dynamo ANALYTICS

Hasta la vista, Actuary?

ASTIN Online Colloquium

18 May 2021

psicle® SOFTWARE

Introduction

Cyborg: A cyborg (/ˈsaɪbɔːrg/) is a portmanteau of *cybernetic* and *organism*

- and refers to a being with both organic and biomechatronic body parts.
- an organism that has [...] enhanced abilities due to the integration of some artificial component or technology

Whole suite of topics about automation and industrialisation. Today:

- How far can and should technology go in the actuarial profession?
- What is the perfect cyborg; the optimal balance between person and machine?
- ….and how do we get there?

Waves of transformation

The first wave

- Henry Ford's deployment of the assembly line in 1913
- Standardized, linear, step-by-step processes
- Companies began to measure efficiency and optimise over time

The second wave

- Began in the 1970s
- Culminated in the business process reengineering ("BPR") and digital computer movement of the 1990s
- Advances in IT began to enable automated processes in the back office

The third wave

- Today automation and technological disruption is transforming business processes to complement and augment human capabilities.
- We are seeing an emerging symbiosis between human and machine

Impacts of Cyborging

The impact of human and machine working together can be categorised under two broad types:

SUSTAINING technologies

- Focus is on streamlining routine and repetitive work
- Leads to an optimisation of traditional work
- Does not fundamentally change the work being done

DISRUPTIVE technologies

- Extends beyond streamlining
- Makes new approaches available that would not have been possible, or even **imaginable,** without the systems/technology in question

Implications of Cyborging

For participants

Machines do what they do best

- Handle routine and repetitive operations
- Analyse huge data sets
- Quickly and accurately

Humans do what they do best

- Apply judgement
- Think creatively
- Improvise when conditions require
- Work more like humans and less like robots

For businesses

Efficiencies

- Upfront investment in design and development
- Leads to long term time and financial savings
- Process are scalable and adaptable

Collaboration

- Facilitates collaboration between teams and geographies, encourages outsourcing
- Single version of data and assumptions
- Feedback loops between functions

Transparency

- Audit trails of manual overrides
- Less key man reliance

For the actuarial profession

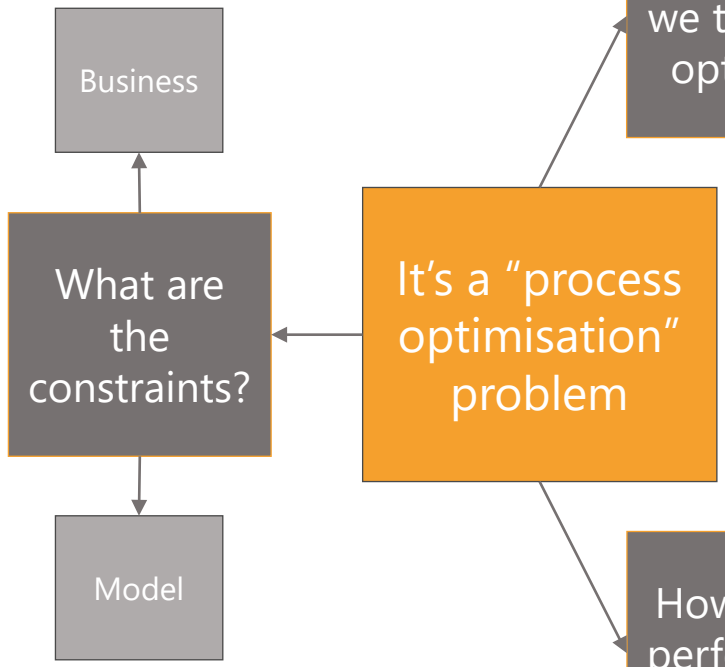
Risks

- Risk of process mystification
- Risks associated with handing ‘decisions’ over to machines
- Actuaries risk being deskilled

Opportunities

- Gives time back to focus on things that really matter, on the ‘so what’
- Enables new approaches and insights
- Traditional actuarial roles will be redesigned

