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***Insurance IT Strategy
and Data Marts:***
**The Role of Actuaries and
Analytics Practitioners in
Technology Transformation**

**CAS Annual Meeting
November 2013**

pwc

Agenda

- I. Overview
- II. Insurance IT Strategy and the Actuary
- III. Predictive Analytics Success Factors
- IV. Actuaries as Business Analysts
- V. Analytics Data Marts
- VI. Conclusions
- VII. Questions



Insurance IT Strategy and the Actuary

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Insurance IT Strategy and the Actuary

Overview

Insurance is a knowledge industry. Carriers who best collect and action information on risk, retention, and service are more profitable, due to better loss and expense ratios.

Actuaries and analytics practitioners are traditional power users of information, and therefore have a **key role communicating information requirements throughout the insurer.**

The role of knowledge broker requires new skills not traditionally associated with actuaries—but rather with IT, including the ability to:

- **Identify structural solutions to streamline ad hoc processes**
- **Translate this vision into formal Technology Requirements**
- **Design solutions which benefit field operations**

Drawing on deep domain expertise, actuaries can fill this role, and thereby advance the insurers' information infrastructure.

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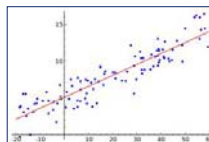
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Overview

Insurance Analytics Evolution



Accident Year	Development Period			
	12	24	36	48
2008	11,987,721	14,385,265	15,823,792	16,614,981
2009	12,319,565	14,783,478	16,261,826	17,074,917
2010	12,761,119	15,313,343	16,844,677	
2011	12,998,323	15,597,988		
2012	13,949,792			
LDF	1.200	1.100	1.050	1.025
CDF	1.421	1.184	1.076	1.025



Improving Technology enables insurers to implement leading segmentation and customer management systems, resulting in:

- Better understanding of customer behavior
- Seamless customer interfaces
- Lower loss and expense ratios

Lacking the actuarial perspective, many systems projects continue to be driven by low value-add, commodity transaction processing goals.

Insurance IT Strategy and the Actuary

The Case for Change



Today's world is specialized.

Specialization begets complexity, due to multiple delivery chain handoffs. Siloed information within organizations results, where different actors:

- Interface with customers
- Collect and manage data and process execution
- Analyze information to derive insights
- Execute change initiatives

Accessing information across boundaries is a major challenge.

Insurance IT Strategy and the Actuary
The Case for Change



Today's Skills Need

To cross organizational boundaries, actuaries and analytics practitioners must expand their tool kits to include skills in:

- Project Management
- Software Development Life Cycle (SLDC)
- Process (Re)Design
- Communications and Change

These skills empower actuaries to play major roles in high-impact Technology and Business Modernization programs.

Insurance IT Strategy and the Actuary
The Case for Change

Data is domain agnostic. This uniquely positions actuaries to cross functional boundaries within insurers. However, other skills and domain expertise must be developed.

Actuarial Skillset Pros

Deep understanding of:

- How**
 - Available data repositories
 - Information used in Predictive Models to drive decision making
- Why**
 - Quantifiable dollar benefits due to process improvements (e.g. Straight-through processing)
 - Underwriting and reserving

Actuarial Skillset Cons

Limited understanding of:

- Technology implementation
- External communication, training, and change mgmt.
- Boots on the ground field experience (in general)
- Sales and service operations

Insurance IT Strategy and the Actuary

The Case for Change

Technology Strategy	Capability Focused	<p><u>Fast Followers</u></p> <ul style="list-style-type: none"> • Second wave adopters, managing innovation gaps • Pursue strategic projects, with low failure tolerance <p><u>Talent Need:</u></p> <ul style="list-style-type: none"> • Power users to quickly design, test, and implement functionality 	<p><u>Innovators</u></p> <ul style="list-style-type: none"> • Early adopters, seeking competitive advantage • High risk projects often fail, so demand top talent <p><u>Talent Need:</u></p> <ul style="list-style-type: none"> • Power users for R&D, solution design and implementation
	Efficiency Focused	<p><u>Core Focused</u></p> <ul style="list-style-type: none"> • Consider technology and process an "order qualifier" • Leverage "Out of the Box" products without customization <p><u>Talent Need:</u></p> <ul style="list-style-type: none"> • Champions for must-have functionality to avoid gaps 	<p><u>Lean Operators</u></p> <ul style="list-style-type: none"> • Focus on front end systems which touch customers • Expense margin pressure limits Next Generation features <p><u>Talent Need:</u></p> <ul style="list-style-type: none"> • Champions for value-add feature and automation benefits
		Paced	Accelerated

