

Using Unstructured Data to Better Manage Defense Costs

Prepared for: 2018 CAS CLRS

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SVP and Chief Claims Officer
NORCAL Group

Chad C. Karls, FCAS, MAAA
Principal and Consulting Actuary
Milliman

Date: September 6, 2018

Agenda

- The Current MPL Environment
- Using Unstructured Data
- Uniform Task Based Management System
- Unstructured Defense Costs Data
- Defense Cost Insight
- Other Considerations

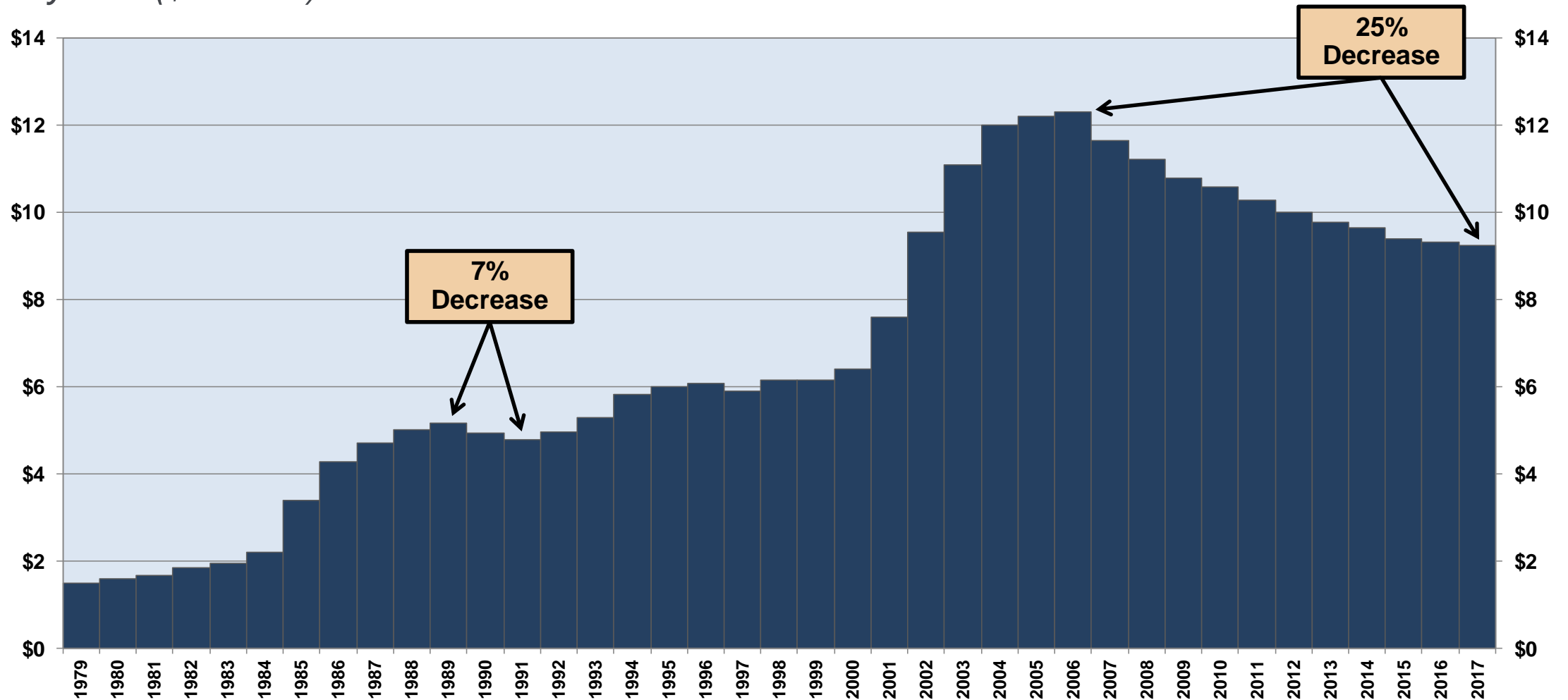
Topic #1

The Current MPL Environment

The Current MPL Environment

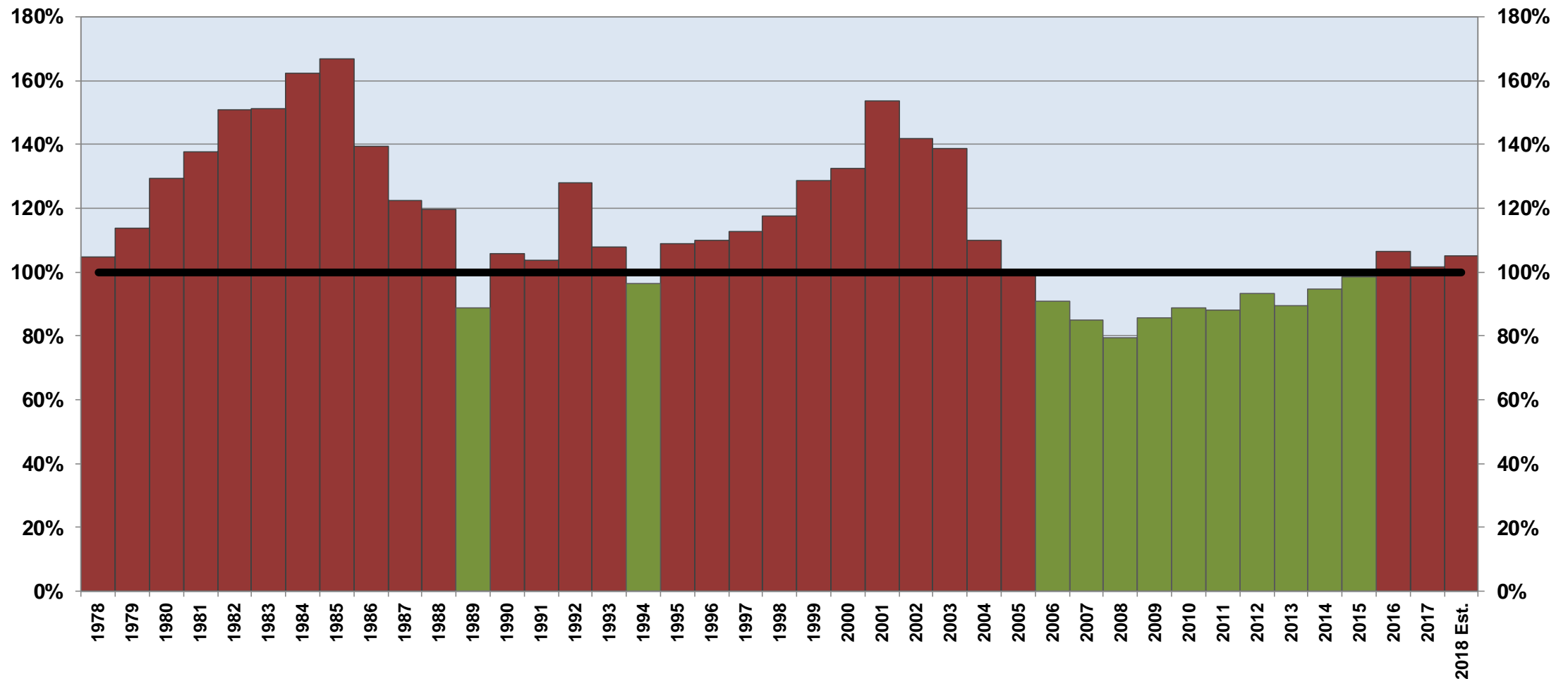
MPL Direct Written Premium

Countrywide (\$Billions)



