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Interface of Actuarial Models with upstream and downstream processes

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Agenda

- Executive summary

- Actuarial model execution process

- Upstream processes

- Downstream processes

- Process streamlining
  - ✓ *Identify*
  - ✓ *Design*
  - ✓ *Develop*
  - ✓ *Sustain*

- Q&A

Executive Summary

Globally, insurers are facing considerable challenges in their day to day operation

Accelerated pace of changes in the regulatory and external environment driving greater demand for actuarial talent

Focus on cost optimisation due to high cost structures, especially for SMRs/ senior actuaries

Disruptive market requiring **integration of new age technologies** to enable digital transformation

This is fundamentally shifting the current operating model…

Change in workforce

Actuarial talent focusing on more strategic activities by automating manual tasks

Skill to task

Aligning right skills to right tasks

Increase in Efficiency

Increase speed of execution through process optimization and restructuring

Currently , significant time of actuarial resources is spent in operational activities like running the model, extracting results etc. It is time to critically evaluate these and understand where capacity can be created to focus on more value adding actuarial and strategic tasks

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Actuarial model execution process
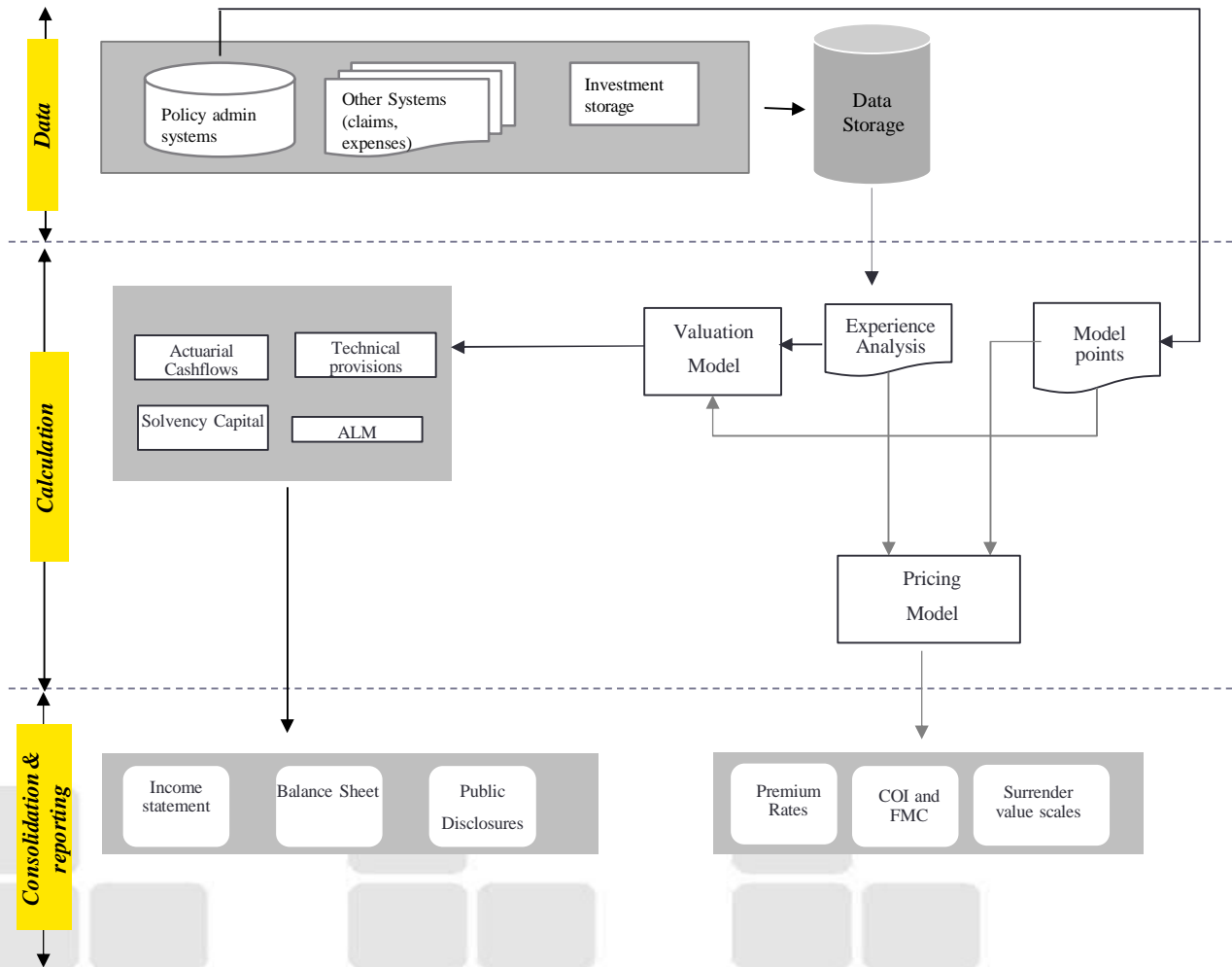
A typical actuarial model execution process can be broken down into three segments

