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Why automated reserving doesn't work - and how to fix it

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- Automating Actuarial Judgements in Reserving
- Alternative Modelling Approaches
- Getting People and Processes Right

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Introduction

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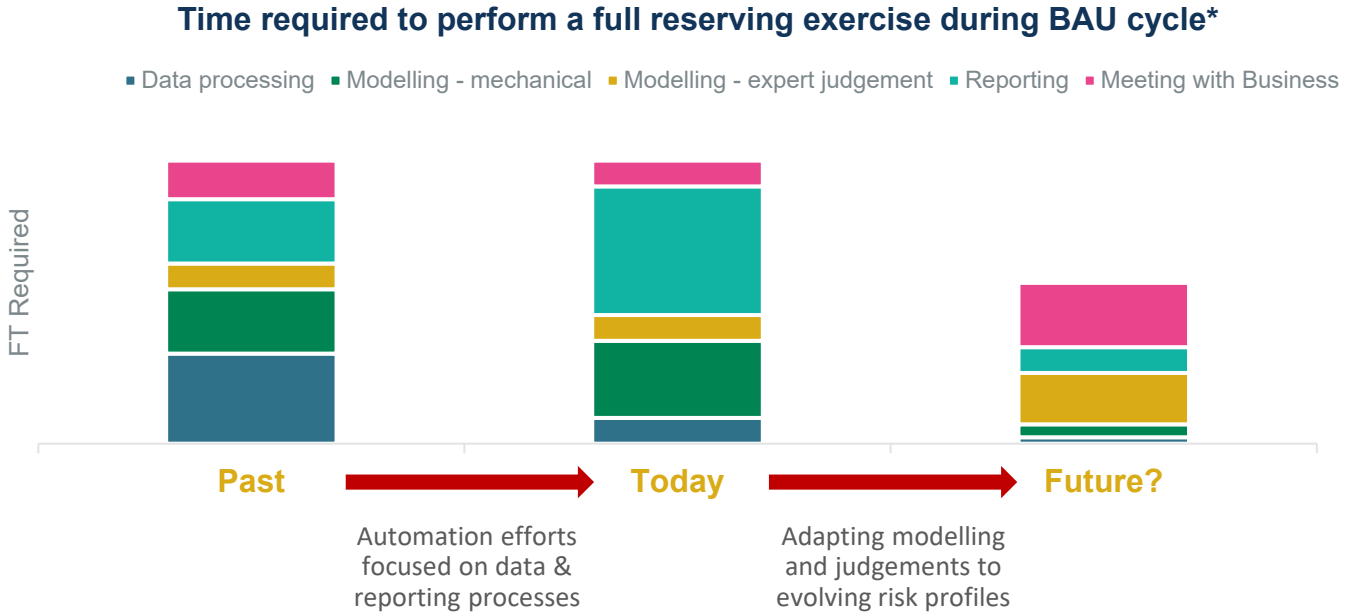
Reserving automation roadmap



** Data on this chart is for illustrative purpose only*

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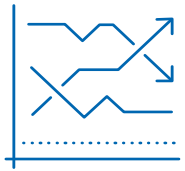
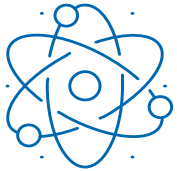
Standard approaches

Traditional approaches to automation attempt to use the same methods actuaries use manually; and need to make the same judgements

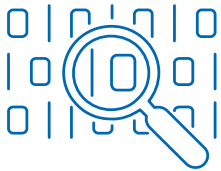


Instability
Noisy claims development can lead to noisy movements.

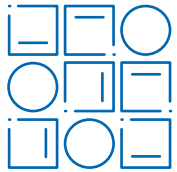


Blow ups
Controls on range of data can lead to blow ups (e.g. automated exclusion of link ratios leading to only a single, inappropriate, link ratio being present

These sorts of problems are easily missed unless every projection is carefully reviewed – taking as long as the old manual processes



Unavailable data
Actuaries can use information not present in the data sets (e.g. knowledge of changes in the business or claims delays from conversations with underwriters and claims teams)



Mechanistic
The approaches used tend to be mechanical in nature. The construction of these methods has not maintained the actuarial skills of exploring the space, considering the sensitivity, or considering stability over time.