Arranging our "cyborg process" estate



- Appetite for change restricting adoption of methods
- Implementation resources may not exist
- No budget for both BAU and building a process
- Timelines may restrict options
- May have insufficient internal technical expertise
- Lack of business partners to steer solution
- Regulatory restrictions on approaches
- Historical failures may colour decision making
- …

- Process is not sufficiently repeatable
- Process is too bespoke to justify implementation
- Technology isn't yet available to deal with specifics
- Insufficient data available to calibrate techniques
- Ill defined process with no clear idea on target
- Process too closely mapped to a single technology
- …

Materiality framework

- Framework to assess what is and isn't material to the overall objectives of the process / model.
- Attempts to define what matters most, and what can move the process results the most

Risk appetite framework

- Framework to assess the number / nature / level of risks in the process that the business is prepared to accept.
- Defines where business is prepared to tolerate the most risk, and where it becomes unacceptable.

Utility framework

- Framework to define the trade-offs between features of a process, to determine an optimal process

Cyborg design

- Breaking the end-to-end process down through functional activity analysis and mapping to identify all key stages.
- Forms basis for decisions on what type of automation and the extent

Implement

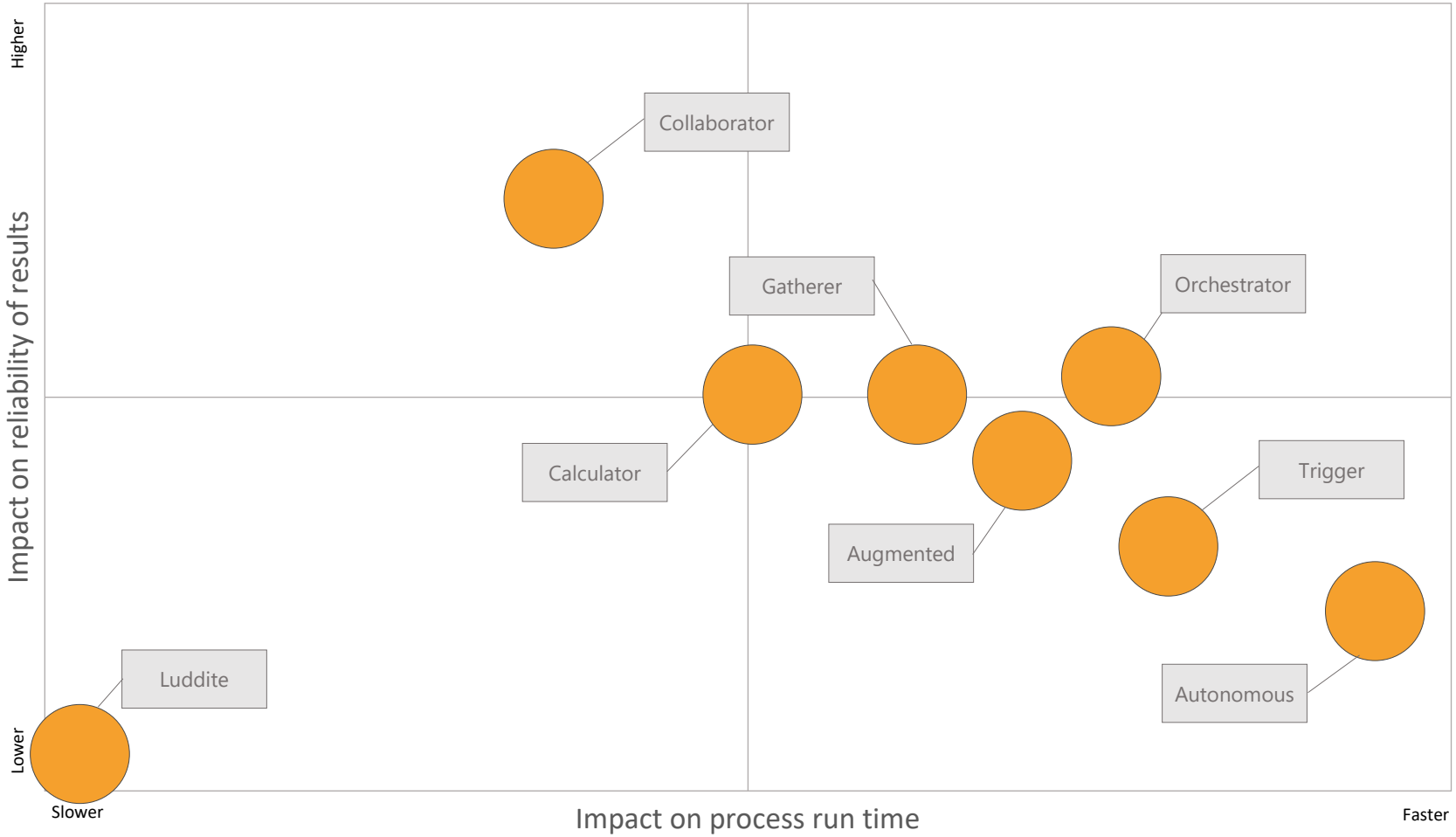
- Full programme management, including software, technical, mindset to enable the change.

