Casualty Actuarial Society RPM Seminar

Underwriting's new reality – a case study of automated integration of analytics and rules

21 March 2018

Building a better working world

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Agenda

- Trends fueling insurance change
- Straight through processing (STP) trends and challenges
- Underwriting rules and models integration solution
- Rules and model enablement
- Rule and models demo
- Portfolio management
- Q&A
- Underwriter of the future

Trends fueling insurance change

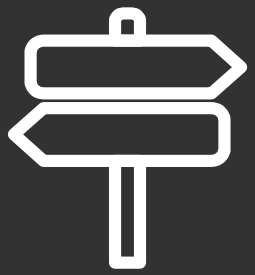
Trends fueling insurance change

Emergence of new technologies

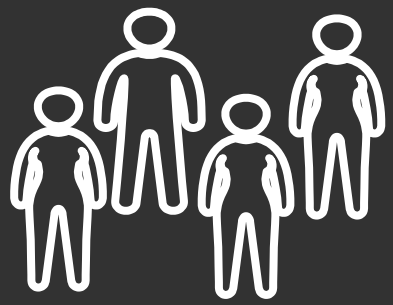
Rising consumer expectations

Explosion of data

Protection and security



Shifting market trends



Workforce of the future

Drivers of disruption

Key drivers

- Product innovation
- Consumer-driven choice
- New business models
- M&A activity
- Digital technologies
- Digital data
- InsurTech platforms
- Real-time insights informing decisions
- Generational expectations

Key implications

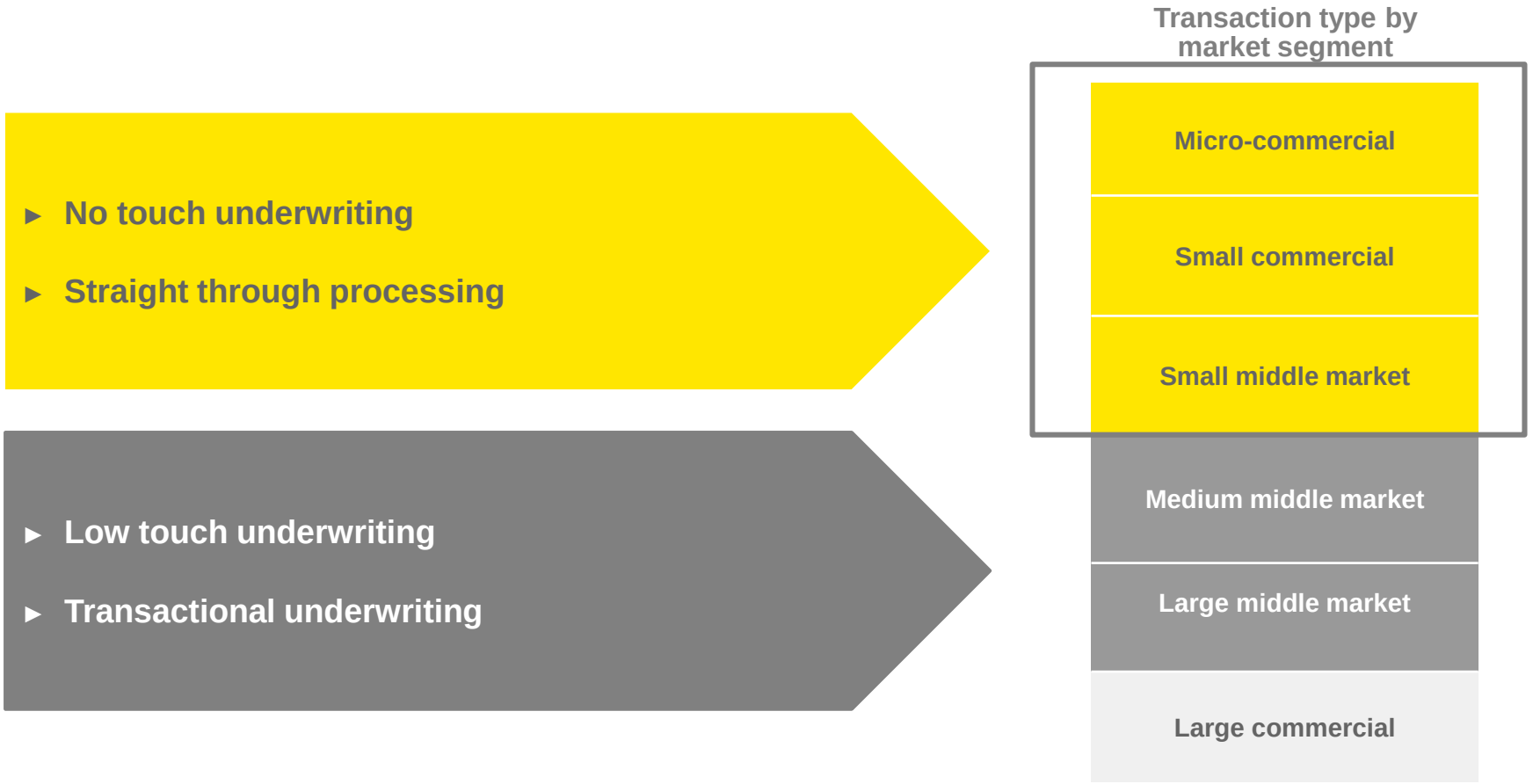
- Speed to market for new products and channels
- Customer identity and trust
- Increased straight through processing
- Variation in products/services and user experience
- New forms of digital integration
- New forms of data and performance analytics

Key requirements

- Simplified user experience
- More sophisticated business rules
- Cohesive product and rules architecture
- More sophisticated predictive models (e.g., differentiated by product and channel)
- Digital architecture with micro-services to support partner integration and digital integration
- Enhanced data architecture
- Competitive operating costs