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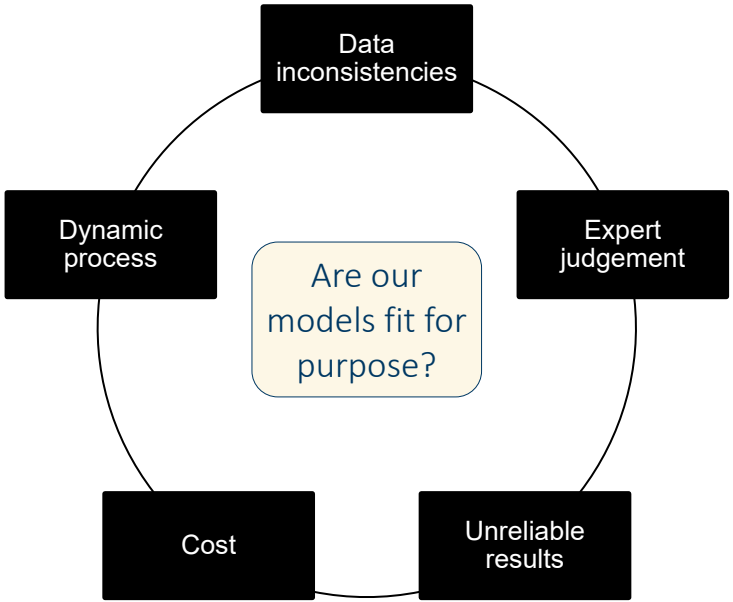
Current approaches are automation of traditional techniques



Key challenge:

Traditional methods rely on volumes of data to reduce noise. They are highly unstable and potentially misleading at low volumes. This puts further onus on the review and adjustment steps.

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Automating Actuarial Judgements in Reserving

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Codifying actuarial judgements

Areas of Reserving Requiring Judgements

Model Selection:
Reserving granularity
Large loss threshold
Frequency severity vs burn cost
BF vs Chain Ladder

Parameter Selection:
Premium
Claims Development Pattern
IELR
Earnings Pattern

Loss Specific Adjustments:
Specific IBNER
Major Events

Typical Judgements

- Outlier exclusions
- Extrapolation
- Smoothing
- Trend over time
- Qualitative information
- ...

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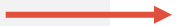

Judgements in Claims Development Pattern Selection

Judgement Area	Specific Judgement
Cohort feature	Data credibility; tail length
Outlier exclusions	Link ratio exclusions
Extrapolation	Tail factor selection
Smoothing	Averaging period; curve fit
Trend over time	Origin/calendar period effects
Qualitative information	Change in business profile/operations

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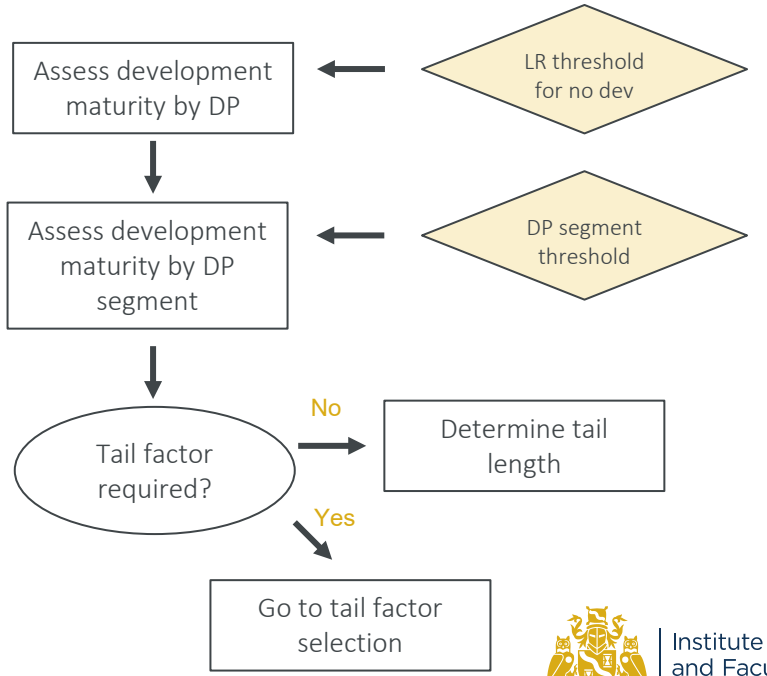
Illustrative procedure



