Deloitte.

Current and Future Trends in and Pricing

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AGENDA

1. **Introductions**

2. **Current Trends in Pricing**

3. **Reflecting on Current State Challenges and Roadmap**

2 | The Age of With: Augmented Intelligence in Insurance 2

The Future of **Pricing**

As Insurance Carriers are beginning to optimize their rating engines, what are the benefits?

FASTER	SMARTER	PERSONALIZED

... the value add for carriers transforming their rating platforms has many benefits

Digitizing your platforms and using an **integrating pricing solution** will help you cater to your customers needs in real time, reducing risk.

Insurer's **must avoid being commoditized**; if you standardize a product, consumers risk judging it solely on cost.

Customers expect personalization, building **loyalty**. This can be done by having riders, add-ons, and usage-based insurance.

The Future of **Pricing**

FASTER ———————— **SMARTER** ———————— **PERSONALIZED**

Forecasting
Accurate forecasts through leveraging predictive, AI/ML models can help carriers tweak their capabilities based on consumer needs.

Scenario Testing
Using "what-if" tests to determine the best price points for specific products based on trade-offs and other data sources.

Price Optimization
Insurers are enabled to optimize volume AND profit, maximizing ROI.

Real-Time Deployment
An integrated pricing solution allows an insurer seamlessly deploy their pricing.

Enterprise-Grade Governance
Includes end-to-end systemization to minimize room for error, in addition to automated documentation and traceability to streamline compliance.

Automated Risk Assessment
Tailored product & coverage recommendations using intelligent rules engine, virtual assistant. Machine learning models using third-party and sensor data improving risk selection.

Tailored Pricing
Achieved through advanced and predictive analytics. This will reduce insurers' susceptibility to adverse selections and entrenching customer loyalty.

Portfolio Optimization
Develop a sensing mechanism for real-time monitoring of shifting business environment. Use market intelligence to implement rapid changes to portfolios and feed into design of new products & coverages. Partner with InsurTechs, data providers.

Valued External Interactions
Insurers can leverage advanced analytics to foster their interactions with other parties.
- *Regulators:* Respond to new regulations real-time.
- *Customers:* Provide valuable info. (e.g., risk management strategies) to customers).

Personalization
Static features based on simple business rules, including discounts for given user profiles, without offering dynamic content.

Selective Testing
Test-and-learn for improved content based on user profiles (i.e., demographics, needs & behavior).

Digital Personalization
Targeted features and recommendations using data analytics. This would include adjusting rating according to user behavior (e.g., UBI) and dynamic interaction with consumer.

Channel-Wide Personalization
Centralized data allows for relevant personalization across all channels & lines of business. This would entail a global use of data.

Digital Agility
Using personalization across all channels to manage corporate-level KPIs. This can drive increased capital management for you, as the insurer.

COMPETITIVE PRICING

Insurance Modeling & Pricing | Landscape

Insurer	Policy Admin	Rating	Modeling	DWP
[intact]	Non-Packaged Legacy App	Non-packaged Legacy App	SAS · R · Python	$8.7B
ICBC	GUIDEWIRE	GUIDEWIRE	C · SAS	$5.4B
AVIVA	GUIDEWIRE / Non-Packaged Legacy App	CGI Ratabase / GUIDEWIRE	Python	$4.7B
Desjardins	EXIGEN insurance solutions	EXIGEN insurance solutions	C	$4.5B
co-operators	GUIDEWIRE	GUIDEWIRE	EARNIX Predict. Perform. · R	$3.1B
TD Insurance	GUIDEWIRE	CGI Ratabase · ORACLE	R · Python · C	$3.0B
Wawanesa Insurance	GUIDEWIRE	GUIDEWIRE	C	$3.0B
RSA	Duck Creek Technologies	Duck Creek Technologies	C · SAS	$2.9B
economical INSURANCE sonnet	GUIDEWIRE	GUIDEWIRE	C · SAS · R	$2.3B
TRAVELERS	GUIDEWIRE (IMPLEMENTING)	GUIDEWIRE (Implementing)	SAS	$1.6B

Dynamic ("Real-time") Pricing

Investment
Many carriers are investing in dynamic real time pricing

EU & UK
Insurers abroad are closer to achieving this goal, with many large insurers in the range of weeks to implement even complex rate changes

Hurdles

Rate Deployment Process
Rate deployment process: rate testing, approval process, regulatory concerns

Operating Model
This would be completed through a large-scale implementation which would reframe how rates are deployed at an organization.

Case Study
Journey to Daily Rate Implementations

A mid-size international insurer wanted to **decrease time to market** when implementing new rates. The elements in scope to update & change were data storage/queries, actuarial modeling, rate testing, and the approval process.

Solution was built using **R** and deployed using **Docker/Kubernetes**. The overall timeline is **12 months.**

The Client opted for **automatic rate testing,** adding 6 months to the overall project timeline.

Pricing Methodology: XGBoost and Neural Networks

Cutting-edge insurers are moving away from linear rating structures and are embracing **advanced frameworks** for rating:

XGBoost

- *Uses a more regularized model, which allows for greater control of over-fitting vs GBM*
- *Variable interactions are automatically detected during training*
- *Supports the parallelization of tree construction, so the model will typically train faster compared to GBM*

Neural Networks

- *Neural Networks will automatically learn non-linear and complex relationships*
- *The user does not need to specify structure of the neural net. This also means the internal trained structure can be difficult to interpret.*
- *Feature engineering can be automated with deep learning*

XGBoost and Neural Networks have been shown to **increase prediction accuracy by up to 60%** in insurance pricing versus only 30% improvement using GLM alone[1]. One notable real-world implementation is Intact using XGBoost for their personal auto pricing algorithm.