Straight through processing trends and challenges

Straight through processing trends



Straight through processing maturity

Illustrative

Straight through processing

	Traditional	Basic	Competitive	Leading
Characteristics	► All business is handled by underwriters/service personnel	► Lowest complexity business handled by underwriting support ► Mid to high complexity handled by underwriters ► Limited book of business management by underwriters ► Limited sales activities by the underwriter	► Low complexity business automated ► Low and some mid complexity business processed by underwriting support ► High complexity business processed by underwriters ► Book of business management conducted by underwriters ► Underwriters participate in sales activities	► Majority of low and some mid complexity business automated ► Mid and high complexity business handled by underwriters ► Book of business management activities conducted by underwriters ► Underwriters actively participate in sales activities and product/program development
Models and rules	**Rate order calculations** **Analytical LOB models** **Underwriting guidelines**	**Rate order calculations** **LOB predictive models** **Simple binary rules** (knock-out, referral)	**Rate order calculations** **Aligned predictive models** **Complex multi-variate rules** (risk assessment)	**Rate order calculations** **Optimized and integrated predictive models** (account, LOB, marketing, etc.) **MECE rule sets** (simple, complex)
Underwriting handling	Underwriting support Underwriter	Automated handling Underwriting support Underwriter	Automated handling Underwriting support Underwriter	Automated handling Underwriter

Straight through processing

Advantages	Challenges
► Significant driver of cost reduction and improved underwriting leverage ratios	► Lack of enabling technology (e.g., data), as well as cultural barriers
► Potential for improved profitability	► Changing the focus of the underwriter to portfolio-level decisions based on data and analytics as opposed to individual risk underwriting
► Increased speed with respect to service delivery	► Managing profitability issues in a proactive way
► Facilitates a “skills-based routing” framework where referrals are sent to the appropriate underwriters based on risk complexity	► Misalignment between underwriting rules and predictive models
► Signaling declinations early in the process to mitigate wasted effort	► Lack of an effective monitoring process for underwriting rules and predictive models
► Improved underwriting and regulatory compliance with rating plans, pricing rules and coverage terms	► High work effort needed to develop and maintain underwriting rules and predictive models
► Improved customer experience for agents and end consumers	

Challenge: aligning UW rules and predictive models

Situation: Implementing robust and complex rulesets to score BOP risks. These rules drive available IRPM credits and debits but, at the same time, utilize a predictive model based on many of the same data elements as the rules to assign tiers for price segmentation.

Result: Adverse selection in the market due to “double-dipping” of credits and debits for variables, such as credit score, building age and class of business.

Rule and model misalignment

Challenge: lack of effective monitoring of rules and models

Situation:	Desire to write small commercial business in an automated way, utilizing both rules and models, but there was no monitoring process established where actual rule and model results were measured against expected.
Result:	The business could not answer simple questions about the health of its portfolio until losses were realized. No framework existed to help business users make data-driven adjustments in response to market conditions.

Challenge: effort needed to maintain UW rules

Situation: A rule set aimed at determining whether a risk should be accepted (STP), rejected or referred uses 10 different risk characteristics. Each rule can use as many risk characteristics as desired. An analyst is tasked with identifying interdependencies between risk characteristics in order to determine whether any rules are redundant.

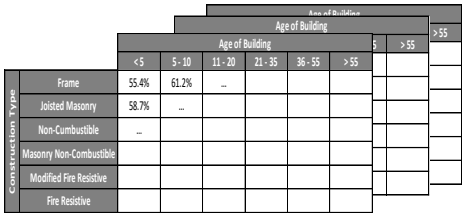
Result: Since there are 45 different combinations of the 10 risk characteristics, the analyst creates 45 two-way tables of loss ratios and looks through them to identify interdependencies. A colleague then points out that there could be more complex interdependencies involving three, four or more risk characteristics. Without the use of models, the analyst would struggle to identify these more complex interdependencies.

Two-way analysis:

Construction Type	Age of Building: <5	5 - 10	11 - 20	21 - 35	36 - 55	>55
Frame	55.4%	61.2%	…			
Joisted Masonry	58.7%	…				
Non-Cumbustible	…					
Masonry Non-Combustible						
Modified Fire Resistive						
Fire Resistive						

45 combinations of two-dimensional tables

Three-way analysis:



Construction Type	Age of Building: <5	5 - 10	11 - 20	21 - 35	36 - 55	>55
Frame	55.4%	61.2%	…			
Joisted Masonry	58.7%	…				
Non-Cumbustible	…					
Masonry Non-Combustible						
Modified Fire Resistive						
Fire Resistive						