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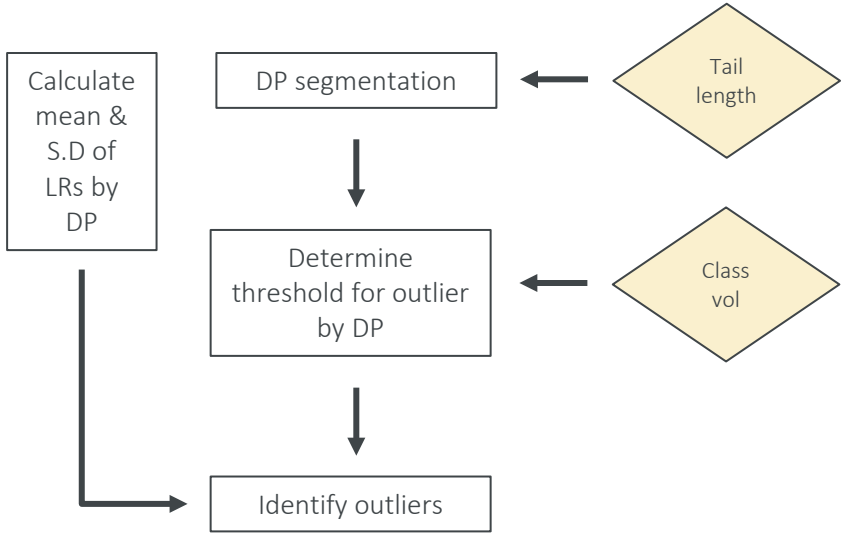

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Codifying actuarial judgements

Overall approach

- Identify area of judgement to codify
- Series of interviews – isolate reviews performed
- Coding of reviews into procedures
- Reflect judgements as parameters
- Reviews of appropriateness of results
- Iterative improvement

Challenges

- Consistency of actuarial judgements
- Ability to isolate actuarial reviews performed
- Edge-cases
- Locked into a specific approach to making judgements
- Expensive and slow to develop
- ‘automate something that should not exist’

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Alternative Modelling Approaches

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Alternative approaches to improve reserving models

Make better use of data

There have always been a number of things reserving actuaries look at which we don't tell our models about (e.g. paid/incurred ratios). Models can be easily extended to include these features if a company is prepared to move away from the Chain Ladder.

Even more data is often available as granularity increases

Machine learning and individual claim approaches

There have been significant developments in Machine Learning inspired methods. In some cases these use more data than traditional approaches, but others just provide a better framework for mechanically valuing the importance of an observation

Make better use of data – separation of patterns

'Standard' approaches can be extended with modern data availability which recognises the separate delay stages of earning, notification, and settlement. By modelling these steps separately (but not independently) their underlying patterns can be more easily assessed, development becomes faster, and patterns typically become more stable and easier to automate

Make better use of data – using data outside the current class

Typically reserving actuaries will make use of data which is exogenous to the current reserving task, whether that be external benchmarks or comparing to the performance of similar internal classes. By separating the calibration and application steps of a reserving model this process can be easily replicated in an automated sense, forming reserves which blend both a population view and the specific granular item being projected

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What are the features of a good reserving model?

While potentially eventually helpful, mechanical granular reserving is not a golden fix. Allocative approaches continue to be required for the foreseeable future. It is worth considering what we would want a good allocative process to achieve

- ☑ Stable results
- ☑ Stable judgements
- ☑ Resist (or at worst highlight) areas of aberrant data
- ☑ Robust set of tests to identify possible failures, which increase cycle on cycle
- ☑ Pre-calibration to inject exogenous data
- ☑ Explores and communicates the range of results, including from different methods
- ☑ Not a black box – ability to dig in and understand the result (e.g. high quality dashboards)
- ☑ Delivers at business required granularity
- ☑ Actuaries should never be able to 'beat the model' the same way twice

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A diversion into reserve allocation…

