



Quantifying Risk, Enabling Opportunity.

Hasta la vista, Actuary?

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INTRODUCTION

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?

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

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
- 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

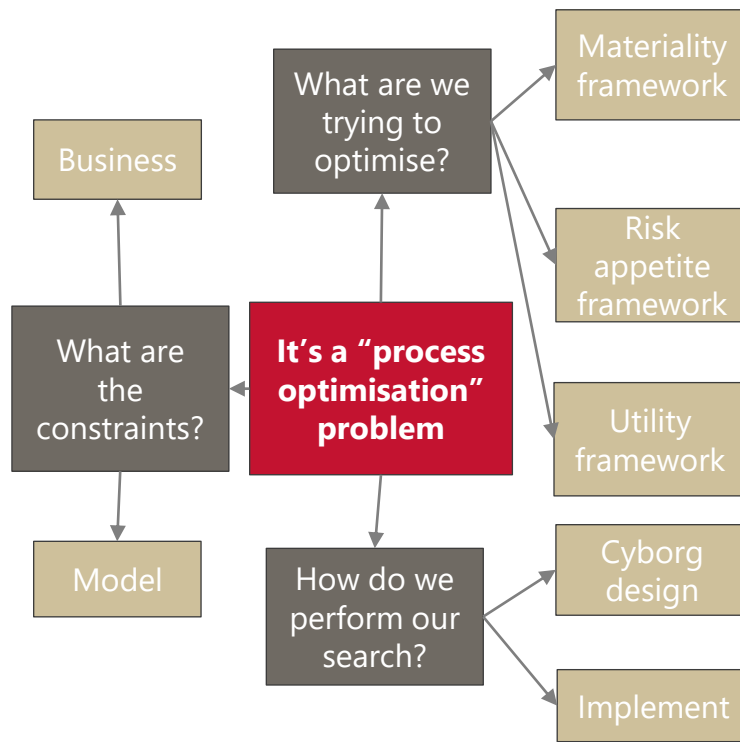
Opportunities

- 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” 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 internally 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
- ...