Deployment Speed

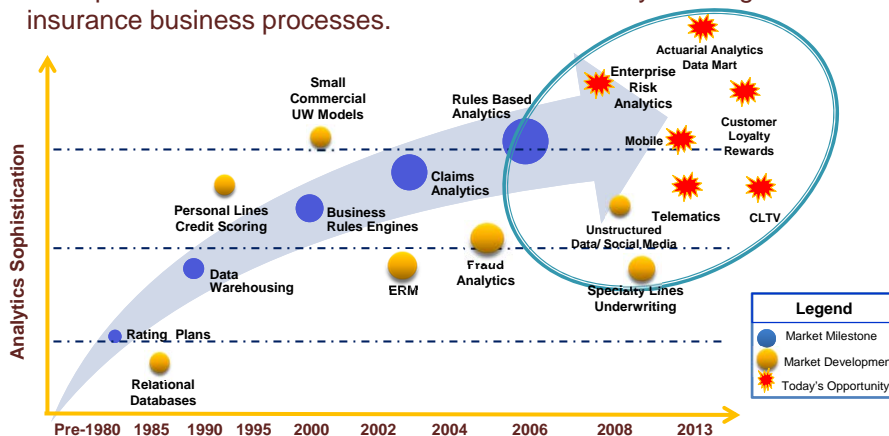
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The Case for Change

Growing technology sophistication, information availability, and more widespread use accentuate the need to embed analytics insights into insurance business processes.

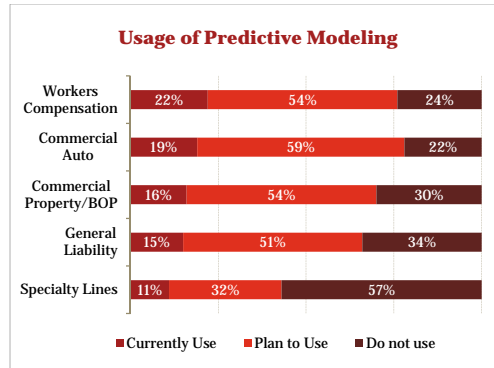


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The Case for Change

- Larger lines of business with homogeneous data (e.g. Workers Compensation, Commercial Auto) lead the way in commercial lines predictive modeling
- Adoption for other lines of business (e.g. Specialty) lags, but is also progressing
- Measurable bottom line improvements on risk selection, loss ratio, and overall profitability result



Future investments include additional internal data capture, third-party data, and competitive analysis.

Insurance IT Strategy and the Actuary
The Case for Change

The remainder of this presentation explores how Actuaries and Analytics practitioners can address the coming data, technology, and talent needs identified by drilling into:

Analytics Development Processes

Analytics is more than modeling. A brief overview of the ancillary skills needed to launch successful analytics solutions provides context.

Actuaries as Business Analysts

Business Analysis provides opportunities for Actuaries to leverage industry domain expertise, while crossing functional boundaries.

Analytics Data Marts

These technology solutions demand major development effort from Analytics users to achieve leading segmentation and agility gains.

Insurance IT Strategy and the Actuary
The Case for Change

Acting as Technology Business Analysts, Actuaries play a key role addressing business needs. One high value example is on Analytics Data Mart Projects.

Solution	Business Value	Skills	Underlying Issue
Deploy Actuarial Business Analysts	<ul style="list-style-type: none"> • BA skills for Technology teams and projects • Specify purpose built, cutting edge features • Analysis of Actuarial, Underwriting, and Statistical components 	<ul style="list-style-type: none"> • Predictive modeling • SDLC • Actuarial, Underwriting, and Statistical insurance operations • Change Management 	Analytics technology development requires: <ul style="list-style-type: none"> • Industry expertise • Functional specialists • Practitioner insights • SLDC tools
Build Analytics Data Mart	<ul style="list-style-type: none"> • Reduced cost of development • Accelerate speed to market • Process efficiencies 	<ul style="list-style-type: none"> • Predictive modeling • SDLC • Database Management 	Data processes are: <ul style="list-style-type: none"> • Manually intensive • Lack controls • Applied inconsistently

Predictive Analytics Success Factors

Predictive Analytics Success Factors

The Analytics Development Process

Predictive Models do not provide any benefit until they change behavior.



