

10th TechTalk on Employee Benefits

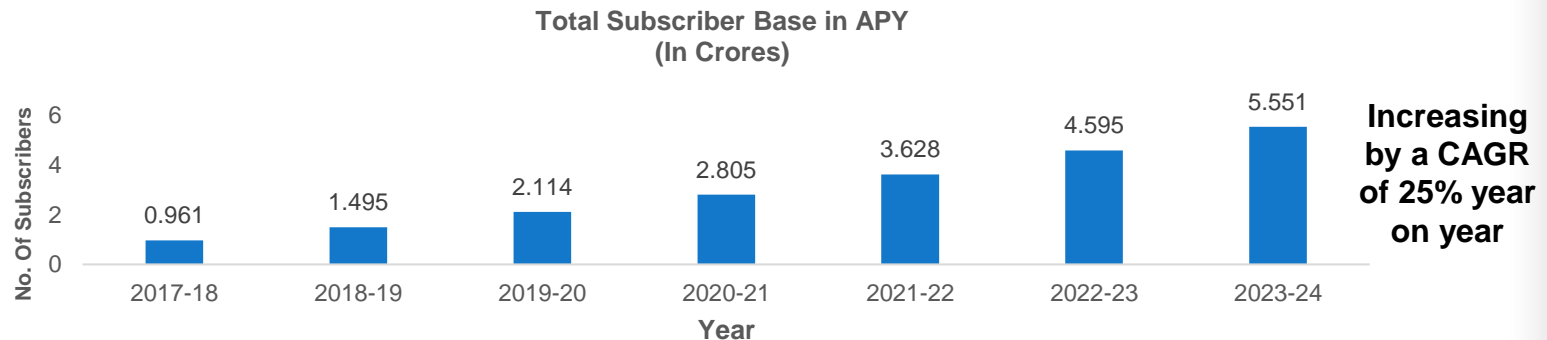
Unlocking the Potential of Big Data in Social Security Schemes



Presenters:-
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Setting the Context

- ❑ The Pension Fund Regulatory and Development Authority (PFRDA) appointed WTW India to conduct an actuarial valuation of the Atal Pension Yojana (APY).
- ❑ The Atal Pension Yojana is one of the **fastest-growing social security schemes** in the country, with its subscriber base* increasing from 2.5 million members in 2016 to over 50 million as of March 31, 2024.



- ❑ Under this scheme, subscribers are guaranteed a minimum pension at retirement in lieu of fixed and regular contributions made into the scheme. This feature makes this scheme a defined contribution (DC) with a defined benefit (DB) underpin.
- ❑ The purposes of the valuation are:
 - To estimate the likely **shortfall due to minimum guaranteed pension** and determine suitable provisioning for any shortfall under the scheme.
 - To assist in ensuring the **long-term financial sustainability** of the pension scheme by examining its various components.
 - To help manage any **shortfall funding requirements** that may arise.

Atal Pension Yojana - Scheme Rules



Eligibility

All citizens of India who have a savings bank account.

Min Age: 18
Max Age: 40

Choice of Pension

Regular contribution until age 60 provides a **Guaranteed Minimum Pension** of

INR 1000 / 2000 / 3000 / 4000
/ 5000 per month

Form of Annuity

Joint life 100% + Return of Corpus

Other Key Features

Upgrade/ Downgrade of Pension Amount

APY subscribers can **upgrade/downgrade their pension amount throughout the year**. The Differential amount needs to be deposited in case of upgrade and differential amount would be returned to the subscribers in case of down grade.