- Data
- Calculation
- Consolidation & Reporting

Key challenges:

- Highly manual processes
- High turn around times
- Lack of control and auditability

Upstream processes

Lets deep dive into the upstream process during a production run
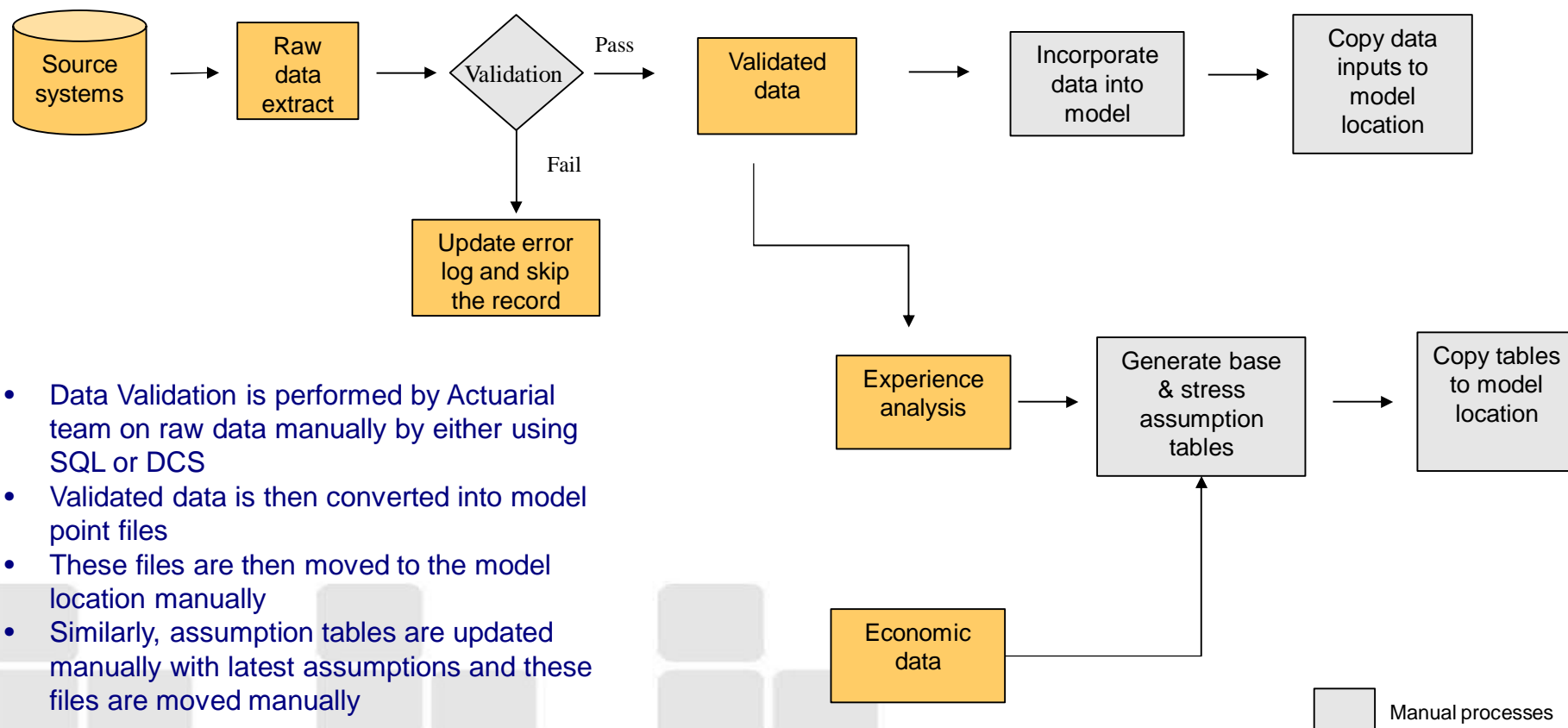
- Data Validation is performed by Actuarial team on raw data manually by either using SQL or DCS
- Validated data is then converted into model point files
- These files are then moved to the model location manually
- Similarly, assumption tables are updated manually with latest assumptions and these files are moved manually