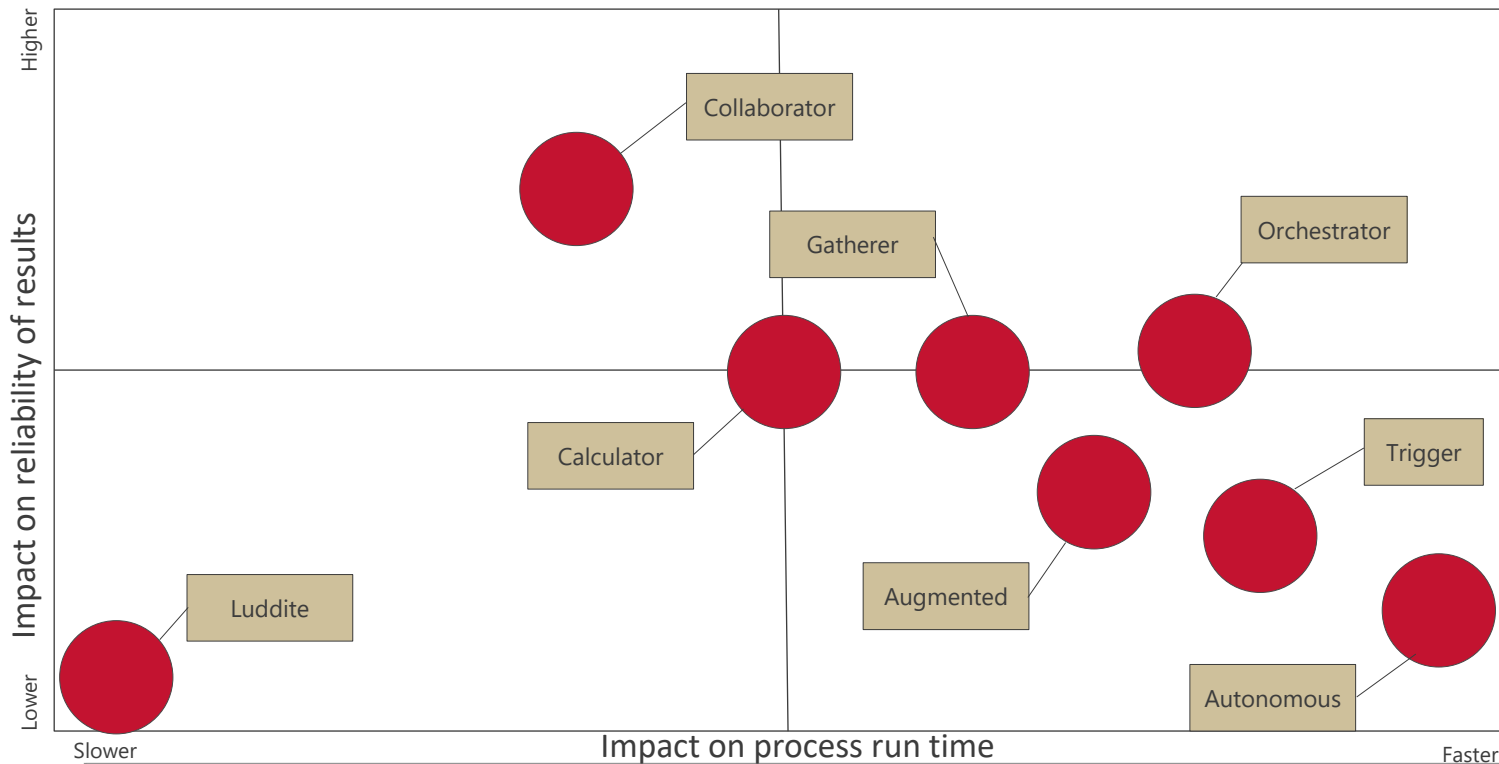


- Framework to assess what is and isn't material to the overall objectives of the process / model.
- Attempts to define what matters most, and what can move the process results the most
- Framework to assess the number / nature / level of risks in the process that the business is prepared to accept.
- Defines where business is prepared to tolerate the most risk, and where it becomes unacceptable.
- Framework to define the trade-offs between features of a process, to determine an optimal process
- 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
- 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	M / H	M / H	H	H	H	H
Collaborator	Machine enables collaboration between experts but does not run any of the process.	H	H	M / H	M / 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