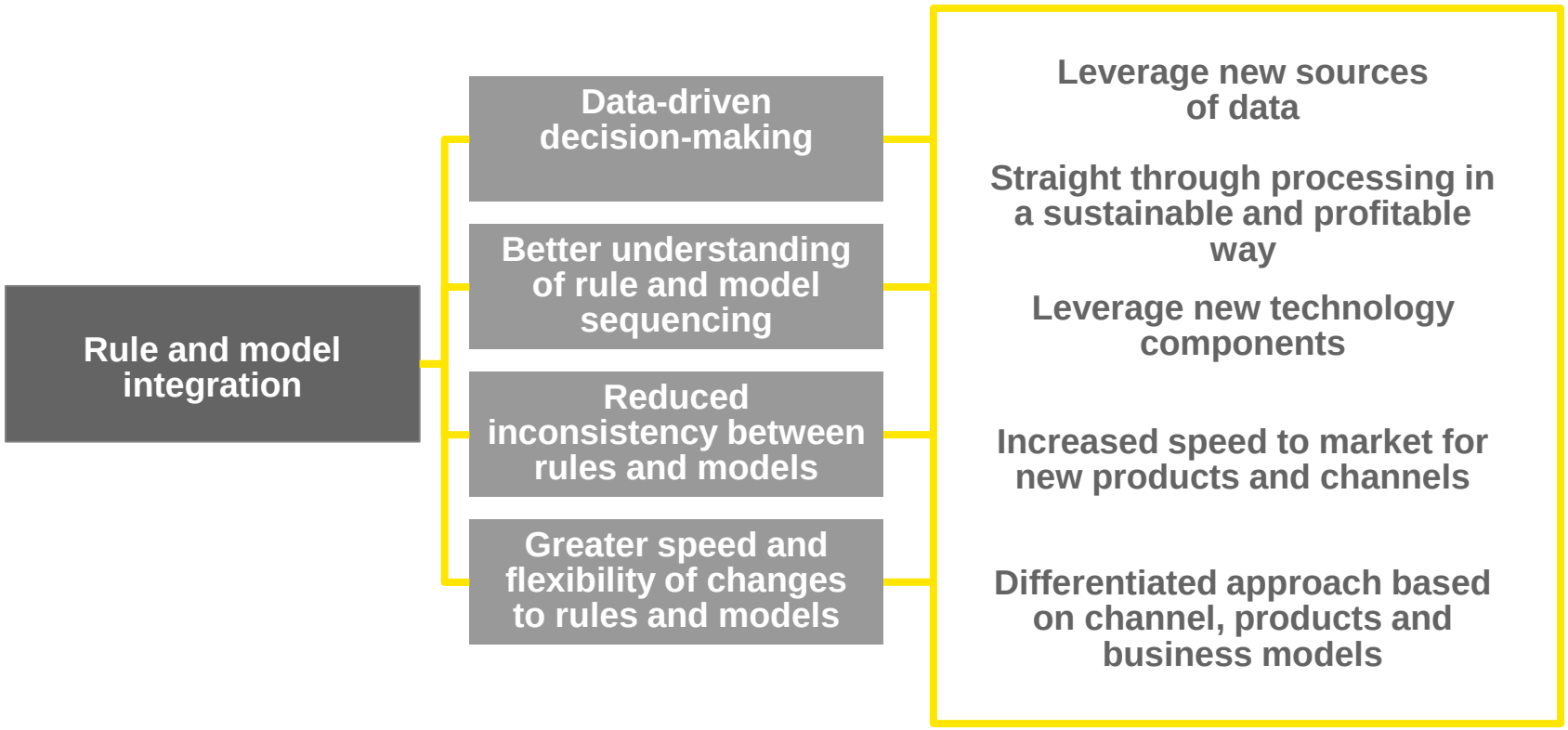
120 combinations of three-dimensional tables

Four-way analysis:

210 combinations of four-dimensional tables

Underwriting rules and models integration solution

Integrated rules and models



Rule and model integration opportunities

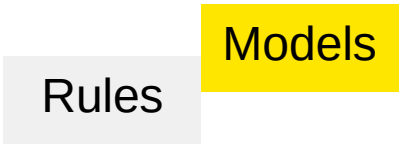
Cohesion

- Cohesion describes how united rules and models are across the enterprise from both a storage and maintenance perspective.

Sequencing

- Sequencing describes how well rule and model interdependencies are considered when determining the optimal firing sequence of rules and models in the workflow, and how well the business understands and uses this information in its decision-making.

Alignment

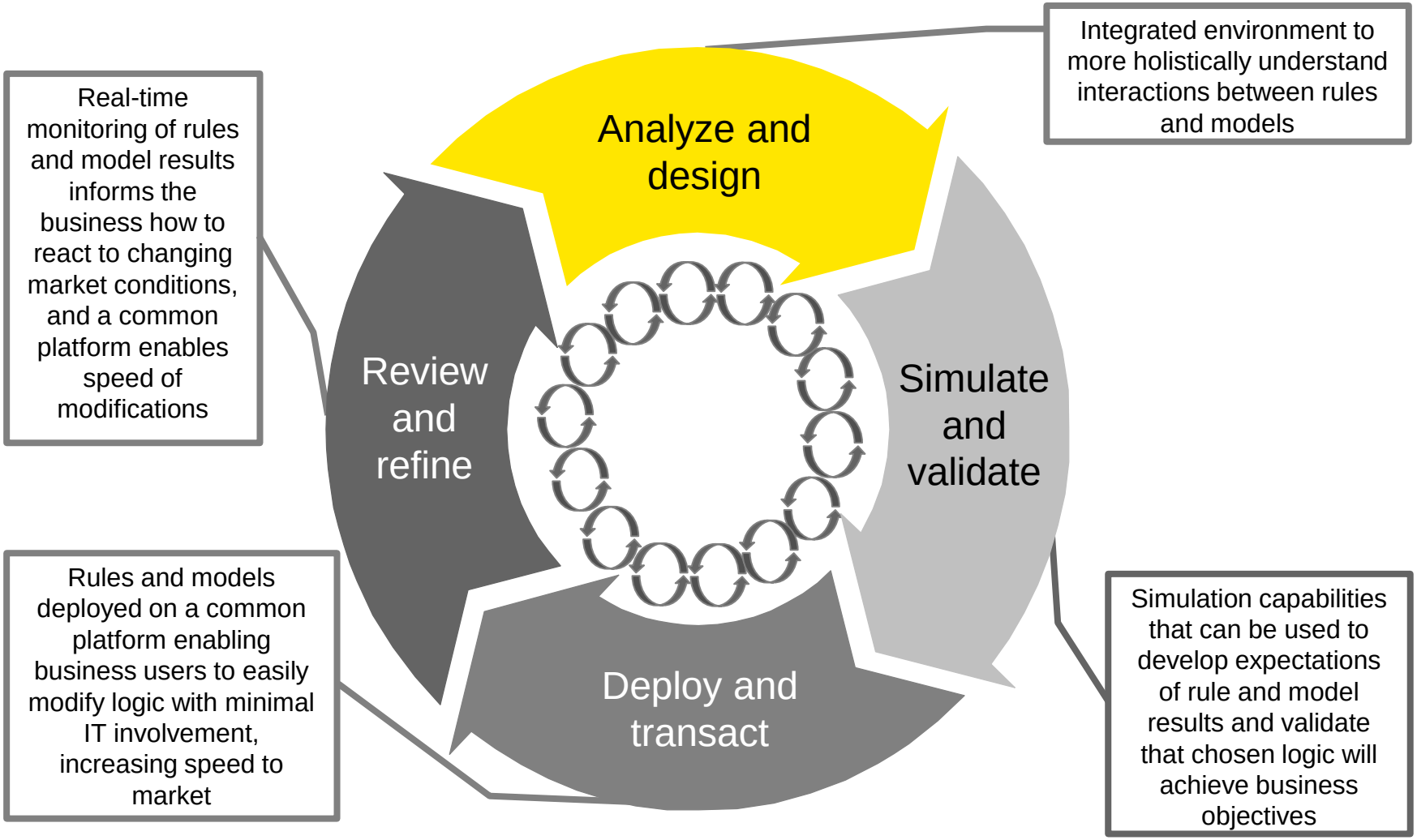


- Alignment refers to how closely related the rule and model development disciplines are within the organization, and how well the rules and models work together functionally.

