

Volume 4 | **SPRING 2016**

GETTING THE MOST OUT OF AXIS

INTEGRATED SOLUTIONS

Editor's words: We are pleased to issue the Spring 2016 edition of our AXIS modeling newsletter. This issue explores key considerations for designing an IT environment around AXIS and provides detailed guidance for modeling reinvestment assets and strategies. You will also find helpful tips and tricks for navigating the system and highlights of new features in recent AXIS releases. We hope you enjoy the newsletter.

IN THIS ISSUE

EXECUTIVE CORNER

IT considerations when implementing AXIS

IN THE SPOTLIGHT

Reinvestment modeling

TIPS & TRICKS

WHAT'S NEW IN AXIS

EXECUTIVE CORNER

IT CONSIDERATIONS WHEN IMPLEMENTING AXIS

Insurance companies spend a good deal of time producing model output for the purposes of financial reporting, valuation, asset/liability management, pricing, and other ad hoc needs or business decisions. Therefore, when implementing a model, one of the main areas to focus on should be creating an efficient production environment.

DATA MANAGEMENT/WAREHOUSING

Many insurers are moving towards a centralized data warehousing platform, which acts as an intermediary between the company's administrative systems and AXIS. With a centralized platform, data formatting can be standardized throughout the entire company, helping separate IT and actuarial roles.

TIPS & TRICKS

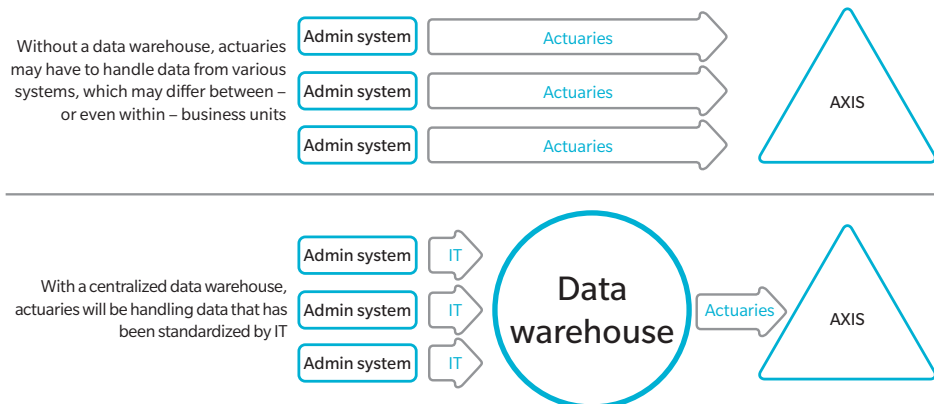
Show all input fields:

When exploring new modeling options, a user may want to see the universe of available input fields. However, by default AXIS hides input fields that are not currently applicable. For example in an Annuity Cell, SOP 03-1 settings are not applicable if the US GAAP basis is set to "0 - Do not produce US GAAP financials or cohort results".

To show all input fields:

1. Click "Format" from the menu bar and choose "Options"
2. For "N/A Screen Fields", set the behavior to "Show" in the drop-down list
3. Click "OK" to confirm the settings

Exhibit 1: Process standardization through a data warehouse



CONSIDERATIONS

The main considerations for whether to adopt a centralized data platform are company size and portfolio diversity. If a company has different business units using different administrative systems, then adopting a centralized platform would help standardize data and avoid heavy data interpretation and manipulation by actuaries before they perform actuarial analysis.

Large companies, even those with a limited number of business units, may wish to consider a data warehouse in order to consolidate large amounts of data manipulation.

PROCESSING

AXIS comes with a Standard Distributed Processing feature which can reduce model run times by distributing work across up to sixteen processors for a single user. However, when companies want to allow for runs (or “jobs”) by multiple users with additional processing power, a grid can be set up using AXIS GridLink.