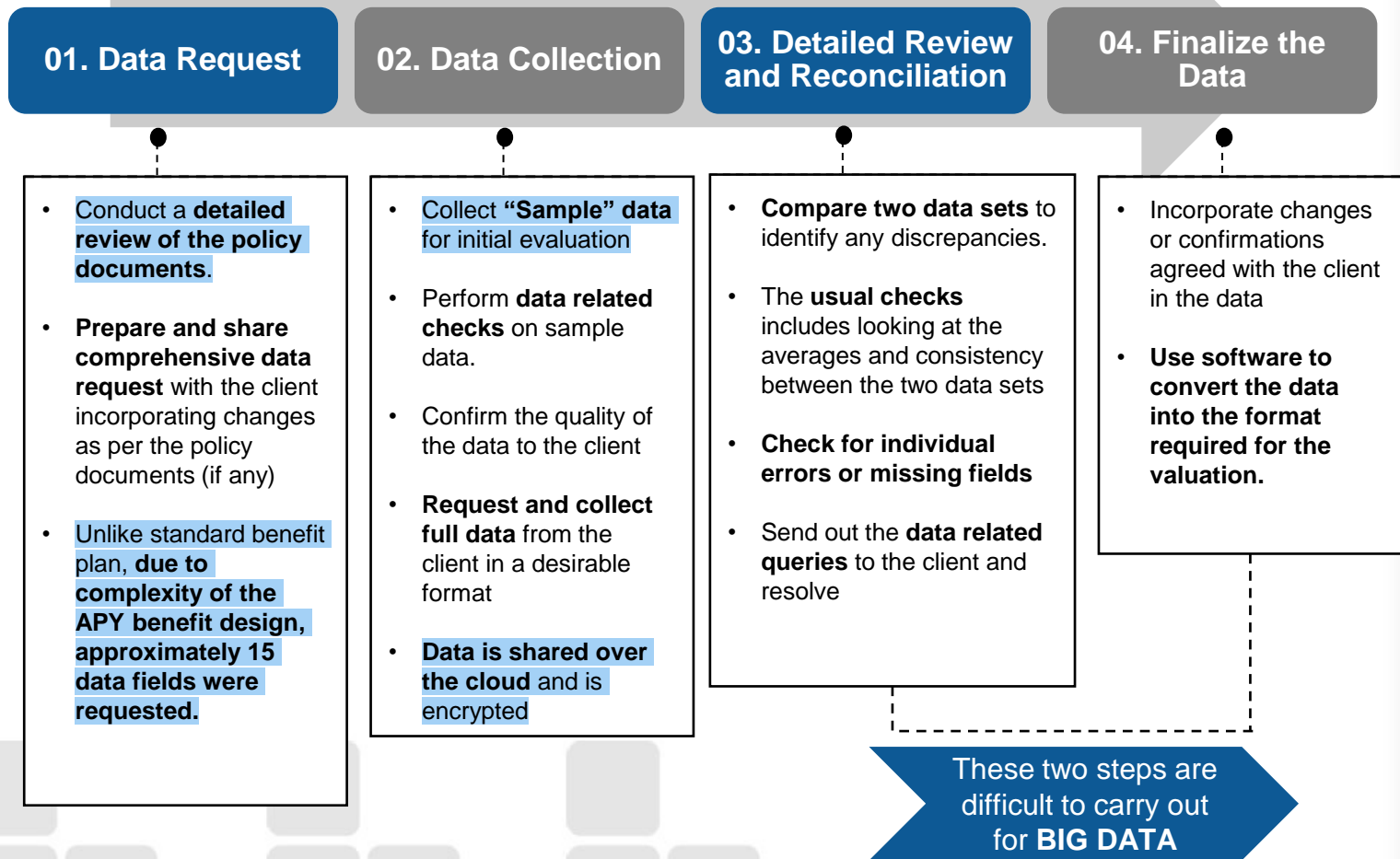
Early Withdrawal Option

Members can choose to **voluntarily exit** the scheme in which case they will receive interest adjusted contributions made till date. They can also exit the scheme in case of terminal disease, death, etc.

Delayed or Missed contributions

Individuals are required to pay **overdue interest** on delayed contributions.

Data Preparation – Key Stages

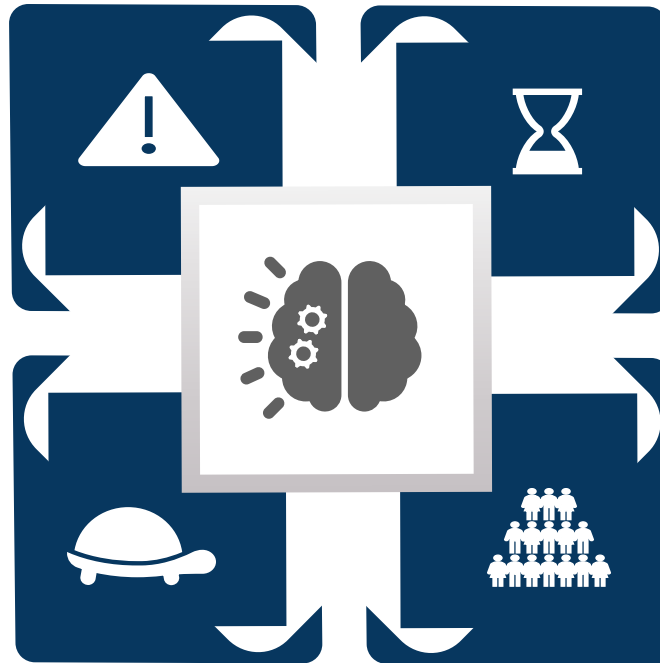


The steps **highlighted** above were introduced considering the data size and complexity.