The Current MPL Environment

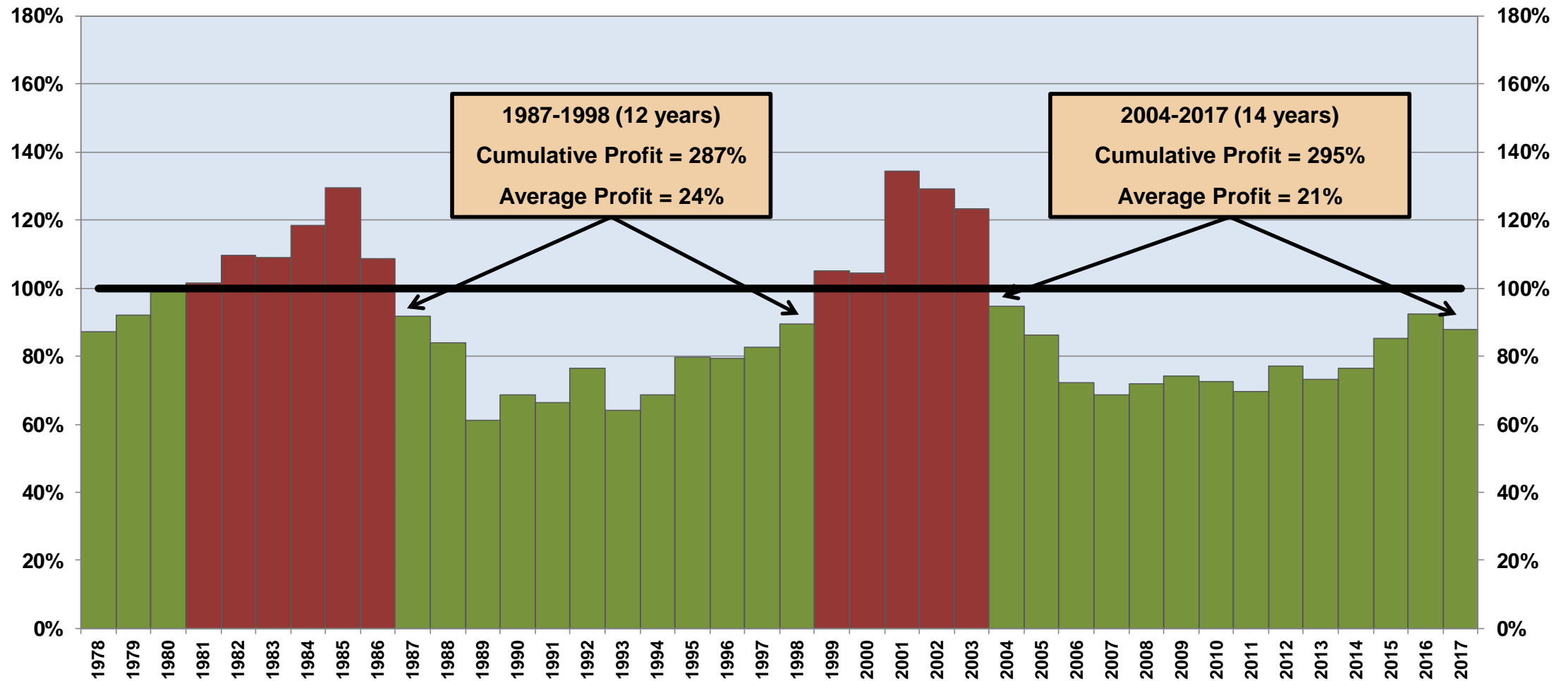
MPL Combined Ratio after Policyholder Dividends



Sources: Milliman analysis of A.M. Best Aggregates & Averages – P&C; multiple editions
Milliman analysis of P&C insurance statutory data as provided by SNL Financial
2018 ratio estimated from A.M. Best Review & Preview; February 2018

