The Evolution of Actuarial Science: Embracing Agile, Product Thinking, and Automation

Nykosi Hollingsworth
Gunjan Saxena

November 20, 2025 | 12:50 PM – 1:50 PM

Agenda

	Topic	Time
1)	Introduction	5 min
2)	Actuaries turned Data Scientists	10 min
3)	Product Teams and Mindsets	15 min
4)	The Role of an Agile Framework	15 min
5)	Automated Workflows	15 min
6)	Q&A	

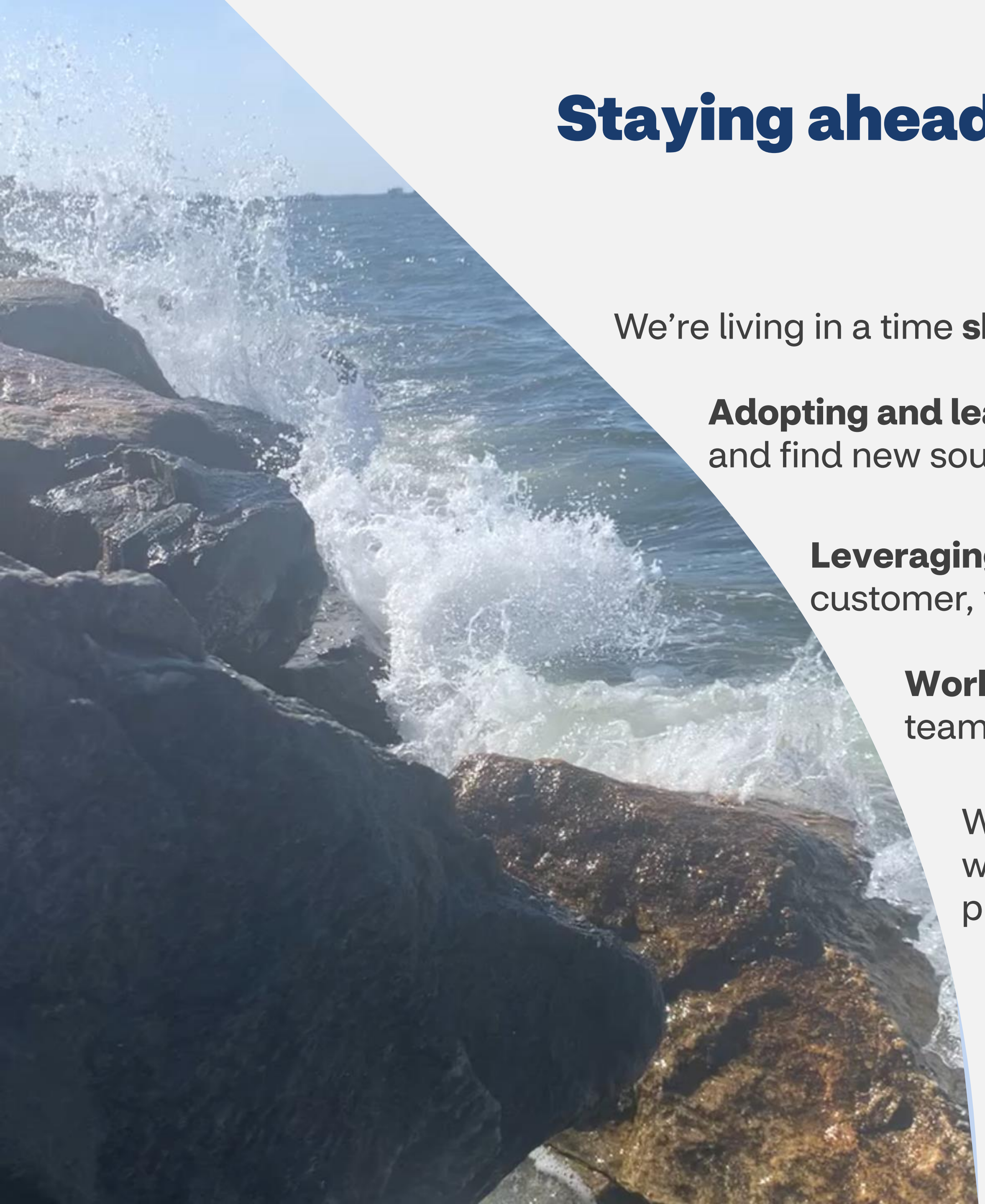
Presenter Biography

Nykosi Hollingsworth, ASA
CVS Health

- Nykosi is a Senior Decision Scientist at CVS Health, focusing on Commercial pricing analytics and actuarial modeling
- He is based in Connecticut and has 8 years of experience across actuarial and data science roles within Healthcare
- Enjoys anything involving pizza and good food

Gunjan Saxena, ASA
CVS Health

- Gunjan is a Lead Decision Scientist at CVS Health, focusing on Government Healthcare analytics
- She is based in New York and has 11 years of experience spanning actuarial and data science work across both consulting and industry roles
- Enjoys reading fantasy books and game nights



