

## Summary

Life and Annuity insurance companies have been addressing legacy concerns with platforms architected, built, and modified over the past four decades. Technologies have evolved multiple times over this period, making many platforms unrecognizable from when they were originally built or purchased. Couple that with product evolutions (e.g., Term, U/L, Whole, Fixed Annuity, Variable Annuity), changes in distribution models, and regulatory advancements, and this technical obsolescence becomes even more complex and issues even more acute. Finally, blocks of business that can be as large as 3-5 million policies, many of which originated decades ago or have been purchased as part of acquisitions, make the prospect of converting to a new platform much more daunting even for those IT and business leaders committed to the objective.

In recent years, there have been very few new entrants in the vendor marketplace that have shown signs of truly modern technology in the Life and Annuity Policy Administration marketplace. Certainly, some in the vendor community have “modernized” their platforms, but few have started from scratch with a modern design in a cloud-native environment.

## Our Report

This report analyzes a new entrant in the Life Insurance and Annuity Policy Administration vendor marketplace. **Penn River** is an Insurtech startup ready to unveil a fully functional core administrative system built from the ground up on a modern technology stack and design. We’ve looked across the technical design and product features to prepare a report that will be undoubtedly useful for many US Life and Annuity Insurance Companies contemplating a modernization journey.

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## **Section 1: Company Background**



**Penn River** is an Insurtech startup founded in May 2016 in Media, Pennsylvania and has developed a new Policy Administration System (PAS) for the US Life and Annuities Insurance Company marketplace. They are a Delaware corporation with a relatively small number of employees (approximately 15) with deep platform experience. Their leadership team and key employees had previously contributed to the development of other platforms in the Life PAS space. **Penn Assurance** is the consulting arm of this venture, and revenues from consulting are used to fund the build of the new platform. Penn Assurance currently provides a broad range of projects in the insurance industry as well as support on other popular policy administrative systems.

Penn River is not considering significant outside investment until they have their initial customers, despite substantial interest from the investor community. They do not want any one customer to overly influence the design and want to think about how the system should work regardless of the customer. So, for now, Penn Assurance and founder investment are the mechanisms to fund the development of the software product.

The company does not have a named Board of Directors that provides outside oversight. Four of the company founders serve as the informal Board and create direction for product development, sales strategy, and overall operational management. This provides for a fluid leadership approach but appears to lack formal outside perspectives. However, they have benefited from significant feedback from carriers with dozens of demos and other industry experts. The long-term intent is to stand up a formal customer advisory board when the timing dictates.

Their current business focus is on the individual life and annuity market. They have not built out group or worksite capabilities, by design. Their focus is on developing a robust product suite for individual life and annuity, including fixed, indexed, and variable. Penn River is establishing relationships with large integrators and TPAs as part of their go-to-market strategy, as well as insurance companies who are contemplating their modernization journeys. Of note (and to be addressed in section 2), the team is not attempting to build out every product type and product chassis. Instead, the most relevant of the core products will continue to be built out during the coming year, and client needs will dictate further advancement of the platform.

There is significant pride of ownership with the company founders and the leadership team. They come from different backgrounds, including a former life and annuity CIO, subject matter experts, and individuals who have already helped to build out enterprise-class software—specifically AdminServer and InsPro—and who are taking another shot at building a better and more modern one. The key technical principle is leveraging the native benefits of running in the cloud and thus helping insurance companies finally have a different solution to consider as they address their modernization concerns.

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**Section 2: System Functionality**

A summary of features and platform functions are described in this section. A key technical observation of the analysis team is how Penn River appears to be leveraging the inherent benefits of running in the cloud. As important, the key *business principle* is a reality-based approach to product configuration and customization. Penn River is dedicated to helping carriers with a different solution to consider as they address modernization concerns. This will be discussed further in Section 3–Technical Design.