The Current MPL Environment

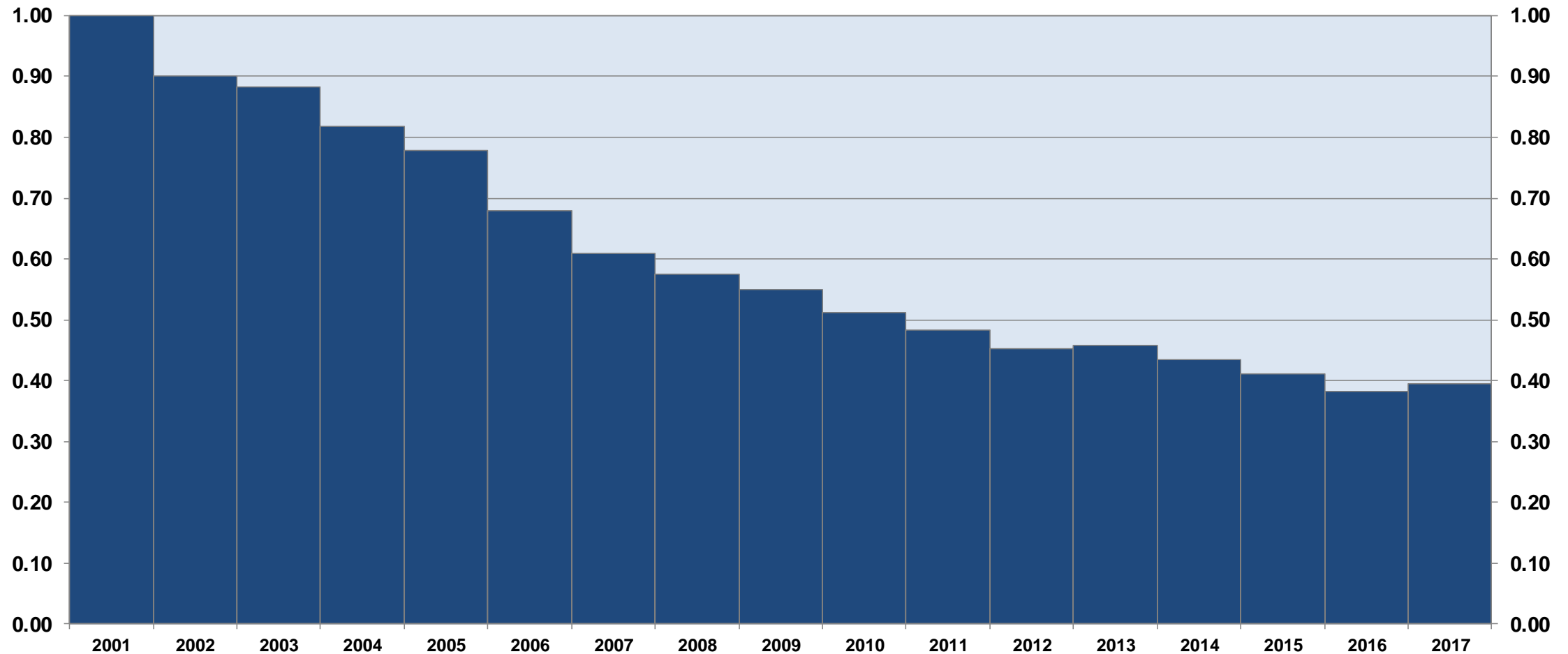
MPL Operating Ratio



The Current MPL Environment

Closed Claim Frequency per Physician

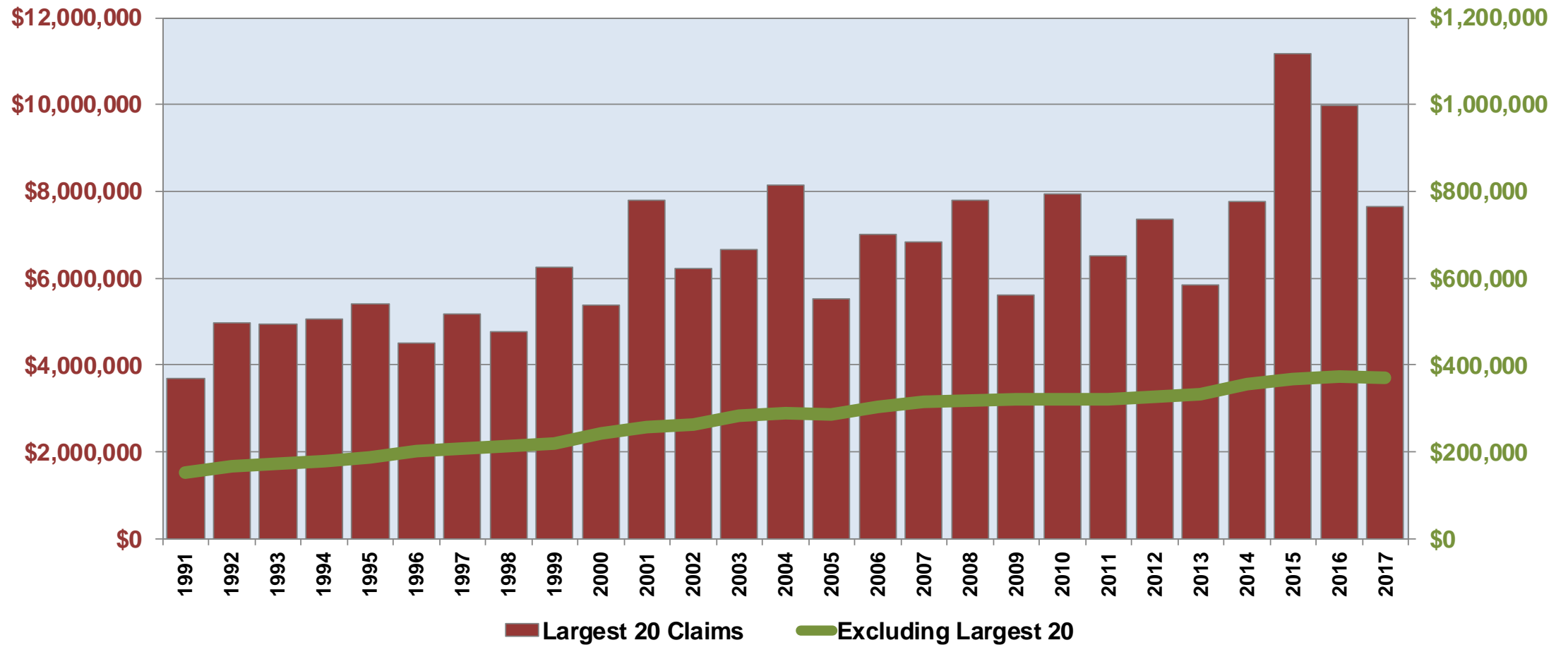
Relative to 2001



The Current MPL Environment

Paid Indemnity Severity

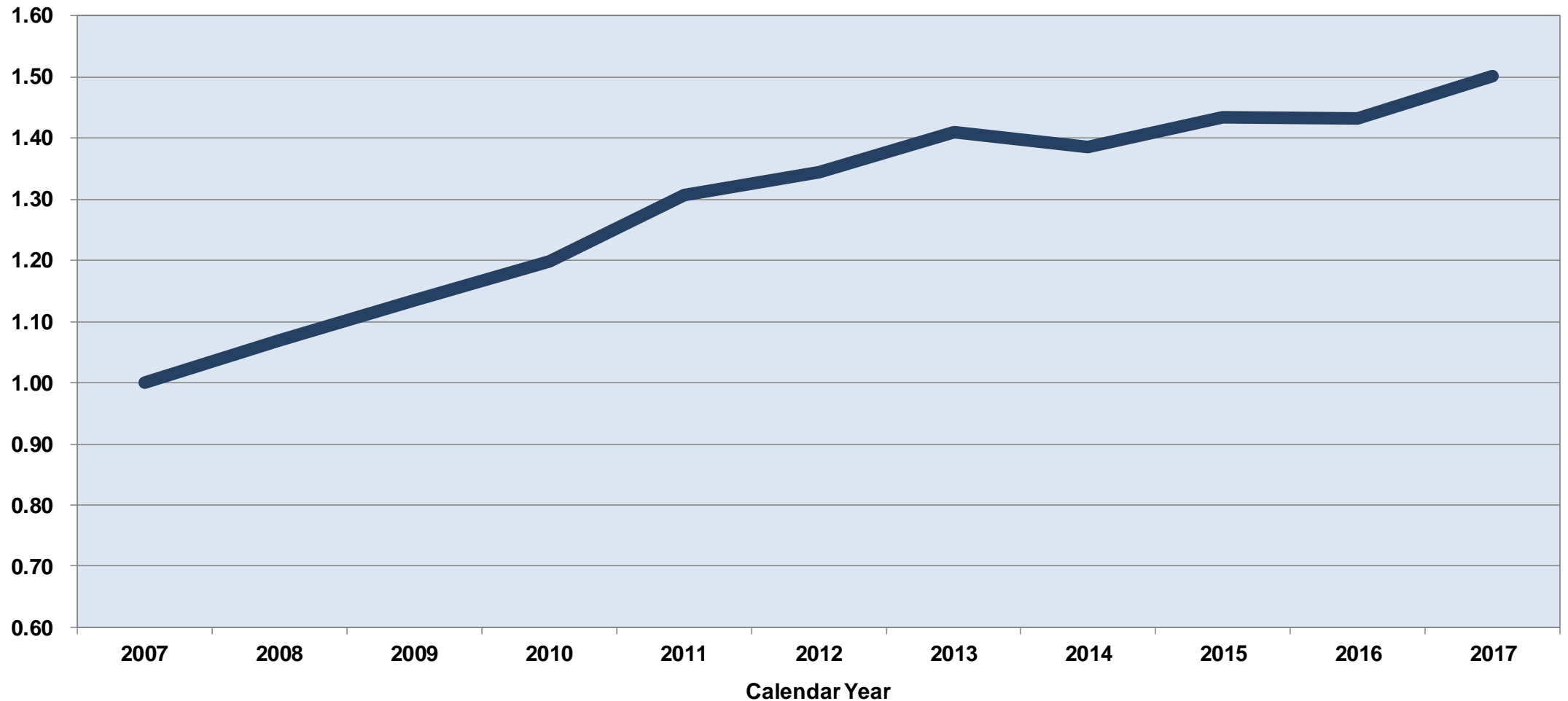
Countrywide, by Closed Year



The Current MPL Environment

Paid ALAE Severity

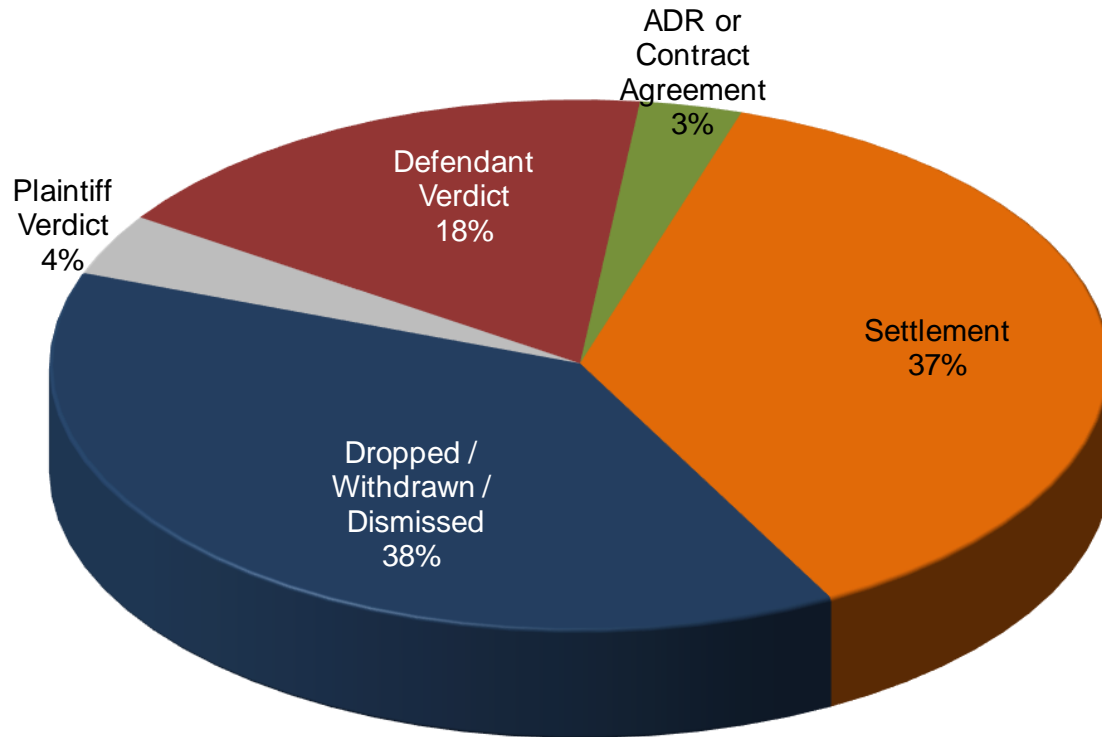
Three Year Rolling by Calendar Year, Relative to 2007



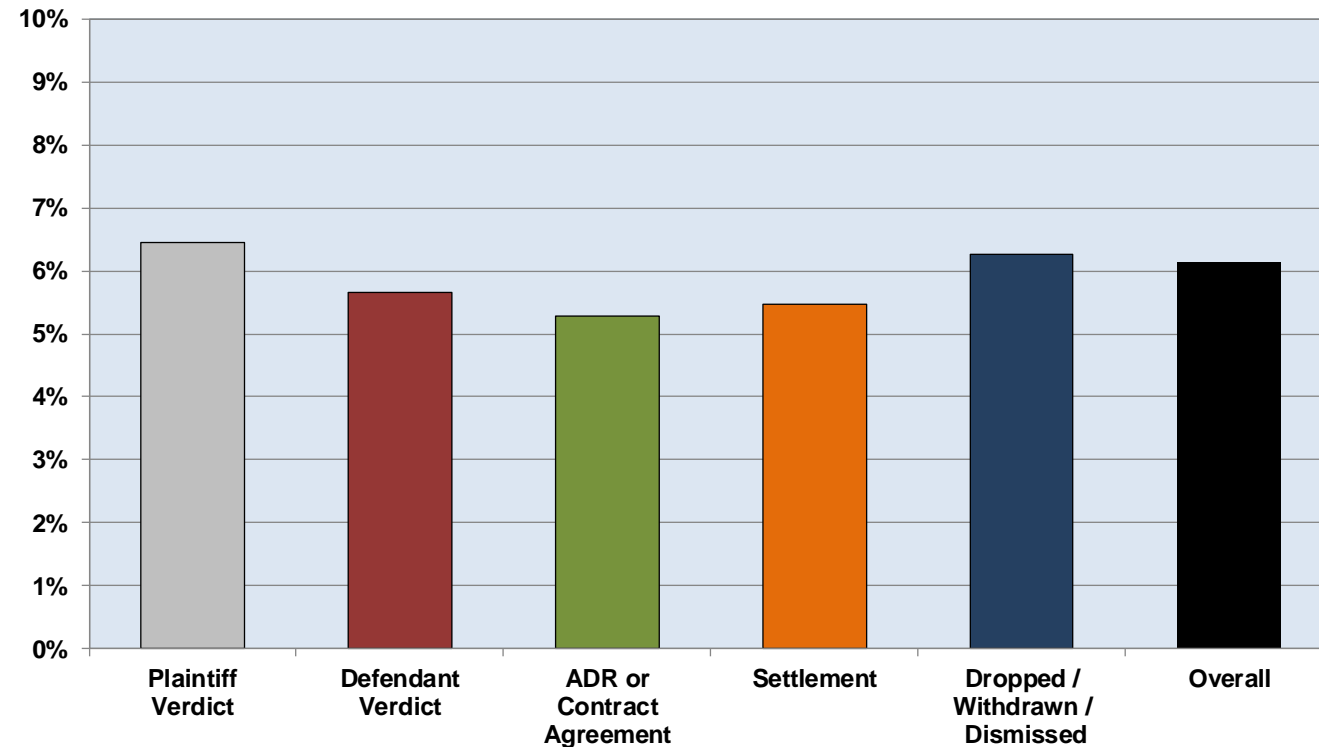
The Current MPL Environment

Paid ALAE Severity Trend

ALAE Cost Distribution



Annual Trend Rate (Relative to 2003)



Topic #2

Using Unstructured Data

What Is Unstructured Data?