Staying ahead of the curve

We're living in a time **shaped by rapid technological change**

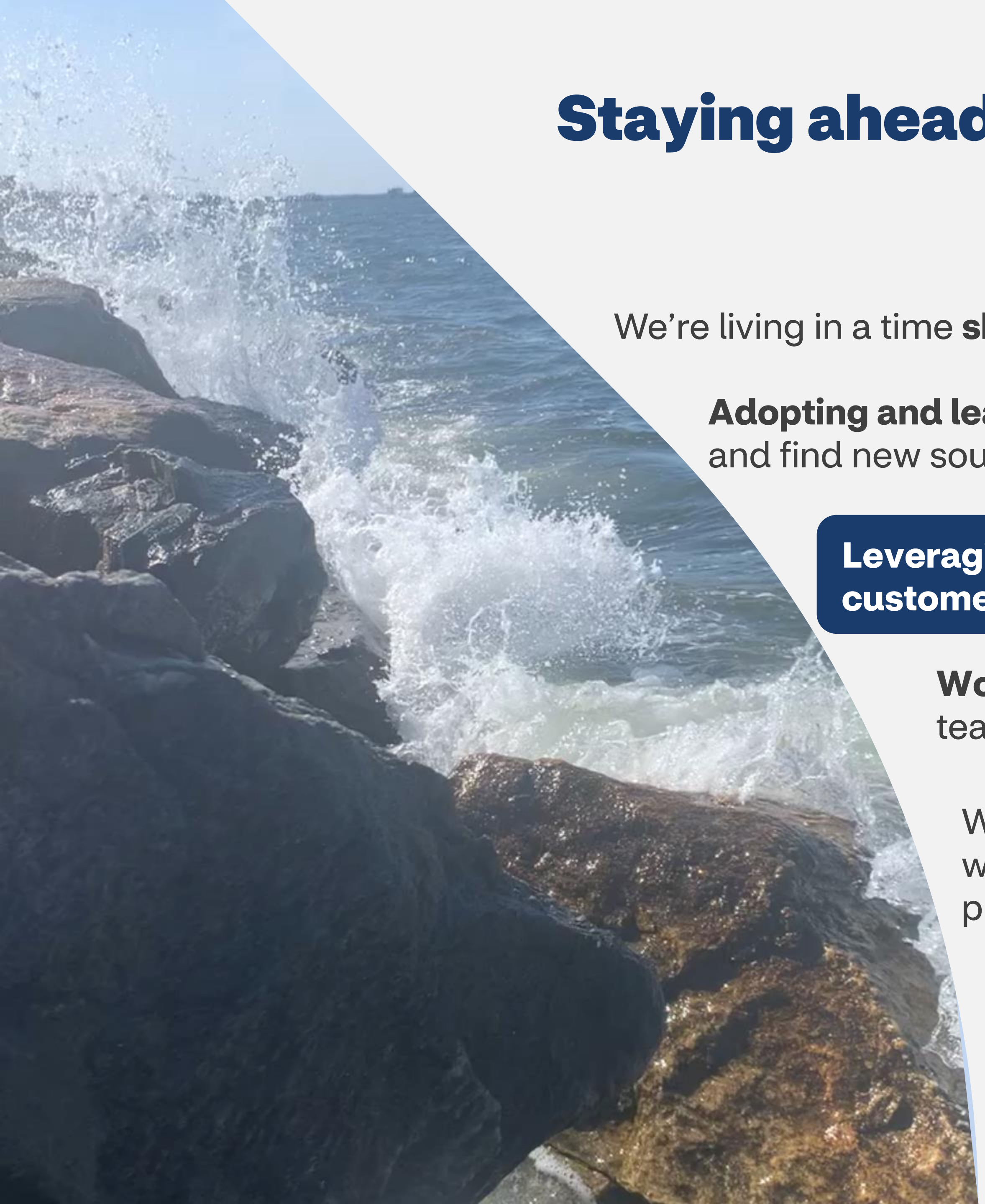
Adopting and learning from new ways of working can allow us to maintain and find new sources of competitive advantage

Leveraging a product mindset allows us to stay focused on the customer, value delivery, measurement, continuous learning

Working with an Agile mindset allows us to work in empowered teams that drive towards outcomes

With this mindset **we'll spot automation opportunities**, and we'll share an example outcome from adopting these principles and the types of tools you can leverage to achieve it

Product & Technology Teams



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What is a product?

“A product is any entity that delivers repeatable value to customers”

From the Forbes article “Why You Should Think Of Everything As A Product” argues that redefining internal services, platforms, and capabilities as "products" can drive greater customer centricity, innovation, and operational efficiency. The author, Craig Strong, draws from his experience at AWS, highlights how this mindset shift clarifies ownership, aligns teams with customer outcomes, and fosters more effective governance and metrics.

“A product is something that can be seen or experienced, created to meet the needs of consumers”

The Economic Times defines a product as anything—tangible or intangible—created to satisfy consumer needs or desires. It can be a physical item, service, experience, or idea, and its success depends on factors like market fit, value prop, quality, pricing, branding, distribution, and customer feedback

“Product = Customer x Business x Technology”

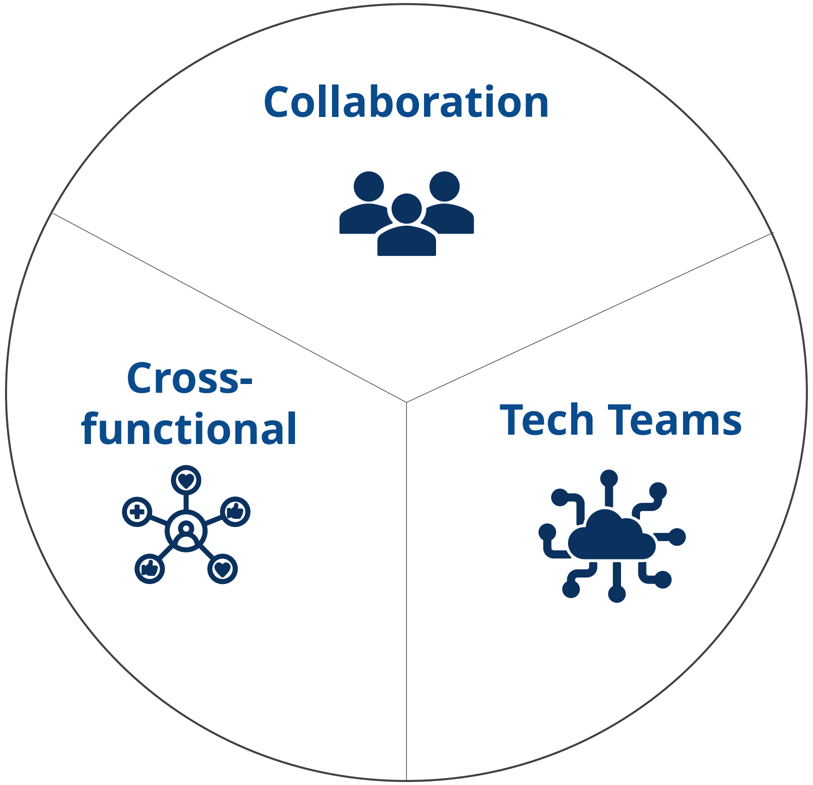
The SVPG article “What is a Product?” defines a product as the intersection of customer needs, business viability, and technical feasibility. It emphasizes that successful products require cross-functional collaboration between product managers, designers, and engineers, each solving for one of these dimensions. The article also warns that neglecting any one of these areas leads to failure—because, as the author puts it, “anything times zero is zero.”

Here’s an example of the roles and responsibilities in technology teams

Role	Responsibilities
Product Manager	• Defines vision, roadmap, and priorities • Ensures alignment between vision and business objectives
Developers (Engineers, Scientists, Architects)	• Builds models, pipelines, architecture, and application • Collaborates with cross functional teams to integrate solutions
UX/UI Designer	• Designs user experience and interfaces • Conducts user research to inform design decisions
QA Engineer	• Tests software for defects and performance • Develops automated testing frameworks to enhance efficiency
Scrum Master	• Facilitates agile process, removes blockers • Promotes continuous improvement within the team
Business Stakeholder	• Owns business outcome, often uses the service • Provides feedback to guide product development
Team Leader	• Sets overall priorities and long-term goals • Mentors team members to foster professional growth
Actuary	• Analyzes complex data to assess financial risks and predict trends • Develops strategies to manage risk and ensure financial stability

Understanding the Two Pizza Team Concept

The “Two Pizza Team” concept promotes small, agile teams where each team should be small enough to be fed with two pizzas



Encourage **collaboration** and quick decision-making

Aligns with roles in **technology teams** for efficiency

Fosters innovation through **cross-functional expertise**

Examples from Amazon: Building innovative products

Since the 1990s Amazon has a track record of delivering game changing innovation across industries, corporate functions, software, and devices

1999
One Click Purchasing

- Simplified checkout
- Patent protected
- Standard for frictionless e-comm

2005
Amazon Prime

- Cross-functional
- Changed consumer expectations
- Drove loyalty and recurring revenue

2006
AWS

- Developer-first B2B product
- Built by cloud architects
- Redefined how businesses scale tech services

2007
Kindle

- Hardware + content ecosystem
- Disrupted publishing
- Amazon became dominant player in e-books

2014
Amazon Echo & Alexa

- AI-powered hardware / software
- Pioneered smart home voice assistants
- Platform for home automation

Where can these concepts be applied in the insurance sector?