**Exhibit 1: Business Functions Enabled**

A review of the system’s product capabilities in multiple live demos showed capabilities in *basic areas* to support a life and annuity implementation. *Exhibit 1*

Feature/Function	Enabled	2020 Enablement
Fixed Annuities	●	
Variable Annuities	●	
Indexed Annuities	●	
Term Life		●
Whole Life		●
Universal Life		2Q2020

shows that annuity product types appear to have been capably built out, with key product types under construction in the life insurance domain, which are planned for 2020 releases.

There are certainly other products that need to be incorporated. Product types such as Variable Life, Variable Universal Life, and Indexed Universal Life, as well as a series of riders that insurance companies require, still need to be made available. For example, life insurance riders such as Short/Long Term Disability, LTC, and Critical Illness still need to be developed. In

contrast, for annuities, most of the common riders have been built with more work to be completed on Lifetime Income Riders and other variants. Penn River has a strategy that includes building out enough capability to support both life and annuity implementations but will leverage live customers and a robust product workbench to build out what’s missing based on customer input.

The Penn River system is focused on policy administration and has expectations of integrating with other capabilities in the life and annuity ecosystem. For example, while commissions are calculated as part of policy administration, the expectation is that Penn River will integrate with an agency management system. The same is true for illustrations, eApp, correspondence, and enterprise workflow. Penn River is assuming that they will be part of a broader ecosystem and are wisely not attempting to build these capabilities into their platform. A powerful design consideration is the exposure of all fields, transactions, and calculations (including product calculations) via APIs, which makes integration with other platforms easier. Of course, integration with Salesforce for service and sales will be critical as well, but as stated earlier, this could be enabled in the future via their APIs.

So, the platform is nicely “boxed,” and that is as a Policy Administration System (PAS) engine. This is done with basic life and annuities product features built, with a powerful workbench to further enhance their product capabilities with client direction.

### **Section 3: Technical Design**

A summary and review of the Penn River technical design philosophy and features is provided in this section. This report uses documentation provided and technical discussions conducted with Penn River technical resources as primary sources of information and context.

#### Design Philosophy

##### **Ride technical innovation, don't reinvent it**

The Penn River platform makes use of trending Open Source technologies wherever possible. Implemented in Java/OSGi/Spring, JavaScript/React-Redux/Node.js, and JSF/PrimeFaces against Sagas/PostgreSQL/Liquibase XML databases, the platform runs in Docker containers and utilizes Maven for DevOps. These tools are all widely accepted and promoted among the technical community and align with current implementation patterns and practices. An Open Source “mash bill” keeps licensing costs down while providing the freedom to create multiple environments. Potential clients with restrictions on Open Source technologies will find this approach challenging, however.

##### **Cloud born and raised**

The platform runs on Amazon Web Services but can run on other cloud platforms as desired. It supports contemporary DevOps principles for branching and continuous integration and provides single-click Create/Copy/Destroy for Penn River environments, enabling a great deal of flexibility when engaged in significant testing or change initiatives. Continuous integration also provides immediacy to configuration changes, affording a level of business agility far beyond typical systems.

##### **Extensibility is key, and portability is paramount**

Client products, configurations, and extensions are stored in a “Customer Bundle” and interact with architecturally protected core functionality. The Customer Bundle is portable and will run on any Penn River instance, making at least the policy admin portion of a book-of-business migration between two Penn River customers simple. More practically, this ability provides a level of environment agility that is exceptional in this space, enabling testing, triage, and experimentation while keeping platform upgrades manageable.

#### Design Features

##### **Configurable and Extendable/Pluggable**

The Penn River platform is highly configurable, which limits the need for developer engagement on parameter-based changes, even if those changes impact the UI and database. The platform will apply those changes for you.

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The platform is also extendable and pluggable. The templates provided with the platform can be extended with additional java code by a client's development team or technology partner. Any extensions are stored in the Customer Bundle and work in concert with (and override if necessary) the core Penn River functionality. This maximizes flexibility while containing customizations.

