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Transforming into an analytics-driven insurance carrier

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Using data is nothing new to insurance carriers and actuaries. Yet the boom in advanced analytics is driving fundamental change.

Although insurance carriers and actuaries have been using analytics for decades, "advanced analytics" has emerged as a hot topic in the media and at industry conferences in recent years. Executives at large and small carriers alike have been building centers of excellence (COEs), with dedicated staff focused on advanced analytics, also known as data science.

These investments have delivered successes in some areas, including the use of claims modeling in workers' compensation, catastrophe modeling in property insurance, sophisticated rating algorithms in personal auto, and fraud identification in both property-and-casualty (P&C) and life-insurance claims. Progress has been slower in other lines of business, such as general liability, most specialty lines, and other elements of life insurance. Overall, carriers have seen mixed results from newly established COEs; there have been clear wins in some cases, while in others, the jury is still out. However, industry executives broadly agree that advanced analytics can be used to drive value in insurance. Even many seasoned underwriters have conceded— perhaps grudgingly—that rigorous and widespread use of data can yield significant benefits.

There are some best practices for starting the journey toward adoption of advanced analytics in insurance.[1] This paper moves beyond mastering use cases and establishing a COE, to describing how advanced analytics can transform the business and change a carrier's operating model. This journey includes four phases (Exhibit 1):
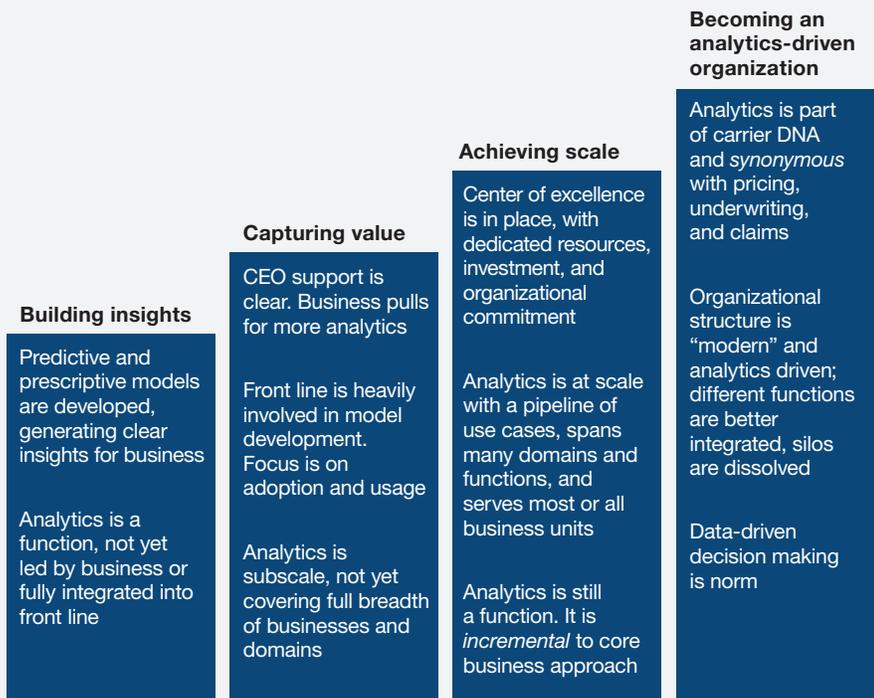
1. *Building insights.* Initially, companies develop models that demonstrate how analytics can add new insights and deliver clear added value. However, these models are often developed in isolation from the business, and the company struggles with frontline adoption.

2. *Capturing value.* As the analytics function matures, model builders work closely with frontline staff, who become involved in the nuts and bolts of building the model. The focus shifts from developing models to their adoption, and the models begin to come to life. Even if their insights are not fully applied, the models are seen as tools that enhance, rather than hamper, decision making.

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[1] Richard Clarke and Ari Libarikian, "Unleashing the value of advanced analytics in insurance," August 2014, mckinsey.com.

3. *Achieving scale.* The company has put in place a COE and established mature and transparent processes related to the COE's work and the value it delivers. The COE also has a clearly defined process for bringing analytics solutions to market rapidly, working collaboratively with IT. An established set of centralized capabilities is emerging, including third-party-data procurement, model libraries and code sharing, and analytics-talent attraction and retention. Clear analytics leadership has been established within each major business unit and function.

4. *Becoming an analytics-driven organization.* Analytics becomes the backbone for conducting business, shifting from an enabling role to one that is central to the business, and the impact of analytics is measured as part of core business results. Analytics drives underwriting, product development, claims, and distribution, and barriers between siloed functions dissolve. The system becomes more complex, with greater involvement of third parties. The talent strategy for these organizations focuses on analytic skills.

