

INFORMATION NOTE 007 - DATA MIGRATION CONSIDERATIONS FOR LIFE INSURANCE ACTUARIES

Classification

This document is classified as an Information Note.

Abstract

This Information Note outlines factors to be considered by life insurance actuaries and actuarial students involved in migrating data from one system or platform to another. This Information Note should be read with the System Testing Information note.

Purpose

This document is intended as a guide to support actuaries in fulfilling their responsibilities in the event of a system migration, whether these responsibilities relate to product specification, data and system checking, or overseeing a project and providing project sign-off. This Information Note specifically focuses on actuarial involvement in migrations and the testing of the migrated data. Testing in combination with business processes is not covered in this version. Note that this document is not intended to provide an exhaustive list of all possible considerations; nor is it intended to prescribe requirements or provide formal actuarial guidance.

Legislation or authority

This Information Note is produced under the auspices of the Actuarial Society of South Africa (ASSA) System and Technology Committee.

Application

ASSA members providing actuarial support in data migrations to new administrative platforms.

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Status

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1. Introduction

Data migrations result from the introduction of a new system or platform in an insurance company. This may involve a system migration or consolidation in which one or more legacy systems (i.e. old or previous systems which are no longer being upgraded) are replaced or supplemented by the deployment of a new or additional system.

2. Data migration testing and actuarial involvement

Accurate data maximises the value of an enterprise's applications. When existing data is migrated to a new system, inaccuracies, gaps and duplication can all become apparent. Although the data in the source system (old system) may be adequate for its current use,

it may be wholly inadequate in content and structure in terms of meeting the objectives of the new destination system.

As part of insurance system testing, data migration testing is conducted in order to compare migrated data with the original data. The aim is to discover any discrepancies that are either created or flagged when moving data from the source system or database(s) to a new destination database.

Although actuaries may only be strictly responsible for signing-off on the statutory or regulatory reporting based on data produced by the new destination system, it is vital that actuarial input is provided to aid in the understanding of data requirements, data quality and the correct future application and use of the data. Without a sufficient understanding of both source and destination systems, transferring data into a more sophisticated application will only amplify the negative impacts of any data deficiencies, perpetuate any hidden legacy problems, and increase risk exposure.

3. Data Migration

Data migration needs to cater for the historical movements of both in-force data, and out of force data up to a pre-specified point in the past.

The structure of the data and how benefits are reported can change between systems, and therefore consolidating record numbers is not a sufficiently rigorous way to check the success of the migration. Migration specifications should explicitly cover the following areas.

3.1. System understanding

Data descriptions and functionality can vary significantly between systems, and therefore the following points need to be considered in every migration:

- Scope of the various status types to be migrated. For example, consider migrating all the active and inactive policies or only the active policies. New business status policies that are in the process of being captured can be recaptured on the destination system. For reporting purposes, data not migrated may need to be stored in a back-up or archive system.
- Verification of the scope and requirements of the source systems and data. Ensuring understanding of the definition of all data fields and one version of the truth in each case.
- Verification of new destination system data requirements such as field names, field types, mandatory fields, valid value lists and other field-level validation checks.
- Consideration of current actuarial data requirements and whether these have been provided for in the destination system.

3.2. Product assessment

Migrations represent an opportunity to relook at the book of business. Some products may no longer be offered to policyholders, while others could be excessively complex and expensive to run on certain systems. A data migration is an opportunity to consider these situations and determine whether there is scope to consolidate related or similar product types.

Product assessments includes:

- Specifically considering whether any product consolidation is required in the destination system and identifying whether any limitations or constraints apply.
- Data mapping tables should be referred to in determining this.
- Any functionality not available on the destination system will guide which products to consolidate or exclude from the migration.

3.3. Data history parameters

- Migration dates, such as the cut-off date of the last movement on the source system.
- Period of data that should be migrated over. For example, the last 5 years, or the last 6 months. In this case, the period of data can refer to the data gathered during the selected period or, for example, all data from inception of policies that were active within the period.
- Identify data to be included as well as data to be excluded.
- Be aware of frequency of data updates to ensure all data updates are included in the migration set.
- Movement data would be required for valuation reporting.