Manual processes

Typical downstream processes during reporting

Let us now look at the typical downstream processes post a production run

```
┌──────────┐     ┌──────────┐     ┌──────────┐     ┌──────────┐     ┌──────────────┐
│ Perform  │ →   │ Extract  │ →   │ Perform  │ →   │ Prepare  │ →   │ Share reports│
│ Model run│     │ results  │     │ out of   │     │ current  │     │ with accounts│
│          │     │ into     │     │ model    │     │ valuation│     │ /finance team│
│          │     │ excel and│     │ calcul-  │     │ reports  │     │              │
│          │     │ analyse  │     │ ations   │     │          │     │              │
└──────────┘     └────┬─────┘     └──────────┘     └──────────┘     └──────────────┘
                      │
                      │              ┌──────────────┐
                      └───────────→  │ Upload results│
                                     │ into database │
                                     │ for BI/regul- │
                                     │ atory reporting│
                                     └──────────────┘
```
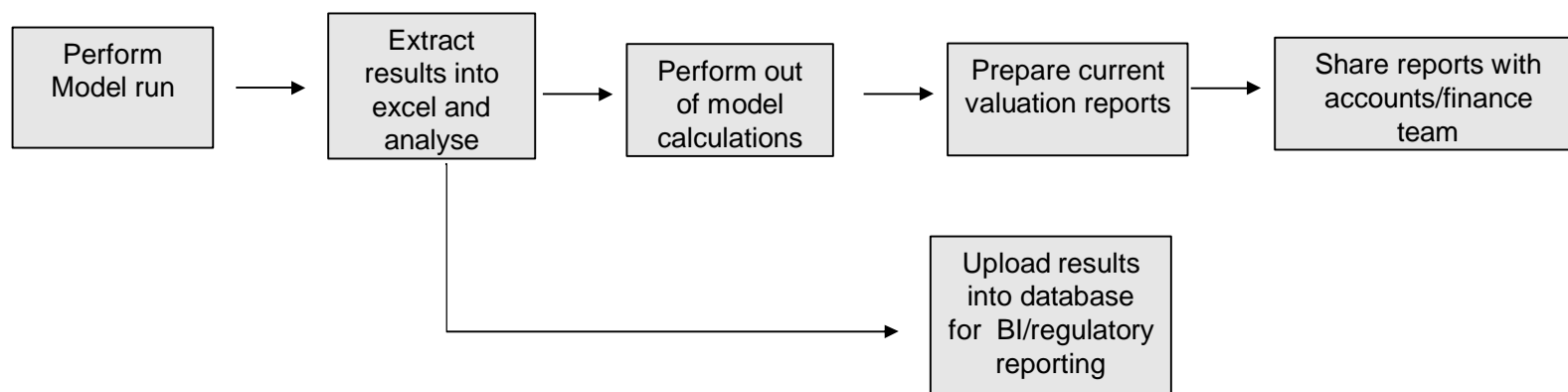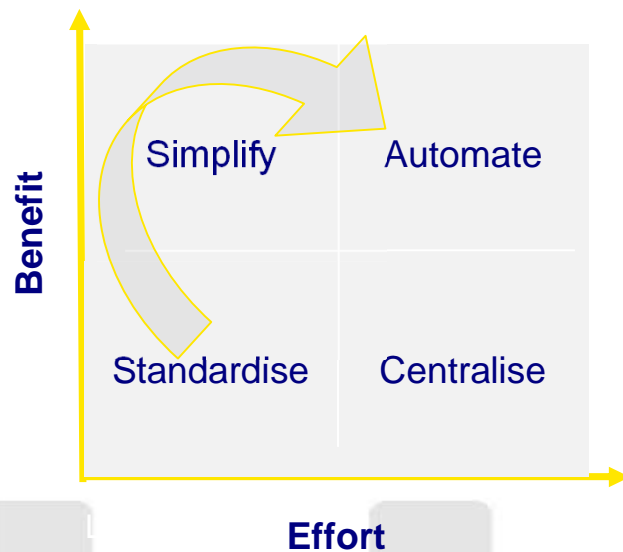
- Post model runs results are usually extracted in excel
- Results are then collated from multiple spreadsheets for analysis
- Post model run, out of the model adjustments are performed by actuarial team
- Spreadsheets or results file can further be uploaded into SQL for BI or regulatory reporting purpose