This moves the model development process from a technical exercise into a strategic project impacting all aspects of the organization, including:

- Senior management to define business goals
- Quantitative modelers to develop specifications
- Technology and business leads to implement models into existing or new processes
- Change, communication, and field managers to train employees, interface with customers, and improve operational performance.

This presentation touches on all aspects of the analytics development process to highlight the areas where Actuaries can play major roles in implementing transformational change—and where additional skills must be developed.

Predictive Analytics Success Factors

Strategy—Defining the Business Goal


Potential Analytics Project Costs



The first—and most important—step in the model development process is to define the project with the highest ROI for the organization, given constraints.

The most successful projects have the following characteristics:

Vision	Culture	Objective	Marketing	Technology
<ul style="list-style-type: none"> • Projects align with organizational goals • Outcomes deliver results not possible via business-as-usual, continuous improvement 	<ul style="list-style-type: none"> • Development process furthers existing data driven culture • Models are quickly adopted by a “change ready” workforce 	<ul style="list-style-type: none"> • Projects address one, critical business need • Objectives are clear, defined, measurable, and explicit prior to project kick off 	<ul style="list-style-type: none"> • Analytics fills gaps in traditional marketing domain expertise • Experiments teach about customer responses and price sensitivity 	<ul style="list-style-type: none"> • Leading technology provides seamless roll out to the field • Platforms support fast and flexible model updates and revisions



Predictive Analytics Success Factors

Project Management—Efficiently Delivering Results

Tightly run analytics development and implementation projects incorporate the following components to deliver business value on time and on budget.

Project Charter
Project objectives, rolls and responsibilities, and success criteria are memorialized

Experience
"Lessons Learned" from past projects improve performance & mitigate risk


Governance
Project decision making and funding authority are clear to resolve arising issues

SLDC
Teams leverage existing project management methodology, skills, and people.

Cross-Functional Skills
Resources from actuarial, underwriting, marketing, IT, and the business collaborate on one team

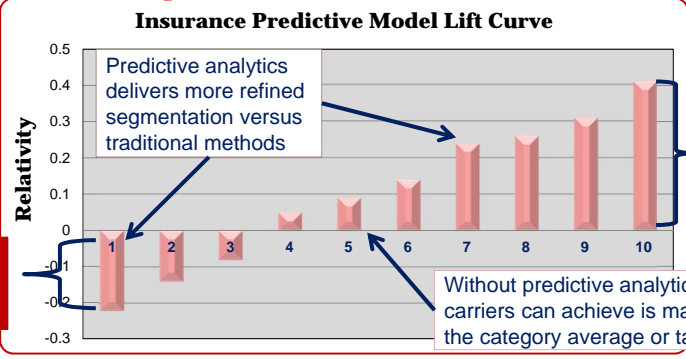
Risk Management
Potential project and business risks and mitigation measures are pre-identified

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Predictive Analytics Success Factors

Technical Development—Predictive Models



Insurance Predictive Model Lift Curve

Relativity

Without predictive analytics, the best carriers can achieve is managing to the category average or target

Better than average by traditional methods

Predictive analytics delivers more refined segmentation versus traditional methods

Worse than average by traditional methods

Questions that can be answered with Predictive Analytics:

- Who will be my most profitable customers during the next policy term?
- Which claims will result in the largest BI payments in the next 120 days?
- Which markets should receive the greatest new agent concentrations?
- What is the right price to charge this risk?

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Predictive Analytics Success Factors

Technical Development—Predictive Models

Business Objective: Create a model to identify customers with the highest likelihood of adding a vehicle during the next year, to flag for special handling during the renewal process.