The cyborg categories: a spectrum

Name	Description	Orchestrate	Run	Select	Judge	Review	Report	Actions
Luddite	Machine offers no assistance	H	H	H	H	H	H	H
Calculator	Machine evaluates algorithms but is set up by, and requires significant input from, the actuary	H	M	H	H	H	H	H
Gatherer	Machine gathers / prepares information for the expert to use in formulating judgements	H	H	M /H	M / H	H	H	H
Collaborator	Machine enables collaboration between experts but does not run any of the process.	H	M / H	M / H	H	H	H	H
Orchestrator	Machine orchestrates and completes tasks with input being required to judge and sign-off	M	M	M	H	H	H	H
Augmented	Actuary completes or augments a task carried out by a machine	M	M	M	M	H	H	H
Trigger	Machine executes on demand or at trigger points. Actuary simply uses output of process.	M	M	M	M	M	H	H
Autonomous	Machine acts autonomously, decides and acts without any actuarial support.	M	M	M	M	M	M	M

H = human driven
M = machine driven

Characteristics of process cyborgs

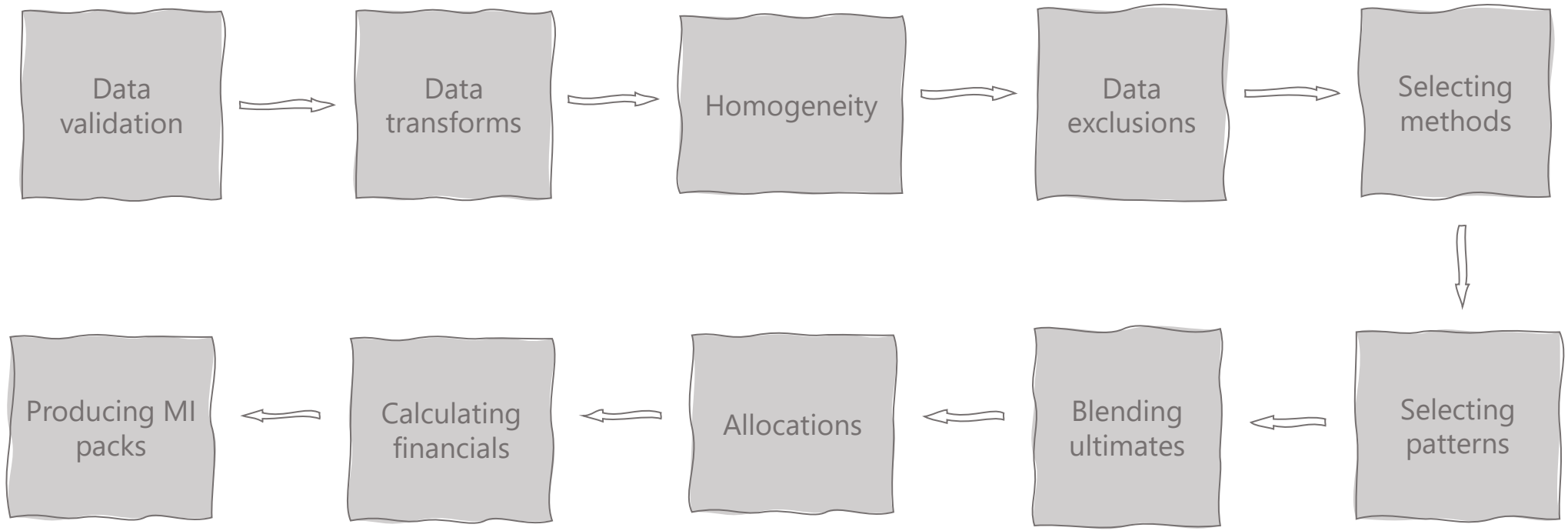


Decision dimensions

- Process run time
- Risk in results
- Transparency
- Cognitive overhead
- Technology required
- Internal skills needed
- Reputation
- …

Builds a fingerprint, relative to what's important to the specific business, for each type of cyborg

A simplistic example: A reserving process



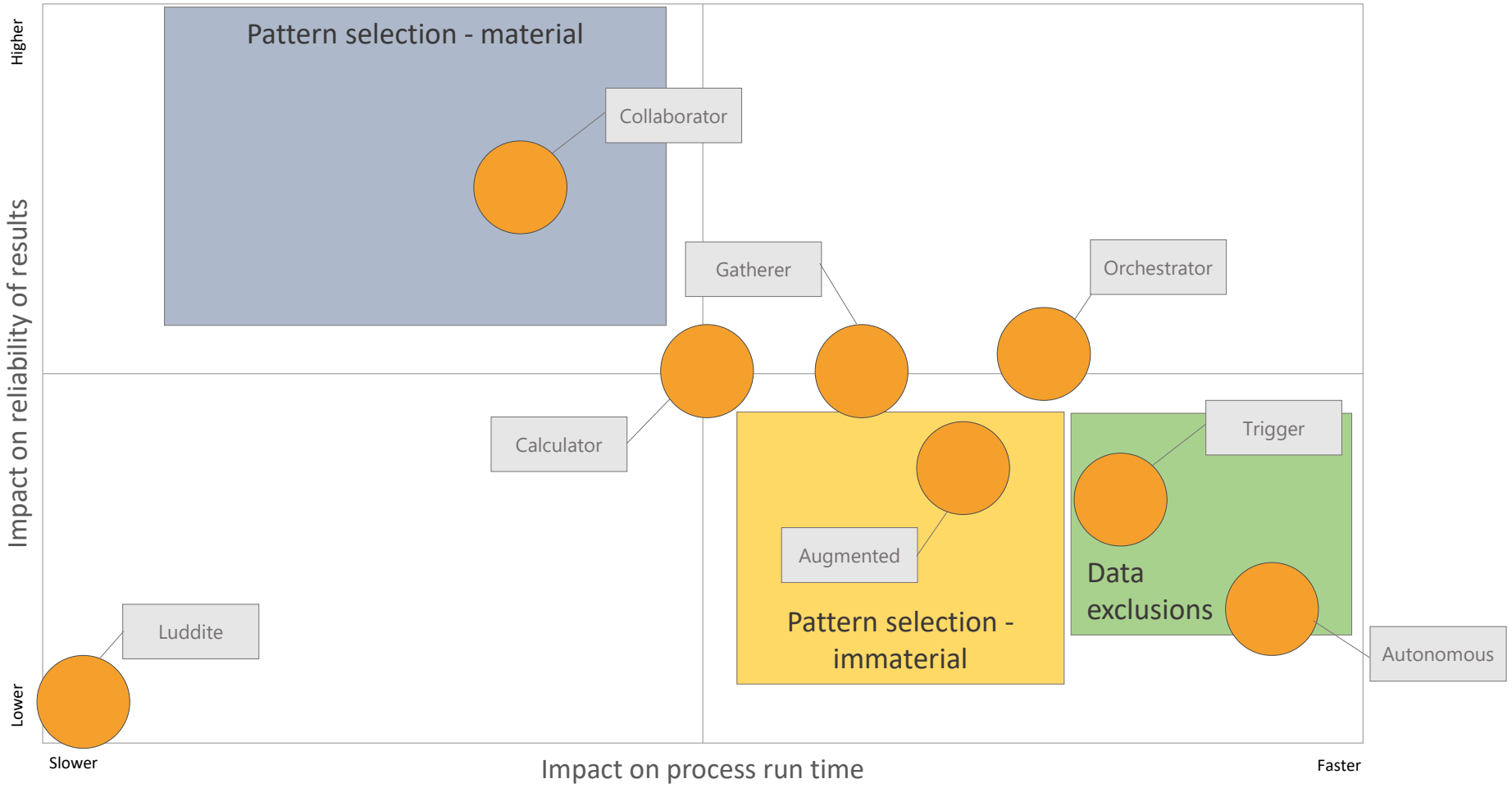
A simplistic example: A reserving process