Streamlining the end to end process
Key considerations

To realise maximum benefit – think about end to end process transformation

Benefit (vertical axis) / **Effort** (horizontal axis)

| Simplify | Automate |
| Standardise | Centralise |

- ➢ Assess your existing processes to identify redundancies

- ➢ Review your end to end processes to identify areas for standardization and simplification to eliminate steps or controls that are surplus to the requirement

- ➢ Use technology to automate your re-designed processes to increase efficiencies and effectiveness

- ➢ Streamline results production to allow focus on interpretation and analysis of model results results and outputs.

Streamlining the end to end process
How to approach the problem

A robust 4 phase approach of "identify" – "design" – "develop" and "sustain" will help you to realise the true benefit of process transformation

Identify

- Identify the areas of redundancies in the process
- Identify areas of standardisation or simplification
- Critically evaluate what can be done inside the model

Design

- Design the solution blueprint
- At initial stage focus on the quick wins

Develop

- Develop and implement the solution
- Perform a Dry run before go - live

Sustain

- Continuously monitor the effectiveness of the solution post implementation

Streamlining end to end process
Identify

- Review existing processes and identify tasks that are redundant in nature
  - *E.g. data moving through multiple layer before model point generation*

- Critically evaluate what can be done inside the model
  - *E.g. Reserves calculated by applying a % on the total portfolio or LOB level reserves taken from Prophet can be modelled inside a summary product*
  - *Solvency margin (and K1 & K2) calculated at LOB/Portfolio level can be done using summary products*

- Identify areas where excel can be removed
  - *Results when extracted in multiple spreadsheets and analysed manually takes a lot of time*
  - *Identify the key variables that are required for analysis and extract them directly in .csv or .txt format using Print to File command*
  - *These files can then be uploaded into SQL using an ETL program (e.g. python scripts) and entire layer of analysis can be build into SQL*

Streamlining end to end process
Design

Design the solution by focusing on 3 key aspects – TAT, efficiency and control

Process Automation

- ► Automated assumption table creation using VBA

- ► Automated process for setting multiple Same As products or creating multiple structures in Prophet using VBA

- ► Automated checks on valuation data – accuracy and completeness.

- ► Automated basis generation using VBA/Python

- ► Automated result uploading process in SQL DB through Python based ETL programmes or Prophet RDB.

- ► Partially automated valuation report through VB user forms.

- ► Automated Dashboard for internal consumptions

Reduction in TAT	Increased efficiency	Increased control
► Low to moderate reduction in TAT ► Buffer time for other activities like unit & functional testing	► Increased efficiency as some peripheral jobs are automated ► More focus on modelling and testing	► Increased control due to less manual intervention.

Streamlining end to end process
Design

Leverage RPA to automate the end to end process

Tools

Web

Applications

Utilities

ERP (e.g.GW)