GRIDLINK

GridLink, when used alongside AXIS EnterpriseLink (see our Fall 2015 AXIS newsletter¹ for more details on EnterpriseLink), can create an interconnected grid of computers with hundreds or even thousands of processors available to process jobs. AXIS is scalable, so run times decrease almost proportionally with added processing power.

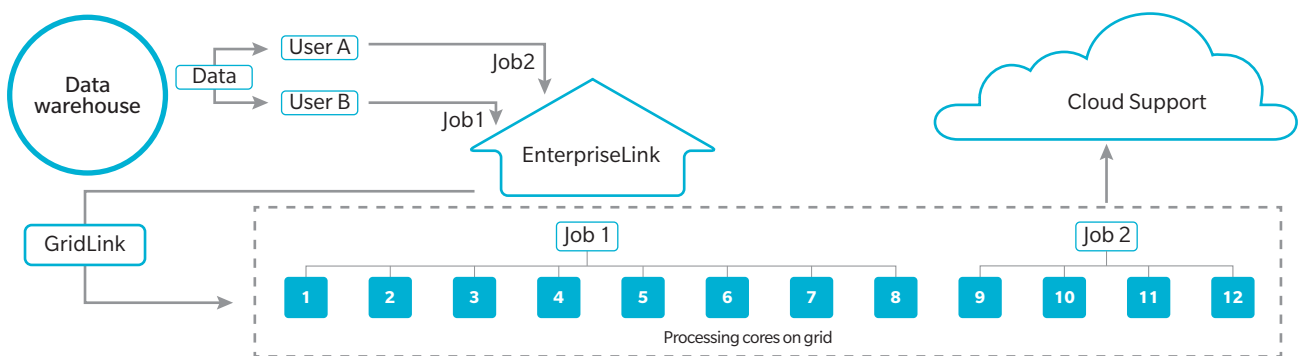
The grid’s processors may all be assigned to a single job or distributed between multiple jobs in various proportions, depending on priority; multiple users can submit jobs in tandem, and jobs can be automatically or manually ordered in a queue. Users can use AXIS freely after submission to the grid.

CLOUD SERVICES

Cloud services can provide extra processing power to GridLink when large jobs are being run. When running a large job and the grid is being fully utilized, AXIS will “burst onto the cloud” and utilize the cloud’s additional processors. Currently, GGY has tested and supports the following cloud environments: GGY Cloud, Microsoft Azure, Amazon EC2, and IBM Softlayer (Bare Metal only).

“
Cloud services
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GridLink when large
jobs are being run

Exhibit 2: Job processing with GridLink and cloud support



1 <http://www.oliverwyman.com/insights/publications/2015/oct/getting-the-most-out-of-axis--volume-3.html#VtRopEYU7OA>

FOR COMPANIES USING MICROSOFT JET/ACCESS WITH AXIS:

GGY is migrating from a Microsoft Jet/Access underlying database to SQL Server LocalDB. This new database engine is already available for use with DataLink and it provides some enhanced features, such as increased table capacity. Companies should consider switching from Jet/Access to SQL Server LocalDB for increased performance and continued support.

CONSIDERATIONS

If interested in using GridLink, an insurer can choose between leasing a grid from GGY and building its own grid. In the same sense, an insurer may choose to lease cloud support from GGY or from another supported provider. The company's grid should be able to handle routine model runs, with the cloud typically providing assistance for large jobs or uncharacteristically busy periods; otherwise, utilizing cloud support may become too costly.

If a company does intend to continually utilize cloud processors, different payment options exist. For example, many cloud providers charge a "per core hour" usage fee whereas others, such as GGY, provide the option to lease out cloud space for a flat monthly service fee. (In the public cloud, GGY charges "per core hour" fees in line with industry practice.)

DATA/IT ROLES

Many companies have found it beneficial to include an IT team member as part of the dedicated project team implementing AXIS. Responsibilities include addressing infrastructure needs, responding to IT issues and liaising with GGY's IT support team.