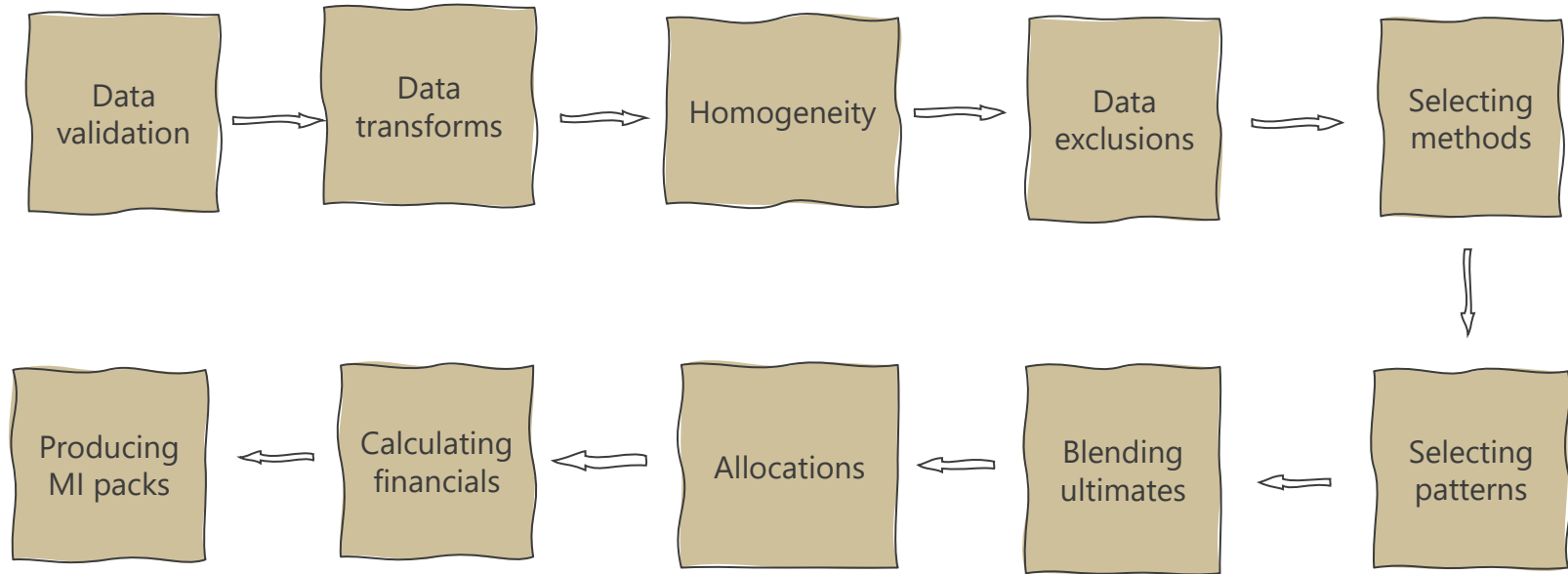
CHARACTERISTICS OF PROCESS CYBORGS



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



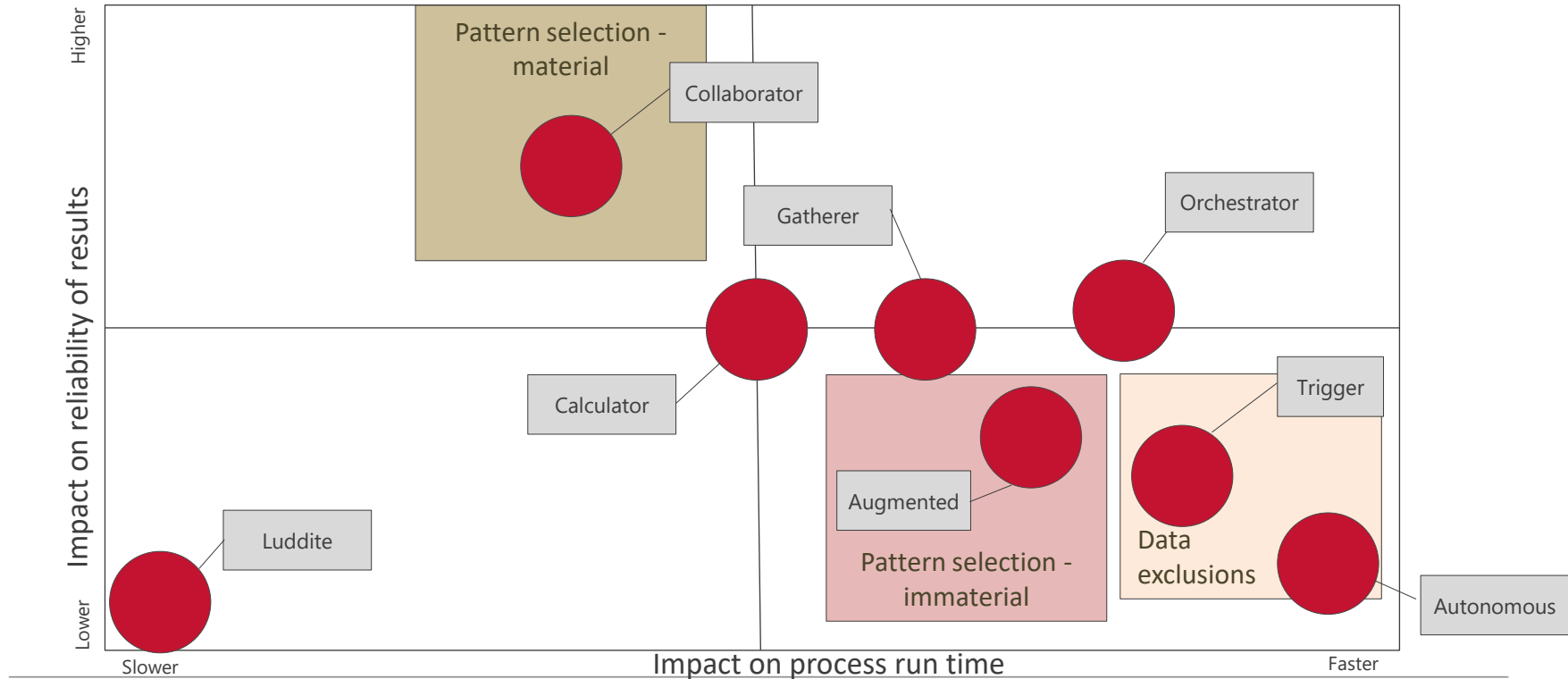
A SIMPLISTIC EXAMPLE: A RESERVING PROCESS