Exhibit 1

Adoption of advanced analytics is a four-stage journey.

Building insights	Capturing value	Achieving scale	Becoming an analytics-driven organization
Predictive and prescriptive models are developed, generating clear insights for business

Analytics is a function, not yet led by business or fully integrated into front line | CEO support is clear. Business pulls for more analytics

Front line is heavily involved in model development. Focus is on adoption and usage

Analytics is subscale, not yet covering full breadth of businesses and domains | Center of excellence is in place, with dedicated resources, investment, and organizational commitment

Analytics is at scale with a pipeline of use cases, spans many domains and functions, and serves most or all business units

Analytics is still a function. It is *incremental* to core business approach | Analytics is part of carrier DNA and *synonymous* with pricing, underwriting, and claims

Organizational structure is "modern" and analytics driven; different functions are better integrated, silos are dissolved

Data-driven decision making is norm |

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Building insights

In the initial phase, carriers develop models that demonstrate early evidence of success. This is a critical proof of concept for analytics that justifies further investments. Key success factors include providing insights that enhance decision making, focusing on data that matter, and embracing advanced analytics and science.

Supporting decision points

Analytics cannot perfectly predict outcomes, particularly in low-frequency, high-severity, or shock-prone lines of business. For instance, during the past decade, the market for directors-and-officers-liability insurance endured waves of litigation—and subsequent spikes in claims—resulting from shock events like the financial crisis, the Madoff scandal, and new regulations governing options backdating. Analytics would have had difficulty predicting any of these events or their impact on any single risk or company. But even when analytics lack predictive value, they can enhance specific types of decisions with novel, fact-based insights. Examples include modeling the ideal attachment point (based on price versus anticipated loss at a particular layer), modeling the right level of deductible or retention, and modeling to inform debits, credits, or exclusions.

In life insurance, similarly, data and analytics have not yet been able to replicate the rigor of biometric underwriting, though external data (for example, credit scores and motor-vehicle records) are widely used to supplement underwriting.

Mining external and internal data

Carriers have gained new insights from external sources of data. For instance, in the past five to ten years, granular geocoding has promoted a more precise understanding of geographic proximity to potential hazards. Pharmacy records have proved to be a good source of supplemental data for many life-insurance carriers. And as with personal auto, credit scores for small-business owners have proved to be a source of insight about management attitudes, which indirectly indicate a company's riskiness.

While there is untapped potential for obtaining new insights from external data, many carriers still struggle to master their internal data, which often remain disaggregated, unstructured, and generally underutilized. Typically, internal data are incomplete or miscoded, and substantial effort is required to bring the data into working condition. Consequently, improved capabilities for mining existing data would generate significant value. By demonstrating their ability to make the most of the data they already collect, carriers would "earn the right" to mine external data.

Experimenting with new techniques

The analytics landscape is rapidly evolving. Carriers can choose from many new analytics platforms. For instance, SPSS and even SAS are quickly being displaced by more modern, versatile open-source languages like Julia, Python, and R. There are also new platforms—such as Hadoop, Spark, and Storm—with higher processing capabilities that can handle real-time,

unstructured data. The industry is also experimenting with cognitive computing and artificial intelligence. However, the latest technology is not always needed. For instance, real-time, unstructured processing of large volumes of data is not required when underwriting a large life policy or when developing annual rates on a portfolio comprising a few hundred or few thousand accounts, many of which have just dozens of variables.

That said, modern science has the potential to greatly enhance analytics techniques, many of which are decades old and predate the advent of the computer. Machine learning in particular—which relies on automated, computer-program-driven pattern recognition—has been proved to produce a stronger signal and better fit than general linear models (GLM). The traditional process to develop insurance ratings has relied on human observations to find the variables that will predict whether a policy will be profitable or a claim will be especially severe. In contrast, machine learning automates the process and, to some extent, removes subjectivity.

Actuaries at carriers have not yet embraced machine learning. To be fair, the clusters of variables that machine learning produces are more complex than traditional GLM output and could add significant complexity to building and executing rating plans (which also need to be explained to each state's regulators). And because pattern recognition is conducted by the machine instead of humans, the results may not be intuitive or easy to explain. Even so, machine learning has demonstrated a superior ability to work with data-sparse contexts and produce superior lift compared with current GLM methods. Successful carriers will more systematically adopt machine learning across most lines of business to supplement and eventually replace GLM.