Product

Design
Create products and plans that better meet customer needs

Customer Service
Answer broker and customer questions on plan designs

Sales

Channels
Connect with customers in the channels they use today

Personalize
Recommend offerings based on customer characteristics

Underwriting

Market Expansion
Spot opportunities to underwrite new types of risks

Enhanced Underwriting
Make more informed decisions

Finance & Actuarial

Risk Assessment
Improve prediction of members' future claims expenditures

Claims Studies
Assess and develop strategies to ensure financial stability

Service Operations

Adjudication
Enhance workflows to support payment and medical review

Fraud detection
Manage potential billing and coding outliers

Care Management

Member Stratification
Identify members for programs and personalize journeys

Develop Programs
Create new programs with optimized outcomes

Industry Examples

- Cyber Insurer Broker Chatbot
- CRM Bot
- AD&D for elective surgeries
- CMS Risk Score
- P&C Insurer Claims Adjudication
- Population Health Company

That’s great, but how can I apply these concepts in my day-to-day?

As an Individual Contributor

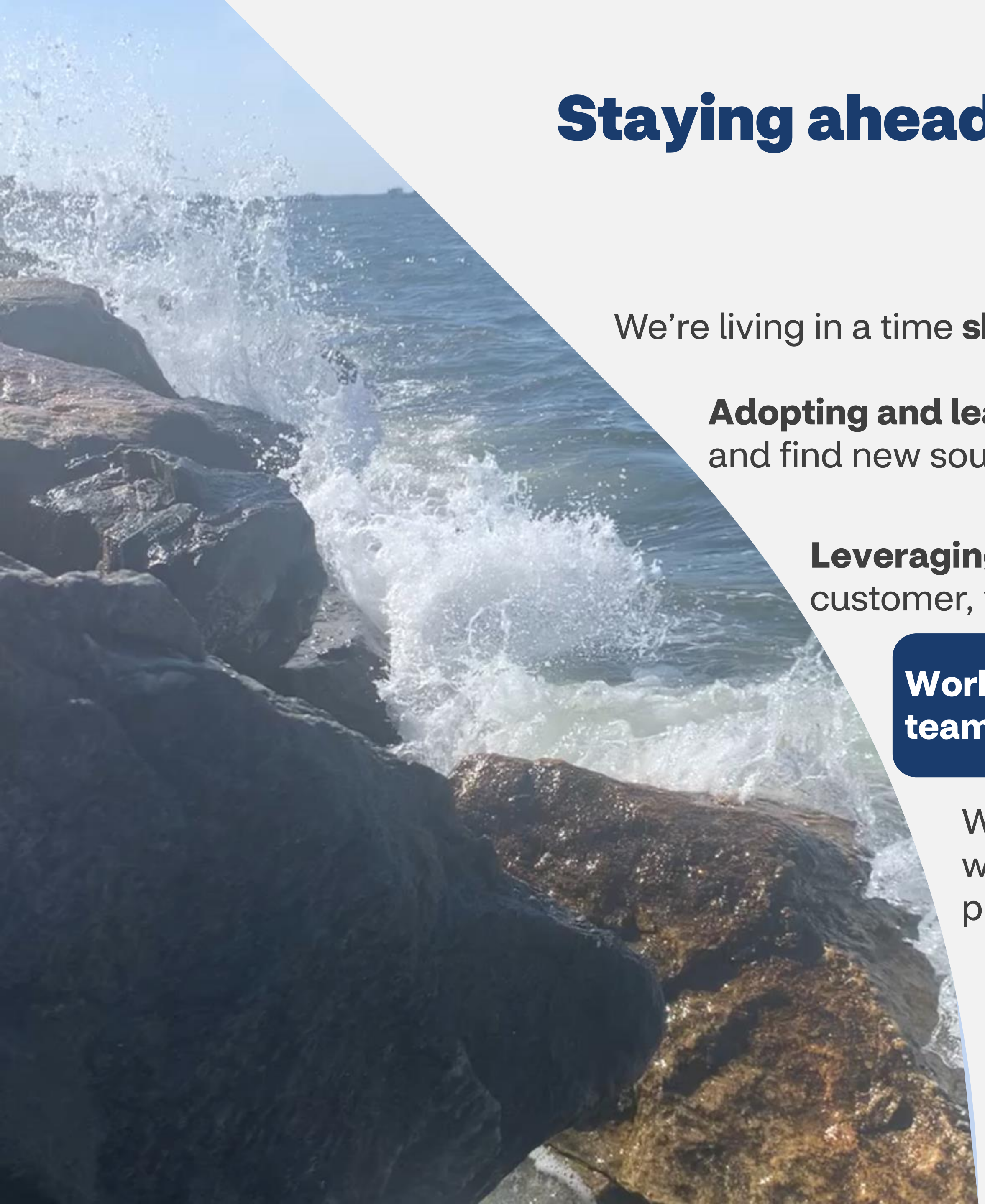
- Invite early input from product, data science, and engineering partners
- Think in terms of MVPs, not deliverables
- Shadow or pair with peers
- Think about the customer just as much as the data

That's great, but how can I apply these concepts in my day-to-day?

As an Individual Contributor	Invite early input from product, data science, and engineering partners	Think in terms of MVPs, not deliverables	Shadow or pair with peers	Think about the customer just as much as the data
As a Team Leader	Model cross-functional behavior	Enable "two-pizza" decision pockets	Stay curious with your team	Support team members' interest in traditional and non-traditional roles

The Role of an Agile Framework

Staying ahead of the curve



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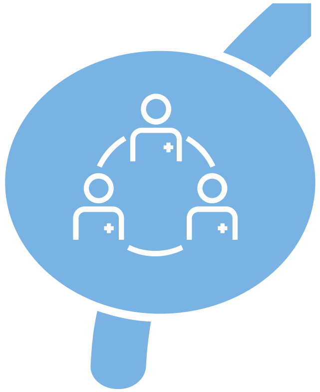
Cross-Functional Collaboration

- **Bridge the gap** between actuarial, underwriting, and claims
- **Leverage data science partnerships** to enhance traditional actuarial methods