	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

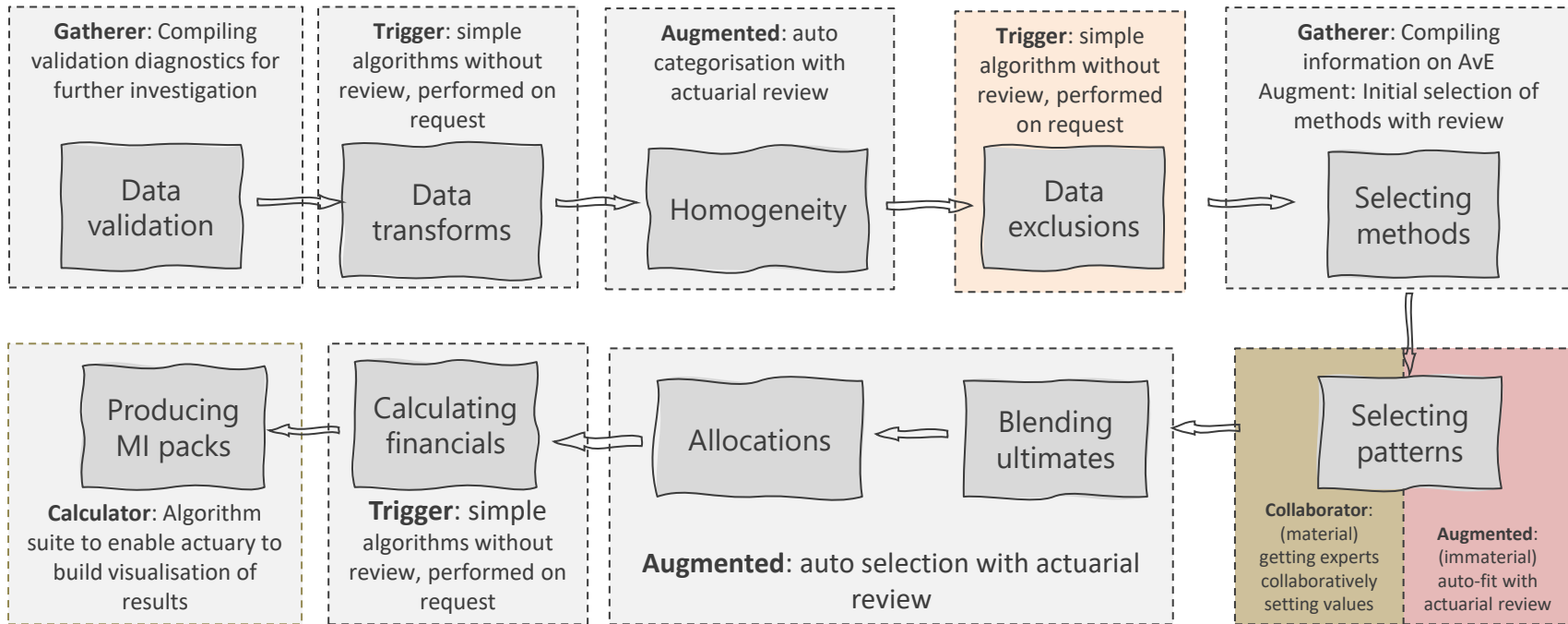
	Materiality	Risk appetite	Utility	Automation?
Data exclusion	This is an <u>immaterial driver</u> of the results under the assumption that only the extreme outliers are removed. Algorithmic exclusion of data points 5 SD's away from the mean <u>has no material difference</u> to exclusion of points 3 SD's away when using automated reserving for the rest of the process.	The business has a <u>wide tolerance for deviation</u> 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 <u>increase the speed of the calculation</u> and increase the visibility / transparency of the algorithm to be able to communicate to stakeholders.	Yes. Prepared to sacrifice margin of error for speed.
Selecting patterns	For Line of Business X and Y this is a <u>material driver on the results</u> , 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 <u>low tolerance for risk in selection of the patterns</u> 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 <u>willing to trade increase in speed for a better results</u> . For the less material classes, <u>useful to work through quickly</u>	Yes. Material classes need small margin of error, with speed of almost no consideration. Immaterial classes have far less margin for error.