Capturing value

As the analytics function matures, the focus shifts from the models to adoption, and the models come to life. Models are seen as critical enablers of better decision making. Critical success factors include frontline involvement, seamless work-flow integration, and performance management that specifically tracks the use of analytics.
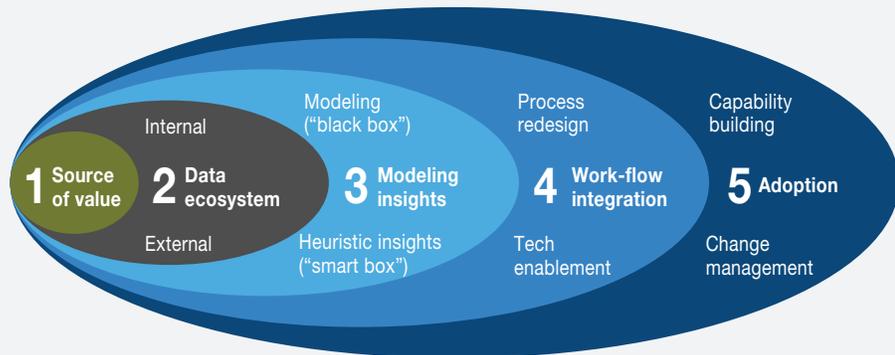
Involving the front line in design

Analytics is more than modeling; it requires a deep grounding in the business and should be seen as an iterative, end-to-end process involving the front line at each step (Exhibit 2). However, carriers often fail to involve business leaders and frontline users adequately throughout this process. The traditional way of working still prevails: build the model or new tool, then roll it out to the front line. New models are often based on unclear assumptions, and the front line does not understand precisely how to apply the output. For example, is the model's recommendation binding, or is there flexibility to deviate from it?

Best practice entails relentlessly involving the front line in the nuts and bolts of building the model, from the earliest stages to completion.

Exhibit 2

Analytics should be an iterative, end-to-end process involving the front line at each step.

		Modeling ("black box")	Process redesign	Capability building
	Internal			
1 Source of value	**2** Data ecosystem	**3** Modeling insights	**4** Work-flow integration	**5** Adoption
	External	Heuristic insights ("smart box")	Tech enablement	Change management

Seamless work-flow integration and data visualization

Among the most difficult issues in building any model is determining how exactly it will be used. Will it be integrated directly into core tools for customer relationship management and pricing, or will it be an additional tool or overlay to current processes? Which types of employees will use it, and how often? Pilots should be designed to answer these questions even before the data are collected and the model itself is built.

Data visualization is another critical but difficult challenge: what will the front line see once the output is produced? As new models are developed, emphasis should be placed on how the output will be explained and understood.

Performance management

Diligently tracking the impact of use cases—particularly their adoption and usage—is a key attribute of maturing analytics organizations. There are various levels of tracking, including economic impact within business metrics, the impact compared with those who don't adopt the model, and user satisfaction. Measuring both adoption and user satisfaction is valuable for gauging the quality of the models. Users may not initially be satisfied with models as they are rolled out, particularly given the new way of doing business; however, tracking user adoption and satisfaction over time provides an important fact base that can be used to calibrate the success of models across businesses, as well as to indicate when version 2.0 or 3.0 is needed.

Achieving scale

As carriers master the execution of use cases, the next step is to build a permanent, scalable COE to support the businesses. When successful, the COE will support many, if not most, of the businesses and will also cover several functions—pricing and underwriting, claims, distribution, and operations. We see three critical success factors for COEs: balancing business engagement with a strong central function; having an integrated analytics strategy, including an iterative, evolving road map of use cases; and directly involving top management.

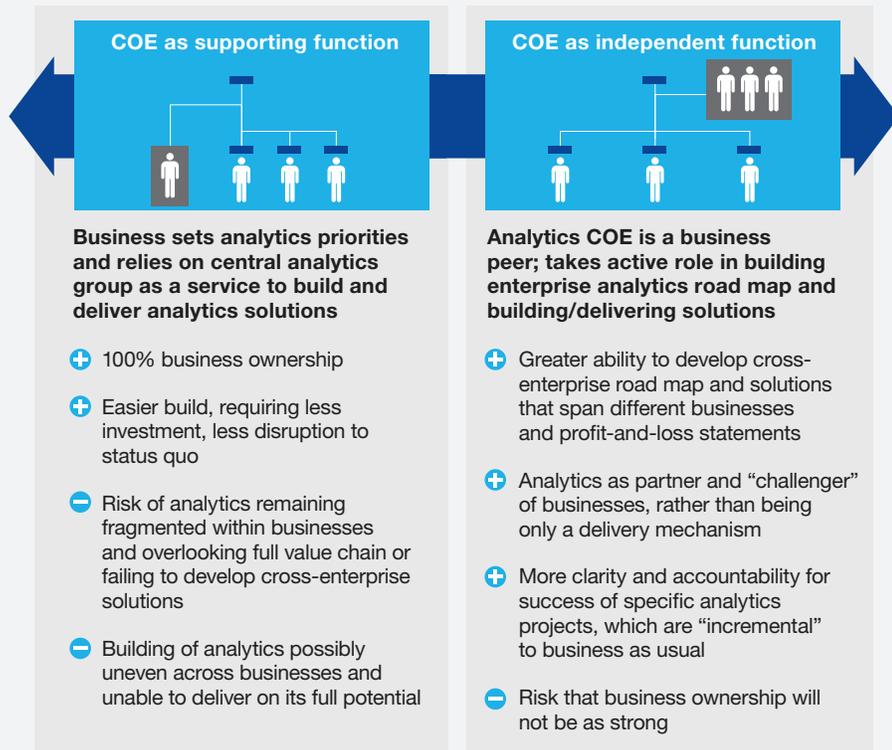## Balancing business engagement with a strong central function