#### Document Oriented Database

The Penn River platform stores product and policy data in XML documents and allows a complete point-in-time view of a policy from any point in time. This also provides a level of policy portability useful in resolving issues. While PostgreSQL is a widely accepted and XML enabled database technology, it is not XML native and lacks some of the XML database functionality. The performance and data growth profile of the current Penn River data architecture is currently being benchmarked and is not yet fully available; however, early returns look promising.

#### 100% Event-Driven

If it takes place in the Penn River platform, it takes the form of a Penn River event. This holds true for every type of business-day transaction as well as for any policy or account settlement that occurs after the close of the business day. Penn River evaluates each policy's events and determines what processing is required, storing the results either immediately on the policy or in a next-business-day version of the policy. In effect, this represents the typical "Batch" processing we see in legacy systems but eliminates the need to take policies or the application offline. Penn River can be configured to publish all events to facilitate the initiation of services external to the platform.

#### Security

Penn River provides proprietary Role-Based Access Control (RBAC) to platform functionality but does not provide any policy- or data-level access control. The platform implements SAML to facilitate RBAC, but there is no user identity management functionality provided. Clients must configure their own federated identity management solution to support a Penn River instance. Backups are encrypted, and data security is provided solely by the cloud services provider. The platform doesn't offer any data-masking functionality, though this feature is on its short-term roadmap. At the time of this writing, penetration and vulnerability testing for the Penn River platform and its components are scheduled but not yet completed.

#### Integration Support

Penn River provides APIs that allow customers to initiate Penn River events. They also publish events to inform or initiate external processes. Customers can customize or extend Penn River events to enable external processes or capabilities to hold, initiate, or synchronize Penn River processing. There is no

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current provision to accept or produce insurance or financial services industry-standard interfaces (e.g., ACORD transactions or DTCC interfaces).

Penn River clients will need to establish a means to aggregate and translate inbound transactions into serialized Penn River events for the platform to ingest them. Similarly, listening for, aggregating, and forming Penn River events into outbound integrations (e.g., DTCC or ACORD transmissions) is left to the client. This type of integration will be new to most clients and may involve a design and implementation learning curve.

### Reports and Dashboards

The platform's document-oriented database approach provides and maintains point-in-time history for policies; there is basic reporting, but no dashboard functionality is included. Like external process integration, establishing a reporting datastore, data visualization, and a means to capture, aggregate, and record policy and operational events are left to the customer. As with all Penn River capabilities, the existing reports are exposed via APIs and can be customized or extended by the customer as well.

A typical reporting solution might require an external data warehouse to store Policy data for reporting, a listener to respond to Penn River events published and to pull policy data into the data warehouse, and a set of reports and dashboards that meet the operational needs of the business. There will also be a need to ensure that the reports and dashboards are refreshed and published appropriately. Prospective clients without sophisticated data warehousing and visualization assets and experience may find the prerequisite capabilities and learning curve steep.

### Section 4: Technical Implementation and Product Configuration

A summary and review of the Penn River approach to implementation will be provided in this section. This report uses documentation provided and technical discussions conducted with Penn River technical resources as primary sources of information and context.