	Materiality	Risk appetite	Utility	Automation
Data validation				
Data transformations				
Homogeneity				
Data exclusion				
Selecting methods				
Selecting patterns				
Blending ultimates				
Allocations				
Calculating financials				
Producing MI packs				

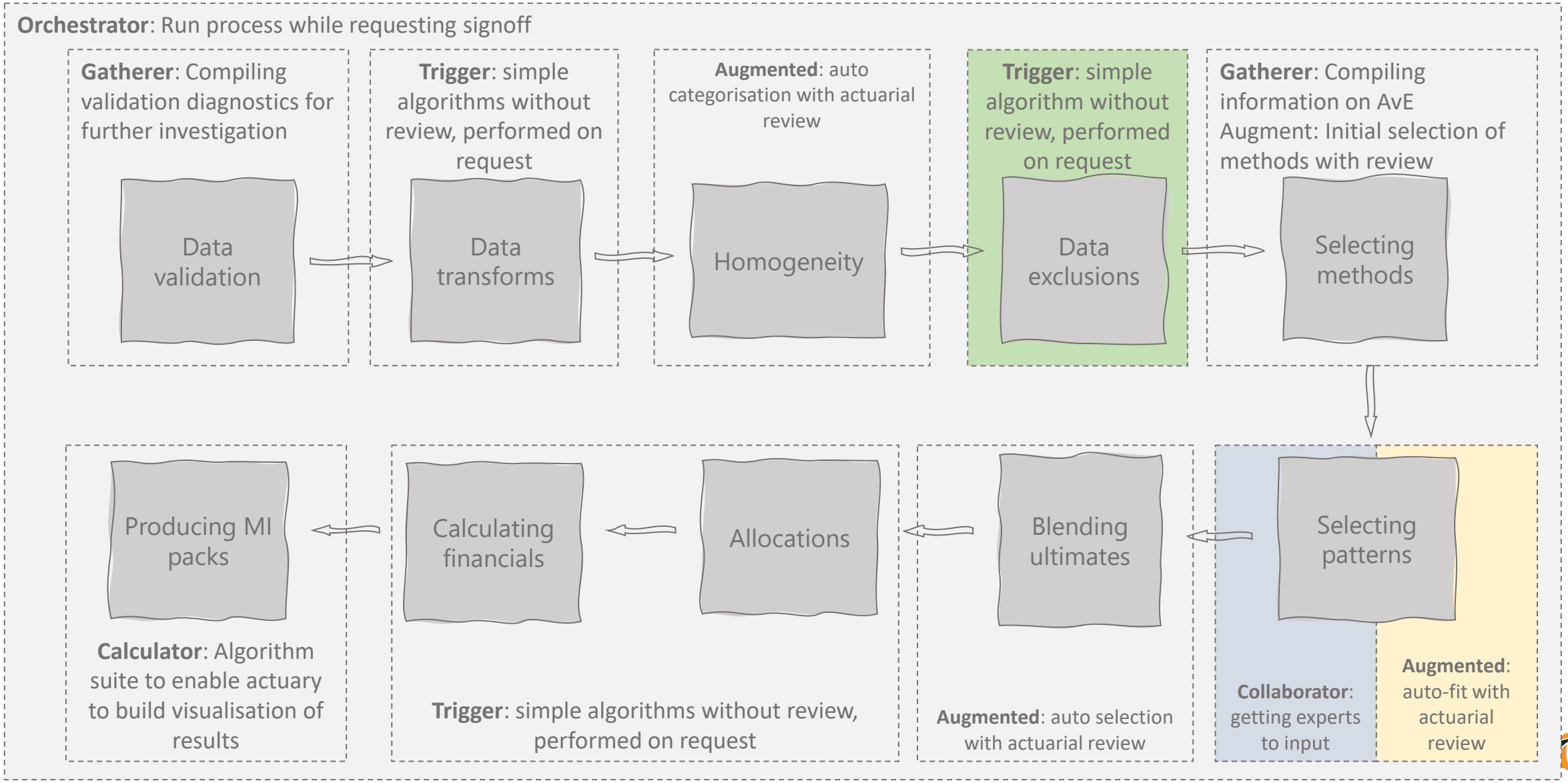
A simplistic example: A reserving process