CONSIDERATIONS

How complicated is the AXIS system being implemented? If an insurer is using a Standard Distributed Processing system and has a fairly homogenous portfolio, then dedicating an internal IT resource may not be necessary. Regardless, leveraging GGY's IT team can help ensure a more reliable model and environment.

IN THE SPOTLIGHT

REINVESTMENT MODELING

In our Fall 2014 AXIS newsletter², we wrote about the increasing number of insurers building integrated asset/liability models and the various purposes of these models. The appetite of insurers to analyze their blocks of business under an asset/liability management ("ALM") framework, and the improvement of actuarial software solutions, will continue to drive the demand for more robust ALM models. Additionally, external scrutiny of insurers' modeling practices continues to increase, notably:

² <http://www.oliverwyman.com/insights/publications/2014/nov/getting-the-most-out-of-axis.html#.VtRoa0YU70A>

- ORSA³ was implemented in January 2015
- Nine insurers have been identified as Global Systemically Important Insurers (G-SIIs)⁴
- Three insurers have been identified as non-bank SIFIs, and will be faced with increased scrutiny when submitting their Comprehensive Capital Analysis and Review
- Life Principles Based Reserves are approaching the tipping point with respect to state legislative action

Like other actuarial software platforms, AXIS has the functionality to model many types of assets and reinvestment strategies and meet these ALM modeling demands. However, through a unique modeling feature, known as a Portfolio Rate Capture Batch, AXIS differentiates itself in the ability to perform multiple iterations of asset/liability projections until there is convergence on a portfolio earned rate. This is useful in an ALM context to appropriately reflect product crediting rates as a function of portfolio earned rates. In the following sections, we will explore the Reinvestment Strategy object in AXIS and illustrate how to capture a general account earned rate to be used in other objects.

REINVESTMENT STRATEGY OBJECT

Insurers have a broad spectrum of investment strategies that models should be capable of reflecting in order to properly capture ALM practices. AXIS offers a flexible and robust solution for meeting these modeling needs through the Reinvestment Strategy object. This object follows a sequential six step algorithm:

Exhibit 3: Reinvestment Strategy algorithm

1	2	3	4	5	6
<p>Designated cashflow</p> <ul style="list-style-type: none"> • Certain cash flows may be assigned Designated Cash Flow categories in the Asset Cell • These marked cash flows can have their own allocation strategy 	<p>Fixed allocations</p> <ul style="list-style-type: none"> • A fixed dollar amount of assets can be assigned to specific Reinvestment Subfunds 	<p>Initial matching</p> <ul style="list-style-type: none"> • A Matching Strategy may be selected in order to cash flow match or duration match liabilities 	<p>Initial negative method</p> <ul style="list-style-type: none"> • Allows for a separate disinvestment strategy • Multiple options are available: sell assets, borrow up to a specified dollar amount and then sell (borrowing limit can be variable) 	<p>Allocation method</p> <ul style="list-style-type: none"> • Allocation of remaining cash flows • Free cash flows may be reinvested between asset classes based on a set allocation, or by attempting to reach a target allocation between classes 	<p>Final matching</p> <ul style="list-style-type: none"> • After all other reinvestments, two choices are available for a final cash flow matching strategy: <ol style="list-style-type: none"> 1. swap hedge 2. duration match with rebalancing (short/long positions with a net zero cash position)

3 http://www.naic.org/cipr_topics/topic_own_risk_solvency_assessment.htm

4 http://www.naic.org/cipr_topics/topic_global_sys_insurers.htm

TIPS & TRICKS

Required soon - EnterpriseLink:

Starting with AXIS version 2017 (tentatively August 2016), all users will be required to install AXIS EnterpriseLink or AXIS EnterpriseLink Solo to run AXIS.

How will this transition impact you?

If you are currently running AXIS on a server, migration to EnterpriseLink server environment will be required. For users running AXIS on their desktop, installation of EnterpriseLink Solo – a personal edition of EnterpriseLink – will be required.

How will you benefit by moving to AXIS EnterpriseLink?