Carriers struggle with how to position an analytics COE relative to the businesses. Should the COE be autonomous and have its own reporting and profit-and-loss statements? Or

should it be less prominent, functioning as a resource that businesses access on demand, similar to offshore captives for operations or the IT function? Each option offers clear pros and cons (Exhibit 3). Having a more autonomous function creates more transparency and more accountability for specific use cases, and it generally allows a stronger, more proactive function to guide and challenge the business. The downsides are less business ownership and greater distance from the business. An on-demand model has the benefit of more closely aligning the COE with the business agenda, but the COE is less proactive and prominent than it would be if it drove analytics independently. There is also a risk that a weaker COE will operate at a slower pace.

The best approach lies somewhere in the middle. The COE needs "teeth" to come up with ideas and recommendations proactively, but the business needs to shape and approve the COE's agenda and be convinced of the COE's value, including that the costs allocated to it are worthwhile.

Exhibit 3

A center of excellence (COE) can be a "leader" or a "function."

COE as supporting function

Business sets analytics priorities and relies on central analytics group as a service to build and deliver analytics solutions

➕ 100% business ownership

➕ Easier build, requiring less investment, less disruption to status quo

➖ Risk of analytics remaining fragmented within businesses and overlooking full value chain or failing to develop cross-enterprise solutions

➖ Building of analytics possibly uneven across businesses and unable to deliver on its full potential

COE as independent function

Analytics COE is a business peer; takes active role in building enterprise analytics road map and building/delivering solutions

➕ Greater ability to develop cross-enterprise road map and solutions that span different businesses and profit-and-loss statements

➕ Analytics as partner and "challenger" of businesses, rather than being only a delivery mechanism

➕ More clarity and accountability for success of specific analytics projects, which are "incremental" to business as usual

➖ Risk that business ownership will not be as strong

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Success requires a combination of strong business leadership and analytics leadership. The strong business leader supports the analytics COE as it experiences the inevitable fits and starts in scaling up, and the strong analytics leader can promote the COE's services to each major business unit and function.

Broad analytics coverage of functions and businesses

The application of advanced analytics may start in the pricing-and-underwriting function, which already applies modeling and data-driven analyses to some extent. Here, advanced analytics enhance or improve upon previous practices—for instance, finding new variables, exploring new modeling techniques, and making processes more automated. Typically, claims also is a rich area for analytics—for instance, anticipating claims severity, identifying opportunities for subrogation, or better managing loss-adjustment expenses. Recently, analytics have been successfully applied in other domains, particularly servicing and distribution. Precise management of the in-force book, coupled with better new-business targeting and funnel management, does more than yield growth in the top line. It also leads to *profitable* growth by identifying, attracting, and retaining better-quality risks and customers with higher lifetime value.

Leading organizations have developed heat maps of opportunities that span all businesses and functions. These opportunities are prioritized based on impact, feasibility, and business priorities, then translated into a road map of use cases. This road map should cover all functions and businesses, so there is a test-and-learn cycle across the organization that shows where analytics are most effective. The road map is dynamic and updated annually, if not more frequently. There are also longer-term speculative initiatives that could have significant payoffs. For example, many carriers are exploring the potential for mining unstructured text and voice data—such as call-center data, engineering reports, and claims files.

Direct involvement of top management

As the COE scales up, senior management makes it a critical corporate priority, paying close attention to the portfolio of initiatives and gaining a basic understanding of how the initiatives have achieved tangible impact. As part of the annual planning cycle, executives personally encourage line leadership to contribute proactively to the pipeline of analytics ideas, and the success of analytics initiatives becomes measured as a part of performance management.

