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

CAS Annual Meeting November 2013

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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.
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.

### Accident Development Period

<table>
<thead>
<tr>
<th>Year</th>
<th>Accident Development Period</th>
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<tbody>
<tr>
<td>2008</td>
<td>11,987,721</td>
</tr>
<tr>
<td>2009</td>
<td>14,385,265</td>
</tr>
<tr>
<td>2010</td>
<td>15,823,792</td>
</tr>
<tr>
<td>2011</td>
<td>16,614,981</td>
</tr>
<tr>
<td>2012</td>
<td>17,030,356</td>
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</table>

### LDF

<table>
<thead>
<tr>
<th>Year</th>
<th>LDF</th>
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<tbody>
<tr>
<td>2009</td>
<td>1.200</td>
</tr>
<tr>
<td>2010</td>
<td>1.100</td>
</tr>
<tr>
<td>2011</td>
<td>1.050</td>
</tr>
<tr>
<td>2012</td>
<td>1.025</td>
</tr>
</tbody>
</table>

### CDF

<table>
<thead>
<tr>
<th>Year</th>
<th>CDF</th>
</tr>
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<tbody>
<tr>
<td>2009</td>
<td>1.421</td>
</tr>
<tr>
<td>2010</td>
<td>1.184</td>
</tr>
<tr>
<td>2011</td>
<td>1.076</td>
</tr>
<tr>
<td>2012</td>
<td>1.025</td>
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### 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.**
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.

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**

- Available data repositories
- Information used in Predictive Models to drive decision making
- 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

<table>
<thead>
<tr>
<th>Capability Focused</th>
<th>Fast Followers</th>
<th>Innovators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Second wave adopters, managing innovation gaps</td>
<td>• Early adopters, seeking competitive advantage</td>
</tr>
<tr>
<td></td>
<td>• Pursue strategic projects, with low failure tolerance</td>
<td>• High risk projects often fail, so demand top talent</td>
</tr>
<tr>
<td>Talent Need:</td>
<td>• Power users to quickly design, test, and implement functionality</td>
<td>Talent Need:</td>
</tr>
<tr>
<td></td>
<td>• Power users for R&amp;D, solution design and implementation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Efficiency Focused</th>
<th>Core Focused</th>
<th>Lean Operators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Consider technology and process an “order qualifier”</td>
<td>• Focus on front end systems which touch customers</td>
</tr>
<tr>
<td></td>
<td>• Leverage “Out of the Box” products without customization</td>
<td>• Expense margin pressure limits Next Generation features</td>
</tr>
<tr>
<td>Talent Need:</td>
<td>• Champions for must-have functionality to avoid gaps</td>
<td>Talent Need:</td>
</tr>
<tr>
<td></td>
<td>• Champions for value-add feature and automation benefits</td>
<td></td>
</tr>
</tbody>
</table>

#### Deployment Speed

- Paced
- Accelerated

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### Analytics Sophistication

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

Usage of Predictive Modeling

<table>
<thead>
<tr>
<th>Line of Business</th>
<th>Currently Use</th>
<th>Plan to Use</th>
<th>Do not use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers Compensation</td>
<td>22%</td>
<td>54%</td>
<td>24%</td>
</tr>
<tr>
<td>Commercial Auto</td>
<td>19%</td>
<td>50%</td>
<td>22%</td>
</tr>
<tr>
<td>Commercial Property/BOP</td>
<td>10%</td>
<td>51%</td>
<td>30%</td>
</tr>
<tr>
<td>General Liability</td>
<td>15%</td>
<td>51%</td>
<td>34%</td>
</tr>
<tr>
<td>Specialty Lines</td>
<td>11%</td>
<td>12%</td>
<td>57%</td>
</tr>
</tbody>
</table>

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

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

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.

<table>
<thead>
<tr>
<th>Solution</th>
<th>Business Value</th>
<th>Skills</th>
<th>Underlying Issue</th>
</tr>
</thead>
</table>
| Deploy Actuarial Business Analysts | • BA skills for Technology teams and projects  
• Specify purpose built, cutting edge features  
• Analysis of Actuarial, Underwriting, and Statistical components | • Predictive modeling  
• SDLC  
• Actuarial, Underwriting, and Statistical insurance operations  
• Change Management | Analytics technology development requires:  
• Industry expertise  
• Functional specialists  
• Practitioner insights  
• SLDC tools |
| Build Analytics Data Mart | • Reduced cost of development  
• Accelerate speed to market  
• Process efficiencies | • Predictive modeling  
• SDLC  
• Database Management | Data processes are:  
• Manually intensive  
• Lack controls  
• Applied inconsistently |
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 leaders 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.

**Strategy**—Defining the Business Goal

Potential Analytics Project Costs

<table>
<thead>
<tr>
<th>Profitability</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pricing Project</td>
<td>Mobility Investment</td>
</tr>
<tr>
<td>$5M</td>
<td>$10M</td>
</tr>
</tbody>
</table>

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:

- Projects align with organizational goals
- Outcomes deliver results not possible via business-as-usual, continuous improvement
- Development process furthers existing data driven culture
- Models are quickly adopted by a “change ready” workforce
- Projects address one, critical business need
- Objectives are clear, defined, measurable, and explicit prior to project kick off
- Analytics fills gaps in traditional marketing domain expertise
- Experiments teach about customer responses and price sensitivity
- 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, roles 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.

Insurance IT Strategy and Data Marts

Predictive Analytics Success Factors
Technical Development—Predictive Models

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?

Insurance Predictive Model Lift Curve

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

Better than average by traditional methods
Worse than average by traditional methods

Predictive analytics delivers more refined segmentation versus traditional methods
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/Financials
- Internal Data
  - Quotes
  - Claim History
  - Coverage Levels
  - Dates

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

Step 3: Model Derivation
Logistic Regression, CART, GLM
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

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
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**

Insurance IT Strategy and Data Marts

November 2013
**Predictive Analytics Success Factors**

**Business Roll Out—Attracting Converts**

Some Predictive Model Business Implementation leading practices are:

<table>
<thead>
<tr>
<th>Success Factor</th>
<th>Leading Practice</th>
</tr>
</thead>
</table>
| **People**     | • 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**   | • Roll out plans and speed account for project risk and customer disruption  
• Training and change management programs prepare users and customers |
| **Communication** | • 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** | • 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** | • Separate documentation is produced for technical specifications, end users, senior management, and customers  
• People are aware of documentation, and access it to resolve questions |

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
**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).
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**

Team structures determine what activities analytics talent pursues.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
</table>
| **Analytics Only Team** | - 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 | - 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** | - 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 | - 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.*

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### 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

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**Analytics Data Marts**

*Fast, Widespread Information*

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*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.

ADM Benefits

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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.

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

Ledger Sources → Staging Tables → Corporate Data Warehouses → Third-Party Data → Analytics Data Mart → Business Intelligence Layer

Power Users → Analytics Modeling Files
Analytic Modelers/Statisticians → BI Tools

Conclusion
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!

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