With AXIS EnterpriseLink, your company gains access to a number of controls and features, including the following:

1. User Roles to control access to the system
2. Version Control for AXIS releases and Datasets
3. Report Libraries for querying reports exported to databases
4. Job Automation via Scripted Jobs and Job Scheduler
5. Integration with AXIS GridLink farms, GGY Cloud Services and Cloud Deployments

Will this requirement change licensing and fees?

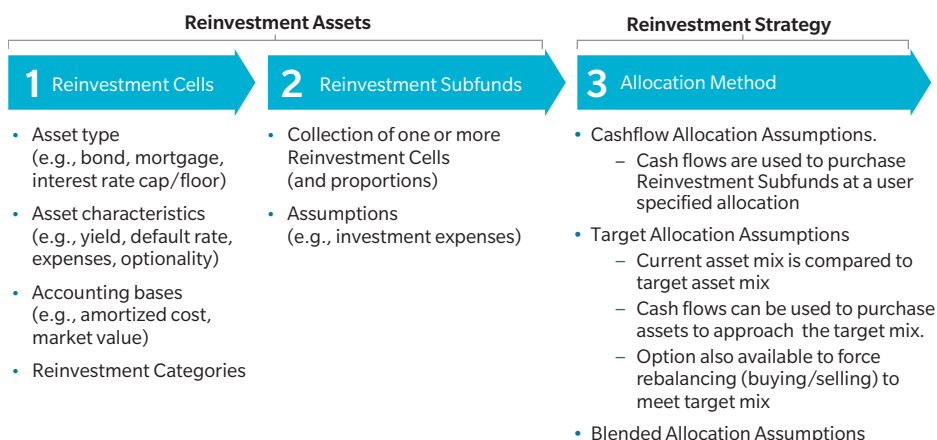
AXIS EnterpriseLink is already available to all AXIS users with no additional charge.

Need more information?

Visit Knowledge Base article 2054: Transitioning to AXIS EnterpriseLink.

Each of these six steps may be used to replicate reinvestment objectives. We will focus on the options available in the Allocation Method specified in step 5. The buildup of the Allocation Method is illustrated below:

Exhibit 4: Reinvestment hierarchy



Like other objects in AXIS, the Reinvestment Strategy and supporting objects follow a hierarchical structure:

- **Reinvestment Cells:** Cells are the base building block and where individual assets are defined. For example, three Cells can be created to define three 10-year corporate bonds representing AA, A, and BBB ratings, with differing income rates and default values. The income rates and default assumptions can vary by projection time step and scenario.
- **Reinvestment Subfunds:** Reinvestment Subfunds are used to aggregate Cells. Continuing the example above, the three Cells can be placed into three different 10-year corporate bond Subfunds. The Reinvestment Strategy can reflect different proportions to reflect a desired overall credit quality.
- **Allocation Method (step 5 from Exhibit 3: Reinvestment Strategy algorithm):** The Reinvestment Strategy Object dictates how the model uses the reinvestment objects described above. For the Allocation Method, there are three options available:
 - **Cashflow Allocation:** Positive cash flows are invested into the assets defined in the Reinvestment Subfunds. The asset purchase mix is defined in the Normal Cashflow Allocation Table. Two primary options are available to fund liability obligations when regular cash flow is insufficient. Cash can be borrowed at a rate specified in the Int Rate for Borrowing Table; this rate may be scenario dependent (e.g., 3M Treasury rate plus a spread). Additionally, assets may be sold with an asset disinvestment mix defined in the Neg Cashflow Allocation Table.

- Target Allocation: The Target Allocation method allows cash flows to be passively invested to meet a target asset allocation mix⁵. Reinvestment strategies requiring active asset management (rebalancing) can also be specified. For example, assume there are two Reinvestment Categories “Corporate Bond” and “Mortgage” with a target asset mix of 60% and 40%, and current allocations of 50% and 50%. If the accumulated net cash position at a reinvestment point is not large enough to passively meet the target allocation (buying only corporate bonds to drive the percentage back to target), mortgages will be sold in order to buy corporate bonds.
- Blended Allocation: This method allows for a blend of the Cashflow Allocation and Target Allocation.