	Materiality	Risk appetite	Utility	Automation?
Data exclusion	This is an immaterial driver of the results under the assumption that only the extreme outliers are removed. Algorithmic exclusion of data points 5 SD's away from the mean has no material difference to exclusion of points 3 SD's away when using automated reserving for the rest of the process.	The business has a wide tolerance for deviation in the estimated value from the "real" value. It is not a material assumption and therefore won't drive results / decision making. There is no requirement for external credibility or stability in the methodology. Internal stakeholders are not particularly concerned about changes to the assumption.	Key considerations are to increase the speed of the calculation and increase the visibility / transparency of the algorithm to be able to communicate to stakeholders.	There is a requirement for the process to be sped up, with a wide tolerance for deviations. Transparency is key, therefore an algorithmic class of methods rather than deeper ML techniques would be more appropriate.
Selecting patterns	For Line of Business X and Y this is a material driver on the results, particularly in the tail of the pattern. All other classes have a medium to low materiality due to the age of the portfolios.	The business has a low tolerance for risk in selection of the patterns for the material classes, due to the widespread use of these patterns in other areas of the business (Solvency II, IFRS17, pricing).	As this is just important for 2 classes, speed is not a key driver of the requirement, and the business would be willing to trade increase in speed for a better results. For the less material classes, useful to work through quickly	Most material classes would benefit from additional collaboration in setting and selecting patterns. Less material classes could have pure mechanical fitting applied.

