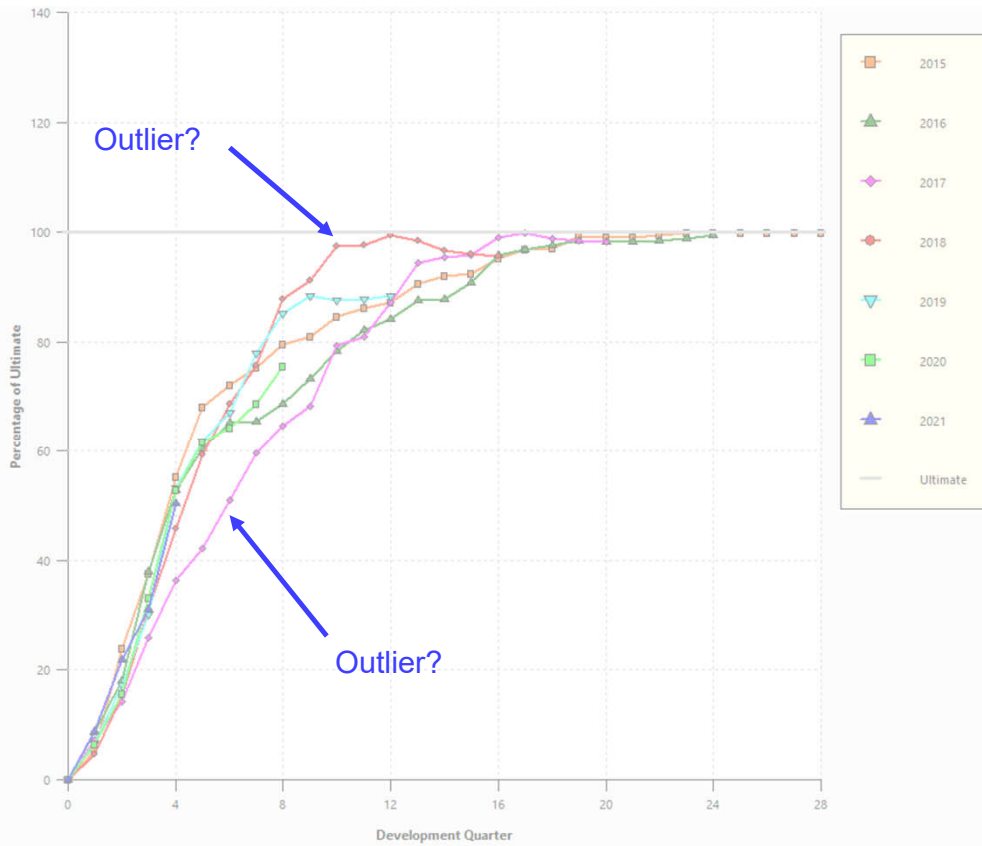
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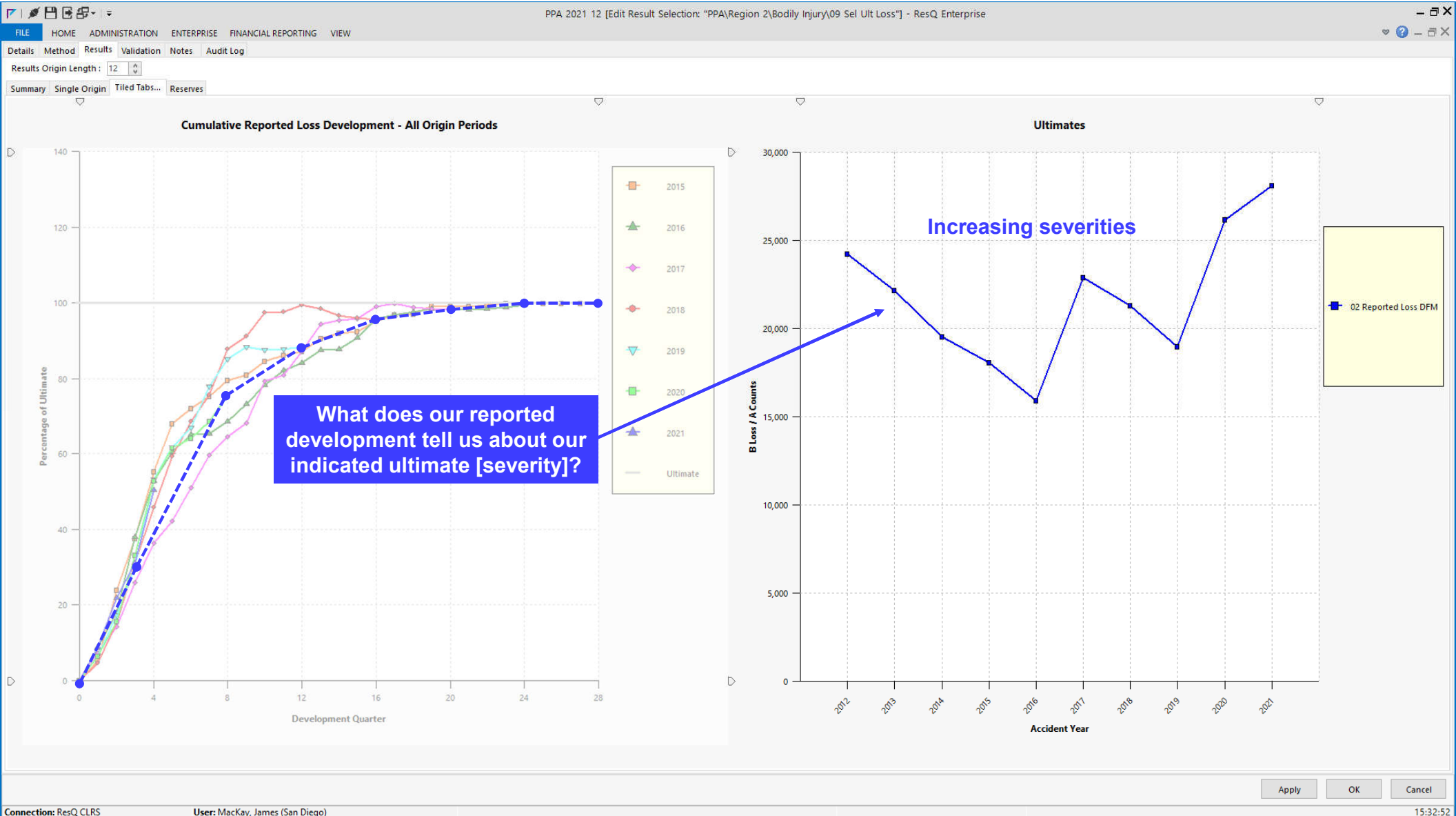
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- The variability in our historical triangles (which tells us about the variability around our indication)
- If there's a time-related pattern associated with that variability (i.e. is the pattern speeding-up or slowing-down?)
- Are there outliers in our historical development (which may inform how we include or reject those LDFs in the calculation of our patterns)