Feedback

- Feedback refers to the existence and effectiveness of a rule and model result monitoring process where results drive the decision-making regarding changes to rules and models.

Holistic underwriting rules and models framework



Rules and models enablement

Rules and model enablement considerations

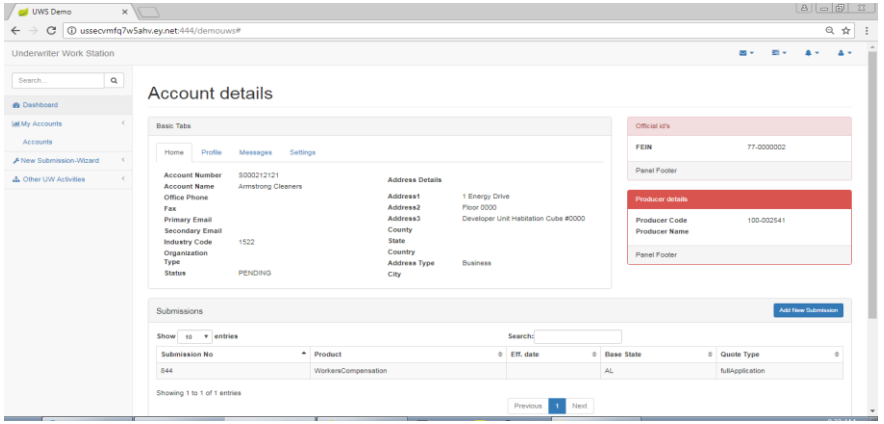
The factors below should be taken into consideration when selecting tools for business rule and model execution and management.

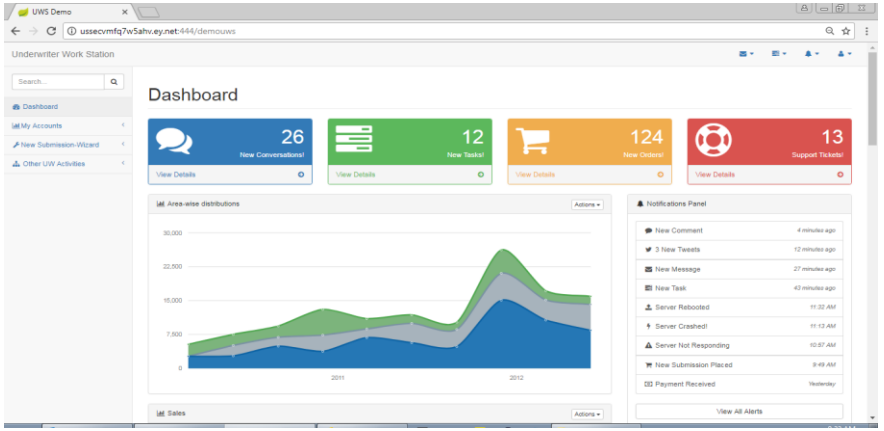
Factor	Description
Transparency	The ability to visualize and interpret the rules as they are implemented
Reusability	The ability to reuse a rule or rule construct (e.g., inputs and outputs) across processes or systems
Complexity	The technical capabilities necessary to enable desired business logic
Frequency/ flexibility	The ability to alter rule logic at the desired frequency and speed
Reporting	The ability to report on rule outcomes and execution frequency

Rules and models solution
Demo

Solution components

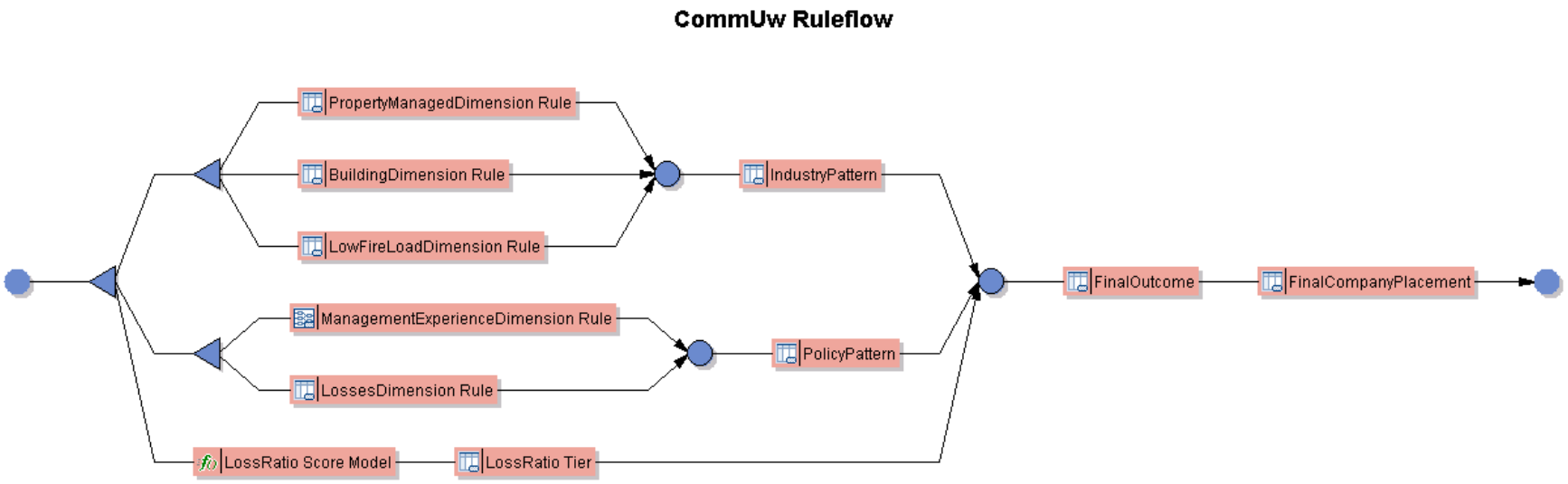
- Configured underwriting rule and predictive pricing model logic using FICO Blaze Advisor rules platform
- Shared data model across rules and models
- Orchestrated underwriting and pricing processes integrated with simple web-based quoting platform