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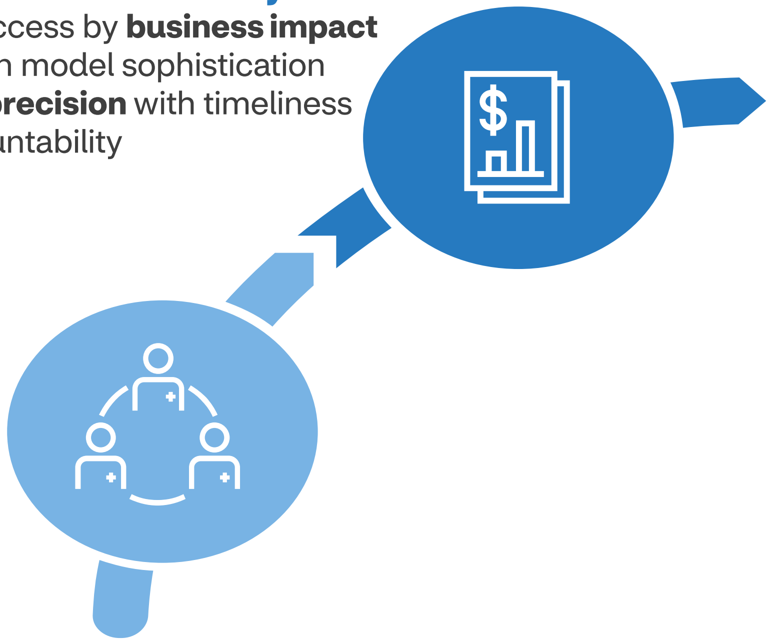
Measure Value beyond Technical Accuracy

- Define success by **business impact** rather than model sophistication
- **Balance precision** with timeliness and accountability



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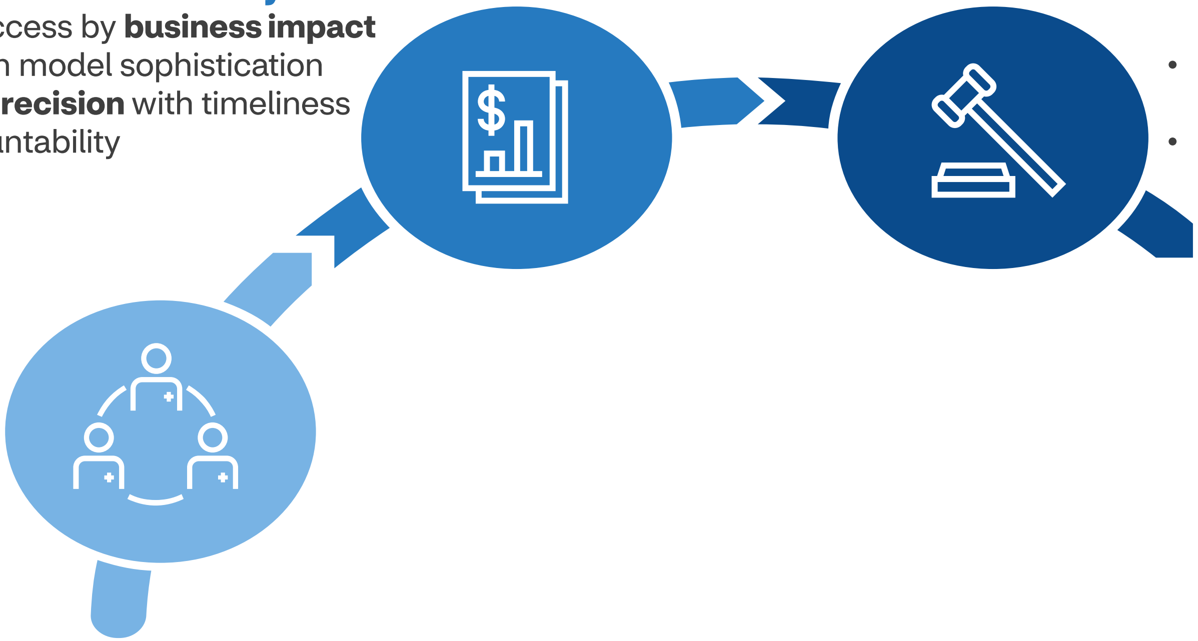

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Adaptive Responses to Regulatory and Assumption Changes

- **Build flexibility** into models to quickly adapt to changing conditions
- Implement **continuous validation** processes versus annual reviews
- Create scenario-based approaches to **anticipate regulatory impacts**

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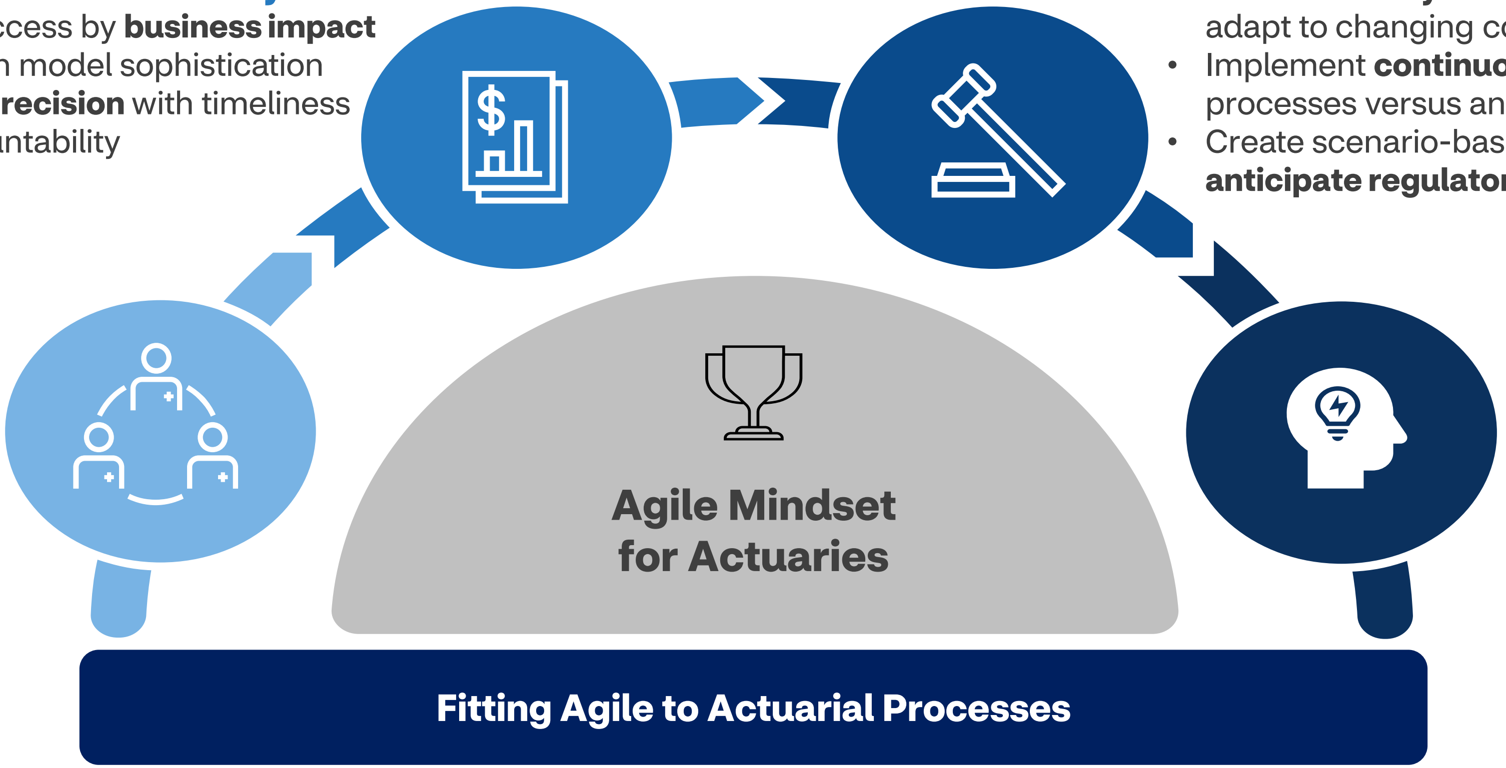