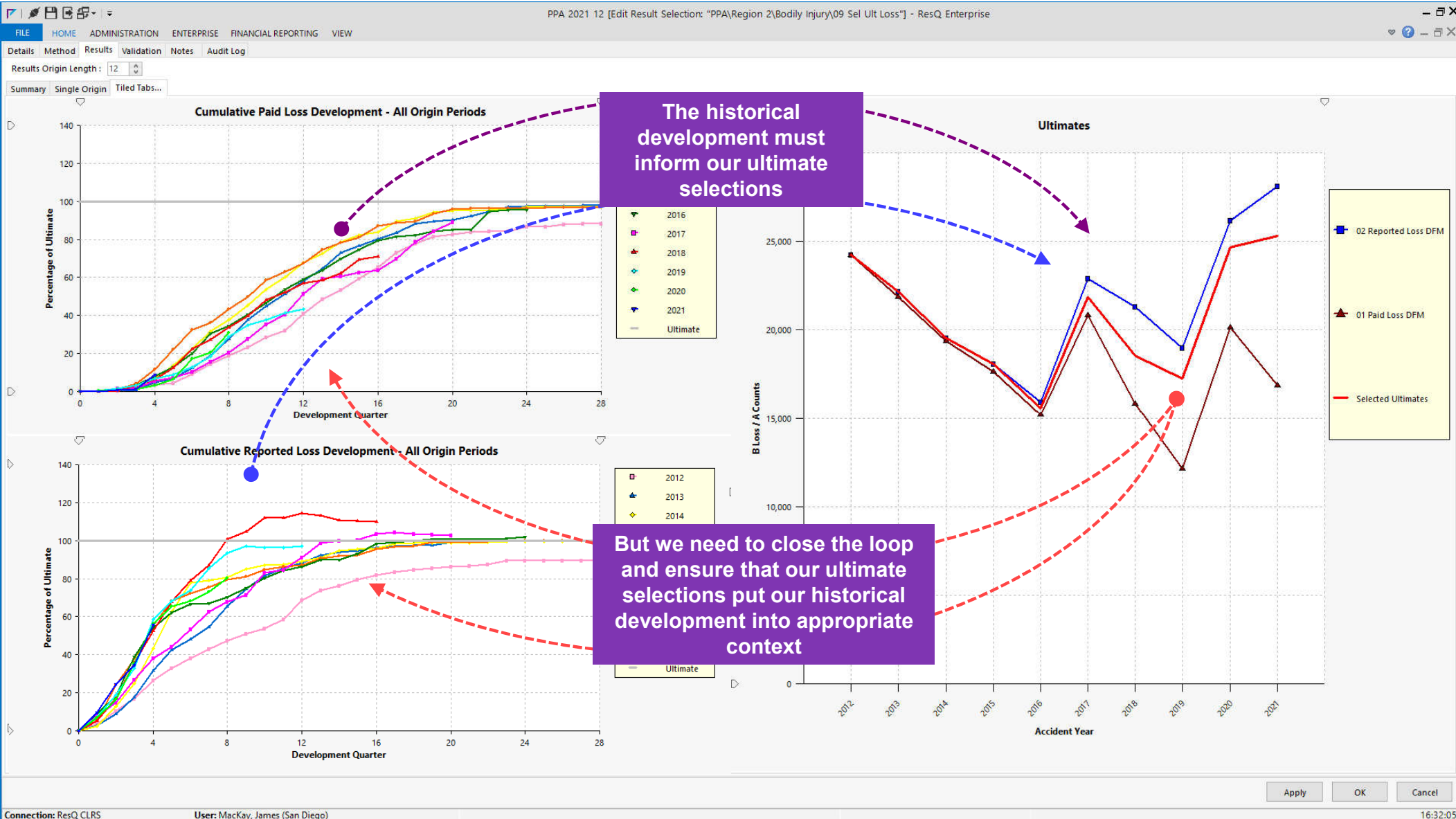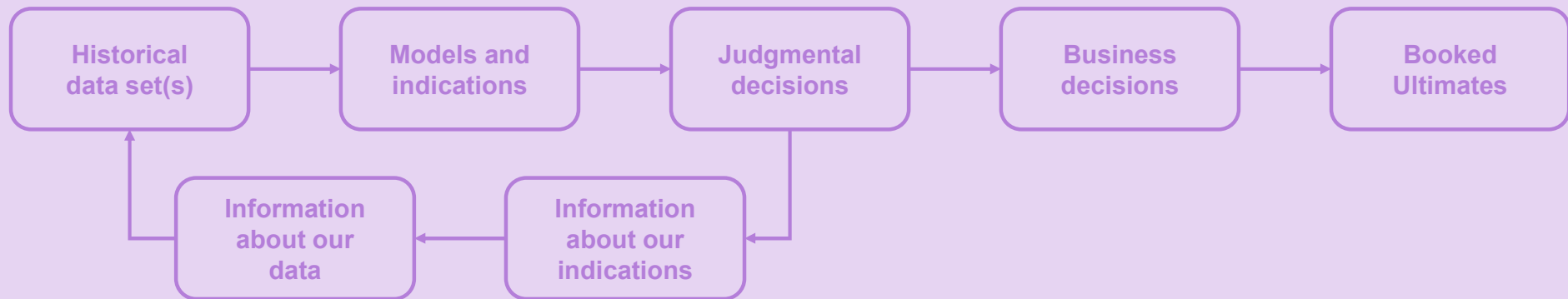**However, we have to assess the reasonableness of that indication…**