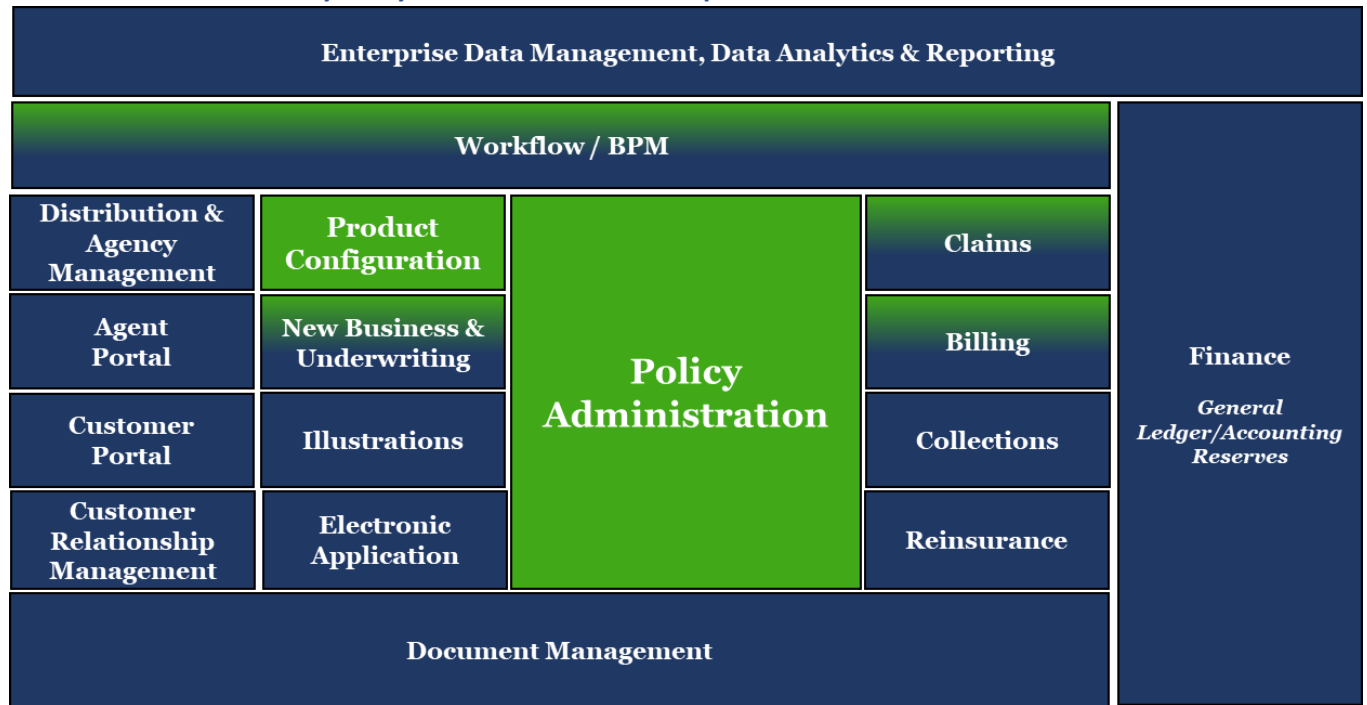
Our intent in this section is to provide insight and perspective across five critical components of implementation: ecosystem integration, product configuration, methodology, infrastructure, and staffing considerations.

### Ecosystem Integration

As previously noted, the current capabilities of Penn River's policy administration system will dictate substantial integration within a client or partner's technology ecosystem. Penn River's PAS business capabilities support new business processing, product configuration, and policy post issue management.

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**Exhibit 2: Life and Annuity Ecosystem with Penn River capabilities**



Penn River’s event-based architecture and an extensive suite of APIs facilitate integration with external ecosystem vendor partners. Penn River does not currently have any preconfigured or ‘out of the box’ third-party integration solutions but anticipates that they will likely develop some in the future based on client or partner needs.

In summation, given Penn River’s current capabilities and near-term development roadmap, clients or partners implementing the system should plan for a substantial integration effort.

**Product configuration**

Product Workbench is the core element of Penn River’s PAS solution. Products are configured within the tool and easily tested within the environment. The configuration tool is designed in consultation with actuaries, and the resulting interface is intuitive as compared to competing product configuration toolsets in the market. Given the complex nature of product design, customization is best supported by resources that have both actuarial expertise and strong system skills.

As noted in Section 2, Exhibit 1, a base product chassis has been pre-built for the most common annuity products, including a robust set of typical riders. This should provide clients with the ability to design and test new products rapidly. Products can be easily cloned, modified, and implemented.

Product modifications will largely be contained within a ‘business logic’ layer, which is part of the Customer Bundle. Some product modifications or features may require updates to Java objects, which,



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as noted above, will automatically update the XML data format. Notable is the ability for those changes to automatically propagate to APIs, which reduces complexity and the associated work effort to implement product changes.