Challenges with large volume of data

Technology (Data Collection, processing and computation) –

- Handling a vast amount of data in 1 single excel file or over an email is not possible.
- Consolidating over 50 spreadsheets to create the final valuation data is simply impractical.
- Using functions like V-lookup for data checks becomes cumbersome and ineffective.
- Slowdowns caused by extensive datasets can trigger out-of-memory errors.



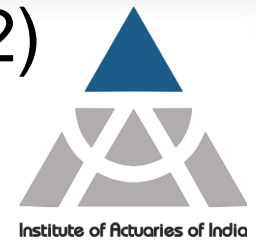
Time Consuming –
The process of data cleaning, integration, and analysis is time-consuming.

Complex Data Analysis –
Interpreting complex data outputs and translating them into actionable insights can be challenging.

Communicated the data –
Effectively communicating complex data analysis results to stakeholders in an understandable manner.

Sophisticated algorithms and tools are needed to handle and process big data effectively.

Detailed Data Review and Insights (1/2)



WTW's In house Proprietary Software* was used to compile over **50 data files into 1 workable data set**



Logical Data Checks using Software

Checking for **Missing or Invalid inputs** for:

1. Gender
2. Date of Birth
3. Date of Joining
4. Marital Status
5. Choice of Pension



Checking for **Duplicates**



Reconciliation with prior year data



Checks on Accumulated corpus –

Non-negative, exceeds total contributions, interest is reasonable

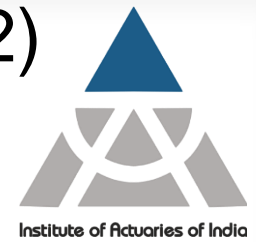


Checks on **Contributions** – non-negative, in-line with policy



*Alternate Publicly available Software like R and Python (and many more!!) can also be used for compiling the data into one and to perform above checks using simple functions and loops

Detailed Data Review and Insights (2/2)



Leveraging Data Analytics for Enhanced Scheme Insights



Demographic profile of subscribers

All data fields were thoroughly analyzed to assess several important parameters for the valuation. This analysis allowed us to identify key liability drivers and set more accurate valuation assumptions.

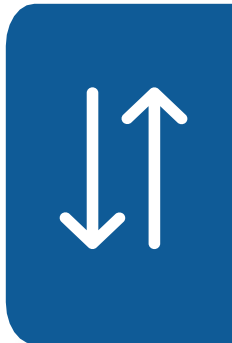


Lapse Rate

The lapse cases (all exit cases except death) are identified from the data to set an appropriate **Lapse Rate assumption** in line with the actual experience.

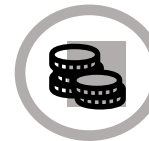
New Entrants

Segregated and **studied new subscribers' demographics** and pension choices for future headcount and liability projections.



Upgrade / Downgrade of Pension Choice

Analyzed subscriber trends in changing pension choices in a year. Helped decide that the experience was too immaterial to consider this as an assumption for valuation.



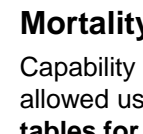
Persistency levels

Assessed the likelihood of members leaving the scheme within a year to understand **average membership duration** and develop a key assumption regarding **persistency rate**.



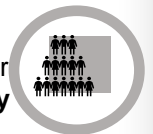
Choice of Pension

Gained insights regarding the most preferred pension choices amongst subscribers. This aided more accurate future liability projections.



Mortality

Capability to segregate data by gender allowed us to **have different mortality tables for males and females**.