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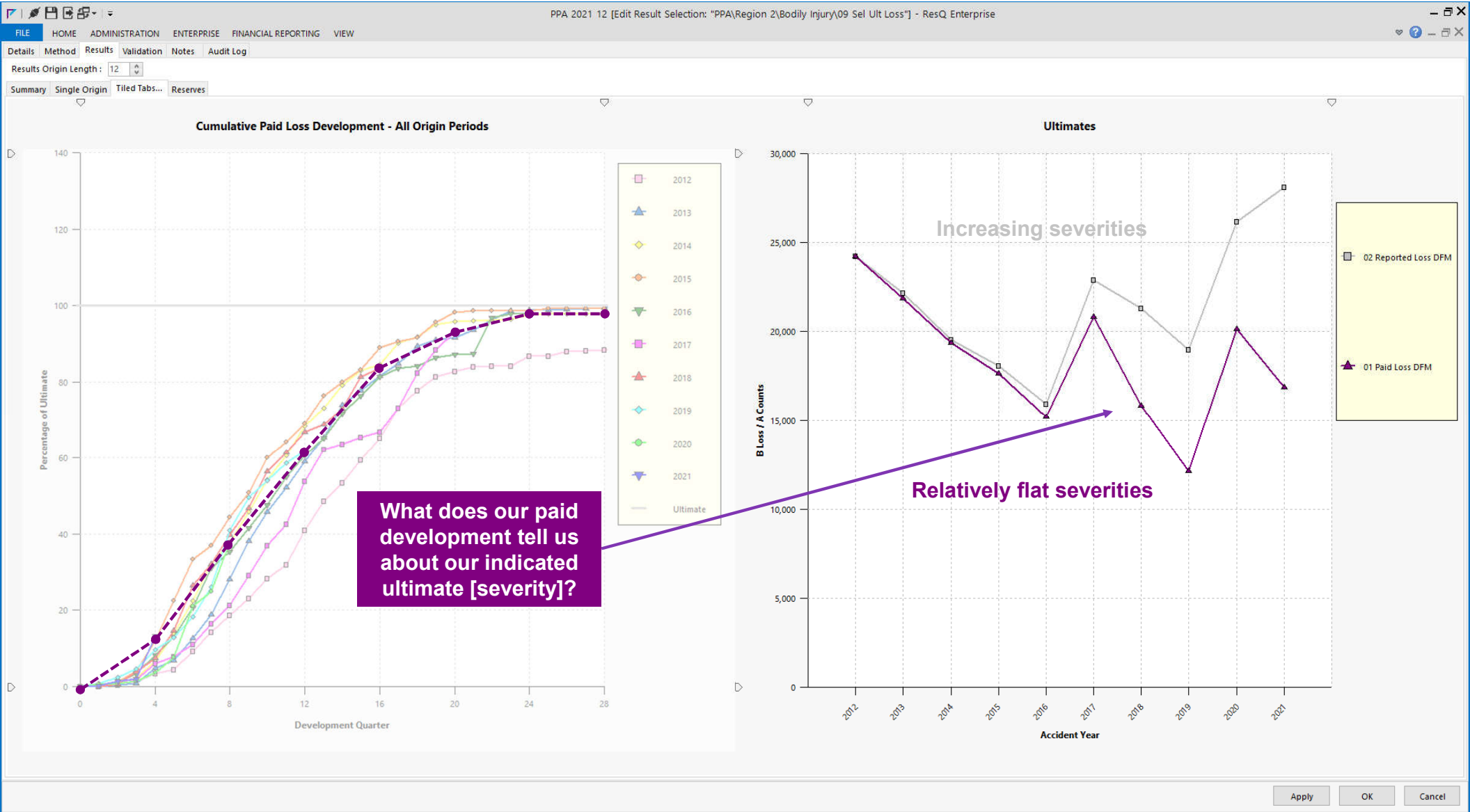
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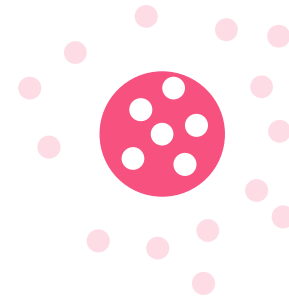
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The importance of context

```
Historical        →    Models and     →    Judgmental     →    Business       →    Booked
data set(s)             indications          decisions           decisions           Ultimates
   ↑                                            ↓
Information        ←    Information
about our               about our
data                    indications
```