Given its intuitive design and common programming toolset, supporting and maintaining the Product Workbench should be possible by leveraging client or partner ‘internal’ resources (after initial setup and training has been completed), mitigating the need for long-term reliance on Penn River.

### Methodology

Clients that have adopted agile will be delighted with Penn River’s “DevOps” oriented implementation approach; those who have little familiarity with modern development approaches will have a learning curve relative to customization and deployment. Client or partner preferences, technology constraints, or conversion strategy may dictate the use of more traditional deployment methods or a “hybrid agile” approach. Further, given the previously mentioned integration requirements, the need to align methodology across other 3<sup>rd</sup> party ecosystem partners will likely influence the chosen approach.

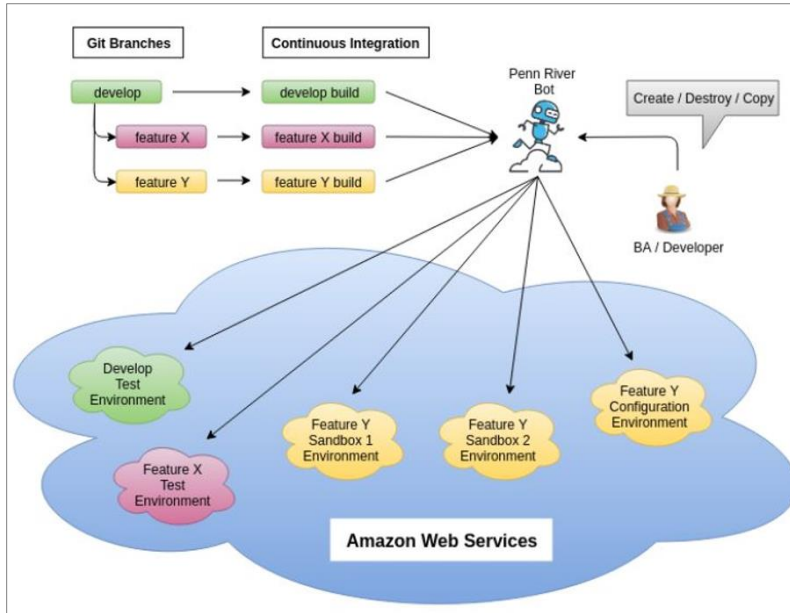
During operations, care will need to be taken to align product or policy enhancements on Penn River with enhancements on external, ancillary systems to avoid conflicts. For example, as Penn River provides no built-in means for dashboarding, clients will almost certainly have established an external data store and visualization system to provide this feature. Any changes to products or policies on Penn River must be coordinated with the visualization system changes, which may or may not be using contemporary DevOps capabilities. In practice, the general agility provided by Penn River may end up being limited by the release constraints of ancillary systems.

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### Infrastructure

#### Exhibit 3: Penn River Environments



The ability to easily instantiate multiple PAS environments leveraging Penn River’s cloud-native architecture allows clients or partners an opportunity to accelerate product innovation and decrease time to market.

Fully leveraged, this capability, combined with Penn River’s Product Workbench, is a significant competitive advantage over other policy administration platforms.

### Staffing Considerations

Implementing a policy administration system requires a broad set of competencies to ensure a successful deployment. Penn River’s modern cloud-based event-driven architecture, configurable product workbench leverage, and API integration layer will require specific competency in:

- Cloud Architecture
- Java and JavaScript Development
- Actuarial Systems
- API Integration
- Data Analysis
- Conversion Analysis (ETL and 3<sup>rd</sup> party tools)
- Ecosystem Integration

Clients or partners who do not have in-house expertise across these competencies will likely need to leverage outside partners to address those gaps. Certain disciplines (e.g., Java development to support customization) will likely be long-term needs that a client can consider developing in-house or via a long-term third-party relationship. Penn River offers training and certification on their platform that will be essential for those implementing the platform for the first time.

## **Section 5: Conversions**

A summary and review of the Penn River approach to conversion is provided in this section based on technical discussion conducted with Penn River resources. The conversion or migration into Penn River follows a necessary three-step process that is generally applicable to all data migrations—data preparation, data ingestion, and data validation.