Prototype ruleflow

- Underwriting rules and predictive models used for pricing can be implemented on a common platform (e.g., rules engine):
  - Holistic view of pricing and underwriting decision logic
  - Streamlined identification of overlaps and conflicts between rules and models



Rule and model constructs

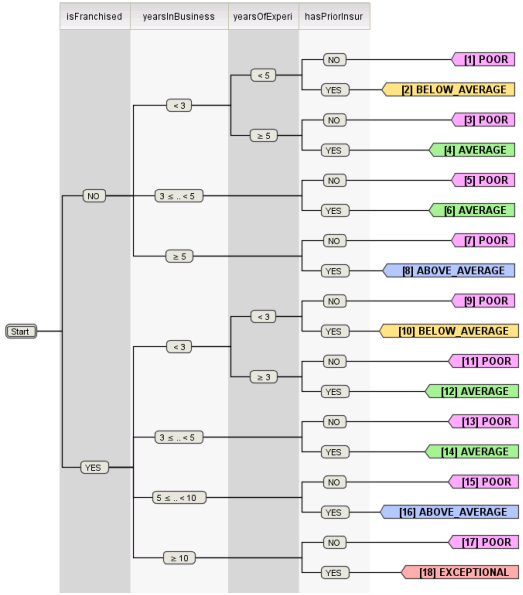
Decision table

The most simple rule construct allows for ease of editing but is more difficult to interpret and manage when rules cross combinations of tables

	A	B	C	D	E	F
	protectionClass	constructionType	ageOfBuilding	ageOfupdates	Building Gradient	Reason for gradient
1	1 <= ..< 7	ModifiedFireResistive	0 <= ..< 30	N/A	EXCEPTIONAL	GR.101 Comb.1
2	1 <= ..< 7	MasonryNoncombustible	0 <= ..< 30	N/A	EXCEPTIONAL	GR.101 Comb.1
3	1 <= ..< 7	FireResistive	0 <= ..< 30	N/A	EXCEPTIONAL	GR.101 Comb.1
4	1 <= ..< 7	Noncombustible	0 <= ..< 30	N/A	ABOVE_AVERAGE	GR.101 Comb.2
5	1 <= ..< 7	FireResistive	30 <= ..< 75	0 <= ..< 30	AVERAGE	GR.101 Comb.3
6	1 <= ..< 7	MasonryNoncombustible	30 <= ..< 75	0 <= ..< 30	AVERAGE	GR.101 Comb.3
7	1 <= ..< 7	ModifiedFireResistive	30 <= ..< 75	0 <= ..< 30	AVERAGE	GR.101 Comb.3
8	7 <= ..< 9	FireResistive	0 <= ..< 75	0 <= ..< 30	AVERAGE	GR.101 Comb.4
9	7 <= ..< 9	ModifiedFireResistive	0 <= ..< 75	0 <= ..< 30	AVERAGE	GR.101 Comb.4
10	7 <= ..< 9	MasonryNoncombustible	0 <= ..< 75	0 <= ..< 30	AVERAGE	GR.101 Comb.4
11	1 <= ..< 7	Noncombustible	30 <= ..< 75	0 <= ..< 30	AVERAGE	GR.101 Comb.5
12	1 <= ..< 4	JoistedMasonry	0 <= ..< 75	N/A	AVERAGE	GR.101 Comb.6
13	4 <= ..< 7	JoistedMasonry	0 <= ..< 75	N/A	AVERAGE	GR.101 Comb.7
14	1 <= ..< 7	Frame	0 <= ..< 30	N/A	AVERAGE	GR.101 Comb.8
15	7 <= ..< 9	Noncombustible	0 <= ..< 75	N/A	BELOW_AVERAGE	GR.101 Comb.9
16	7 <= ..< 9	JoistedMasonry	0 <= ..< 75	N/A	BELOW_AVERAGE	GR.101 Comb.9
17	7 <= ..< 9	Frame	0 <= ..< 75	N/A	BELOW_AVERAGE	GR.101 Comb.9
18	4 <= ..< 7	JoistedMasonry	30 <= ..< 75	20 <= ..< 30	BELOW_AVERAGE	GR.101 Comb.10
19	1 <= ..< 7	Frame	30 <= ..< 75	0 <= ..< 30	BELOW_AVERAGE	GR.101 Comb.11
20	1 <= ..< 9	FireResistive	30 <= ..< 75	31 <= ..< 1,000	POOR	GR.101 Comb.12
21	1 <= ..< 9	ModifiedFireResistive	30 <= ..< 75	31 <= ..< 1,000	POOR	GR.101 Comb.12
22	1 <= ..< 9	MasonryNoncombustible	30 <= ..< 75	31 <= ..< 1,000	POOR	GR.101 Comb.12

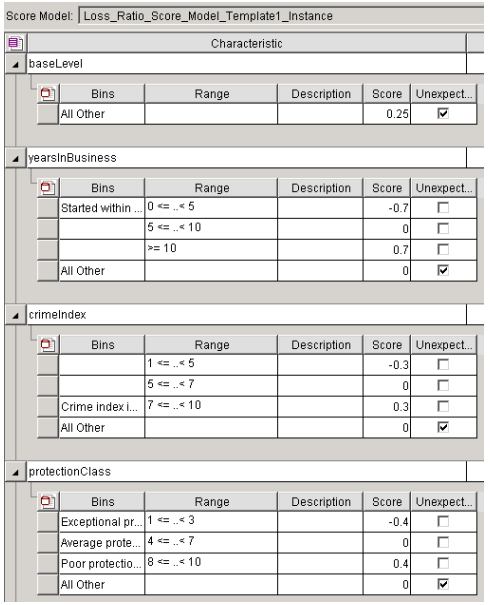
Decision tree

Visualization of a decision table allows users to better understand complex rules