Databases

Finance
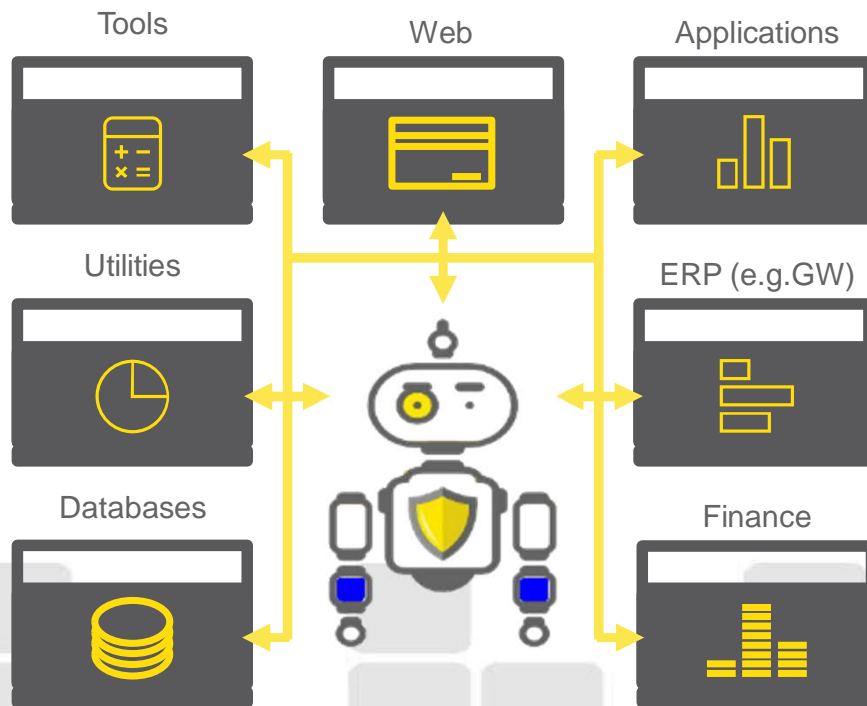
An enterprise-class software automation solution that runs unattended by people:

► Unwinds legacy of people-based quick fixes

► Performs laborious and repetitive tasks reliably

► Scales up and down to match peak loads

► Emulates business user behavior

► Shifts control directly to the business rather than coders

► Delivers ROI in weeks through a rapid, agile approach

Streamlining end to end process
Design

Case study of robotic process automation

Automation prototype for a specific life actuarial valuation process
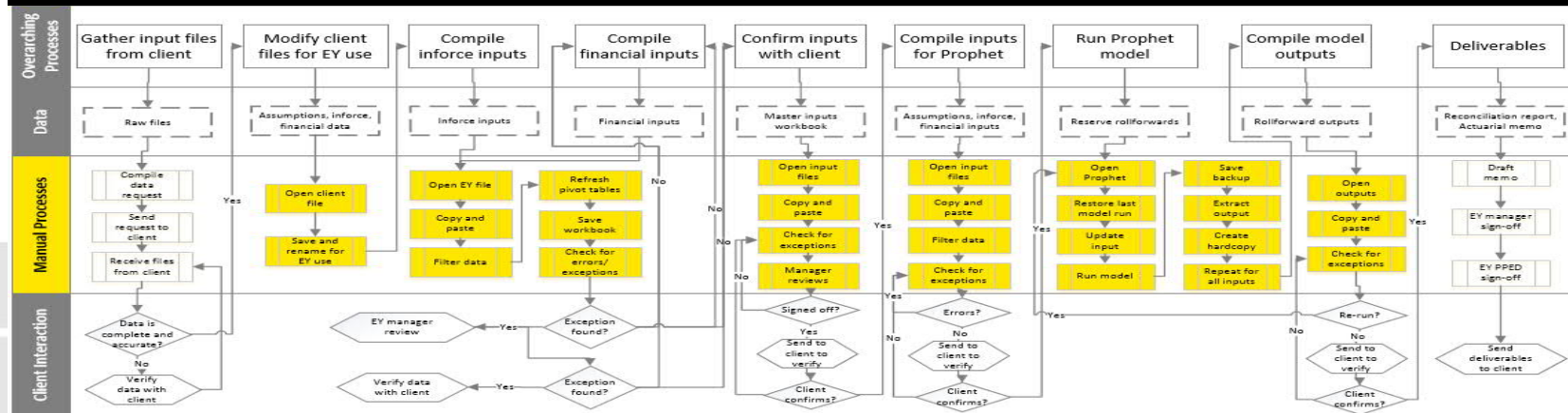
- Using BluePrism – Interacting with FIS Prophet, MS Excel and MS Outlook to:
  - *Collate, check and format data inputs for review and for input into Prophet*
  - *Run Prophet*
  - *Collate the output and check for exceptions*
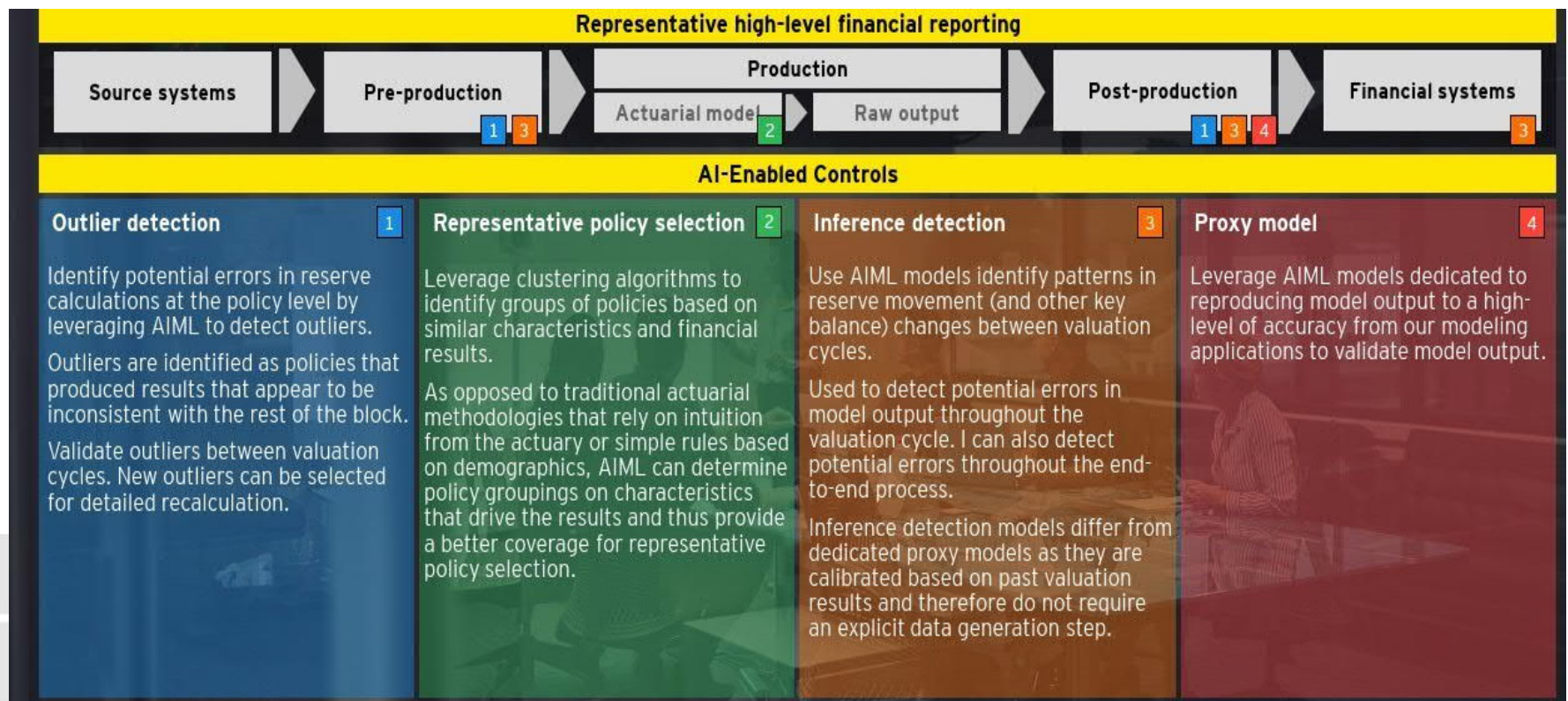 - *Notify the process owner of completion*