Step 1: Data Gathering

External Data

- Geographic
- Territory
- Credit/Finance

Internal Data

- Quotes
- Claim History
- Coverage Levels
- Dates

➔

Analytics Data Mart

Define:
Target Variables: Growth (Binary Indicator of customers that added a vehicle over a one year time period)
Time Period: 2007-2012 data

Step 2: Data Analysis

Claims (Annual) per Fleet Size

	No. Claims	1-2	3-4	5-6	7-8	8+
Target 0	62	55	5	14	40	50
Target 1	32	16	64	68	112	188

Identified 30 Leading Variables

Step 3: Model Derivation

Logistic Regression, CART, GLM

$$\log\left(\frac{p_i}{1-p_i}\right) = \alpha + \beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_p X_{ip}$$

11 Variables in Final Model

Step 4: Model Diagnostics

- Test model on hold-out validation data
- Lifts and Gains charts demonstrate strong predictive power of model to identify customers with highest growth potential

Step 5: Implementation

Integrate automatic "growth" flag during renewal process for special handling

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Predictive Analytics Success Factors

Business Rules—The Solution's Impact

Predictive Models are not developed in a vacuum. They rely on complex data sourcing procedures, and create new business rules—which impact customers downstream. Prior to implementation, project teams must:

- Identify current, changing, and new rules
- Estimate policyholder impacts
- Perform scenario and "what if" analysis to understand potential customer reactions
- Develop tools to respond quickly and deftly to impacted customers

To achieve these goals, rules decision management frameworks must be developed, tested and implemented.

✔ *Benefits from actuarial and analytics perspective*

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Pricing Rules
✔

Risk Selection Rules
✔

Transition Rules
✔

Data Quality Rules
✔


Data Sourcing Rules
✔

Capping Rules
✔

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Predictive Analytics Success Factors

Technical Implementation—Building the Pipes

Predictive analytics solutions can be developed using a variety of statistical packages, and can reside in many technology applications. Two key model development technical considerations are:

Testing

- ✔ Extends beyond technical validation to include business reasonability
- ✔ Uses historical and artificial test cases
- ✔ Simulates business impact under a variety of potential scenarios
- ✔ Identifies downstream process and workflow impacts
- ✔ Covers data sourcing and flows, calculations, and decision results


Infrastructure

- ✔ Has flexibility to incorporate new data sources and model changes over time
- ✔ Integrates with existing technology
- ✔ Leverages “out of the box” functionality
- ✔ Can be accessed across functional silos
- ✔ Performs elementary modeling processes to maximize efficiency
- ✔ Produces ongoing monitoring reports to measure model effectiveness

✔ *Benefits from actuarial and analytics perspective*

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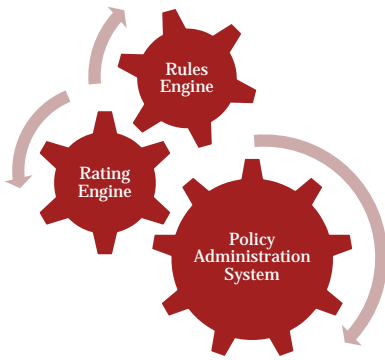
Predictive Analytics Success Factors

Technical Implementation—Building the Pipes

Predictive analytics solutions can be implemented at various points in the carrier’s IT infrastructure.



Selecting the best implementation point depends on each carrier’s:

- Existing Technology
- Information Processing Capability
- Data Sourcing and Storage
- Straight Through Processing Goals
- End State Functional Specifications
- Degree of Automation Desired



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Predictive Analytics Success Factors


Business Roll Out—Attracting Converts

Some Predictive Model Business Implementation leading practices are:

Success Factor	Leading Practice
People	<ul style="list-style-type: none"> • Management promotes a strong, united front of full “buy in” • Expected results are tied to key business metrics • Business users embrace the benefits of predictive modeling
Roll Out	<ul style="list-style-type: none"> • Roll out plans and speed account for project risk and customer disruption • Training and change management programs prepare users and customers
Communication	<ul style="list-style-type: none"> • External communication is tailored to specific stakeholders • The most effective people and channels to communicate changes are used • Communication strategy and execution are high management priorities, including communication up the chain of command
Process Integration	<ul style="list-style-type: none"> • Process flow maps document changing processes—and identify currently unaffected processes which could benefit from predictive model use • Resources are reallocated to smooth temporary workflow disruptions
Documentation	<ul style="list-style-type: none"> • Separate documentation is produced for technical specifications, end users, senior management, and customers • People are aware of documentation, and access it to resolve questions

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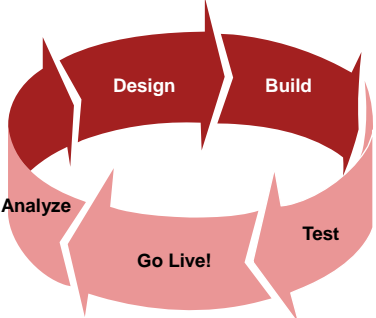
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Predictive Analytics Success Factors