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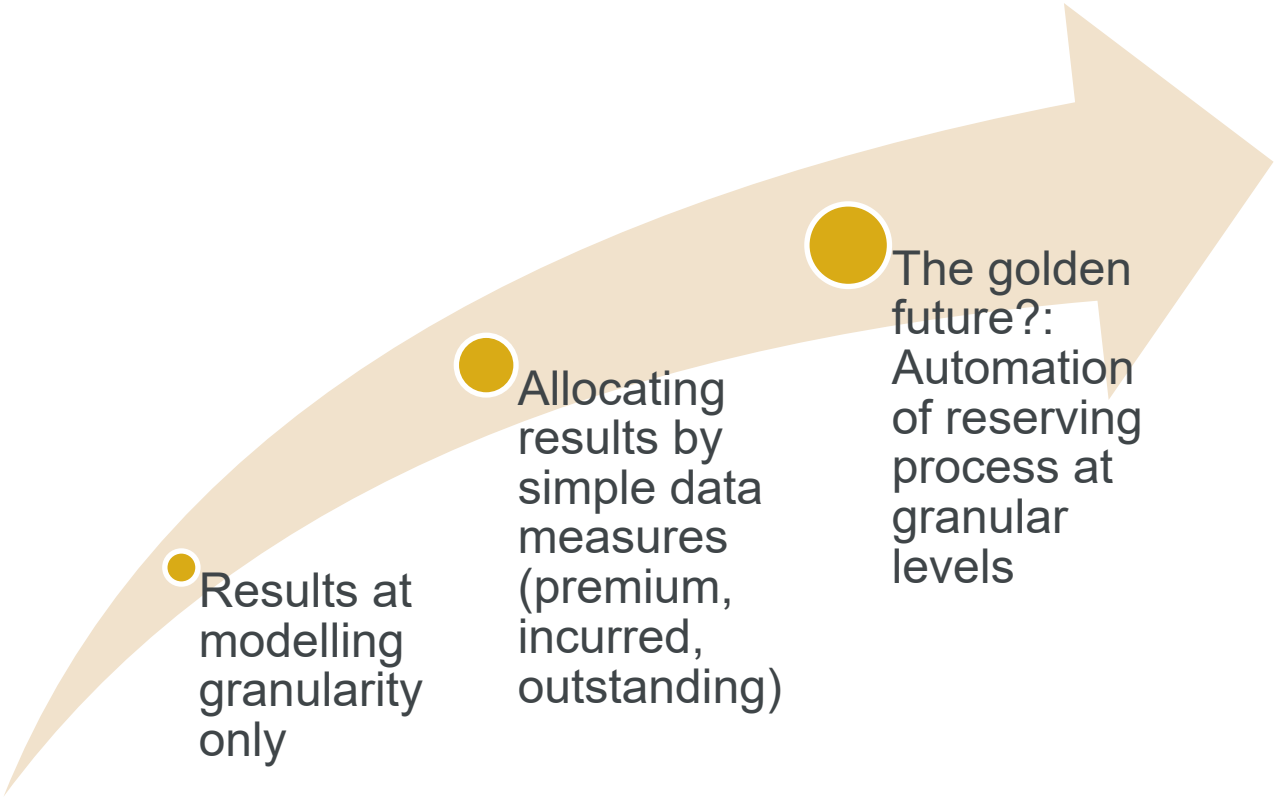
Allocation has been a journey

Firms are increasingly looking at allocation as a way to deliver faster results, manage increasing effort requirements, and meet increasing and different output demands



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What are the features of a good allocation?

While potentially eventually helpful, mechanical granular reserving is not a golden fix. Allocative approaches continue to be required for the foreseeable future. It is worth considering what we would want a good allocative process to achieve

- ☑ Adds to total
- ☑ Reflects historical developments (e.g. segments which have developed slower have higher reserves, all else being equal)
- ☑ Reflects volume of business (e.g. we wrote more of segment x than segment y, so it should have more reserves)
- ☑ Reflects business knowledge on ranking (e.g. we expect this segment to have more reserves than another)
- ☑ Reflects business knowledge about performance (e.g. we expect reserves to be higher than last year due to worsening market conditions)
- ☑ Reflects emerged claims to date (e.g. we have had a couple of large claims so incurred is higher than typical, but they are agreed and won't develop further)
- ☑ Reflects claims not in data (e.g. there has been a claims processing delay at an outsourcer)

But these requirements can conflict!