3.4. Data mapping

Scope	Example
Role-player information	Full name, date of birth, ID number, gender, marital status, preferred communication language, mobile number, email address, etc.
Policy information	Cancellation reason, collection day, collection method, bank details, commencement date, contract term, termination date, payment frequency, etc.
Benefits information	Premiums, sum assured, benefit commencement date, benefit terms, etc.
Claim information	Claim type, claim cause, claim incident date, claim amount, claimant information, beneficiary information, claim status, payment information, repudiation reasons, etc
Financial transaction information	Collection account, fees accounts, reinsurance account, commission account, investment build up balance, etc.
Financial information	Investment balance, portfolios, proportion of premium invested per portfolio, etc.
Client communication information	Policy schedule, SMS, emails, etc.

3.4.1. Action points

- Define high-level mapping for each category of data between source and destination and verify that the desired data type has been defined in the new destination system.
- Use source to destination mapping to test the source data against the requirements of the new destination system. Examples include:
 - Where the new destination system has a mandatory field, ensure that the appropriate source field is not null (or that the new system allows null fields on policies issued before migration);
 - Where the new destination system field has a defined list of valid values, test to ensure that the appropriate source fields contain these valid values (or that the new destination system allows different values on policies issued before migration).

Validations should be confirmed on both systems, and error log files should be kept. It is also important to identify ways to handle identified errors such as values that fall outside the permitted parameters.

- Consider the use of the destination system versus the source system when considering data requirements and deciding on appropriate validation checks.

- Example: merging records for the same individuals, or creating two records (pre-migration and post-migration data)
- Example: checks to ensure that exact mapping of individual data happens. How do you ensure you are merging data relating to the same individual, or that you're referencing the most up-to-date data, especially where there are changes in the data (such as married surname, address or bank account) at or on the date of migration?

4. Migration Testing

Environment: Typical testing involves using a test environment which contains a read-only copy of the source database and a clean copy of the destination database. In the case of complex or large datasets, data comparisons between the source and destination systems can be carried out with the use of data management software, for example SQL.

Sampling: Effective post-migration and ongoing testing generally relies on sampling, where subsets of random data are selected for inspection. Sampling is reliant upon an acceptable level of error and an assumption about repeatability. In general, sampling may miss data on policies that have very specific details that confine them to small subsets.

Test and repeat: Testing plans need to be defined and agreed on upfront so that both the approach and intended outcome are clear. Iterative tests involve testing, debugging and retesting. Subsequent iterations may reveal different error conditions as new samples are reviewed.

4.1. Pre-data migration testing

This is the testing of the data prior to the actual migration to establish the scope of the data and source systems.

Pre-data migration testing is carried out at the start of the migration planning and prior to the actual migration. It involves:

- Testing the fields that uniquely link source and destination records and ensure that there is definitive mapping between the record sets. Identification and determination of the treatment of apparent duplicate records in source system.
- Testing source and destination system connections from the migration platform. Where data is manipulated during the mapping, testing should take place as part of each step.
- Testing destination configuration against the migration specification. Verification of the completeness and accuracy of the migration specification's mapping.
- Retention of evidence of sign-off on the mapping tables and lockdown. This step should be completed as early as possible to allow work to continue.
- Making allowance in the testing plan for testing of data build-ups over different periods and at a group level. This will confirm if the destination system is being administered correctly.
- Feedback to be clearly communicated to the project team.
- Retention of complete records of all testing performed and of any issues noted.

4.2. Post-data migration testing

This testing is performed after completion of the migration and is typically conducted in a test environment. Data migration testing allows comparison of the migrated data with the original data and the discovery any discrepancies when moving data from a legacy database(s) to a new destination database.

Once a migration has been executed, end-to-end testing can be performed.

It is likely that a significant number of errors will be identified during the initial test runs - although the number can be effectively minimised through sufficient pre-migration testing. Post-migration testing typically includes:

4.2.1. Summary verification

This involves the use of testing methods which provide summary information including record counts and checksums between the migrated set and the destination system data upload. This method may not always indicate the root cause of any issues noted, so further investigation will be required.