Go Live!—Realizing Benefits

Software Development Life Cycle (SLDC)



Once development and implementation activities are complete, the predictive analytics solution is ready for implementation. At this stage, the model development lifecycle begins anew, focusing on:

- *Model refresh and revisions*
- *New applications*
- *Incorporating new data sources*
- *Ongoing monitoring*

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Actuaries as Business Analysts

Actuaries as Business Analysts

Where to Add Value

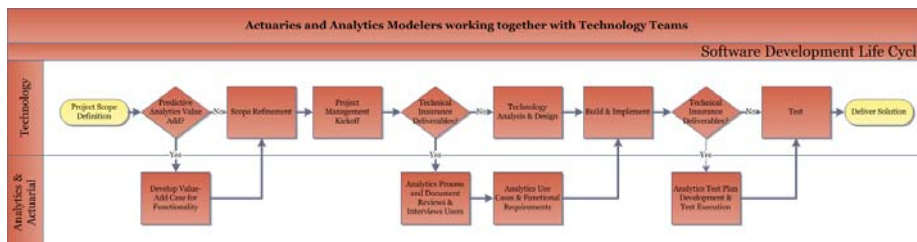
Insurance Technology professionals know hardware and software inside and out—especially with large scale Transaction Processing Systems (TPS) and Data Warehouses (DW) projects. However, many lack the operational expertise to deliver user-friendly systems. Actuaries can deliver value-add services by:

- ***Providing Business Analyst skills to Technology teams***
- ***Specifying purpose built features which meet operational needs***
- ***Demystifying complex actuarial, underwriting, and statistical components***

The modern organization's matrix structure is predicated upon the ability to merge disparate domain and functional experts into singular teams. Historically, Actuaries have done this well on underwriting, reserving, controls, and regulatory projects. The time is now to apply our insurance expertise to marketing, technology, procurement, and strategy.

Value-add is possible through the Analysis, Design, and Testing phases of the Software Development Life Cycle (SDLC).

Actuaries as Business Analysts Where to Add Value

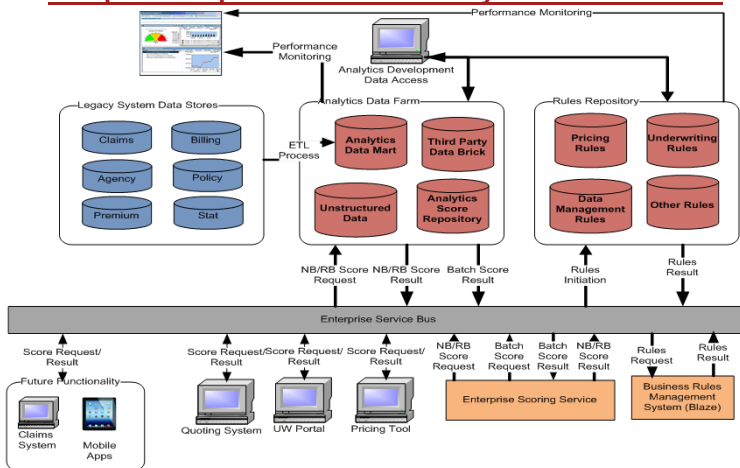


Project management is a core competency of Technology development. By engaging with Technology teams on their terms and integrating with existing delivery teams, Actuaries can build loyal internal clients—and deliver cutting edge solutions.

To be successful, actuaries must learn to work under formal project management structures, and acquire SDLC expertise.

Actuaries as Business Analysts Where to Add Value

Sample Enterprise Predictive Analytics IT Framework



Actuaries as Business Analysts

Where to Add Value

Team structures determine what activities analytics talent pursues.

Structure	Pros	Cons
Analytics Only Team	<ul style="list-style-type: none"> Resources within the actuarial or analytics department with common analytics skill sets Analytics Lead has full resource control Easier to implement rotational programs and job sharing Common skill sets and experiences usually results in better team chemistry 	<ul style="list-style-type: none"> Resources may have limited understanding of IT and Business Implementation considerations Silos between IT and Business impact timelines and cross-department communication Limits expansion into adjacent capabilities Analytics Team must contend with IT and Business constraints and prioritization
Cross-Functional Team	<ul style="list-style-type: none"> One team of IT, actuarial, statisticians and business specialists is dedicated to delivering end-to-end solutions Improved communication and translational of analytics specifications Promotes knowledge sharing, leading to lower cost and shorter analytics implementation lifecycles 	<ul style="list-style-type: none"> Difficult to implement rotational programs and job sharing Specialized resources perceive fewer career advancement opportunities Cultural differences within team due to different technical and educational backgrounds Cyclical workloads vary among resource types

Operating structures impact one's ability to move into adjacent functions.