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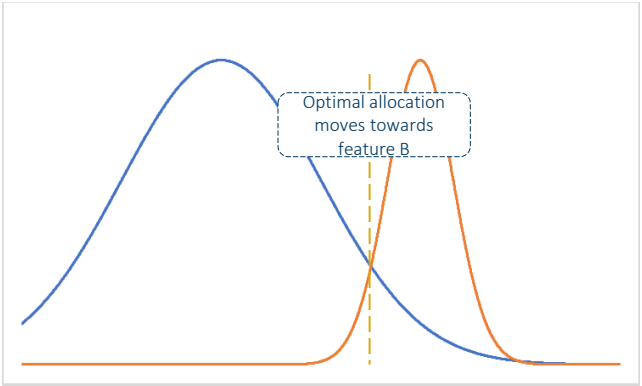
How do we handle conflicts?

To take inspiration for an automatic allocation, we consider how a manual process would handle the case where two or more of the 'good' features are in conflict

- Practically we recognise that none of these features are 'perfect'
  - We'd be prepared to tolerate a solution 'close' to the perfect 'good' features
  - Different features will present different 'optimal' allocations
- The best overall allocation will be the one which is 'least' bad looked across all features (wisdom of the crowd)
- We may care more about certain features, and will be less tolerant of deviations from the optimal allocation under that method. This will pull the overall best allocation towards the one proposed by that feature



This is essentially an optimisation problem!

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Good rules

Simple exposure:
IBNR should be proportional to paid
IBNR should be proportional to outstanding
IBNR should be proportional to premium/exposure

Allowance for trends:
ULRs have been increasing in history => increase IBNR
Development patterns have been quickening in recent history => decrease IBNR

Development based:
IBNR should be proportional to automated chain ladder

Integrated development based:
Projected at time t+1 should form a ratio which is in line with the historical average growth t -> t+1
Projected burn on exposure at time t+1 should be in line with historical norms

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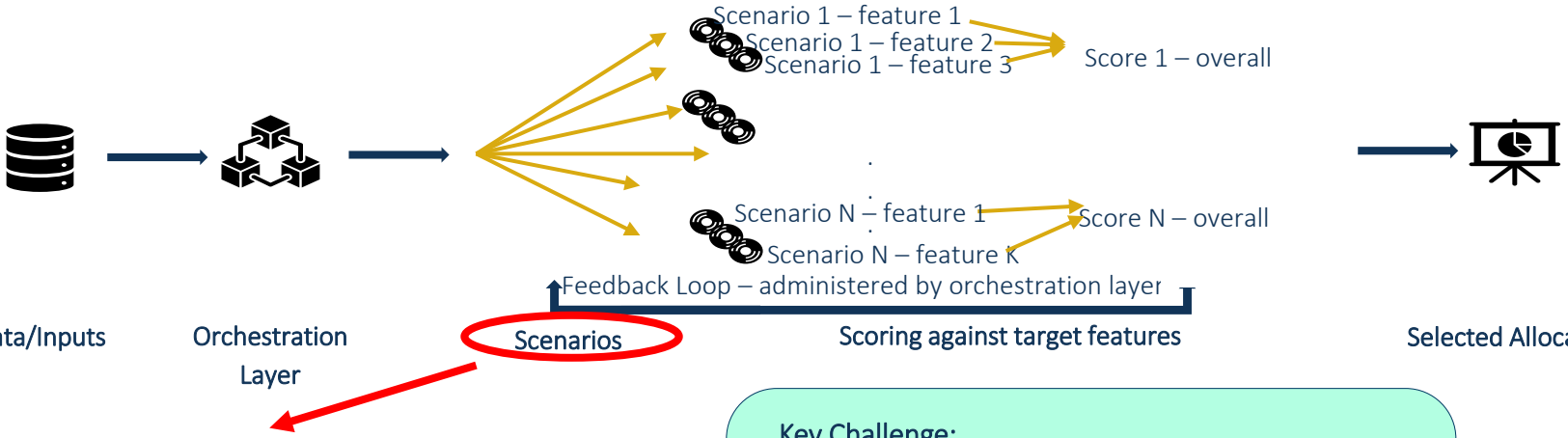
How might this be implemented?



What is a scenario?

A scenario is just any set of reserves at the granular level (which add up to the already derived total)

Key Challenge:

Potentially very large parameter problem.