- Information that exists without a pre-defined data model or is not organized in a pre-defined manner
- Oftentimes characterized by text instead of numbers
- Not conducive to analysis using traditional, formulaic type commands and inquiries

BIG DATA & AI LANDSCAPE 2018

INFRASTRUCTURE

HADOOP ON-PREMISE

cloudera Hortonworks
MAPR Pivotal
IBM InfoSphere
bluedata jethro

HADOOP IN THE CLOUD

aws Microsoft Azure
Google Cloud IBM InfoSphere
TREASURE DATA Doble altiscale
CAZENA CenturyLink

STREAMING / IN-MEMORY

aws databricks stream
confluent GridGain ORACLE
dataArtisans hazelcast
TERRACOTTA Ix PASTDATA
WallarooLABS

ANALYTICS

DATA ANALYST PLATFORMS

Microsoft pentaho alteryx
Digital guavus AYASDI
ATTIVO Datameer Quid incorta.
interana ClearStory Origami
ENDOR MODE Bottlenose switchboard

DATA SCIENCE PLATFORMS

IBM KNIME dataiku
DOMINO rapidminer
CONTINUUM ANALYTICS ALGORITHMIA
DATAWATCH ANALYSYS SAS

APPLICATIONS - ENTERPRISE

SALES

CHORUS RADIUS App Annie
INSIDESALES.COM EVERSTRING Lattice
conversica HINTIGO sense
clari avisio tact.ai
fusejmachines TROOPS ENGAGIO mrpe

MARKETING - B2B

BlueYonder [PERSADO] Okahuna
ACTIONIQ SAILTHRU BLUECORE
QUANTIFIND mparticle Ampero
amperity STALUM Simon Lyfics

MARKETING - B2C

zeta bloomreach SendGrid
BlueYonder [PERSADO] Okahuna
ACTIONIQ SAILTHRU BLUECORE
QUANTIFIND mparticle Ampero
amperity STALUM Simon Lyfics

CUSTOMER SERVICE

MEDALLIA zendesk
CLARABRIDGE
Gainsight NGDATA
DigitalGenius ahniti
AUTOMAT frame.ai
msga INTERCOM Ca@Desk

NOSQL DATABASES

Google Cloud aws
ORACLE Microsoft Azure
mongoDB MarkLogic
KEROSPIKE DTRASTX
ArangoDB Couchbase
redislabs SCYLLA

NewSQL DATABASES

SAP Clustrix NUODB
Cockroach LABS IBM
MEMSQL influxdata
MADRID DB VOLTDB
citusdata splice
paradigm4 TIBCO

GRAPH DBs

neo4j Amazon Neptune
IBM ORACLE
Cytoscape
HITSDB
Objectivity

MPP DBs

TERADATA VERTICA
IBM Data Warehouse Systems
Cation
Kognitio
Exasol
dremio

CLOUD EDW

aws Google Cloud
Microsoft Azure
Pivotal
snowflake

BI PLATFORMS

Microsoft aws
DOMO Water Analytics
looker thoughtspot
ARCADIA DATA Information Builders
MicroStrategy birst

VISUALIZATION

tableau SAP
Google Cloud CELESTIS
Qlik Periscope Data
ZEPH ZOOMDATA plotly
CHARTIO TOUCHAN TOCO

MACHINE LEARNING

Amazon SageMaker AWS
Google Cloud H2O
DataRobot gamalton
ELEMENT VISENZE
deeparisto bonsai

COMPUTER VISION

Microsoft Azure
Amazon Rekognition
clarifai
EVER AI deepomatic
twentybn

HORIZONTAL AI

IBM Watson Cortana Face++
sentient Voyager
Affective PROPHESY
Numenta PETUUM
narologics CURIOUS AI OSARO

SPEECH & NLP

Google Cloud twilio
Amazon alexa narrative intelligence
semantic machines
Moviel Movel
Soundhound Inc. viceroy
Medfield control.io
snips

SEARCH

ORACLE elasticsearch
EXPLERD covéo
Lucidworks ATTIVO
swiftype algolia
alphasense MAANA
omni:us SINEQUA

LOG ANALYTICS

splunk sumologic
LOGGLY
hibana
logz.io

SOCIAL ANALYTICS

Hootsuite sprinklr
NETBASE
synthesio
simple reach
bitly predata
SimilarWeb

WEB / MOBILE / COMMERCE ANALYTICS

Google Analytics
mixpanel AMPUTIDE
SUMALL Airtable
RESOL SIGOPT
granify custora

CROSS-INFRASTRUCTURE/ANALYTICS

aws Google Cloud Microsoft IBM SAP Hewlett Packard Enterprise SAS IOTODATA vmware TIBCO TERADATA ORACLE NetApp syncsort MAPR cloudera

APPLICATIONS - INDUSTRY

ADVERTISING

AppNexus
criteo xAd
ORACLE MOAT
theTradeDesk
Cappor

EDUCATION

Blackboard
KNEWTON
Clever
KIDaptive

GOVERNMENT

OPENSIV mark43
GRIDSMAART
Livestartes
SmartProcure
STREETSPYDATA

REAL ESTATE

Opendor
VTS
CREDI
reonomy
COMPSTAK
CAPE

FINANCE - LENDING

ondeck Affirm
JANPUAI
Kreditech AVANT
INSIKT
WELAB
TrueAccord
MoneyLion
aire

INSURANCE

metromile
Lemonade
CYENCE
Shift Technology
TRACTABLE

HEALTHCARE

fitation Clover XPRUS HealthTap
METABIOTA Gingerio Glow babyon
3D MED zebra PathAI OVIA
TEMPUS patientScribe AICURE
RECURSION prognos enlitic imago
Qventus BAYLABS ARTERYS
IMAGEN KOMP HEALTH PAIGE DATAMAN

LIFE SCIENCES

Genentech color
BenevolentAI Verily
WuXiNextCODE ZEPHYR
nautology
Clear Labs
freemans
DNAnexus
CITRINE
twoSAR

TRANSPORTATION

UBER TESLA
CLEARPATH
drive.ai
nauto
PILOTAI
OPTIMUS
moovit
nexar
netradyn

AGRICULTURE

FARMERS
Granular
JOHN DEERE
BLUE RIVER
FarmersEdge
FarmLogs
TARANIS
BOXEVER
GAMAYA
prospera

COMMERCE

instacart
STITCH FIX
Dorco
NewGood
HURDUCKY
FarmersEdge
Other
eHarmony stem
ByteDance
BUXEVER
Unbabel
remesh ASAPP

INDUSTRIAL

AVEVA SIEMENS
PREDIX
Cytio UPTAKE
TACHYUS
Altium SCORTEX
Amper

OPEN SOURCE

FRAMEWORK

hadoop
Flink
Spark

QUERY / DATA FLOW

Spark SQL
presto
SLAMDATA
Google cloud Dataflow

DATA ACCESS

cassandra nifi mongoDB
CouchDB
HBASE

COORDINATION

talend
Apache Zookeeper
Apache Ambari
Apache Airflow

STREAMING

Spark
Flink
kafka
druid
STORM

STAT TOOLS

python
Scalalab
SciPy
julia

AI / MACHINE LEARNING / DEEP LEARNING

TensorFlow theano
Caffe
Microsoft Cognitive Toolkit
OpenAI
neon
DSSNE

SEARCH

elasticsearch
Solr

LOGGING & MONITORING

elasticsearch kibana
SENTRY
logstash
Prometheus

VISUALIZATION

BeakerX
Rodeo

COLLABORATION

Jupyter
ANACONDA

SECURITY

Apache Ranger
KNOX
Sentry

DATA SOURCES & APIs

HEALTH

Apple VALIDIC
practicefusion
fitbit GARMIN
HUMAN API kinsa

IOT

GE Digital
UPTAKE thingworx
helium samsara

FINANCIAL & ECONOMIC DATA

Bloomberg THOMSON REUTERS DOW JONES
SEPCAPITALIQ CBINSIGHTS xignite Quandl
INVESTNET
PREMISE gestimize
Eagle Alpha StockTwits PLAID Thinknum earnest

AIR / SPACE / SEA

Orbital insight pionet
Airware AIRBOTICS
spire kespry
WINDWARD
DroneDeploy

PEOPLE / ENTITIES

action expier.
EPSILON
Crimson Hexagon
BASIS
SAFEGRAPH

LOCATION INTELLIGENCE

FOURSQUARE
sense360
PlaceIQ esri factual
CARY Mapillary Streetline
cubicq Radar

OTHER

QUALTRICS
DATA.GOV
enigma
CRUX

DATA RESOURCES

DATA SERVICES

Palantir OPERA
DATA SCIENCE
fractal kaggle
DataKind
EXL innoplexus

INCUBATORS & SCHOOLS

PLURALSIGHT GALVANIZE
DataCamp DataLite
INSIGHT The Data Incubator

RESEARCH

facebook research
MIRI
VECTOR INSTITUTE
ALLEN INSTITUTE OF ARTIFICIAL INTELLIGENCE