Analytics Data Marts

Analytics Data Marts
Fast, Widespread Information

At many insurers, major opportunities exist to streamline the data sourcing and management processes which transforms raw data elements into a Predictive Analytics solutions.

These processes are often manually intensive, lack embedded data management and controls, and are applied inconsistently across lines of businesses and applications.

Automating these processes frees expensive modeling talent from data cleansing to pursue innovative model development and application work.

Analytics Data Marts (ADMs) help insurers address process gaps, and thereby:

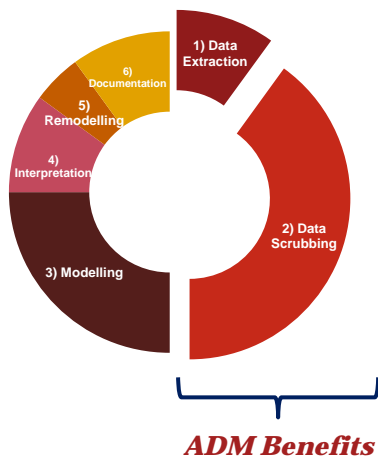
- ***Reduce internal analytics development costs***
- ***Accelerate analytics speed to market***
- ***Realize development, deployment and monitoring process efficiencies***

Analytics Data Marts
Fast, Widespread Information

Is it better to be fast or slow?



Analytics Data Marts
Fast, Widespread Information



In a typical model Technical Development process, around half of the practitioner's time goes to data processing.

These activities are:

- **Time consuming**
- **Relatively low value-add**
- **Generally repeatable**

Automation improves efficiency.

Analytics Data Marts
Fast, Widespread Information

Analytics practitioners and actuaries help ADM development teams avoid roadblocks which typically bog down IT projects.

It's better to be fast than slow—and sometimes *it's better to be light than heavy.*

Left to Right



- Traditional “heavy” development provides users what is possible
- Includes unneeded functionality
- Extra overhead increases development complexity
- Complexity slows execution
- Permanent solution

Right to Left



- “Light” development provides users only what is needed
- Needs specified by analytics
- Sandbox to experiment with new data or processes
- Lower project complexity
- Incremental solution

Analytics Data Marts Fast, Widespread Information

ADMs offer benefits to both Power Users and the wider organization.

Business Intelligence



Source: Tableau

- Fast, reliable information source
- Scrubbed data aligns with operations
- Reduces reliance on Power Users
- Promotes data based decision making

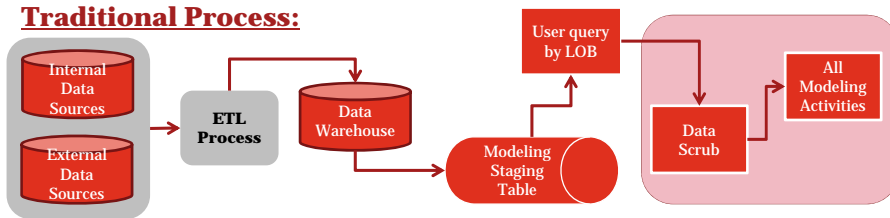
Data Governance



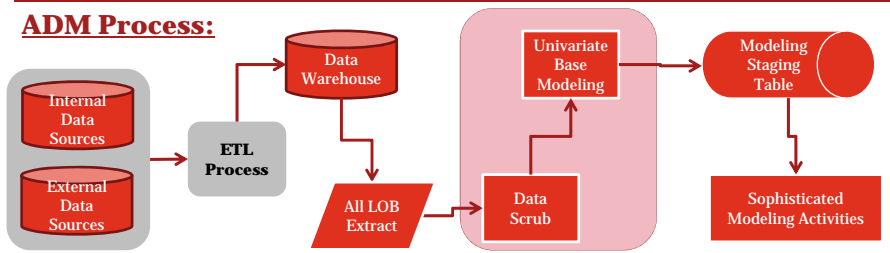
- Data issues fixed at the source, rather than continually adjusted for by users
- Better IT understanding of business uses
- Tighter feedback loops when issues arise