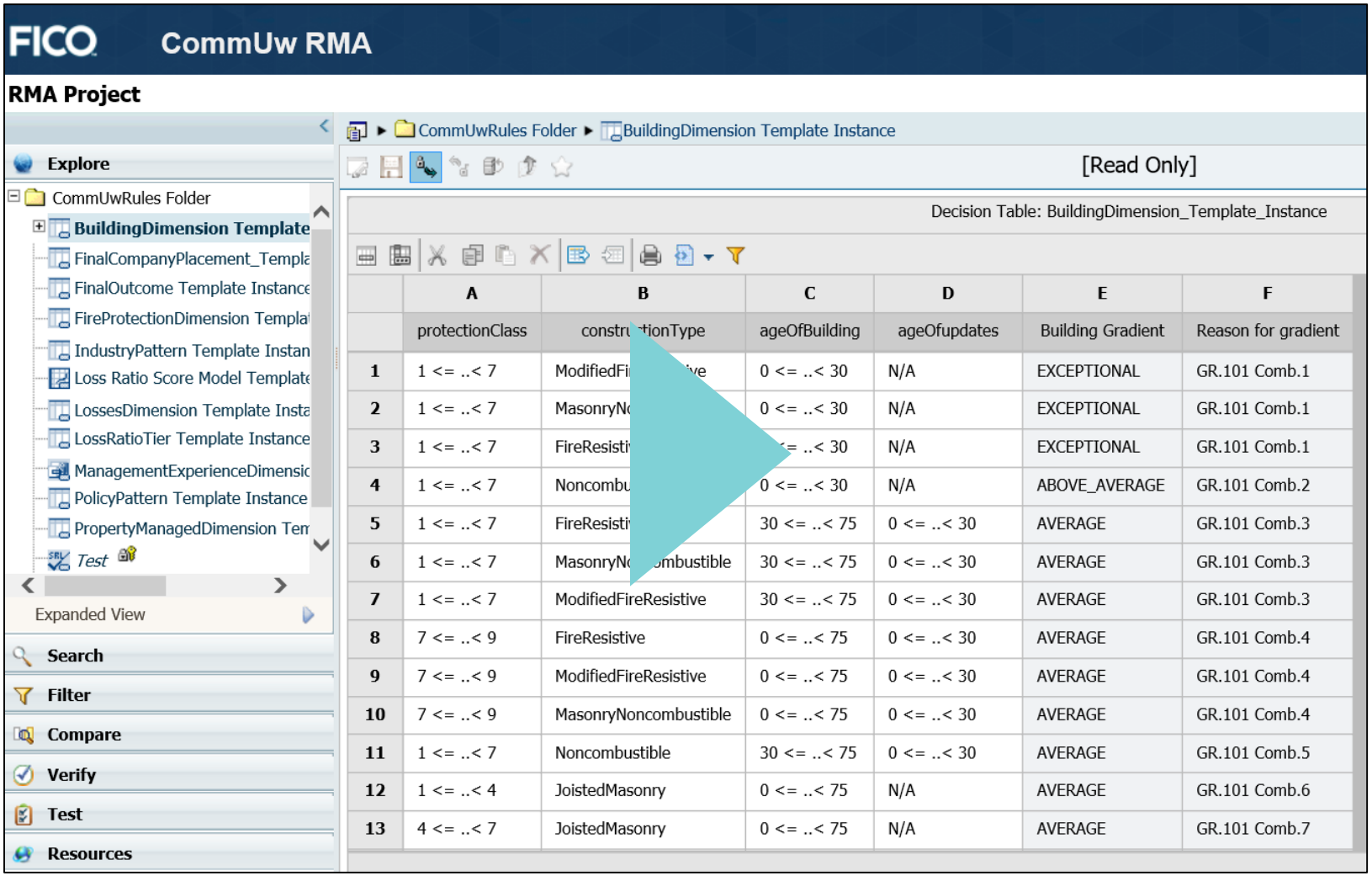


Scorecard

Generally used to implement models or other scoring mechanisms



Prototype



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8	7 <= ..< 9	FireResistive	0 <= ..< 75	0 <= ..< 30	AVERAGE	GR.101 Comb.4
9	7 <= ..< 9	ModifiedFireResistive	0 <= ..< 75	0 <= ..< 30	AVERAGE	GR.101 Comb.4
10	7 <= ..< 9	MasonryNoncombustible	0 <= ..< 75	0 <= ..< 30	AVERAGE	GR.101 Comb.4
11	1 <= ..< 7	Noncombustible	30 <= ..< 75	0 <= ..< 30	AVERAGE	GR.101 Comb.5
12	1 <= ..< 4	JoistedMasonry	0 <= ..< 75	N/A	AVERAGE	GR.101 Comb.6
13	4 <= ..< 7	JoistedMasonry	0 <= ..< 75	N/A	AVERAGE	GR.101 Comb.7

Portfolio management

What do we mean by portfolio management?