Defense Costs = Big Data

▪ Assumed Annual Defense Costs Paid	\$50,000,000
▪ Average Billing Increment	0.21 hours
▪ Average Hourly Rate	\$141.86
▪ Average Line Items per Page	11.5
▪ Thickness of 100 Pieces of Paper	17/32"
▪ Weight of 100 Pieces of Paper	19 oz.
▪ Height of Defense Costs Paper	64' 7³/₄"
▪ Weight of Defense Costs Paper	1,732 lbs. 4 oz.
▪ Number of Line Item Descriptions	1,679,272

Topic #3

Uniform Task Based Management System

Uniform Task Based Management System

- Developed in the mid-1990s by a joint American Bar Association committee to create a consistent electronic billing standard
- Created an electronic version of the bill called a LEDES file
 - Almost all firms/billing systems have adopted some form of LEDES
 - LEDES 1998B is the most common (pipe delimited “txt” file)
 - LEDES 2000 is a XML version but adoption has been slow
 - Additional versions are being developed to allow more flexibility at the firm level
- The litigation code sets require judgmental assignments and thus are inconsistent from firm to firm and even within an individual firm

Uniform Task Based Management System



ABA GROUPS

Uniform Task-Based Management System

Participants and Liaisons

Litigation Code Set

Litigation Code Set Sample Budget Format

Litigation Code Definitions

Background, Definitions, Principles, and Assumptions

Participants and Liaisons

Uniform Task-Based Management System Participants and Liaisons

Corporate Participants

- American Airlines Inc.
- Chase Manhattan Bank, N.A.
- Chrysler Corporation
- CIGNA Corporation
- Citicorp/Citibank N.A.
- Dow Chemical Company
- DuPont Company
- Eastman Kodak Company
- Metropolitan Life Insurance Company
- NationsBank Corporation
- Niagara Mohawk Power Corporation
- NYNEX Corporation
- The Pacific Telesis Group
- Philip Morris Companies Inc.
- Prudential Insurance Company of America
- TRW Inc.
- Viacom International Inc.
- Westinghouse Electric Corporation

Law Firm Participants

- Abelman, Frayne & Schwab
- Adams, Duque & Hazeltine
- Crowell & Moring
- Goodwin, Procter & Hoar
- Heller Ehrman White & McAuliffe
- Jones, Day, Reavis & Pogue
- Kenyon & Kenyon
- King & Spalding
- McCutchen, Doyle, Brown & Enersen
- McMillan Binch
- Milbank, Tweed, Hadley & McCloy
- Nixon, Hargrave, Devans & Doyle
- O'Melveny & Myers
- Paul, Weiss, Rifkind, Wharton & Garrison
- Peterson & Ross
- Pillsbury Madison & Sutro
- Reed Smith Shaw & McClay
- Sedgwick, Detert, Moran & Arnold
- Shearman & Sterling
- Sidley & Austin
- Skadden, Arps, Slate, Meagher & Flom
- Weil, Gotshal & Manges
- White & Case
- Wilmer, Cutler & Pickering

Uniform Task Based Management System

Uniform Task-Based Management System Litigation Code Set

L100 Case Assessment, Development and Administration

- L110 Fact Investigation/Development
- L120 Analysis/Strategy
- L130 Experts/Consultants
- L140 Document/File Management
- L150 Budgeting
- L160 Settlement/Non-Binding ADR
- L190 Other Case Assessment, Development and Administration

L200 Pre-Trial Pleadings and Motions

- L210 Pleadings
- L220 Preliminary Injunctions/Provisional Remedies
- L230 Court Mandated Conferences
- L240 Dispositive Motions
- L250 Other Written Motions and Submissions
- L260 Class Action Certification and Notice

L300 Discovery

- L310 Written Discovery
- L320 Document Production
- L330 Depositions
- L340 Expert Discovery
- L350 Discovery Motions
- L390 Other Discovery

L400 Trial Preparation and Trial

- L410 Fact Witnesses
- L420 Expert Witnesses
- L430 Written Motions and Submissions
- L440 Other Trial Preparation and Support
- L450 Trial and Hearing Attendance
- L460 Post-Trial Motions and Submissions
- L470 Enforcement

L500 Appeal

- L510 Appellate Motions and Submissions
- L520 Appellate Briefs
- L530 Oral Argument

A100 Activities

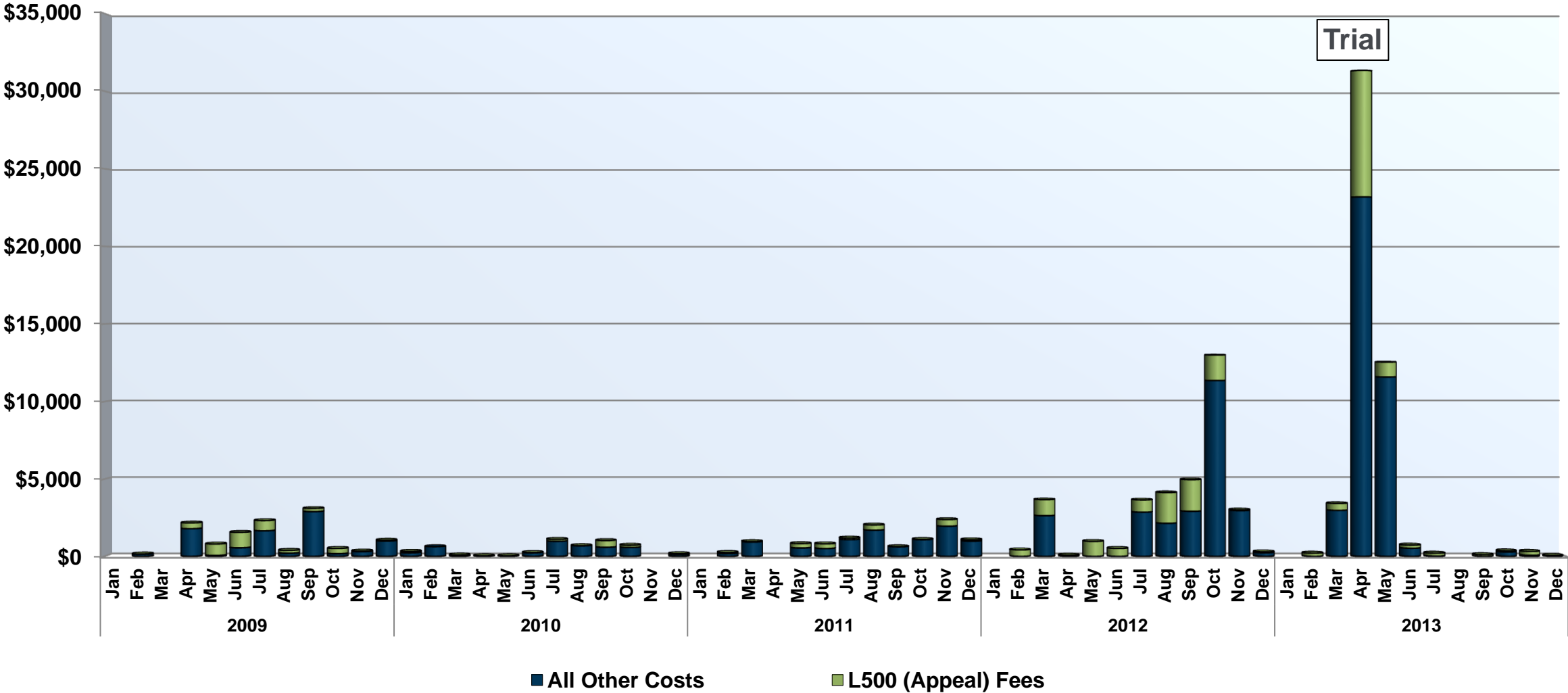
- A101 Plan and prepare for
- A102 Research
- A103 Draft/revise
- A104 Review/analyze
- A105 Communicate (in firm)
- A106 Communicate (with client)
- A107 Communicate (other outside counsel)
- A108 Communicate (other external)
- A109 Appear for/attend
- A110 Manage data/files
- A111 Other

E100 Expenses

- E101 Copying
- E102 Outside printing
- E103 Word processing
- E104 Facsimile
- E105 Telephone
- E106 Online research
- E107 Delivery services/messengers
- E108 Postage
- E109 Local travel
- E110 Out-of-town travel
- E111 Meals
- E112 Court fees
- E113 Subpoena fees
- E114 Witness fees
- E115 Deposition transcripts
- E116 Trial transcripts
- E117 Trial exhibits
- E118 Litigation support vendors
- E119 Experts
- E120 Private investigators
- E121 Arbitrators/mediators
- E122 Local counsel
- E123 Other professionals
- E124 Other