To fulfill this role effectively, top managers need to build a basic understanding of the techniques, tools, and technologies that drive the use of analytics.

The analytics-driven organization

Although most carriers have not yet reached the highest level of maturity, for many the journey is well under way. As carriers become analytics driven, they adopt new ways of doing business centered on analytics. Analytics shift from being an enabler to being the core way of doing business. The COE structure becomes embedded more directly in individual businesses, having realized its goals of temporarily building new muscle for analytics and initiating progress.

Most decisions are enabled by insightful and relevant analytics

In the mature organization, all decisions, whether related to the business or to core support functions, are enabled by analytics, at least where modeling and data-based analyses are possible. Analytics can take many different forms, such as describing and visualizing key trends, predicting future outcomes, and prescribing actions. Across the board, senior executives demand facts and data to inform decision making, and no longer rely on static reports.

Silos are dissolved, and new structures emerge

As an organization reaches analytic maturity, the COE structure—in which analytics are separate from the business—becomes redundant, because analytics becomes ingrained in the company's way of doing business. Analytics also becomes the critical function around which decision making is organized. For instance, today there are practical reasons to separate distribution, claims, and underwriting and pricing; these are different processes and require different skills. In the future, these various functions may still exist because the practical activities differ, but the core decision making, as well as the analytics engine supporting the decisions, will converge at a single point. Key decision makers will have integrated dashboards that provide a full view of the business, cutting across functions, including the distribution funnel, underwriting and pricing decisions, portfolio and risk performance, product performance, and details on the drivers of losses and claims. Very early prototypes of such 360-degree analytics exist, but most carriers are far from having this integrated view. As analytics becomes more integrated, so will decision making.

In the mature organization, the business system is also more expansive, with greater involvement of third parties—whether as partners to conduct analytics or as providers of unique data and assets.

Analytics return on investment is no longer measured as a distinct metric

Successful organizations will have clear, quantitative measurements to track the performance of all key business metrics. While they track the success of individual use cases, they do not track the financial impact of analytics separately from key business metrics. The business metrics themselves become the markers of success. In P&C, for instance, the metrics would be price adequacy and other technical price metrics, in addition to loss, expense, and combined ratios. In life insurance, measures could be the quality of new-business growth and in-force lapse, among others.

Earlier in the maturity curve, organizations make significant investments in analytics and therefore need to see the return on investment and be confident of the impact. Executives seek to isolate the financial impact from particular analytics initiatives. While having this disciplined measurement can be critical, it can also be a distraction, particularly since trying to isolate the economic impact of analytics, as distinct from other business initiatives, can become an exercise in false precision.

Talent strategy focuses on analytics

In the analytics-driven organization, analytics are used to track and manage HR decisions—for instance, assessing profiles and traits of successful staff to inform recruiting, identifying and incubating future leadership, and proactively managing retention. Redefinition of individual roles increases, so that using analytics is a core part of the work description and expectations. In addition to using analytics, staff members are required to contribute to innovation and the development of new use cases. This contribution becomes a core part of performance reviews. HR strategy explicitly promotes a culture where analytics becomes an integral part of each role.

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In their efforts to capture the full potential of analytics, most carriers are somewhere between phase two and phase three. Many have achieved pockets of success and validated the potential of analytics. They have also attempted to build central, scalable resources to roll out analytics more broadly. CEOs can push progress beyond this middle ground in four ways:

1. *Make analytics a senior-leadership priority.* Analytics should be a relentless priority of the CEO. It is not just one of several themes, but the target end state for the organization.

2. *Make a multiyear commitment.* Investments over several years are required, and they should account for false starts and trial and error. Advancing on the maturity curve does not happen in a year, and the impact may not be obvious within the first few quarters.

3. *Demand fast progress.* While the full impact takes several years, quick wins and success stories will help prove the concept and maintain momentum. CEOs should personally look for several use cases each year that demonstrate new and incremental impact from analytics, and they should promote these successes as examples for the entire organization.

4. *Find the right analytics leadership.* Many business leaders are reluctant to shift away from the business into a supporting function, and these leaders also do not have the practical skills or experience to drive analytics. At the same time, statisticians and data scientists often lack the skill to navigate the businesses and lead critical change management. Finding the "two-sport manager" who can bridge the gap between the COE and the business is a prerequisite for success.

Even though many carriers have made progress in building a dedicated, central capability, they have only scratched the surface in realizing the impact of analytics. The first carriers to make this leap and successfully bring science to insurance are likely to capture an unrivaled competitive advantage. ◻

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