### **Data Preparation**

In addition to standard data quality and completeness readiness, Penn River recommends a preparation step relative to assembling history into a series of transactions. The data ingestion approach relies on bringing in original (or point-in-time if necessary) policy data and then layering the history on top of it—so the more transaction history a policy has, the better the conversion and ability to maintain the policies going forward. They recommend a tool such as Oliver Wyman’s Fulcrum to support data enrichment before the conversion. This step is something that will likely require significant effort and is not something that can be outsourced to Penn River as part of the process.

### **Data Conversion/Ingestion**

As described above, the Penn River architecture includes a set of APIs that are designed for both inbound and outbound data. The approach to data ingestion into Penn River would be for the Penn River team to develop one or more “Conversion APIs” that would take in a set of policy information (base policy data, historical transactions, etc.) and persist it appropriately into the data stores. A conversion would be done after the product implementation and configuration is completed, as the Conversion APIs would use those product-oriented rules and business logic to ingest the converted policy properly. Considerations will need to be made for data outside of the policy as the logical unit of work, e.g., customer data.

### **Data Validation**

Data validation is an area where Penn River is designed to shine. They have implemented a sophisticated Plan Inspector tool that is intended to validate policy data or transactions in the system against the core and customized business rules and data models. So as part of the conversion process, the Plan Inspector can be used to ensure the quality of the conversion, based on how the converted policies will behave on the new system, and also comparing them to how they looked on the old system, based on how expected results can be configured. It is not clear how much effort using this tool will take for testing and validation as opposed to more traditional approaches.

Overall, this API-based conversion approach has both benefits and drawbacks. Benefits include a high degree of quality and functionality in place for converted policies—no “shoeboxed” policies here. Disadvantages include a potentially difficult data preparation step, especially for older blocks of business that may have decades of transactions no longer available, which would be difficult, or even impossible,

to recreate. This would require a point-in-time conversion approach, which may have an impact on the ability to maintain a policy going forward, no different from any conversion when transaction history is not available.

## **Section 6: Partnership Strategy**

A summary and review of the Penn River approach to partnerships is found in this section. This report uses our discussions with Penn River’s team as primary sources of information and context.

**Leveraging the platform via partnerships.** Penn River has had many conversations in this space, including with another Insurtech to strengthen integration opportunities with a Life and Annuity insurance company relative to co-development, and with other software companies that have complementary capabilities.

**Implementation/Integration Partners.** Penn River is aware of the need for strategy consulting and implementation support. It is improbable that a client or partner will have enough in-house expertise to implement the Penn River PAS. Penn River is generally open to working with partners desired by the client insurance company or has a network of partners to recommend as part of the implementation.

**White label.** Penn River is having active white labeling conversations with little detail offered.

**Agency Management.** Penn River is working with an Agency Management platform vendor to focus on integration capabilities.

**Salesforce.** Penn River asked integrators how easy it would be for Salesforce to consume their data; the answer has been “pretty straightforward,” but no direct work with Salesforce integration has been initiated—their intent is not to proactively build integrations to Salesforce in these early days.

## **Section 7: Pricing**

The pricing strategy for Penn River is being solidified, and they will have a pricing model for both insurance carriers and third-party administrators. There are three potential elements to their pricing.

- 1. Professional Services.** Initial implementation fees would be charged for the installation of the platform. While the fees were not explicitly disclosed, the intent is to charge roughly half of what competitors would charge based on ease of implementation and how the system is designed.
- 2. Subscription Model.** The go-forward approach would be a subscription model based on transaction fees, which would scale based on factors such as the line of business supported and associated complexity. The plan is to have a floor, or minimum yearly charge. They are open to a “trial model” that would, for example, limit the number of policies in play.

**3. Transaction fees.** Still under consideration are fees based on transactions; however, discussions continue regarding the definition of a transaction, and unintended consequences of charging in this manner (such as client not adding business to the system because of the expense related to each new transaction).