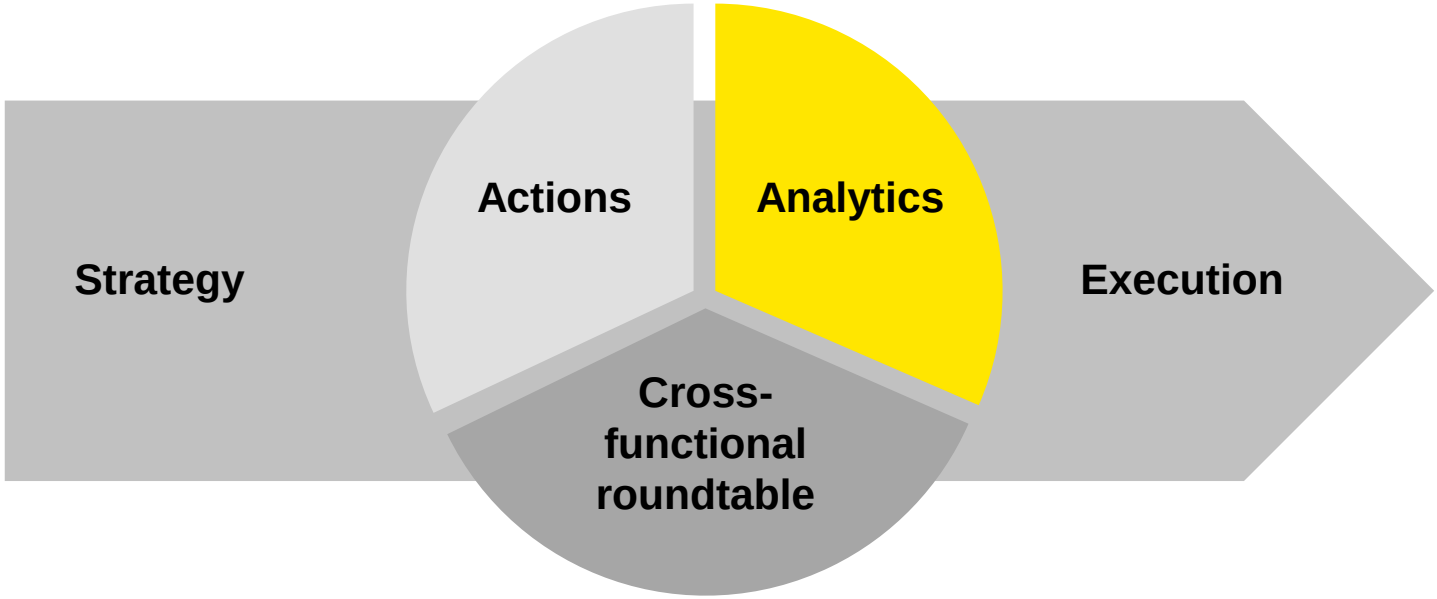
- **Portfolio management should include:**
  - A comprehensive view of the book of business that aligns rating, pricing, modeling, risk selection, product mix and exposure management by agent, industry, geography, underwriter, etc.
  - Use of internal and external data for evaluation
  - Leveraging tools for rules, predictive models, data analytics and workflow to expedite and optimize portfolio decision-making and implementation
  - Frequent governance process
  - Monitoring of key metrics, such as growth, profitability, efficiency, automation rates, etc.
  - Organization structure that supports collaboration across product, underwriting, sales, actuary and change management to implement

The importance of the feedback loop

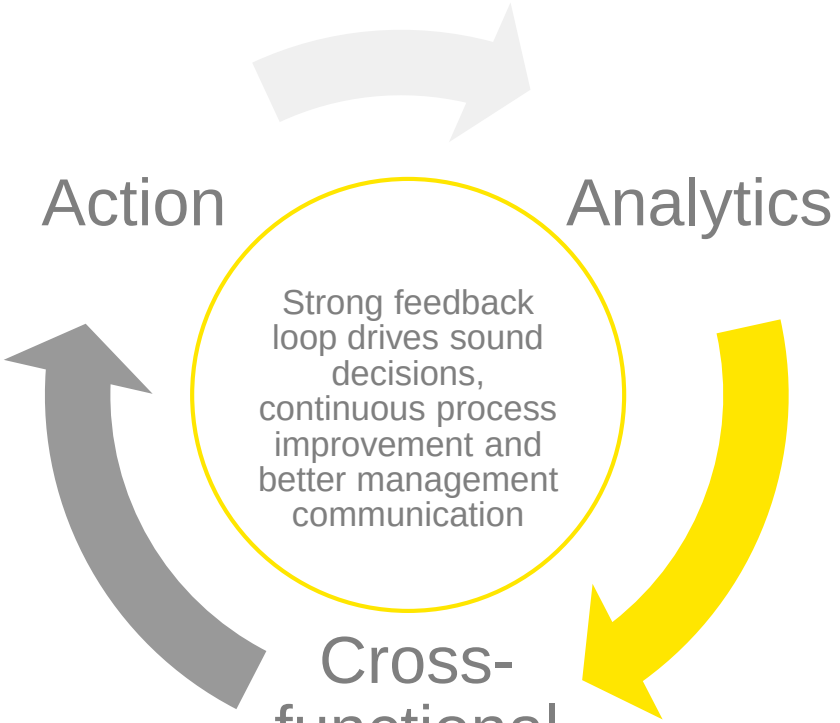
The **feedback loop** is a continuous cycle of analytics, discussions and actions across claims, actuarial and underwriting. An effective feedback loop is important to enable a consistent enterprise-wide view of the data and changes in trends and exposures, as well as effective discussions among the functions that lead to actionable tasks, including claims and risk management decisions, actuarial assumption setting and segmentation, and underwriting decisions.

Developing an effective feedback loop requires a sound strategy and execution plan.

A strong feedback loop drives **sound decisions**, **continuous process improvement** and **better management communication.**



Consistent data and analytics drive better decisions



Claims
- Triage and mitigation
- Reduce unexpected developments
- Consistent claims handling

Actuarial
- Re-segmenting for traditional methods
- Refining granular level model
- Assumption selection

Underwriting
- Adjusting risk appetite
- Exposure management
- Data driven underwriting decisions

- Notable unexpected large emergence
- Notable claim outliers
- Exhibited changes in trends and exposures

Claims
- Claim levels by organizational level
- Claim levels by claimant characteristics
- Leakage assessment