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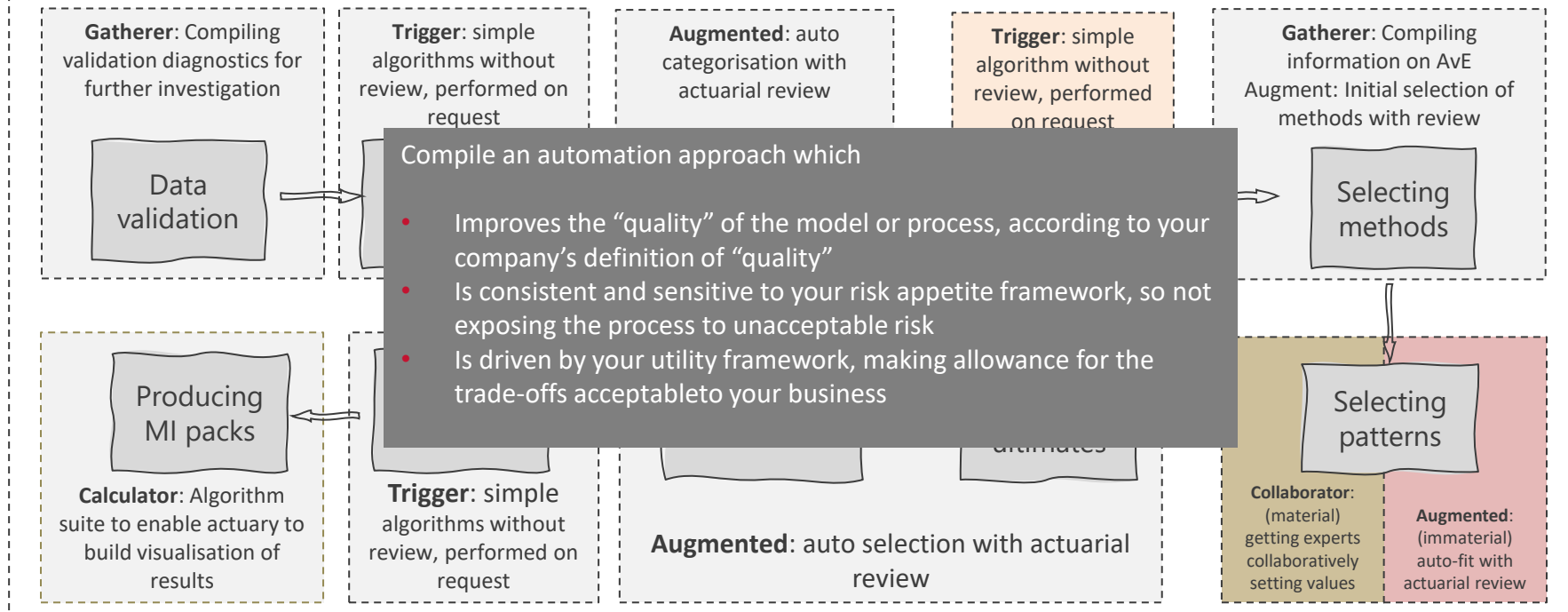
A SIMPLISTIC EXAMPLE: A RESERVING PROCESS