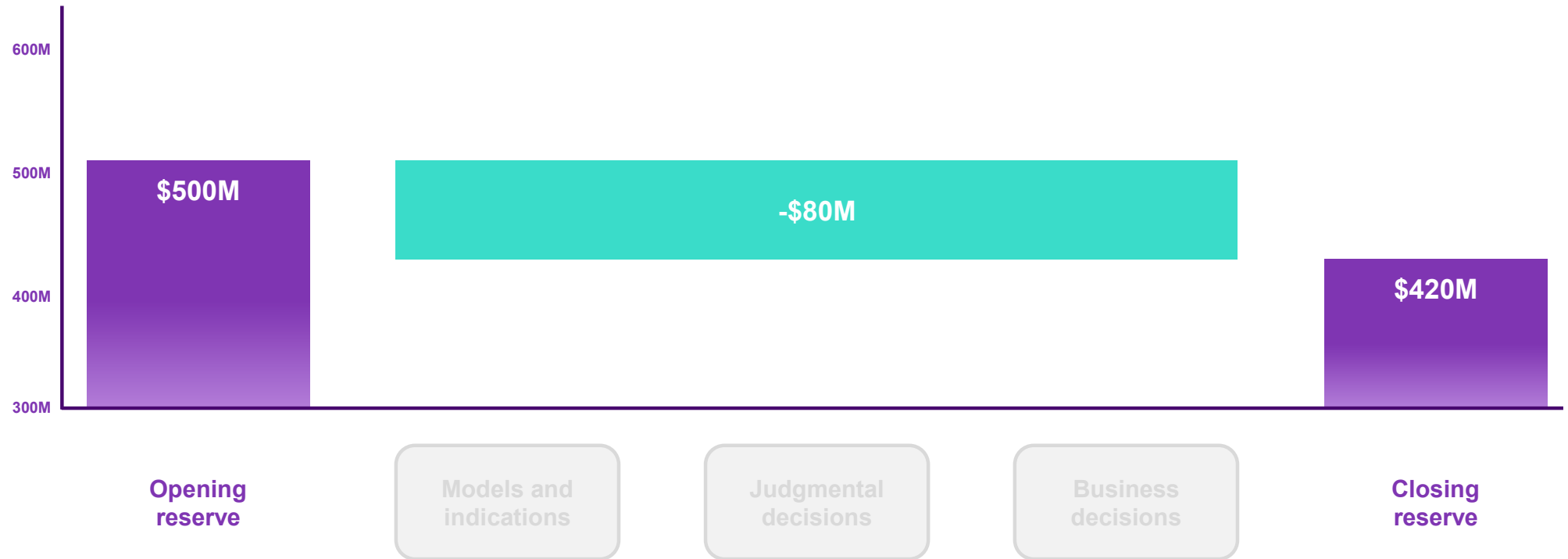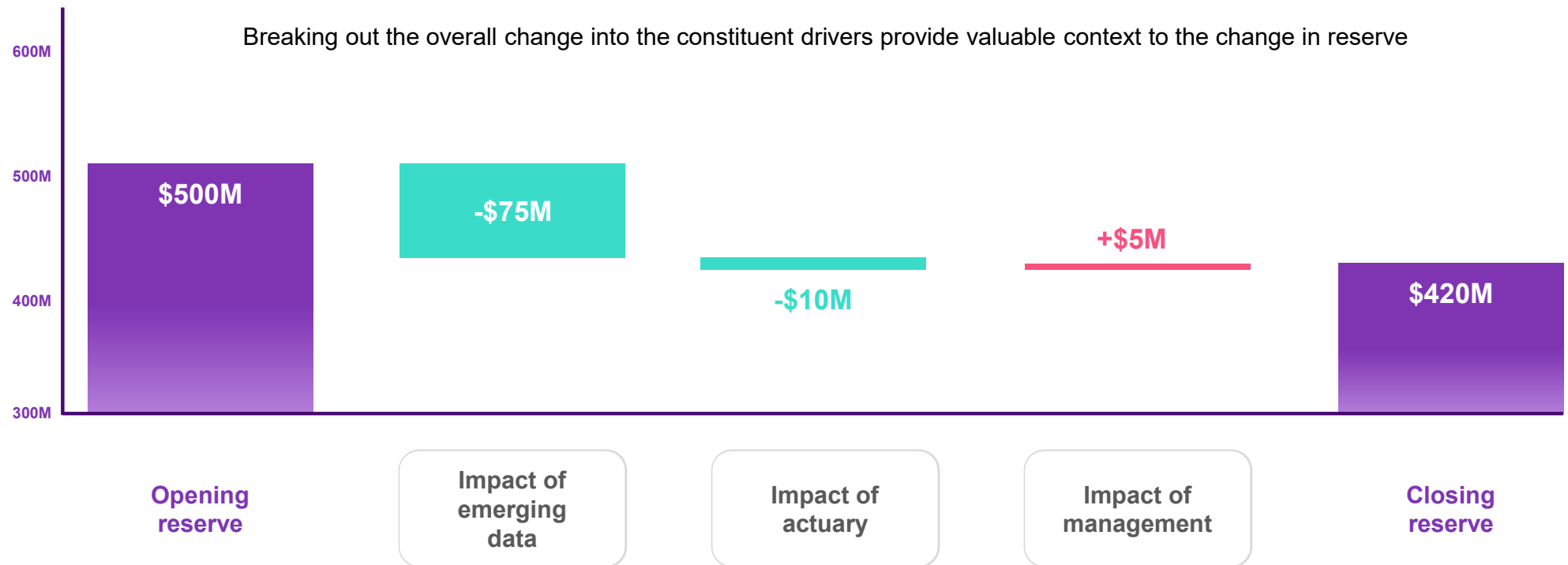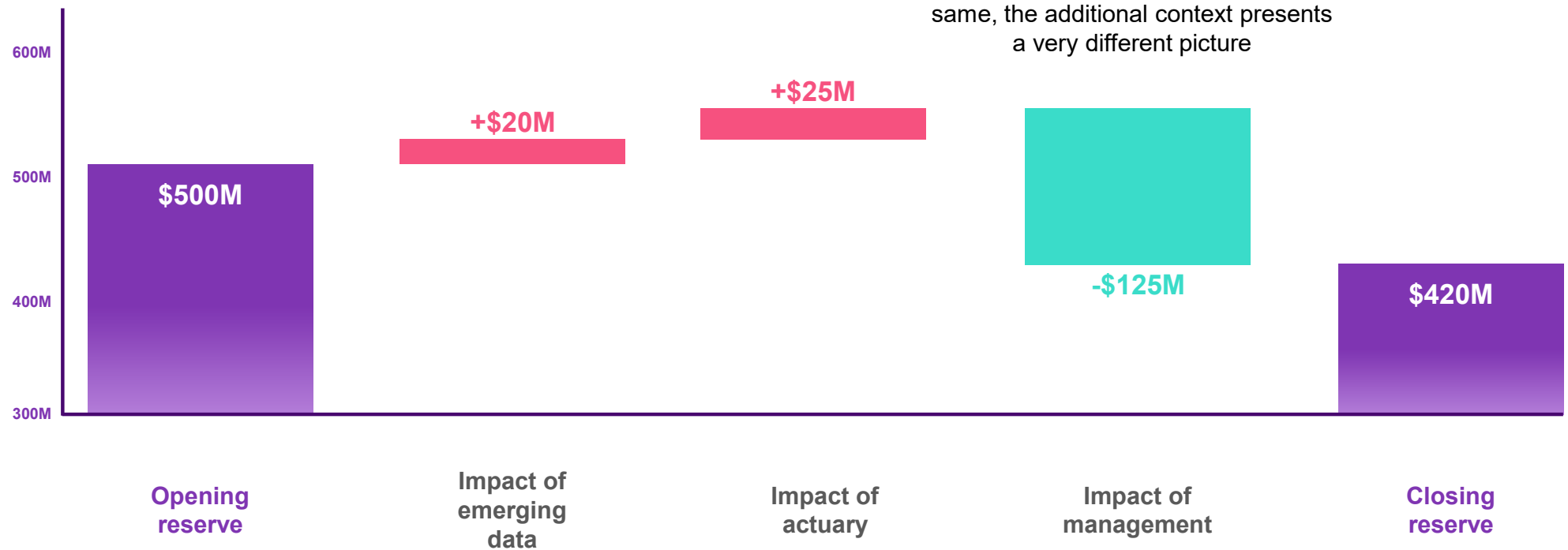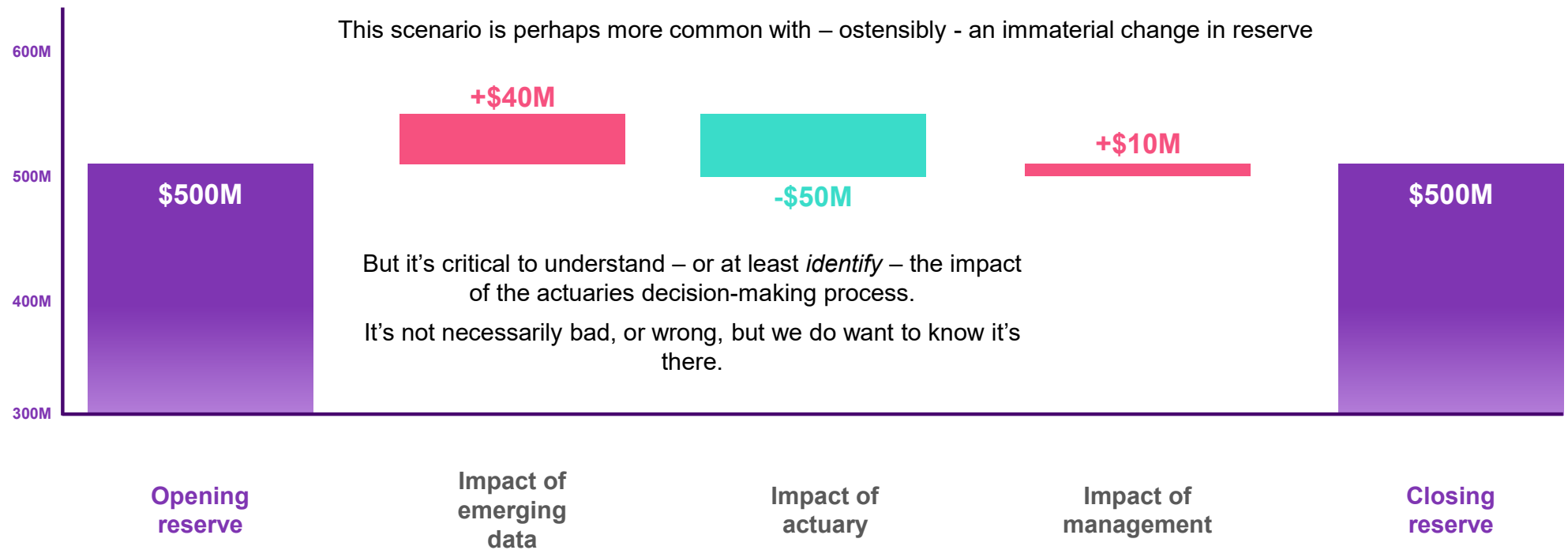Using visualizations allows us to feed usable information back to the business and complete the virtuous cycle.