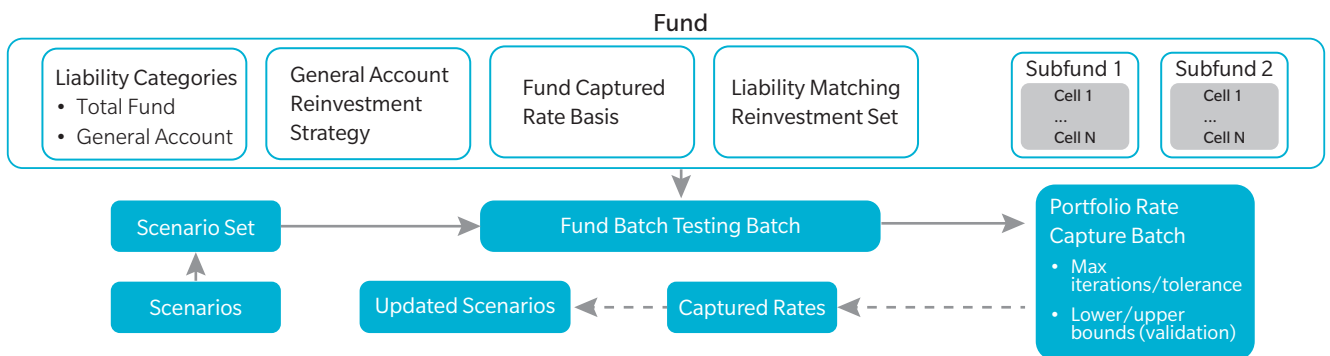
The Reinvestment Strategy needs to be included in a Fund along with liability Subfunds (e.g., Annuity, Universal Life) and Asset Subfunds (representing inforce assets.) Future asset purchases are defined by the Reinvestment Strategy in order to project investment income, defaults, and expenses from the cash flows generated by the liabilities. This ensures that assets and liabilities are modeled in tandem, and users have a holistic view of their business.

EARNED RATE CAPTURE

PORTFOLIO RATE CAPTURE MARKET

In the Fall 2015 AXIS newsletter, we provided an overview of the flexible scenario format⁶ and the associated scenario objects: Markets, Scenario Formats and Scenario References. One type of Market is a Portfolio Rate Capture Market, which is used to capture the rate earned on a portfolio of assets. Like other Markets in the Flexible Scenario Format, the Portfolio Rate Capture Market can be called by objects using a Scenario Reference Object. This is useful in setting product crediting rates as a function of the overall portfolio yield (not simply a single Treasury point), or in reserve bases that use general account earned rates. Unlike other Markets, the Portfolio Rate Capture Market cannot be directly written or loaded into AXIS; instead, it is populated using a Portfolio Rate Capture Batch. The Portfolio Rate Capture Batch process is illustrated in Exhibit 5:

Exhibit 5: Portfolio Rate Capture Batch process



5 The asset allocation mix is defined using Reinvestment Categories. Reinvestment Categories are defined in each Reinvestment Cell, and allow for a higher-level grouping of the assets defined in the Cell.

6 The flexible scenario format was introduced in AXIS version 2013.04.01.

TIPS & TRICKS

Model your Universal Life products with secondary guarantees:

AXIS is compatible with UL designs containing up to three specified premium guarantees. To enable this feature:

1. Navigate to the “Product Features - Continuation guarantee (NLG)” section of the Cell
2. Set the “Continuation guarantee option” to the appropriate setting option (6, 7, or 8)
3. Select a “NLG Criteria [Set]” table in the “Continuation guarantee criteria” assumption field and define criteria for up to 3 premium guarantees

AXIS is compatible with UL designs containing up to three shadow accounts (sometimes referred to as a “multi fund” design or “term-UL”) using multiple AXIS Notional Accounts (NA). Each NA has a unique interest rate and deduction specification. The input for “NA deduction order” specifies the order in which risk charges, NA charges (usually per unit deductions), NA expense charge (usually direct deductions), and withdrawals are deducted from the Notional Accounts.