Orchestrator: Run process while requesting signoff

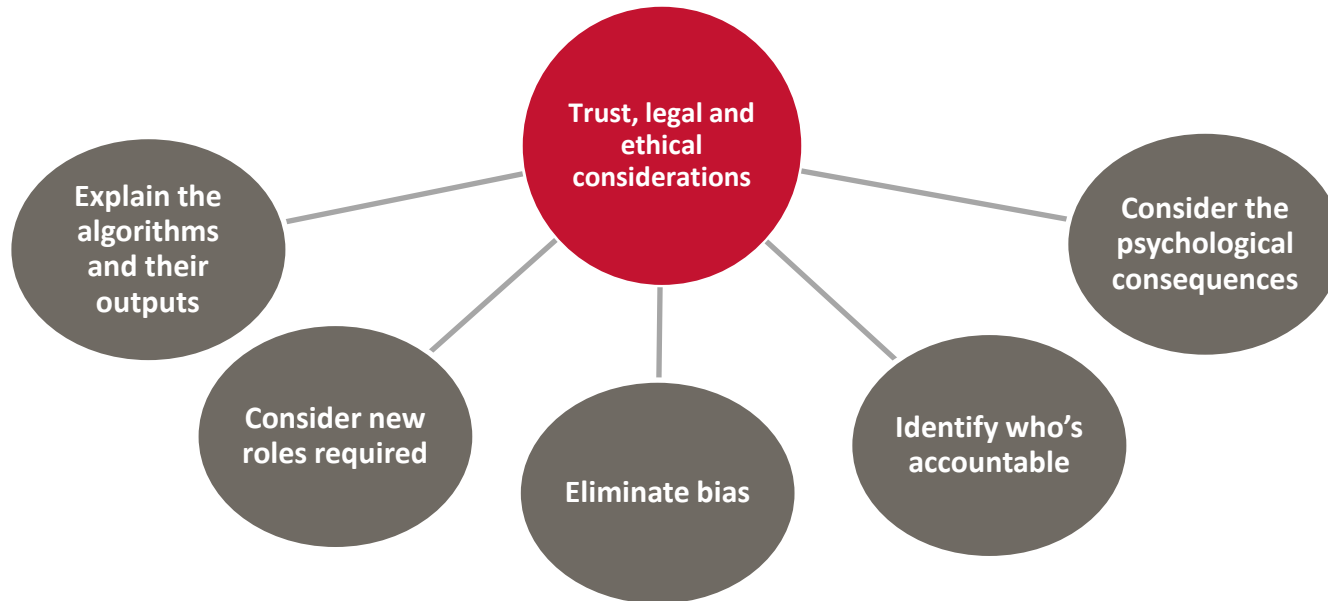


A SIMPLISTIC EXAMPLE: A RESERVING PROCESS

Orchestrator: Run process while requesting signoff



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’

THANK YOU...

...WE'LL BE BACK!

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