BUT there are some approaches to speed this up:

- Nested allocation
- Parallel processing

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And we could stop there…

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But…

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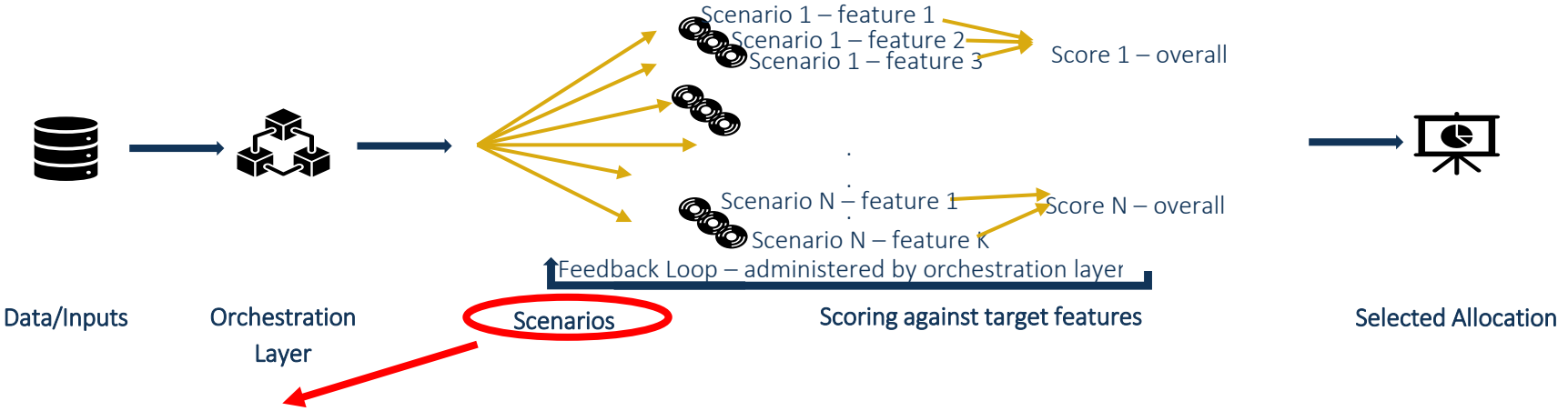
Allocation as automated reserving



What is a scenario?

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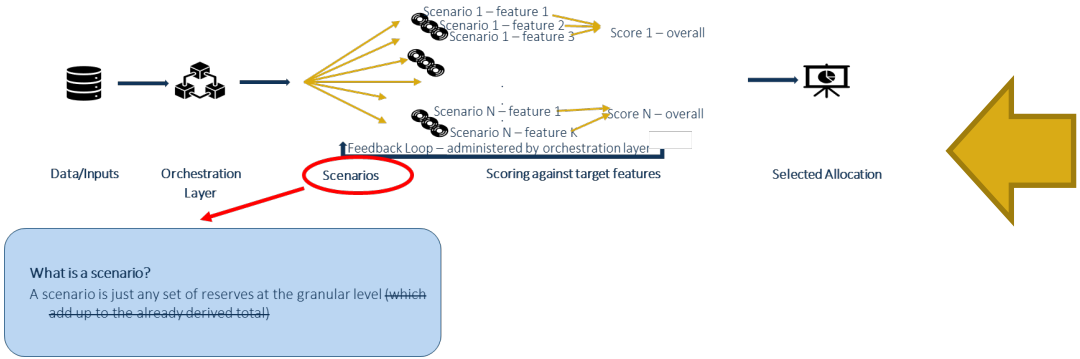
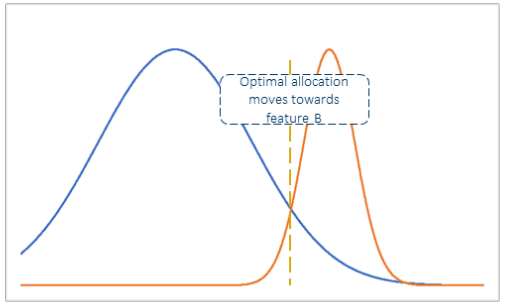
But don’t we need to start from reserves?