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Focus on Purpose over Process

- Structure meetings around **decisions, not updates**
- Adapt agile practices to **fit actuarial work** rather than forcing actuarial work to fit into standard agile

Case Study: The hybrid approach to Agile

	Traditional Actuarial
Structure & Organization	• **Teams** organized by technical function and capability • **Project-based** work with longer delivery cycles
Work Processes	• **Large batch deliverables** with extensive documentation • Focus on **technical precision** • **Sequential** approach to analysis and modeling
Culture & Mindset	• Success = accuracy • Communication primarily through **formal documentation / emails**
Stakeholder Engagement	• Business requirements gathered at **project initiation**

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Work Processes	• **Large batch deliverables** with extensive documentation • Focus on **technical precision** • **Sequential** approach to analysis and modeling	• **Regular cadence** of smaller deliverables • **Collaborative** problem-solving across specialties
Culture & Mindset	• Success = accuracy • Communication primarily through **formal documentation / emails**	• Regular **retrospectives** to improve processes
Stakeholder Engagement	• Business requirements gathered at **project initiation**	• **Business partners integrated** into the actuarial workflow • **Ability to reprioritize** based on emerging business needs

Case Study: The hybrid approach to Agile

	Traditional Actuarial	Shift to Agile	Hybrid Approach: People over Process
Structure & Organization	• **Teams** organized by technical function and capability • **Project-based** work with longer delivery cycles	• **Cross-functional teams** with mixed actuarial specialties • **Product or value-stream** organization around business outcomes	• **Centers of excellence** for deep technical specialties • **Dual tracks** for innovation (more agile) and production (more structured)
Work Processes	• **Large batch deliverables** with focus on documentation • Focus on **technical precision** • **Sequential** approach to analysis and modeling	• **Regular cadence** of smaller deliverables • **Collaborative** problem-solving across specialties	• **"Regulatory sprints"** aligned with reporting cycles alongside continuous improvement work • **Agile principles** for experience studies while maintaining traditional approaches for formal valuation
Culture & Mindset	• Success = accuracy • Communication primarily through **formal documentation / emails**	• Regular **retrospectives** to improve processes	• **Balanced approach** to risk, technical accuracy, and business relevance • **Follow guidelines according to ASOP 41** while considering additional way to document decisions
Stakeholder Engagement	• Business requirements gathered at **project initiation**	• **Business partners integrated** into the actuarial workflow • **Ability to reprioritize** based on emerging business needs	• **Continuous feedback** loops with key stakeholders • **Regular demos** of work-in-progress

Agile methodologies should be thoughtfully applied rather than universally adopted

Indicators of Agile growing pains

- Bureaucratic checkboxes versus valuable interactions
- Partial deliverables when complete solutions are needed
- Pressure to “look agile”

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- Small teams where cross-training may be impractical
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My agile journey

- Past and current roles are very meeting-heavy
- Frequent ad hoc / urgent requests from leadership force reprioritization of work
- Estimating “T-shirt” size of task

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Let's consider how the agile mindset can keep actuarial teams ahead of the curve through supporting opportunities for automating workflows

Automated Workflows

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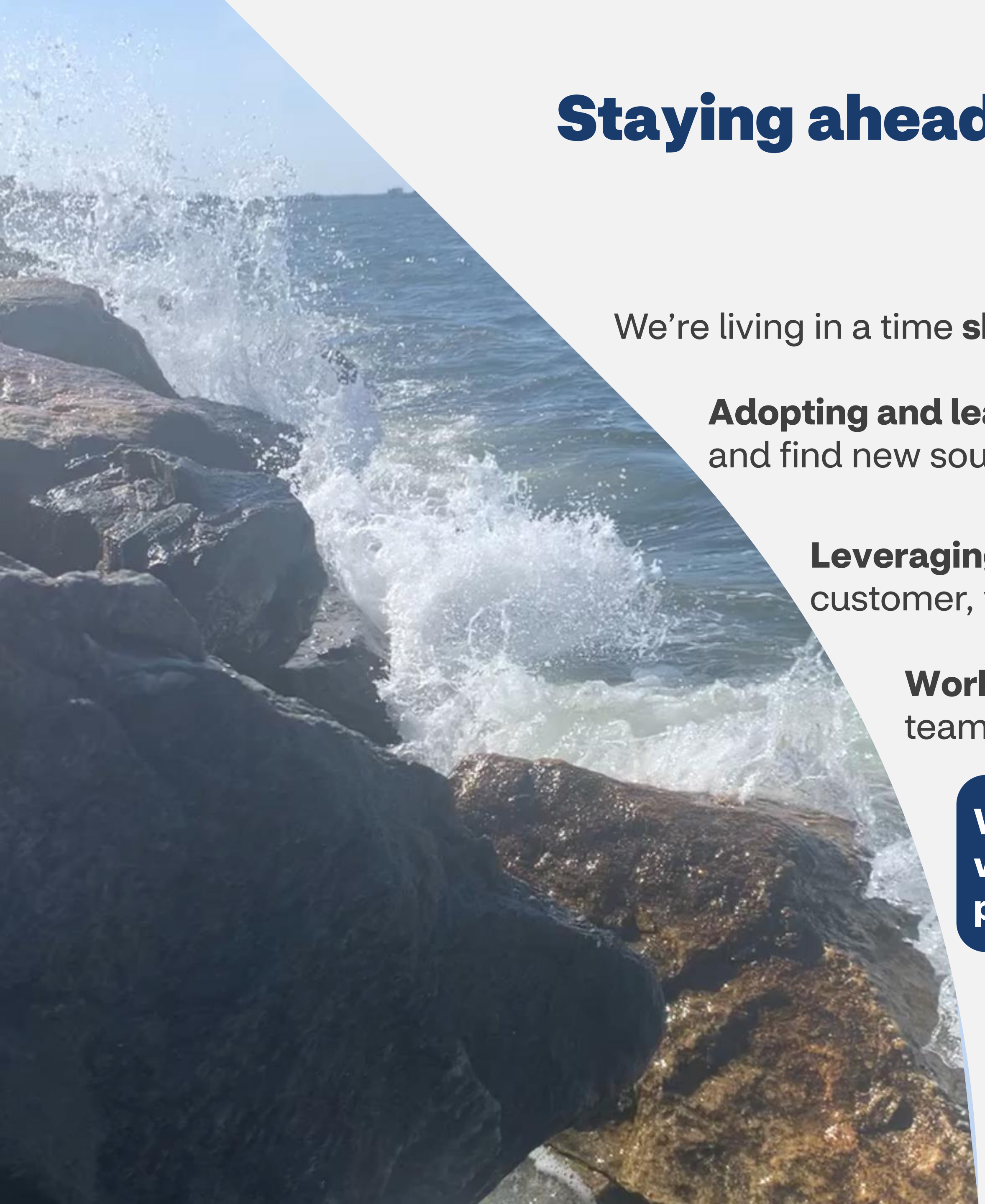