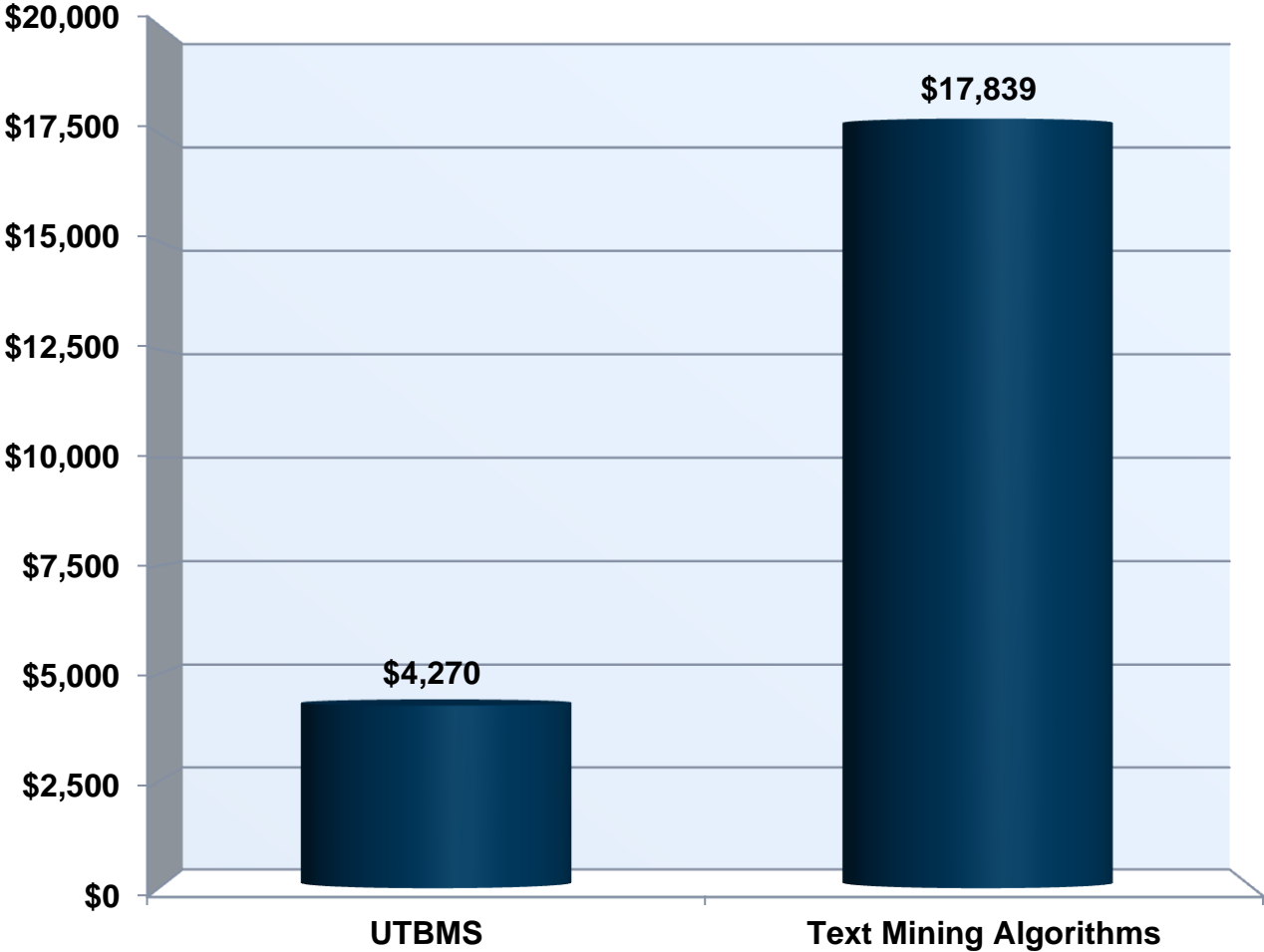
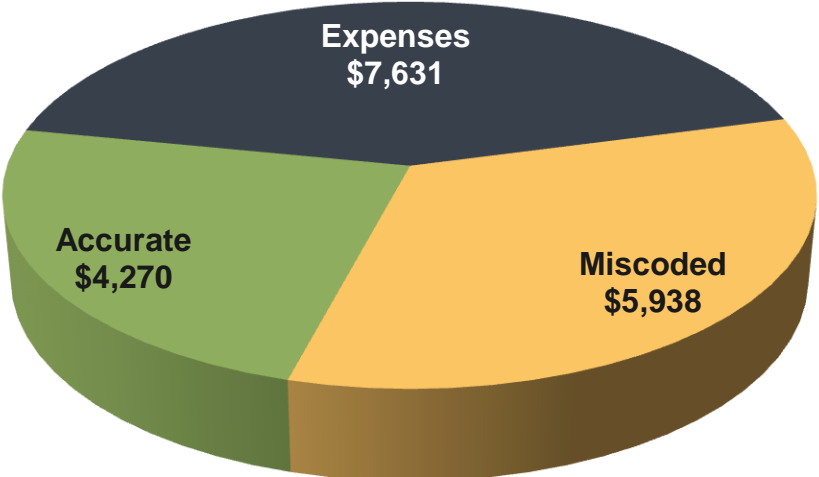
Uniform Task Based Management System

UTBMS Codes are Incorrect



Uniform Task Based Management System

Incomplete and Erroneous Coding – Deposition Costs



Topic #4

Unstructured Defense Costs Data

Unstructured Defense Costs Data

**ABC Law Firm
123 Main Street
Any Town, USA 12345**

Mr. John Smith
President and CEO
Medical Malpractice Insurance Co.
123 Main Street, Suite 100
Milwaukee, WI 12345

OUR FEES

			Hours	Rate	Total
4/7/2009	JWM	Receipt and review of correspondence from adversary regarding deposition of co-defendant.	0.1	150	\$15.00
4/7/2009	JWM	Receipt and review of lengthy notice of videotaped deposition of co-defendant.	0.2	150	\$30.00
4/7/2009	JWM	Receipt and review of correspondence from co-defendant's attorney regarding objections to plaintiff's Notice of videotaped deposition.	0.1	150	\$15.00
4/7/2009	JWM	Review of co-defendant's objections to plaintiff's Notice of videotaped deposition.	0.2	150	\$30.00
4/9/2009	JWM	Attendance at and participation in deposition of John Smith (9:00 - 11:50).	2.8	150	\$420.00
4/9/2009	JWM	Travel time to and from Hartford (rush hour traffic and construction traffic).	3.3	150	\$495.00
4/9/2009	JWM	Preparation for the deposition of John Smith, including review of expert reports, interrogatory answers, medical records and responses to Notice to Produce.	1.5	150	\$225.00
			<u>8.2</u>		<u>\$1,230.00</u>

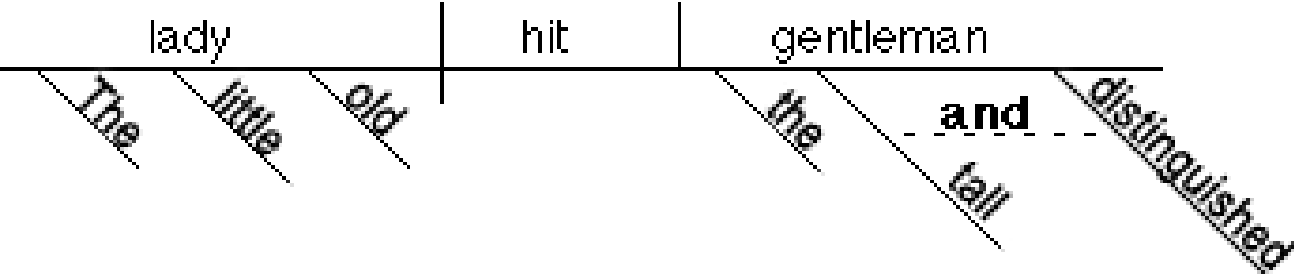
DISBURSEMENTS

4/9/2009	JWM	Parking - \$22.00	1	22	\$22.00
4/9/2009	JWM	Mileage Expense - To/From Hartford	100	0.55	\$55.00
					<u>\$77.00</u>

Unstructured Defense Costs Data

Sentence Diagram

The little old lady hit the tall and distinguished gentleman.



Unstructured Defense Costs Data

Results of Text Mining

4/5/2009 JWM Analysis of correspondence from adversary regarding deposition of defendant.
 4/6/2009 JWM Review of file in preparation for meeting with defendant Dr. J. Smith.
 4/7/2009 JWM Extended telephone conference with defendant in preparation for his deposition.
 4/7/2009 JWM Receipt and review of letter from co-defs attorney regarding our client's upcoming deposition.
 4/8/2018 JWM Preparation for the deposition of John A. Smith of General Hospital, including review of expert reports, interrogatory answers, medical records and responses to Notice to Produce.
 4/9/2009 JWM Meeting with Dr. Smith prior to his deposition.
 4/9/2009 JWM Attendance at and participation in deposition of John Smith, MD (9:00 - 11:50).
 4/9/2009 JWM Travel time to and from Hartford (rush hour traffic and construction traffic).