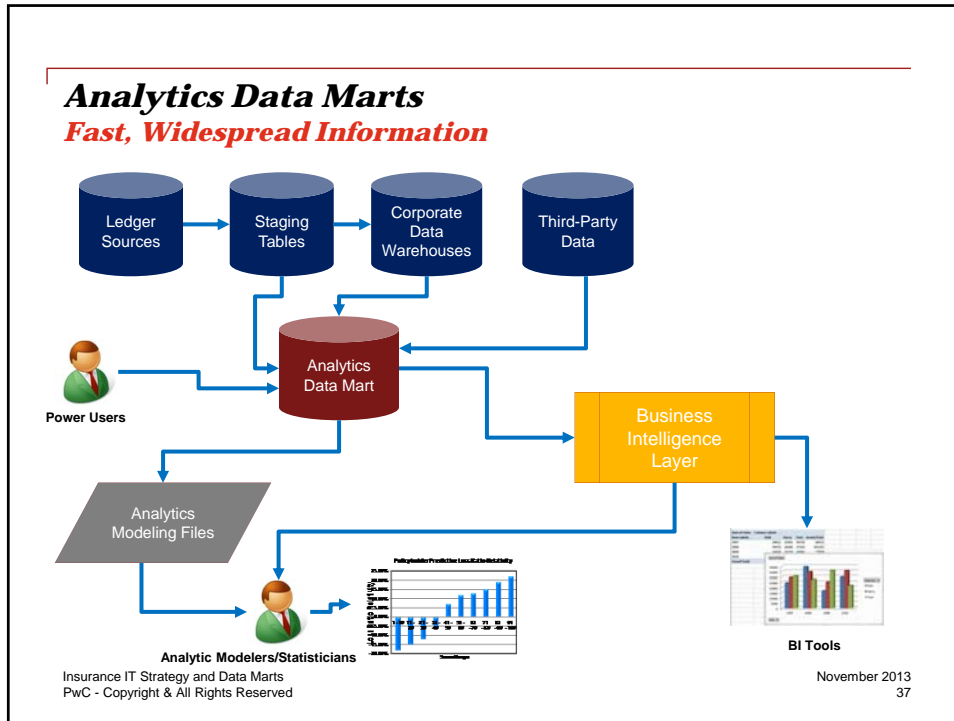
Analytics Data Marts Fast, Widespread Information

Traditional Process:



ADM Process:





Conclusion

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Insurance IT Strategy and Data Marts ***Conclusions***

Business today runs on Data.

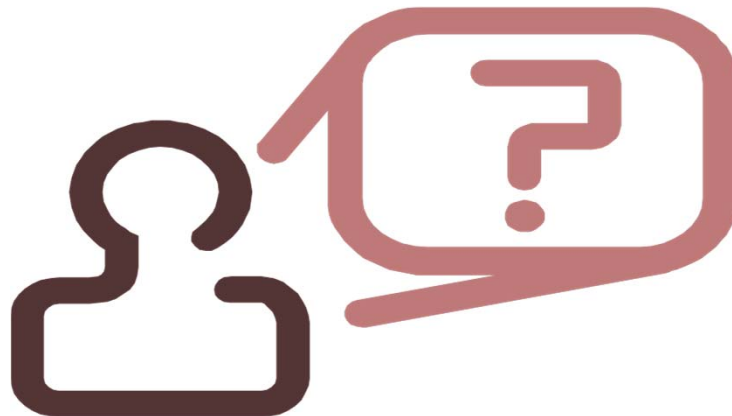
Actuaries and analytics practitioners can drive business improvement through:

- *Traditional modeling activities*
- *Improving the infrastructure that powers Predictive Analytics models*
- *Championing next generation Technology*



Insurers with the most effective actuaries and analytics practitioners in these roles will develop the best Technology infrastructure.

Questions?



Thank you!

Mo Masud, MBA

National Leader of Predictive Analytics - AIMS

mo.masud@us.pwc.com

+1 (518) 221-9589

Tony Beirne, FCAS FIAA MAAA

Director in PwC's Predictive Analytics AIMS Practice

anthony.o.beirne@us.pwc.com

+1 (267) 330-1492

PwC Actuarial and Insurance Management Solutions (AIMS)

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