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An agile framework can reduce repetition and manual processes to allow more time for meaningful impact

Manual data pulls & reconciliations
Time-consuming and error-prone workflows slow down analyses and introduce inconsistencies in reporting cycles

Repetitive copy/paste between Excel models
Duplicative tasks increase the risk of human error and create version control headaches.

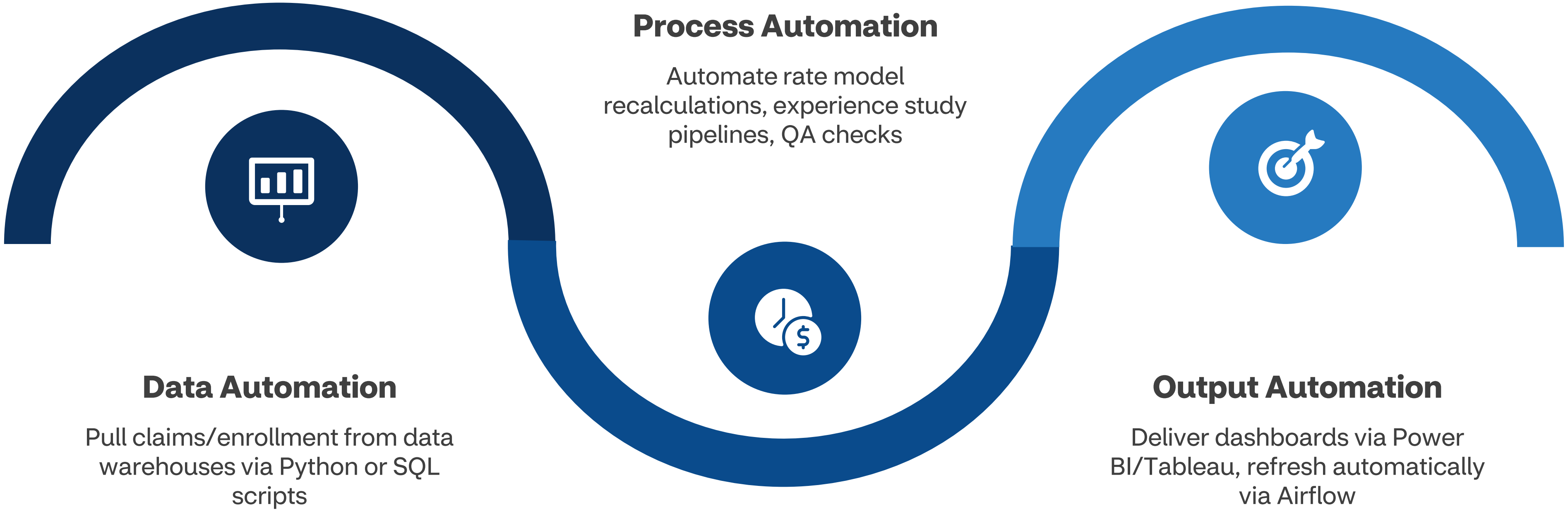
Ad hoc reporting requests
Analysts spending time responding reactively instead of building reusable tools that serve broader business needs.

Late-stage data issues
Data quality problems often surface too late in the process, impacting enterprise reporting and delaying key decisions.

An agile framework could:

- **Encourage the development of reusable scripts and templates** that scale across projects and reduce duplicative work.
- **Enable faster detection and resolution** of upstream data issues through iterative validation and automation.

Automation is not a black box – rather a tiered structure to get from data to decisions more efficiently



Though there are common tools that support automation, the key takeaway is "*what they do*" not "*who they are*"

Data Automation

These tools reduce time spend on manual pulls and enable consistent, auditable data preparation.

- Parametrized SQL scripts allow you to **automate the retrieval of refreshed data sets**.
- Python scripts **clean, join, and transform raw data** into analysis-ready formats.

Process Automation

With automation, you're not just running models – you're building pipelines that easily scale.

- Apache Airflow **schedules and coordinates recurring processes** like model runs, reconciliations, and data refreshes.
- YAML files **consolidate assumptions** so inputs can be updated in one place.

Output Automation

Automation doesn't end at analysis – it extends all the way to stakeholder impact

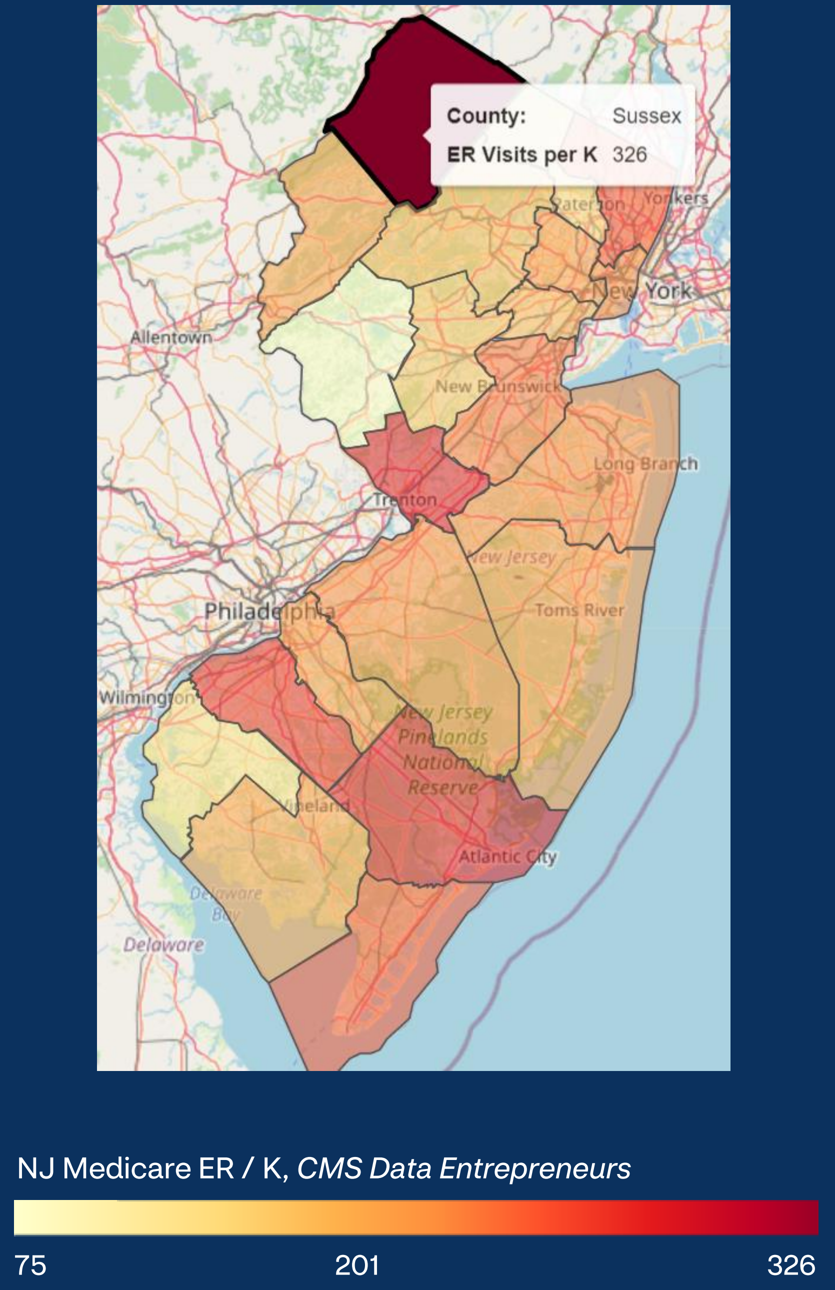
- Power BI delivers **live dashboards that automatically refresh** as data changes, reducing manual updates.
- MS Excel supports **templates or Power Query setups that auto-update** from external sources.