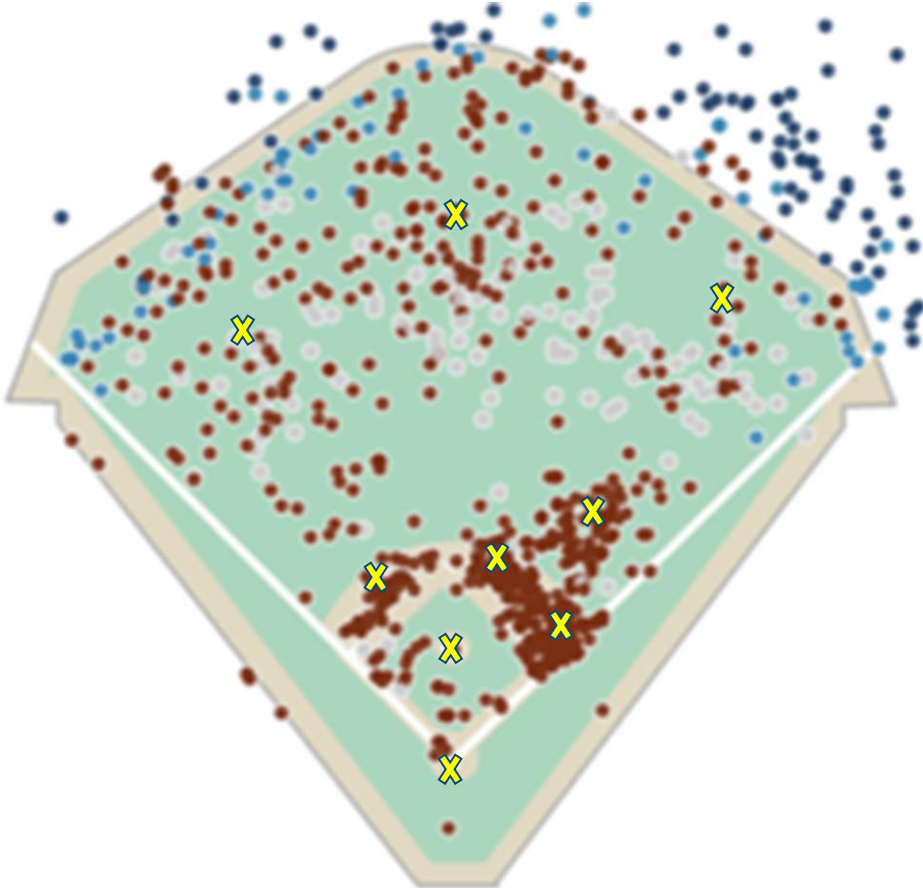
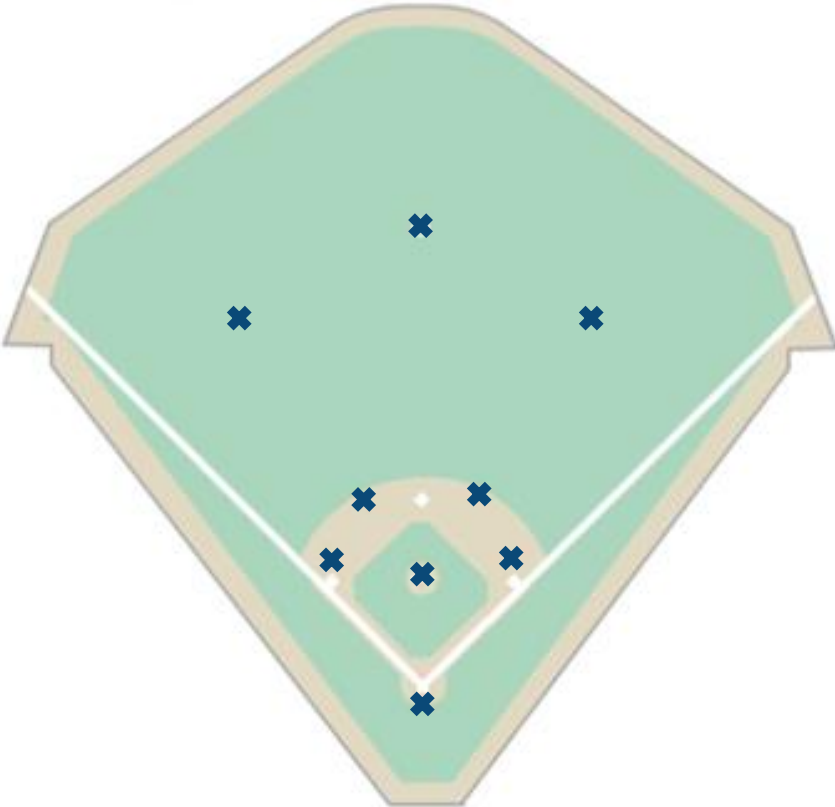
Date	Verb	Subject	Event Type	Event Participant	Travel	Location	Unit Type
4/5/2009	review	correspondence	deposition	defendant Dr. John A. Smith, MD			Hours
4/6/2009	review	file	deposition	defendant Dr. John A. Smith, MD			Hours
4/7/2009	communicate	conference call	deposition	defendant Dr. John A. Smith, MD			Hours
4/7/2009	review	correspondence	deposition	defendant Dr. John A. Smith, MD			Hours
4/8/2009	plan/prepare	deposition	deposition	defendant Dr. John A. Smith, MD			Hours
4/9/2009	attend	meeting	deposition	defendant Dr. John A. Smith, MD		Hartford	Hours
4/9/2009	attend	deposition	deposition	defendant Dr. John A. Smith, MD		Hartford	Hours
4/9/2009	travel	deposition	deposition	defendant Dr. John A. Smith, MD	to/from	Hartford	Hours
4/9/2009	travel	deposition	deposition	defendant Dr. John A. Smith, MD	to/from	Hartford	Parking
4/9/2009	travel	deposition	deposition	defendant Dr. John A. Smith, MD	to/from	Hartford	Miles

Topic #5

Defense Cost Insights

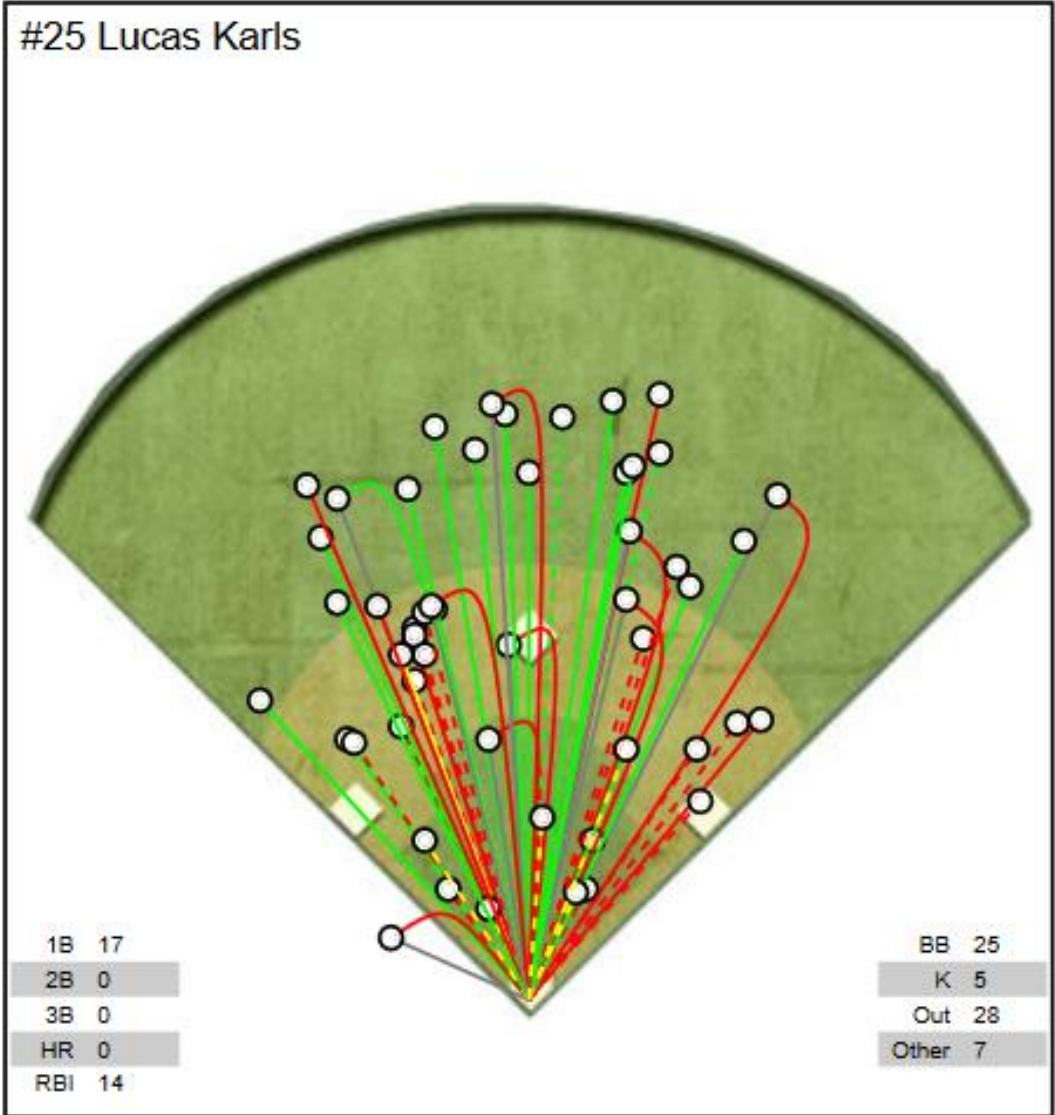
Defense Cost Insights

Better Intelligence Starts with Better Data



Defense Cost Insights

Better Intelligence Starts with Better Data



Defense Cost Insights

Business Intelligence Reporting

▪ Auditing Features

- Duplicate services, improper rate, travel restrictions
- Unauthorized activities, work management issues
- Outlier time charges, inconsistent charges

▪ Defense Firm Management Reports

- Peer firm comparisons
- Outlier firm identification
- Actual results versus predicted results