Advantages	Disadvantages
Automates analysis	Poor transparency & high error susceptibility
Higher predictive power	High data requirements
Learns complex relationships	Regulators less likely to approve
Scalable (with caveats)	Resources needed for computing power

1. Schelldorfer, Jürg and Wuthrich, Mario V., Nesting Classical Actuarial Models into Neural Networks (January 22, 2019). Available at SSRN: https://ssrn.com/abstract=3320525 or http://dx.doi.org/10.2139/ssrn.3320525

Price Optimization

Ratebook Optimization

Output can maintain a consistent rating structure

Efficient frontier is an easy way to visualize decisions

Individual Optimization

Requires an advanced analytical rating engine

Can provide 2x the lift on rate factor optimization

Hurdles

Access to Data
A demand model is a minimum requirement, which means the team needs to query more data than just a loss-cost model.

What do with competitor analysis
The insurer could incorporate a third model (to predict competitor rates) but that adds even further complexity.

Case Study
Rate factor optimization

A mid-size international insurer had previously been trying to optimize their rates using an ad-hoc approach after analyzing competitor rates.

Deloitte assisted the insurer in formalizing their integration of demand and loss-cost models to **generate a scalable (across all regions/lines) rate factor optimization framework.**

Individual rate optimization is on their roadmap, but currently going through a rating engine implementation which is delaying this activity.

Autonomous Vehicles and their Insurance Implications

We are progressively seeing a shift to more **vehicle automation** and **fully autonomous vehicles**. As more vehicles on the road have some level or are fully automated, this represents a material shift in how to evaluate vehicle insurance. We estimate a reduction in insurance premiums by up to 30% driven by safety improvements.

Drivers for Reduced Premiums Driven by Increased Vehicle Safety

1 **Increased fraud and tracking capabilities** will reduce theft

2 **Reduced human involvement**, reducing human driving error

3 **Reduced severity of bodily injury** through reduction in impact

How can insurers get ahead?

A Call for Collaboration

- Successful insurers will partner with AV providers, regulators and manufacturers to gather data and develop policies

Updated Product & Policy Models

- Product models need to be updated to account for increased product liability and changed risk exposure

Regulatory Factors

- Ontario and Quebec have approved AV for testing on roads. Working with regulators on the rating and pricing is key

New Approach to Pricing

- Fast movers that know the risk and exposures can price for it best
- While reductions in injury frequency and severity are likely, increases to repair costs are also likely.

Evaluating Where You Are in your Pricing Transformation

	Legacy	Average	Cutting Edge
Data Availability	Data for Pricing Available at ad-hoc intervals. Data extracts are performed when needed.	Data for pricing are readily available and data extracts are performed frequently.	Data for pricing available in real-time. Pricing Tools, fully integrated with internal databases.
Data Source	Only Internal Data used for pricing. Limited data validation.	A mix of internal and some external validated data sources are used for pricing.	Internal and External Data used in pricing. External economic and market data used in pricing models.
Pricing Methodology	Traditional Rating Methodologies used, simple loss cost methods, model interactions are not removed.	GLM's and advanced risk classification algorithms used for Rating. Model interactions removed.	Highly sophisticated pricing incorporating machine learning, data visualization, decision support systems, "next best action" advice.
Frequency of Pricing Model Updates	Pricing Model is updated rarely, only small changes made to model. Pricing is reactive and only reviewed on infrequent intervals.	Pricing Model is updated regularly, major changes made to model in order to respond to market conditions alongside internal profitability.	Pricing Models are continuously tested for validity against market dynamics and internal profitability. Models updated when pre-determined thresholds are breached.
Rate Implementation	Implemented Model is different from actuarial model, it is severely limited by technological constraints.	Implemented Model is slightly different from actuarial model, it is limited by technological constraints.	Implemented Model is the actuarial model, there are no technological constraints.
Price Optimization	Limited or no price-optimization tools with heavy reliance on Excel or other basic tools. Pricing is product focused without regard to cross product or customer segmentation	Some pricing optimization and pricing elasticity measures incorporated into pricing models and rates. Pricing incorporates some cross product sales but with limited capabilities.	Pricing focuses on customer personalization with portfolio-based pricing for a customer, customer lifetime value metrics.
Tracking and Monitoring	Only a few rudimentary metrics are tracked and monitored, limited data drilling features. Monthly or quarterly reviews of metrics.	Various metrics are tracked and monitored; able to drill down to key segments of portfolio. Weekly and/or daily reviews.	Real time monitoring and utilizing market intelligence for changes to portfolio and risk selection. Able to drill down to risk level for each metric in real-time.

Lessons Learned When Starting a Earnix Pricing Transformation

1 **Product Model Influence Earnix Project Design**

Before starting your implementation, answering key questions around the product model will define your Earnix set up:

1) What kind of discounts exist, and how do customers get them?
2) Do policies allow risks from different jurisdictions?
3) What is the interaction between commercial and personal lines risks on a policy?

2 **Communication between Actuarial Teams and IT is Key**

Earnix and Guidewire need to be aligned to enable a successful integration. Early planning and design reduces implementation time and defects. Key considerations include:

1) What are the standard API naming conventions?
2) What is the error handling?
3) What security measures need to exist?

3 **Think about the future**

Earnix can enable insurers significant advancements to their pricing and rating capabilities. When implementing Earnix, a carrier may not be ready to fully utilize those capabilities but thinking about your plan helps ensure you don't design yourself into a corner.

4 **Not every calculation belongs in the Earnix**

When starting an Earnix project, there can be a desire to move all calculations to Earnix off of Guidewire. It's important to think through and properly consider where a calculation should occur. Key questions to ask include:

1) Is this variable only used in rating, or is it required for other operations? (underwriting rules, coverage availability, etc).
2) How often is this variable updated / changed?

Q&A