Additionally, the “NA allocation” Formula Table provides the flexibility to allocate premium among the Notional Accounts.

To enable this feature:

1. Navigate to the “Product Features - Continuation guarantee (NLG)” section of the Cell
2. Set the “Continuation guarantee option” to the appropriate setting option (5, 7, or 8)
3. Set the “Notional account option” to “Has N sub accounts” and define N
4. Define the characteristics of the Notional Accounts in the Cell sections below

FUND LEVEL REINVESTMENT OBJECTS

In the previous section we described the reinvestment strategies available in AXIS. To incorporate the Reinvestment Strategy into a model, and use it in a Portfolio Rate Capture, it must be mapped into a Fund, as specified through the “General Account Reinvestment Strategy”:

Exhibit 6: Reinvestment objects at Fund level

The screenshot displays two main sections: "Investment Earnings" and "Investment Earned Rate".

Investment Earnings

- General account investment earnings**
 - Investment earnings: 2 - Use the General account reinvestment strategy
 - Total fund liability category: Total Fund Rate
 - General account liability category: General Account Only
 - General account reinvestment strategy: Reinvestment Strategy
- Liability category investment earnings**
 - Investment earnings: 0 - Ignore liability matching reinvestment strategy
 - Liability matching reinvest strategy: [Dropdown menu]

Investment Earned Rate

- Capture earned rate**
- Fund**
 - Fund captured rate basis 1: Stat Earned Rate
 - Fund captured rate basis 2: [Dropdown menu]

In the simplest form, the earned rate calculation and capture only requires a Fund Captured Rate Basic Object to be included in the Fund. More robust strategies can be implemented, which allow for the segmentation of assets in order to match liabilities. Three objects are needed for this approach:

- **Liability Category:** AXIS has the ability to capture a total fund earned rate, and also capture rates for different segmentations of assets in a Fund using the Liability Category in the asset Subfund. If assets are not assigned to a Liability Category by the AXIS user, they are grouped by AXIS into the default “general account” Liability Category and included in the calculation of the general account earned rate.
- **Liability Matching Reinvest Strategy:** Specific strategies can be identified for separate Liability Categories. For example, modeling the index hedge strategy for a Fixed Indexed Annuity (FIA). The investment strategies included in the Liability Matching Reinvest Strategy will only affect the total fund earned rate.
- **Captured Rate Basis:** This object specifies the characteristics of the earned rate capture. Notably, the accounting basis (AXIS can project multiple asset accounting bases at the same time, e.g., amortized cost, market value, outstanding principal, US Stat SSAP 43, etc.) and whether the earned rate is net or gross of investment expenses are defined. Two Captured Rate Bases may be specified.

FUND BATCH TESTING BATCH AND PORTFOLIO RATE CAPTURE BATCH

Performing multiple iterations and converging on an earned rate is necessary when the asset and liability projections interact. The earned rate calculation and capture utilizes a number of AXIS objects, as described in the following paragraphs.

Fund Batch Testing and Portfolio Rate Capture Batches are used to write the earned rates from the Fund to the Future Scenario. The Funds and Future Scenarios are input into the Fund Batch Testing Batch. A Portfolio Rate Capture Batch specifies the maximum number of iterations used, and what the convergence threshold is for the earned rate.