50% quick hit productivity gain from RPA

Streamlining end to end process
Design

AI/ML can be used to strengthen and augment financial reporting controls. These techniques can be used to identify potential errors on a real time and automated basis as the company performs its financial reporting
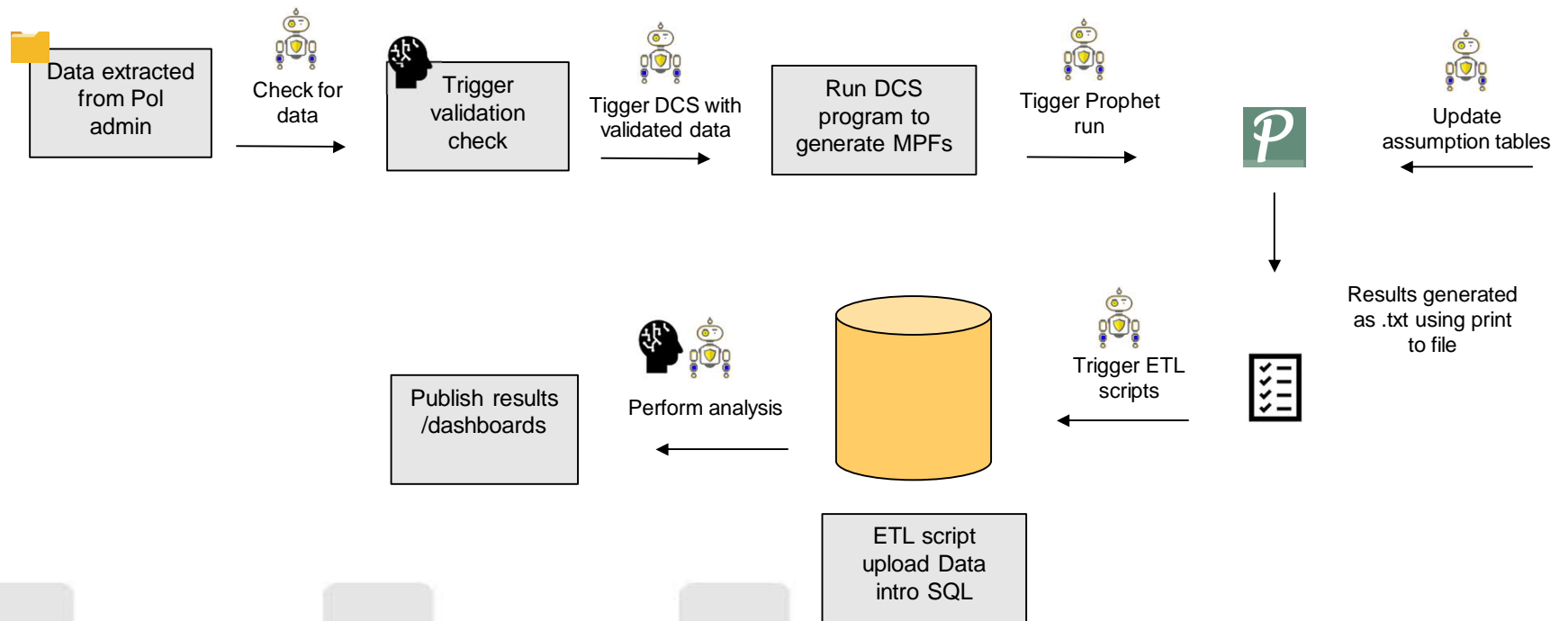

Representative high-level financial reporting

Source systems → Pre-production → Production (Actuarial model | Raw output) → Post-production → Financial systems

AI-Enabled Controls

Outlier detection [1]

Identify potential errors in reserve calculations at the policy level by leveraging AIML to detect outliers.

Outliers are identified as policies that produced results that appear to be inconsistent with the rest of the block.

Validate outliers between valuation cycles. New outliers can be selected for detailed recalculation.

Representative policy selection [2]

Leverage clustering algorithms to identify groups of policies based on similar characteristics and financial results.

As opposed to traditional actuarial methodologies that rely on intuition from the actuary or simple rules based on demographics, AIML can determine policy groupings on characteristics that drive the results and thus provide a better coverage for representative policy selection.

Inference detection [3]

Use AIML models identify patterns in reserve movement (and other key balance) changes between valuation cycles.

Used to detect potential errors in model output throughout the valuation cycle. I can also detect potential errors throughout the end-to-end process.

Inference detection models differ from dedicated proxy models as they are calibrated based on past valuation results and therefore do not require an explicit data generation step.

Proxy model [4]

Leverage AIML models dedicated to reproducing model output to a high-level of accuracy from our modeling applications to validate model output.

Streamlining end to end process
Develop

The "to – be" process flow

Streamlining end to end process
Sustain

Monitor the solution continuously to ensure effectiveness

- *An automation solution might not be tailor made to all possible situations*

- *Effectiveness of the solution need to be assessed on a periodic basis with changes in underlying process flow*

Q&A

Thank You