The different perspectives allow us explain the results though a lens understandable to the audience.

The ability to effectively eliminate what the result _definitely isn't_ allows us to focus discussion on what it really _could be._

The importance of context

The importance of context

Breaking out the overall change into the constituent drivers provide valuable context to the change in reserve

Opening reserve	Impact of emerging data	Impact of actuary	Impact of management	Closing reserve
$500M	-$75M	-$10M	+$5M	$420M

The importance of context

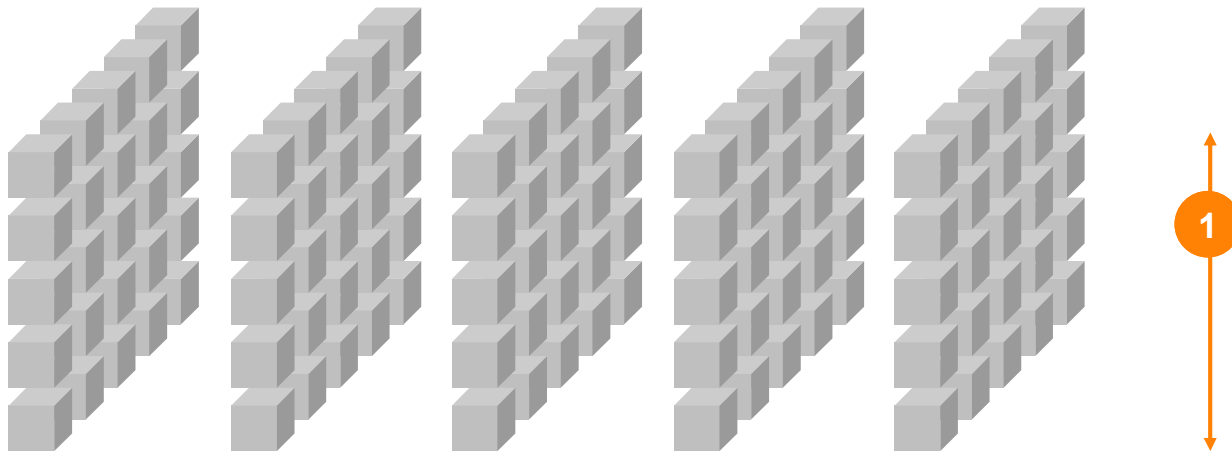While this overall change remains the same, the additional context presents a very different picture

+$20M

+$25M

-$125M

$500M

$420M

Opening reserve

Impact of emerging data

Impact of actuary

Impact of management

Closing reserve

The importance of context

This scenario is perhaps more common with – ostensibly - an immaterial change in reserve

+$40M

-$50M

+$10M

$500M

$500M

But it's critical to understand – or at least *identify* – the impact of the actuaries decision-making process.