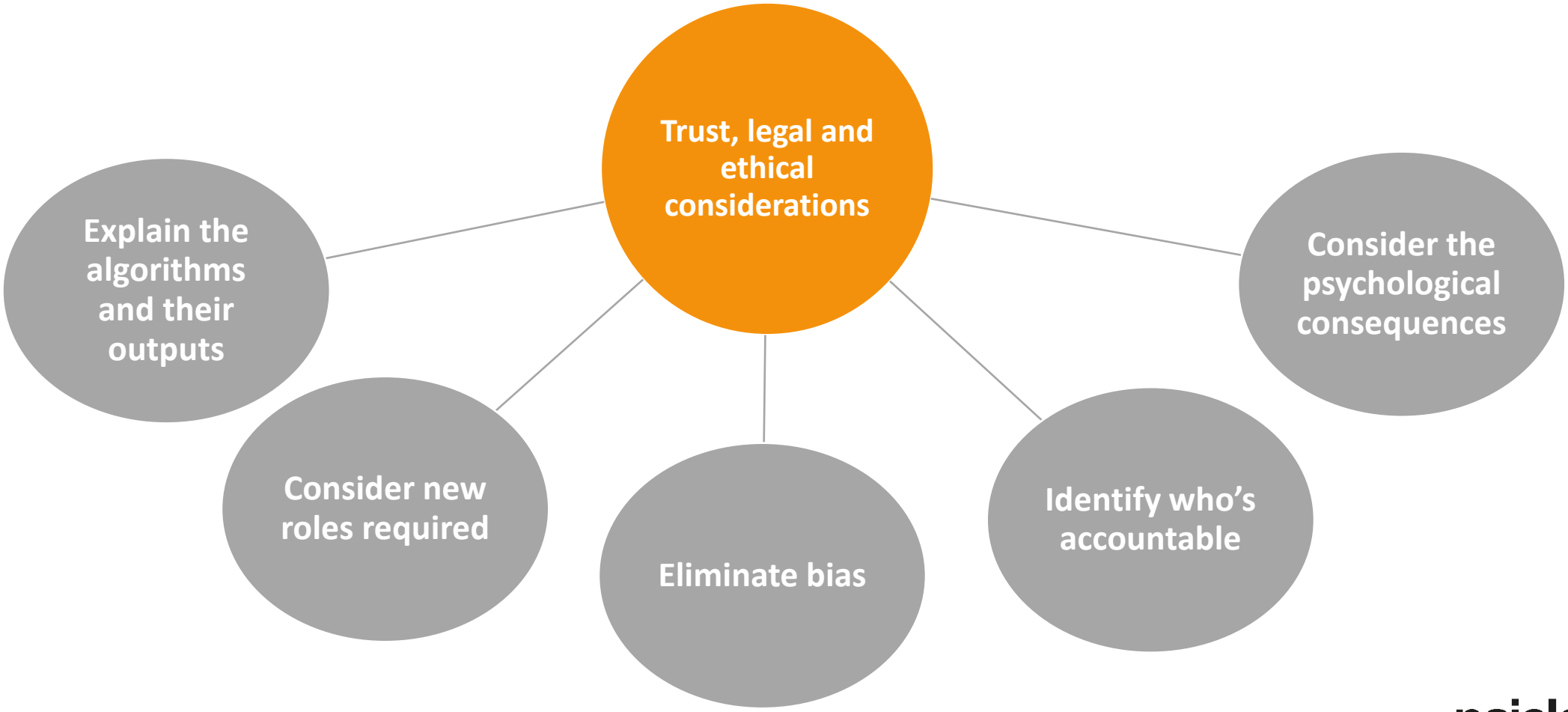
A simplistic example: A reserving process



A simplistic example: A reserving process



Actuaries' responsibilities



Your roadmap

Actuaries are needed more than ever in the third wave of technological reform

Mindset

- **ATTITUDE –** To imagine the processes that ***might*** be
- **ADAPTABILITY** – to rapidly changing data and human contributions
- **ETHICS –** make a commitment to responsible technology

Resources

- **EXPERIMENTATION –** to identify where technology can change processes
- **DATA –** think dynamically to increase variety, speed and access
- **TRAIN AND RETRAIN –** to foster human-machine 'fusion skills'

dynamo ANALYTICS

THANK YOU….WE'LL BE BACK!

psicle® SOFTWARE

UNITED KINGDOM
Adrian Ericsson

E: adrian.ericsson@dyna-mo.com

T: +44 20 35 10 15 75

EUROPE
Lucy Quemeneur

E: lucy.quemeneur@dyna-mo.com

T: +33 6 40 97 65 58