- We can inject all of the knowledge we’ve extracted from the reserving actuaries in the ‘codifying actuarial judgements’ approach
- In this framework, instead of having a process flow (if data is like X, then make judgement Y) we inject the knowledge in as ‘preferences’ (I’d like the model output/intermediate calculation to be consistent with this)
- But I’ll tolerate it not being perfect if other things I like pull me in different directions
- This is essentially how a manual reserving process works, we’re just letting the computer do the hard work of lots of different solutions

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Last but not the Least…Getting People and Processes Right

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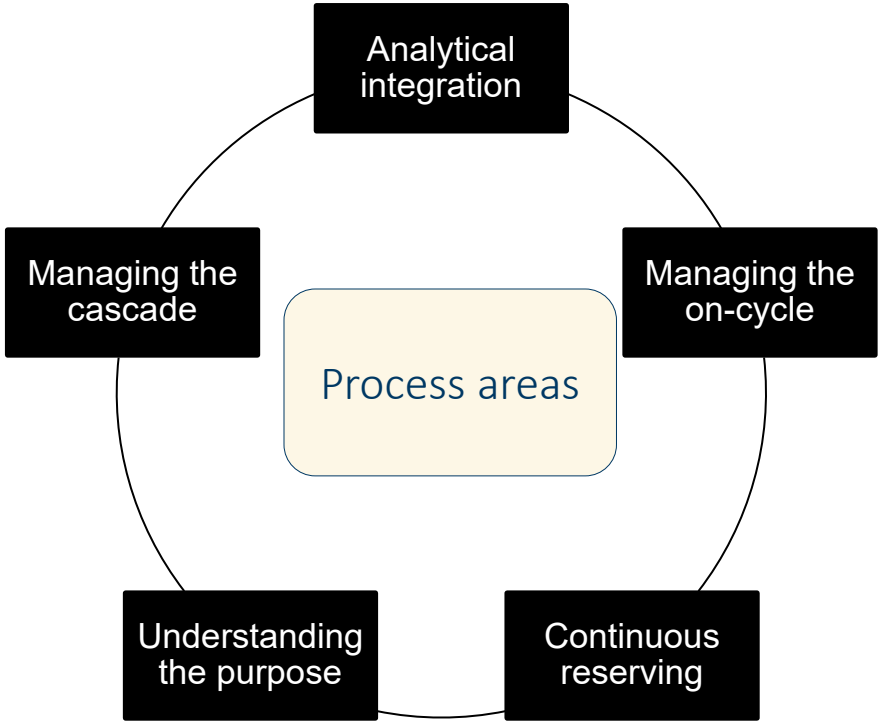
Nothing can be achieved without good people having the right environment



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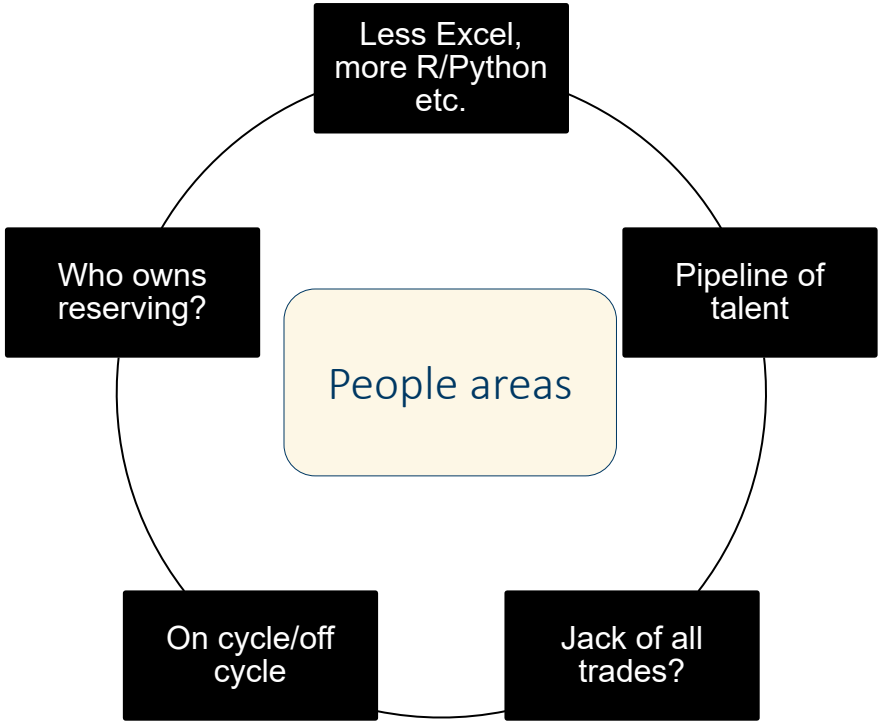
…or having the right people



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Questions

Comments

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