It's not necessarily bad, or wrong, but we do want to know it's there.

Opening reserve

Impact of emerging data

Impact of actuary

Impact of management

Closing reserve

600M

500M

400M

300M

Plotting a course

With larger data sets and increased granularities, the number of data points – and the challenge in how to effectively interrogate those data points - can become quite overwhelming

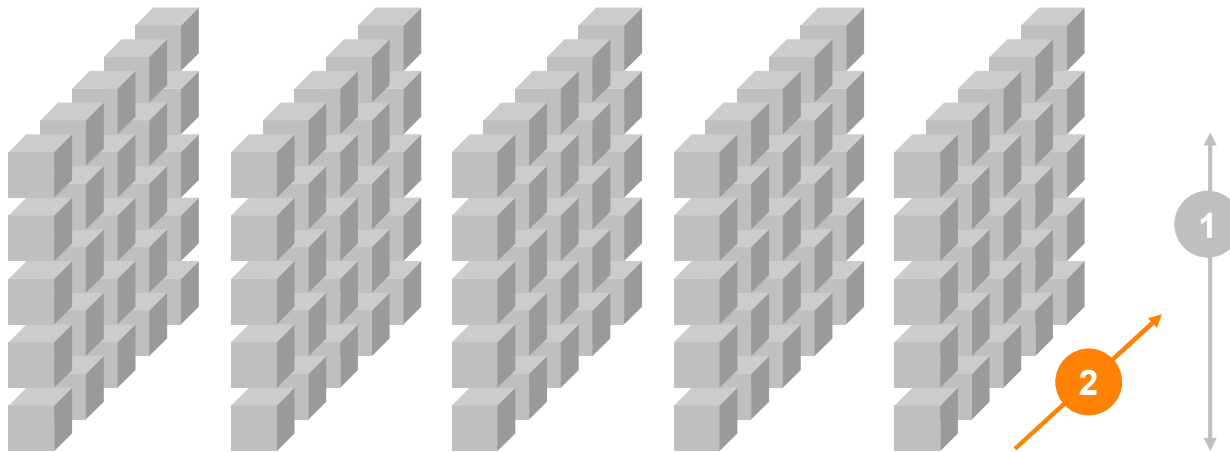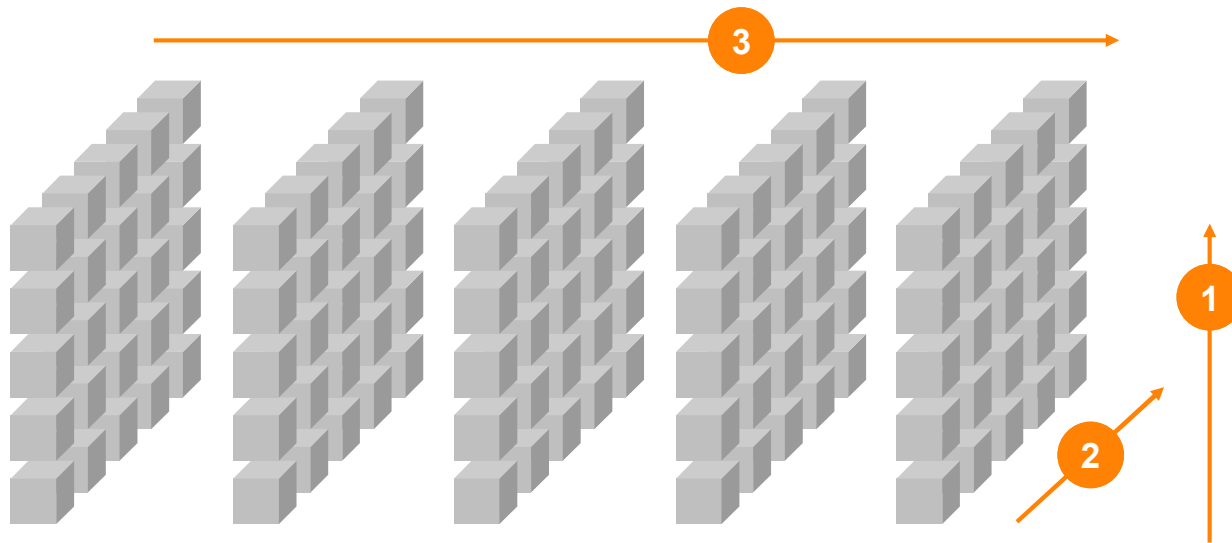# Plotting a course