CMS Data Entrepreneurs File is used for training purposes only

CMS Data Entrepreneurs File (DE-SynPUF) is a 5% sample of 2008 Medicare beneficiaries with significant alterations applied to beneficiary and claims data. Per the DE-SynPUF User Manual:

- All beneficiaries are synthetic beneficiaries, meant to represent actual beneficiaries, but based on at least 3 Medicare beneficiaries.
- Rare records are suppressed and dates are perturbed
- All codes identifying providers and physicians are random numbers/characters with no association to any known id number.
- Variable names are the same as those in actual Medicare data unless they begin with “SP_”. SP variables were significantly coarsened to decrease re-identification risk.

Due to the alterations that have been applied to the 5% sample, analytics insights from this data are of limited value.



Interactive Choropleth Map

A map with geographic regions shaded by a metric

Regions can be states, counties, zip codes, census tracts, or custom defined regions such as neighborhoods

Choropleth maps help to spot patterns in geographic clusters, for instance:

- Does northeast region have higher healthcare spend than central region?
- Do urban areas have higher rates of healthcare spend than rural areas?

Code to create the map is saved here on GitHub.

What was created:

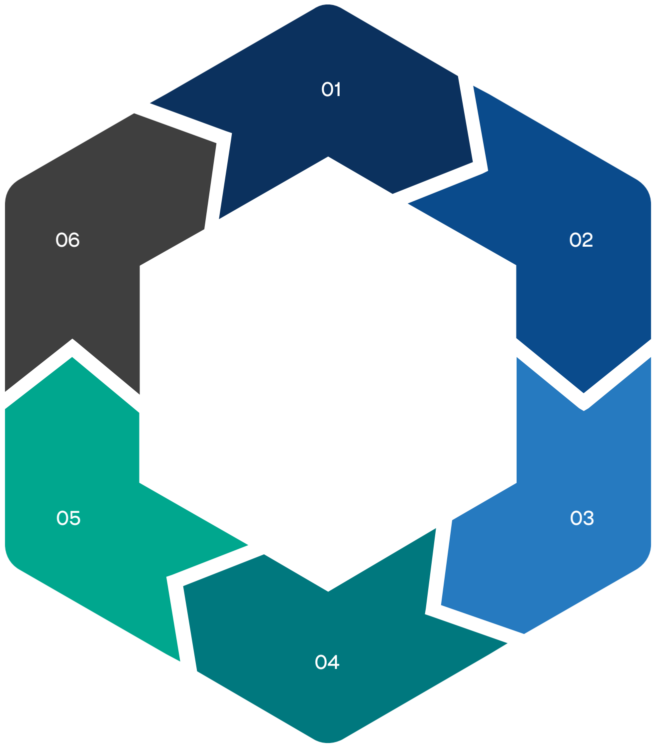
- Map of Emergency Room visits per thousand (“ER/K”) by county
- Overlay of de-identified facilities

What changes with agile and tech integration?

Agile & Automated Workflow	Transition Challenges
• **Scripted pipelines** – parameterized SQL/Python scripts automate data prep, assumption updates, and model runs.	• Shifting away from familiar Excel-based workflows may feel daunting – learning curves can seem steep at first.
• **Built-in data checks** – validations are embedded into ingestion and data preparation steps (e.g., in Airflow or Python).	• Required upfront investment in planning, building, and testing pipelines.
• **Cross-functional collaboration** – work is reviewed, versioned, and improved across technology and business partners.	• Need to clarify roles in new ways, manage shared ownership, and align on priorities.
• **Success = value delivered** – focus on how fast and effectively insights inform decisions	• Adding new KPIs and changing stakeholder expectations around deliverables.

The Actuarial Control Cycle through an Agile Lens

Plan, Execute, Review



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Clarify the business need, identify data sources, and align on success metrics to guide solution design and analysis.

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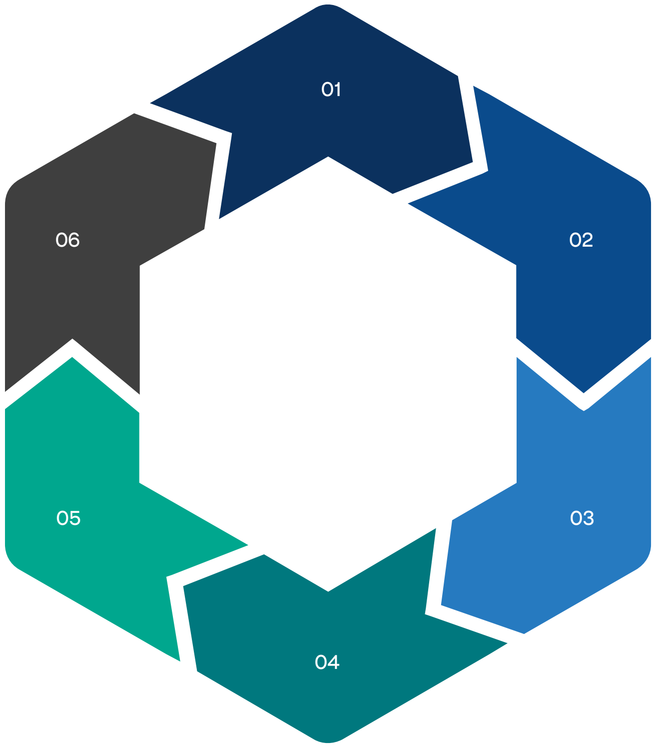