4.2.2. Individual record verification

This test verifies that each field's values have been migrated as per the migration specification.

Individual field level mapping is used to determine the expected results in the destination system. Sampling can be used where appropriate. It is important to consider whether the migration includes data that poses significant business or compliance risks. When deciding on an appropriate sample size, it should be borne in mind that the more complex the data, the greater the number of samples that will be needed.

Example: testing of processes in progress and whether this will correctly work during and after migration, i.e. ensuring successful integration of any workflow management systems to the destination system. Examples include: a claim has been registered and is in the process of being approved; a debit order file has been sent to the bank from the source system, but rejections come back on the destination system. Testing needs to include scenarios similar to these ones.

The full migration data set could be tested if an automated testing tool is available, and it has the capacity to check every single record between the source and destination systems.

The testing, reporting, debugging and retesting cycle should be applied multiple times to each sample to check for consistent results, while complete records of testing methods and outcomes should be retained.

4.2.3. Testing the throughput

This considers the number of records converted per time unit and can be used upfront to verify whether the planned downtime for the migration is sufficient, or whether the migration run under investigation was completed successfully.

4.2.4. Testing data in ongoing processes

The testing plan should consider whether the migrated data works for ongoing processes. Where the migration involves working with take-on balances, rather than full historical data, testing needs to flag this and identify any additional fields which should be included in the migration.

Example: testing the data required to process a claim in the destination system for an event which happened while still working on the source system, i.e. with an event date prior to the migration date.

Testing should also be done to ensure that certain processes work correctly on a group level. This will entail testing the performance of monthly runs and annual runs, as well as the testing of both before and after results.

5. Testing for sign-off

There are 11 aspects of the migrated data that need to be reconciled and signed-off (in sequential order). This will then constitute a successful migration of data between administration systems used for actuarial valuations.

These checks are divided between data-based checks, which could be performed as part of the migration and passed to actuaries for review, and checks on actuarial models and staging processes with the source and migrated data:

5.1. Data checks

1. In-force policy numbers
2. Hash totals (control numbers) for dates (DOB, DOE, DOC), phone numbers, bank account numbers etc.
3. Policy premiums from in-force policies
4. Policy premiums from out-of-force policies up to a pre-specified point in the past
5. Policy movement build-ups spanning the same time periods, e.g. 12 months.
6. Summary totals member data: in-force counts by total group, product, status, etc.
7. Summary total cashflows, e.g.:
 - Premium balance
 - Receipts
 - Reinsurance cashflows, percentages
 - Commission balances
 - Total investment values/units
 - Total number of claims (by status)
 - Sign-off of trial balances before and after migration

5.2. Model checks

8. Reserving valuation results
9. Embedded value valuation results
10. Analysis of surplus results
11. Analysis of embedded value results

Best practice involves performing items 1 - 6 for two consecutive reporting periods, e.g. monthly or quarterly.

Notes of all testing done, and the outcomes achieved should be retained, with any issues noted being reported and re-tested when resolved.

Parallel runs can also be done after go-live; this is not covered in this Information Note.

5.3. Sign-off

Actuarial sign-off could be done on a provisional basis as and when each step is completed. Consideration should be given to the level of completeness required, considering the practical implications of delaying final sign-off.

On switchover, the migrated data should be used as the reporting data. All items previously and provisionally signed off need to be rechecked against the source administration system before final sign-off.

Sign-off confirms that:

- The new administration system sufficiently represents the data captured and reported on in the previous administration system.
- The results obtained from the new administration system are sufficiently in line with the former administration system from an actuarial perspective.
- There is no unacceptable loss of accuracy introduced by moving data to the new administration system.
- From a data perspective, there is no significant effect on the financial liability at the date of migration. (Note that process testing should be covered separately).
- The actuary can use the migrated data for future calculations.

However, sign-off does not confirm:

- That the new administration system is correct and complete.
- That all financial transactions have been brought across correctly and are complete.
- That all product setups are accurate and complete.
- That the test results will still apply if a significant period of time is allowed to elapse between testing and the actual migration.