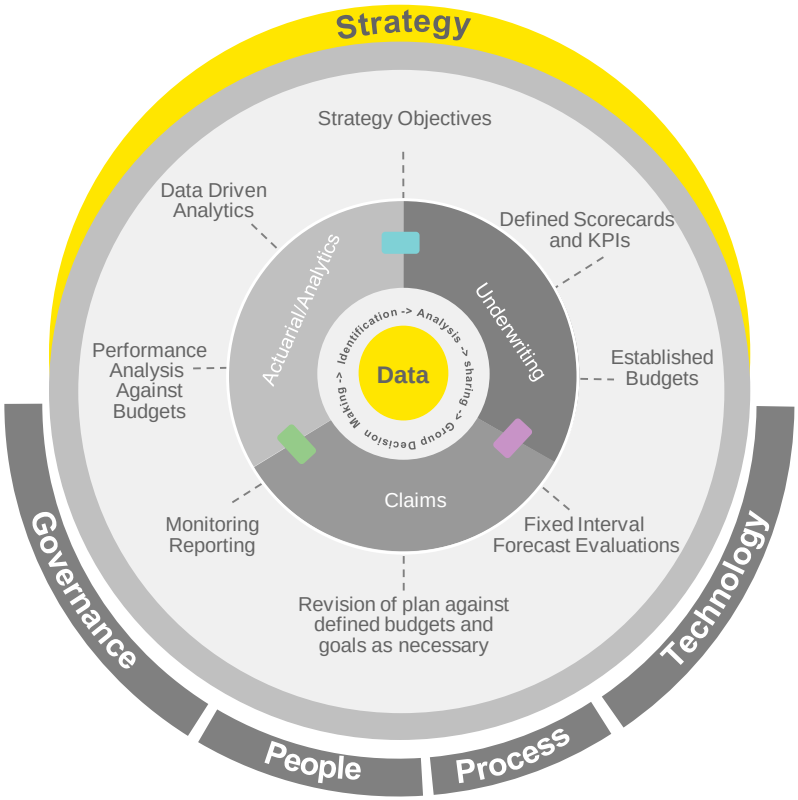
Actuarial
- Drivers of emergence
- Granular frequency and severity statistics
- Similar categories
- Economic indicators

Underwriting
- Quote and bind ratios
- Exposure accumulation
- Coverage and form demand in the market
- Geographic updates on property conditions
- Leakage report (actuarial indication vs. quote vs. bound price)

Defined organizational structure enables effective interactions

Effective governance is driven by a defined strategy, key performance metrics, identification, quantification and monitoring of risk, common enterprise values, and sharing of leading practices to consistently and frequently access performance against planned performance goals/objectives.

Collaboration must be enterprise-wide and driven by a governance framework promoting cooperation, collaboration and trust – learning and sharing of data, people, processes, products, controls, risk and technology must be **embedded in the enterprise culture**.



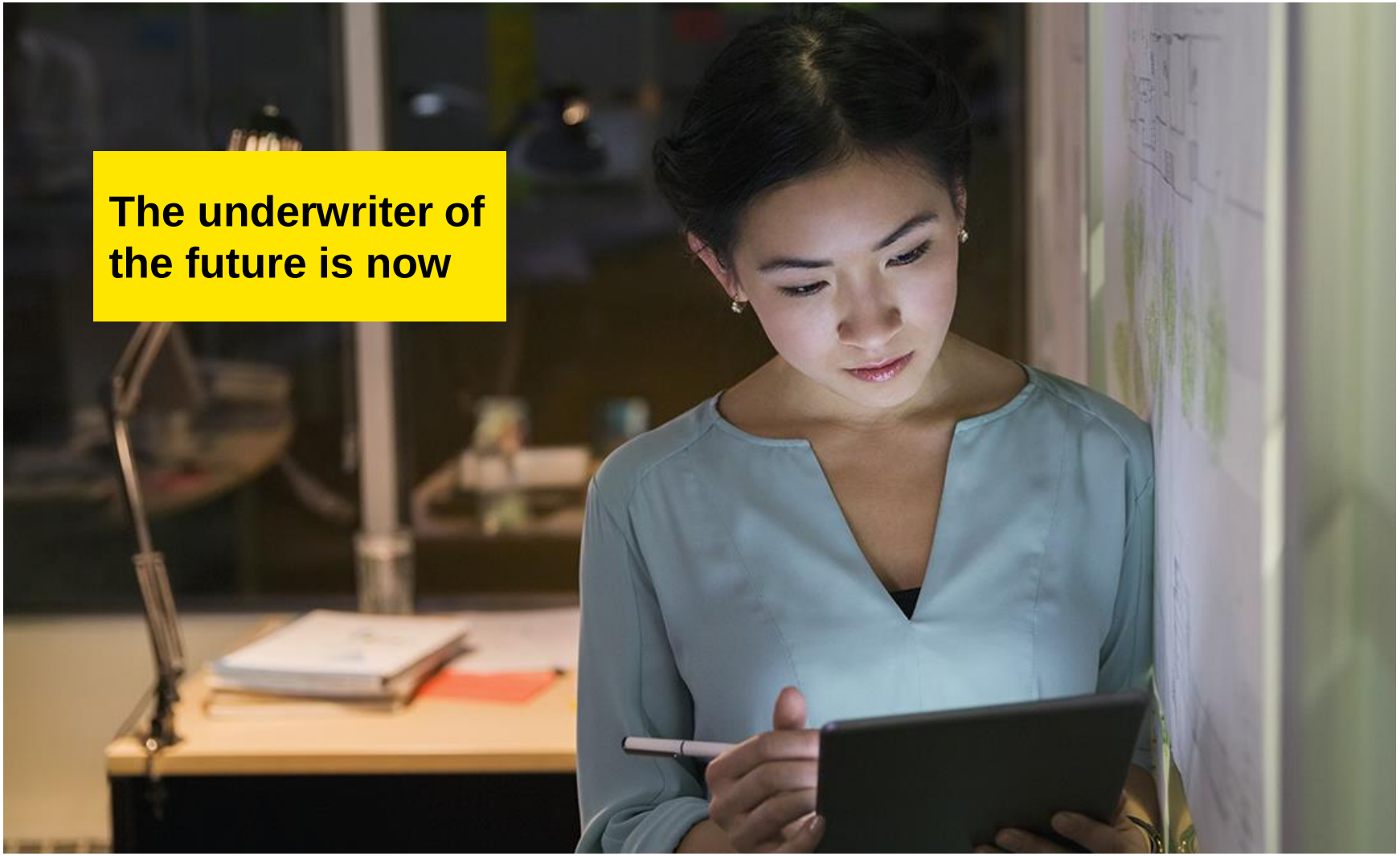
For a continuous feedback loop to exist and be successful, it must be **driven from the highest level of the enterprise** to the key operational levels and professionals of the organization.

No voice within the organization can be more or less important than any other. The ability to collaborate, communicate, share data and analytics, and **drive consensus-based decisions** will drive cohesive action and execution against established plans, goals and objectives.

Q&A

Underwriter of the future

Underwriter of the future



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