The Batches can solve for earned rates using multiple Funds and multiple Future Scenarios. This functionality is an automated solution of solving for earned rates across multiple dimensions for later use. After executing the Batches, the Future Scenarios are updated with the Portfolio Rate Capture Market for each Liability Category and Captured Earned Rate Basis specified in the Fund:



Performing multiple iterations and converging on an earned rate is necessary when the asset and liability projections interact



Exhibit 7: Portfolio Rate Capture Market

Col 1: LC[5] - General Account Only - CRB[1] - Stat Earned Rate
Annual effective

Mn		C1
M 1	R1	0.07
M 2	R2	4.49
M 3	R3	4.46
M 4	R4	4.44
M 5	R5	4.42
M 6	R6	4.40
M 7	R7	4.39
M 8	R8	4.48
M 9	R9	4.46
M 10	R10	4.45
M 11	R11	4.43
M 12	R12	4.41
M 13	R13	4.23
M 14	R14	4.46
M 15	R15	4.43
M 16	R16	4.42

Interest Rate | Equity | User Value | **Portfolio Rate Capture** | LC[5] - General Account Only

“
The Reinvestment Strategy object and Batch capabilities offered by AXIS give insurers an integrated solution to asset/liability projections
”

As a final step, a Scenario Reference Object (SRO) may be created for each Portfolio Rate Capture Market:

Exhibit 8: Scenario Reference Object

The screenshot shows a configuration interface for a Scenario Reference Object. It features a 'Market type' dropdown menu set to 'Portfolio Rate Capture'. Below this, there are three rows of configuration options, each with a dropdown menu and a three-dot menu icon to its right. The first row is 'Liability category' with the value '[3] General account'. The second row is 'Captured rate basis' with the value '[1] Stat Earned Rate'. The third row is 'Default scenario reference' with the value '[2] Interest - Term: 10 Yr'.

Each SRO includes a Liability Category and Captured Rate Basis. In the case when the liability category and captured rate basis does not exist in the Future Scenario, then AXIS will use the Default Scenario Reference. Cells, Investment Accounts, and other AXIS objects can call the Scenario Reference Objects. For example, when setting the cap rate for an Indexed Universal Life product, the cap rate may be solved for using an option budget that is a function of the earned rate. The Portfolio Rate Capture will record the earned rate for a scenario considering assets, liabilities, and reinvestments, and this earned rate can be called through the SRO to ensure that cap rates accurately align with the projection scenario. The Scenario Reference Object can also be an input into the Interest Table, allowing for investment income for EGPs in FAS 97 to be projected using a modeled earned rate.

CONCLUSION

The Reinvestment Strategy object and Batch capabilities offered by AXIS give insurers an integrated solution to asset/liability projections. Available AXIS modeling approaches allow for a realistic recreation of the actual ALM performed within the company by providing the ability to project existing inforce assets with accurate reinvestment strategies. Leveraging this functionality may allow an insurer to reduce model simplifications, create more credible projections, and, combined with proper documentation, ensure that models will withstand the scrutiny of external reviews.

WHAT'S NEW IN AXIS

NET AMOUNT AT RISK RESTRUCTURE

Description

- The "Net amount at risk" switch in Regular Life and Par modules replaced with the following switches to provide additional of flexibility in methodology:
 - Base Benefit
 - Dividend Benefit
 - Return of Premium
 - Other Benefit

Details

- Version: 20160501

Learn more

- <https://www.ggy.com/support/kbase/upddetail.asp?id=20758>

NAAR CASH VALUE TIMING

Description

- A new switch added in the Regular Life module to set the NAAR calculation timing for YRT reinsurance for the following:
 - Cash Surrender Value
 - Return of Premium on Lapse
 - Other Benefit on lapse

Details

- Version: 20160601

Learn more

- <https://www.ggy.com/support/kbase/upddetail.asp?id=20934>

SUBSTANDARD EXTRAS FOR OTHER BENEFIT RATES AND PREMIUMS

Description

- New fields added in Regular Life, Par and Disability modules to allow substandard adjustments to other benefit rates and premiums:
 - Extra Other Benefit Rate
 - Extra Other Benefit Rate Duration
 - Extra Other Benefit Premium
 - Extra Other Benefit Premium Duration

Details

- Version: 20150601

Learn more

- <https://www.ggy.com/support/kbase/upddetail.asp?id=20958>

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