Overall, the stated objective is to be highly competitive when compared to their peers in the marketplace. It is important to note that upgrades are included in the basic fee, which is a strategic advantage. Penn River is also thinking about additional services (potentially for a fee) unique to their system design, such as having a client directly involved in the DevOps process to test their Customer Bundle against incremental changes to the Core.

### **Section 8: Conclusions**

It isn't very often that a new and different Life and Annuities Policy Administration System enters the marketplace, so the opportunity to look at Penn River's system was eagerly anticipated by the authors. That anticipation was bolstered by the fact that the authors have all spent their careers in an industry dominated by legacy systems.

Penn River's fresh approach to policy administration did not disappoint. As noted above, they have challenges that all small companies and new entrants will have to face, but their key differentiators will resonate with like-minded clients. These differentiators include the Product Workbench, which was discussed in the report, as well as what we consider to be a "real world" approach to customization. Penn River believes that meaningful customization will eventually require altering application code, and they embrace this by exposing important business logic in a well-documented and easy to modify Customer Bundle that is designed to be customized by client or third-party programmers.

Most clients we work with enhance their administrative systems through both configuration and code customizations. Penn River's open acknowledgement that they intend to partner with clients in a co-development ecosystem is refreshing and should align closely with the way many clients approach policy administration system maintenance.

The following are some additional observations relative to Penn River and the platform:

- The depth of experience of the Penn River's people is impressive; however, Penn River's size and newness to the marketplace will be a hurdle for some clients.
- Key strengths of the Penn River platform include its cloud-native design and, most likely of all, its focus on rapid product design. Through the Product Workbench, essentially the core element of Penn River's solution, products are configured end-to-end and are easily tested with Plan Inspector.
- The platform runs on Amazon Web Services but can run on other cloud platforms as desired.

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- Clients with restrictions on Open Source technologies will not be aligned to Penn River’s Open Source inclusive approach.
- Backups are encrypted, and data security is provided solely by the cloud services provider. The platform doesn’t yet offer any data-masking functionality. At the time of this writing, penetration and vulnerability testing for the Penn River platform and its components has been scheduled but not yet completed.
- Clients comparing the overall functionality of Penn River to other competing policy administration systems will note the lack of end to end new business capabilities, specifically support for underwriting. Penn River does not currently have plans to develop such capability, purposefully containing the platform, which can be ideal for third-party providers who are building out an ecosystem, and a very important design consideration for insurance companies.
- API management is key to the Penn River implementation. This type of integration will be new to most clients and may involve a design and implementation learning curve.
- There is no current provision provided to accept or produce insurance or financial services industry-standard interfaces (i.e., ACORD transactions or DTCC interfaces).
- No dashboarding features are provided with the platform. Prospective clients without sophisticated data warehousing and visualization assets and experience may find the prerequisite capabilities and learning curve steep to implement integrated operational reporting or visualization.
- Clients that have adopted agile will be delighted with Penn River’s “DevOps” oriented implementation approach; those who have little familiarity with modern development approaches will have a learning curve relative to customization and deployment.
- Given its intuitive design and common programming toolset, supporting and maintaining Product Workbench should be possible by leveraging client or partner ‘internal’ resources (after initial setup and training has been completed), mitigating the need for long term reliance on Penn River.
- The ability to easily instantiate multiple PAS environments leveraging Penn River’s cloud-native architecture allows the client or partner to accelerate product innovation and decrease time to market. Fully leveraged, this capability, combined with Penn River’s Product Workbench, is a significant competitive advantage over other policy administration platforms.

## About the Authors

This report was created jointly by members of **Mantissa Group and NEOS**. The report is intended to provide insights on a perceived development in the Life and Annuity Policy Administration System (PAS) industry, with an analysis that crossed multiple topic areas with the appropriate level of depth in each area. *The report is not intended to be an endorsement of the platform, but rather bring objective insights on capabilities, strengths, and areas of potential improvement.* This report will be a first in a series of related reports jointly developed by both companies.



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