1 Ground-up (or top-down) allows us to build a story from the data to the results (or vice versa)
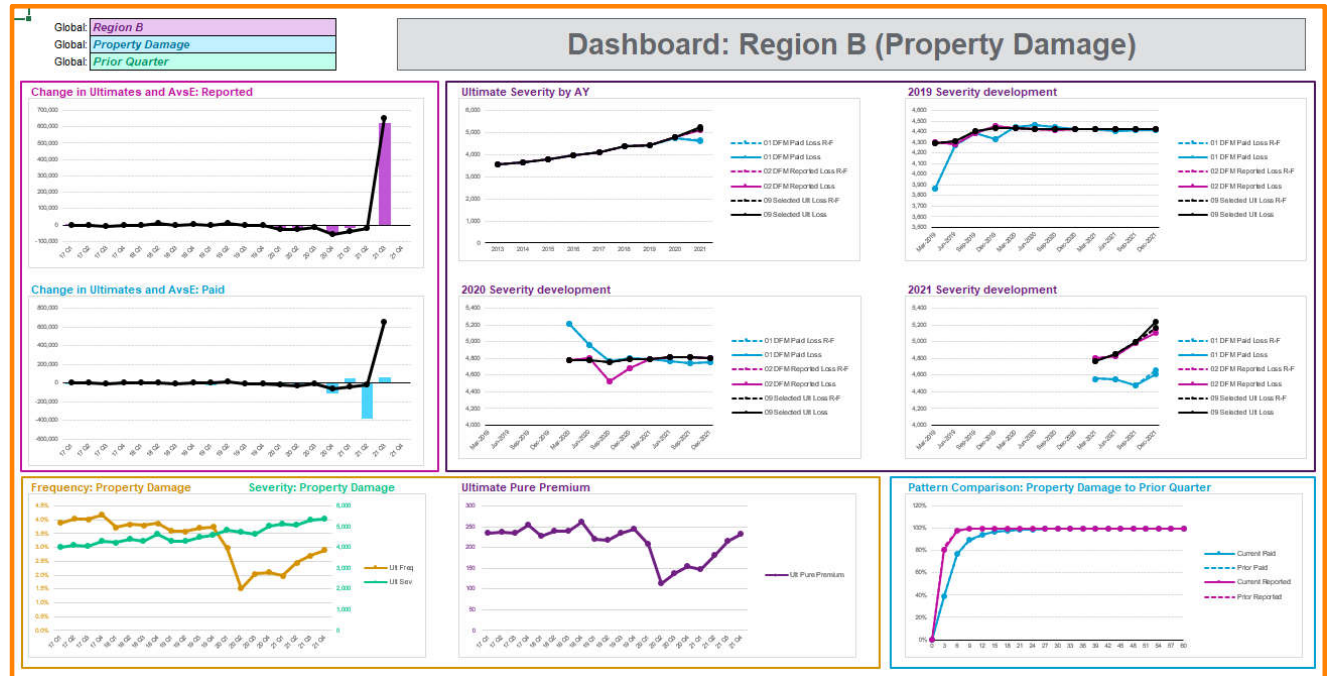
Plotting a course

1 Ground-up (or top-down) allows us to build a story from the data to the results (or vice versa)

2 A "broad" perspective allows us to identify trends or outliers across lines of business. This is helpful either when assessing large and / or correlated lines or managing large teams
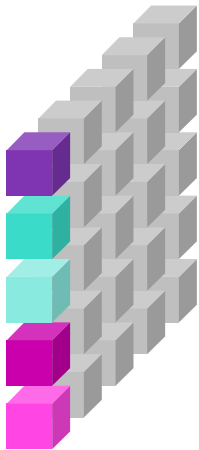
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2. A "broad" perspective allows us to identify trends or outliers across lines of business. This is helpful either when assessing large and / or correlated lines or managing large teams

3. A chronological approach focuses on changes – either in the indicated reserves or in the actions taken by our reserving team
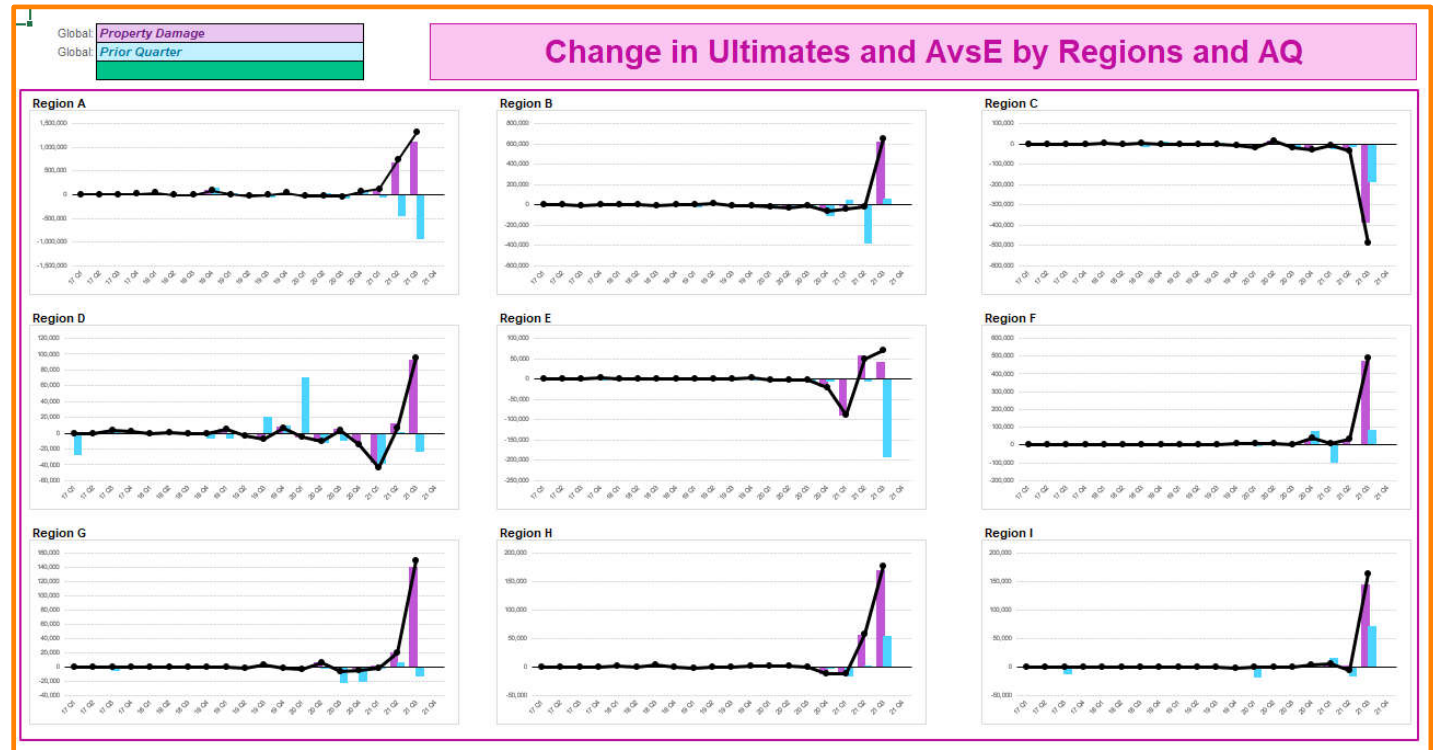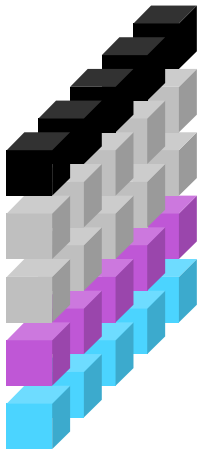
Plotting a course

Plotting a course

Plotting a course

Plotting a course

Another common challenge is encountered in the results review or socialization phase.