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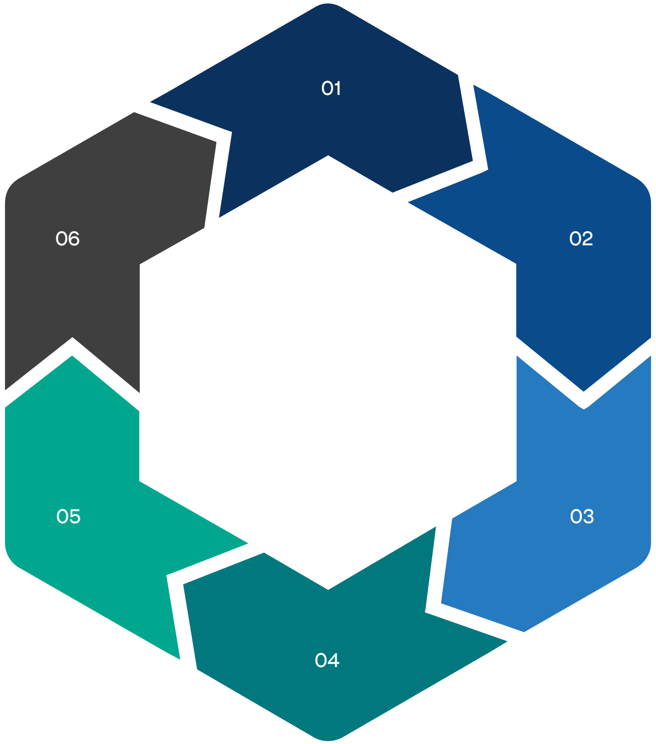

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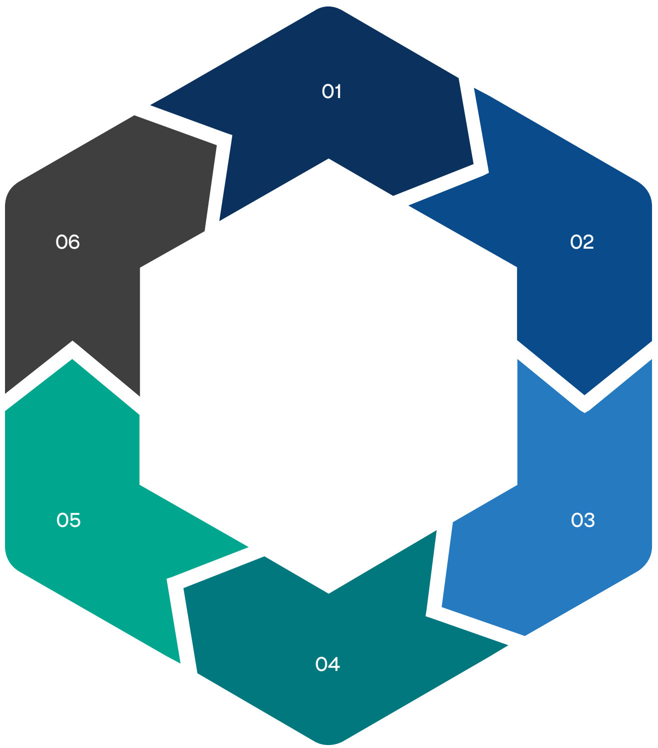

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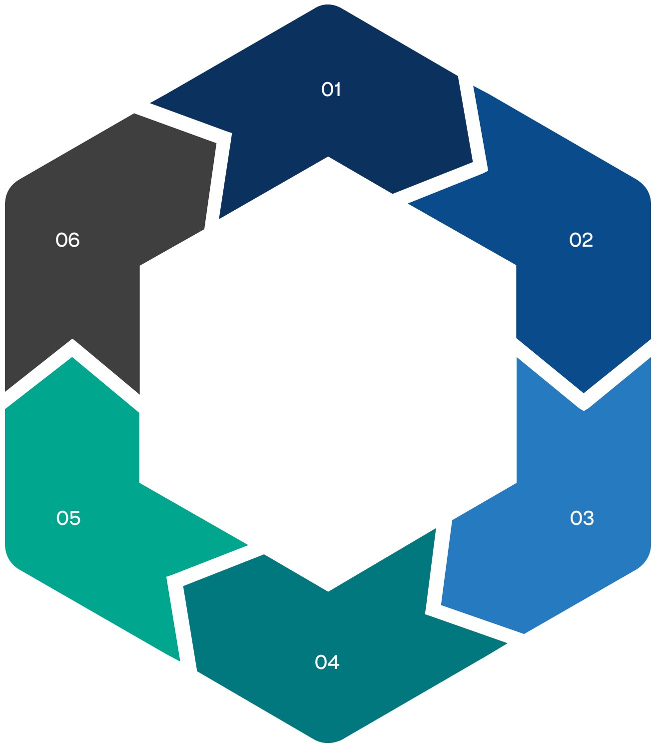

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The Actuarial Control Cycle through an Agile Lens

Plan, Execute, Review

06. Review Risk Appetite | Maintenance

Reassess thresholds, tolerances, and business strategies based on findings. Feed insights into the next planning cycle.

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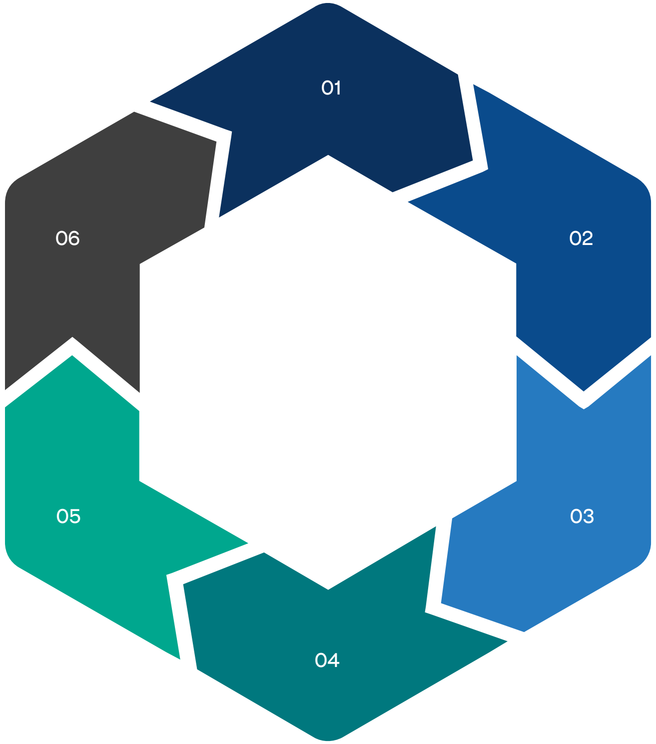

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Closing Remarks

Bringing it all together: Why does this matter?