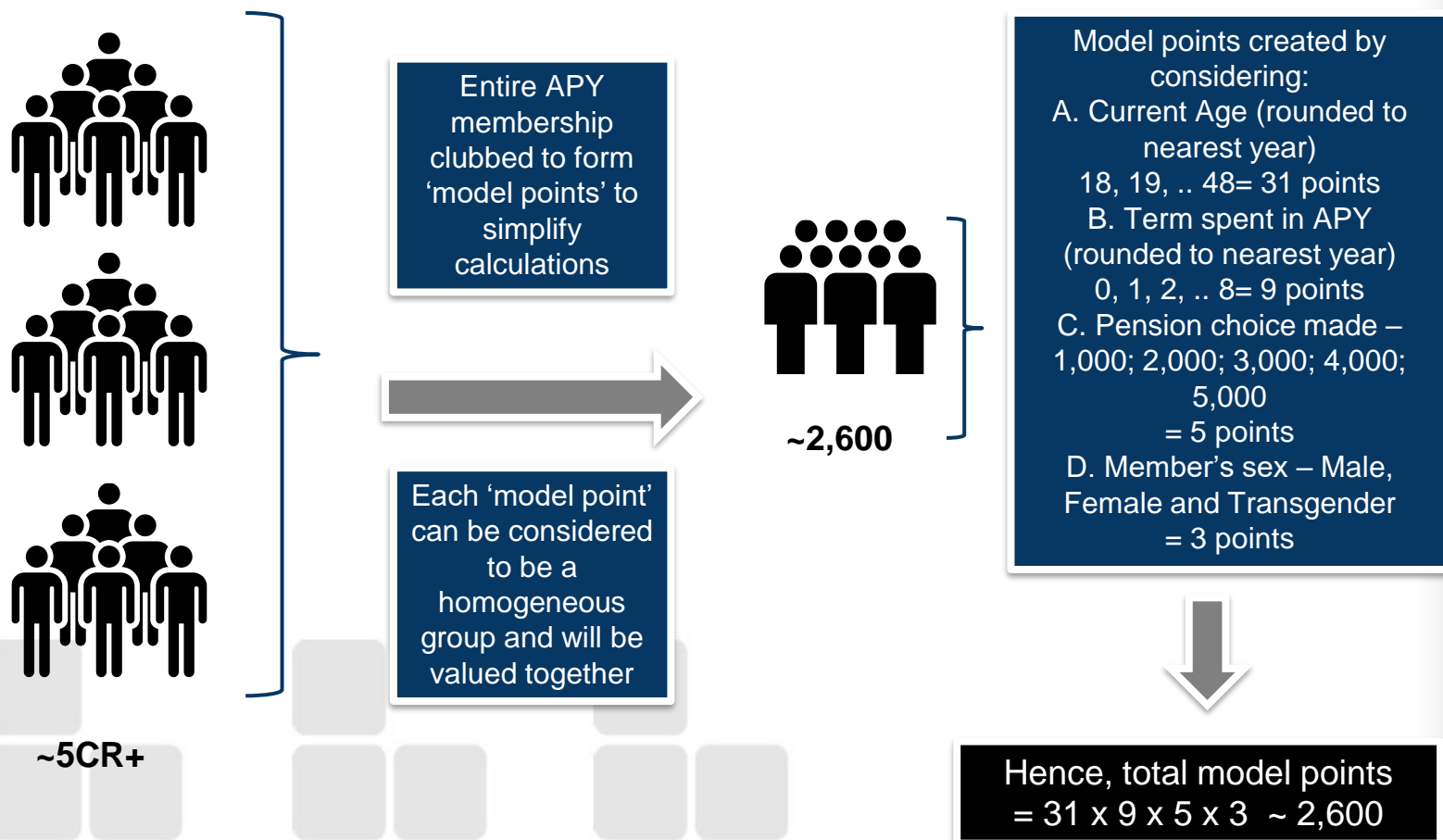


Married Proportion

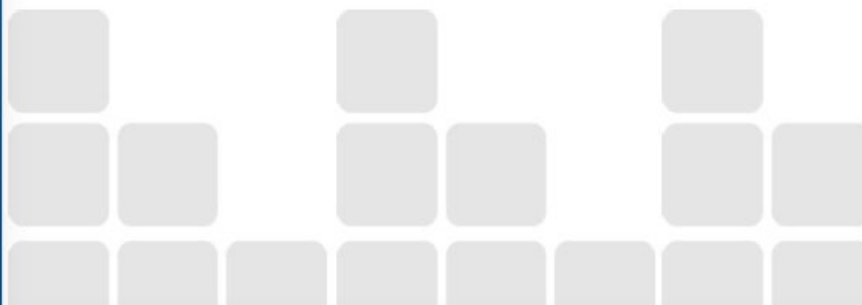
Information regarding marital status was examined to set an **assumption for proportion married**.

Finalizing Data for Valuation-Model Point Approach

The software also helped create model points for the actuarial valuation, basis factors such as current age, time spent in APY, pension choice made and gender.



Model Point Approach - Pros and Cons



Key Learnings from the Project

- 1. No “one size fits all” approach to data preparation – Actuary should assess the quantum of the data, nature of the valuation, criticality of the analysis before finalizing the approach
- 2. For 1st time reporting, it is necessary to get a thorough understanding of the functioning of the scheme – discussing individual illustrations with the client is crucial
- 3. ‘Sample Data’ testing before proceeding with the full data helped to bring proficiency to the process
- 4. Data security is paramount. Ensuring that the data accessed and transmitted through online portals are managed securely. In absence of these portals, CDs or pen-drives can be used which need to be shredded once the data is transmitted.
- 5. Role of high-end software can not be overestimated – Helps improve accuracy, quality and efficiency in actuarial world

QUESTIONS?