Occasionally high-level discussions can disappear down rabbit holes

After a time, we lose our orientation

The risk is that we waste time discussing something that is either not interesting or – more frustratingly – not material

Such disorientation can be countered by:

- Ensuring that our visual provides some sort of materiality flag or map or where in the results our presentation is focusing

- Using dynamic visuals that we can interactive and allow us to dive only into areas of the analysis that are both material and provide insight
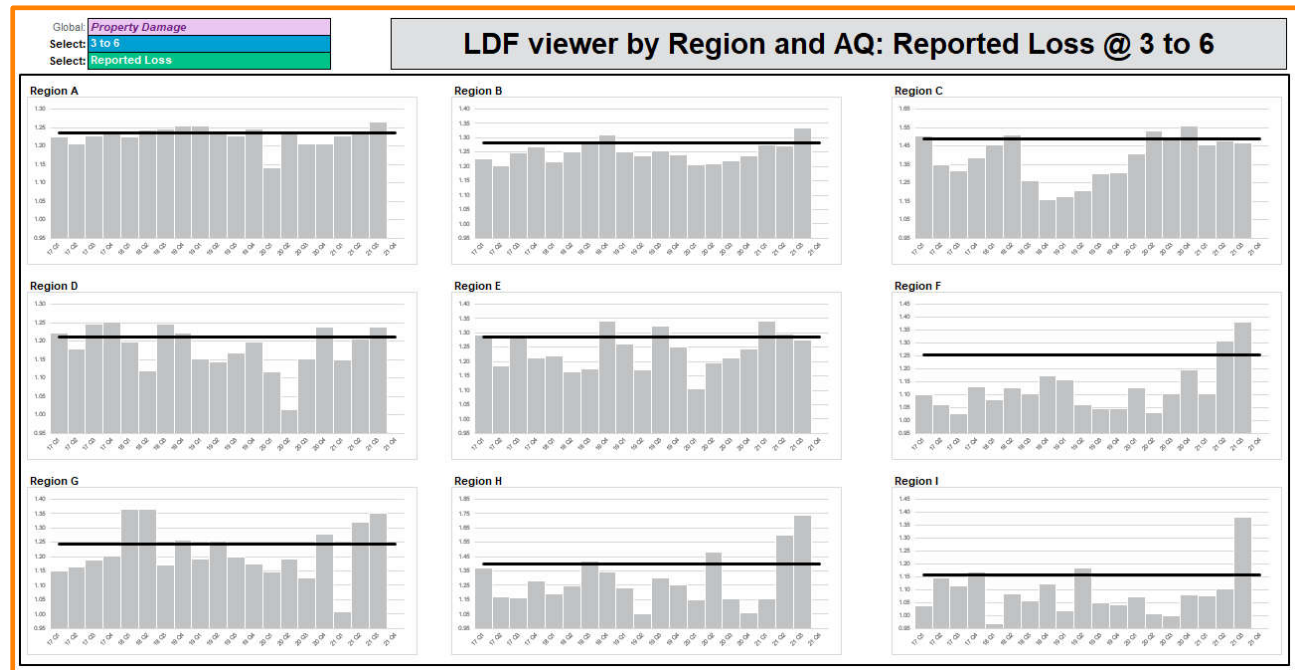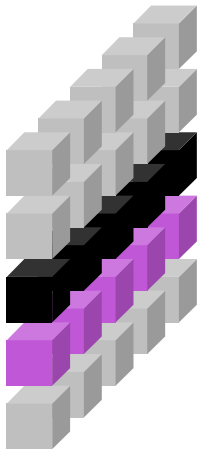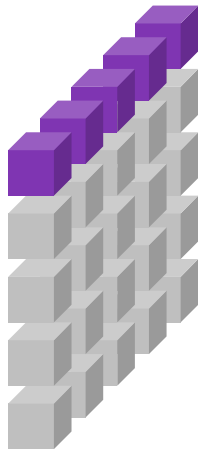
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Polling questions

Working with Power BI

Should I be using Power BI or Tableau or Qlikview? Can't I just keep Excel?

	Excel	
	• Easy to find experts (we're all experts!) • Easy to build, easy to maintain, easy to change • Understandable data model • Everyone has it • Enormously customizable	• Limits on volumes of data • Limited stock visualizations • Not particularly sophisticated data models • Limited connectivity to external data sources
	Power BI	
	• Dynamic graph interactions • Can handle large data sets • Powerful data model • Access to more sophisticated visualizations • Much sleeker and more modern looking • Web / Teams interface	• Dynamic graph interactions • Can handle large data sets • Powerful data model • Access to more sophisticated visualizations • More challenging to build, maintain and change

Working with Power BI

Different skills?

1 Visualization design	**2** Data model	**3** Data delivery	**4** Delivery
• What to show • How to show it • Look-and-feel • Is it intuitive? • Interaction • Navigation	• Tabular calculations, manipulations and queries • How are the data tables related? • Does the data model support the interactions? • Transformations?	• Where is the data sourced from? • How will it be delivered to the visualization? • How often will it be updated? • *How* will be updated?	• Where will the visualizations be…visualized? • Is the information secure? • Who can see it? • How will it be updated?

More challenging to build, maintain and change

Summary