▪ Management Reports

- Actual versus expected impact of billing guideline changes
- Reduced variability in ALAE patterns

▪ Better Practice of Claims Defense

- Timing of depositions impact on CWIP ratio
- Efficiency of Motions for Summary Judgment

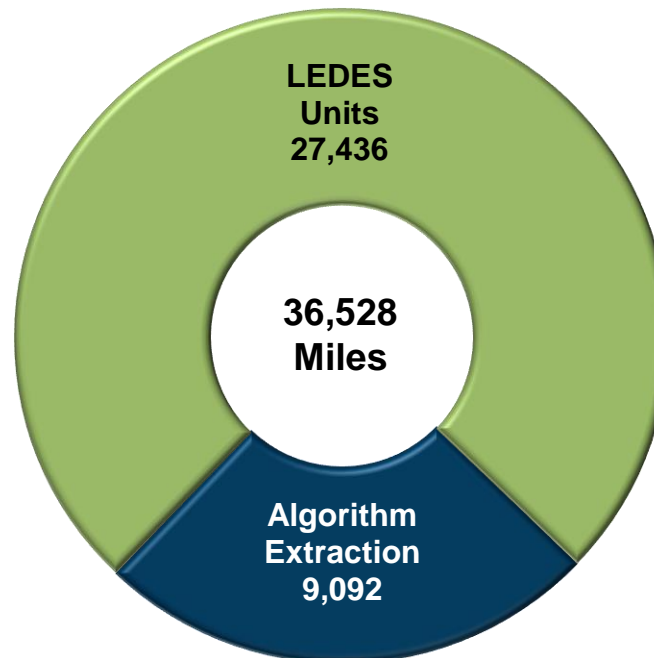
Defense Cost Insights

Reimbursed Expenses – Mileage

Even When Costs Are Correct, Coding Is Often Incorrect

Invoice Line Items		Show All		miles		Show: 50	
Line Item	Date	Description	TK	Fee / Exp	Cost Details		Actions
25	09/09/2014	MCA mileage cost @ .56 per mile (miles = 151 to Modesto for pre-deposition meeting with Dr. Altman)		E	1	x \$84.56 = \$84.56	
					(units)	(rate) (total)	

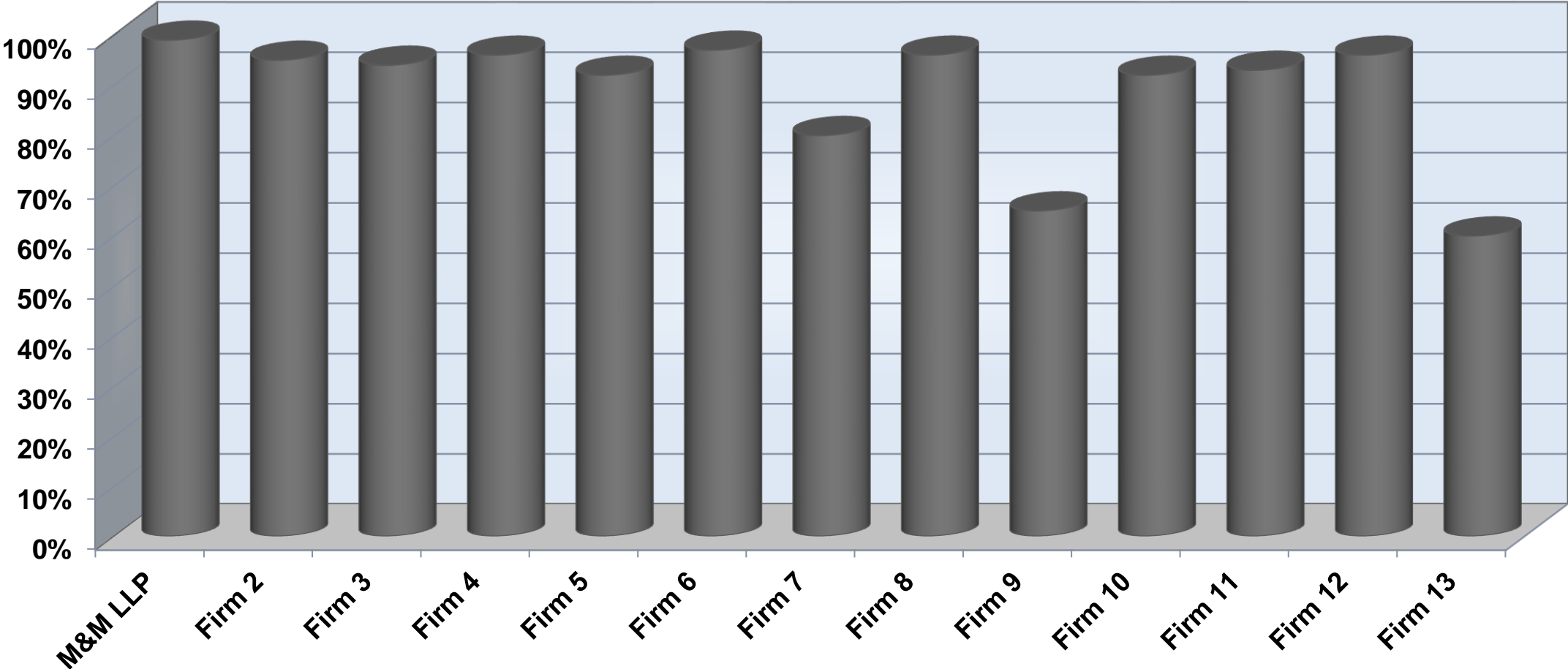
Mileage Reimbursement Q4 2014



Defense Cost Insights

Defense Firm Management – Initial Claim Report

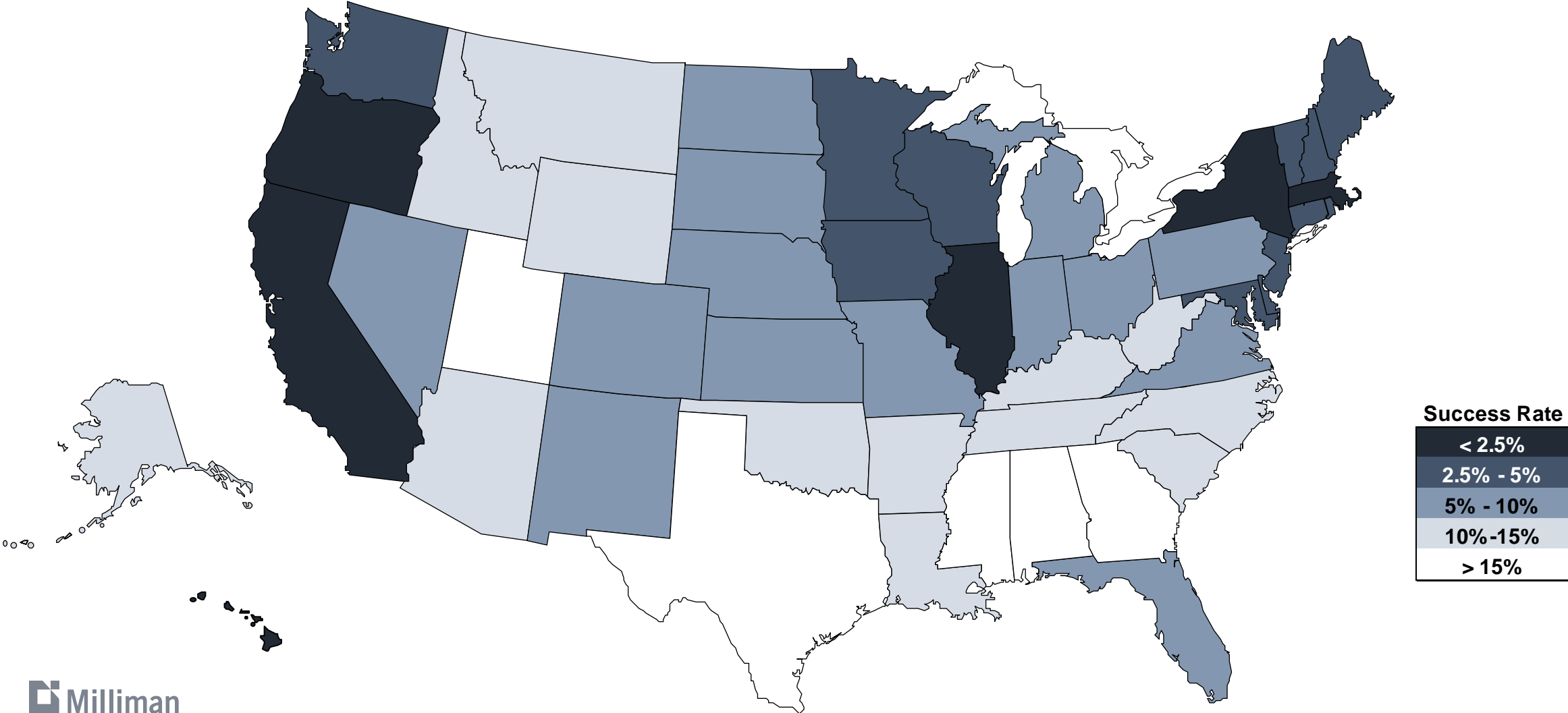
Compliance Percentage



Defense Cost Insights

Motion for Summary Judgment

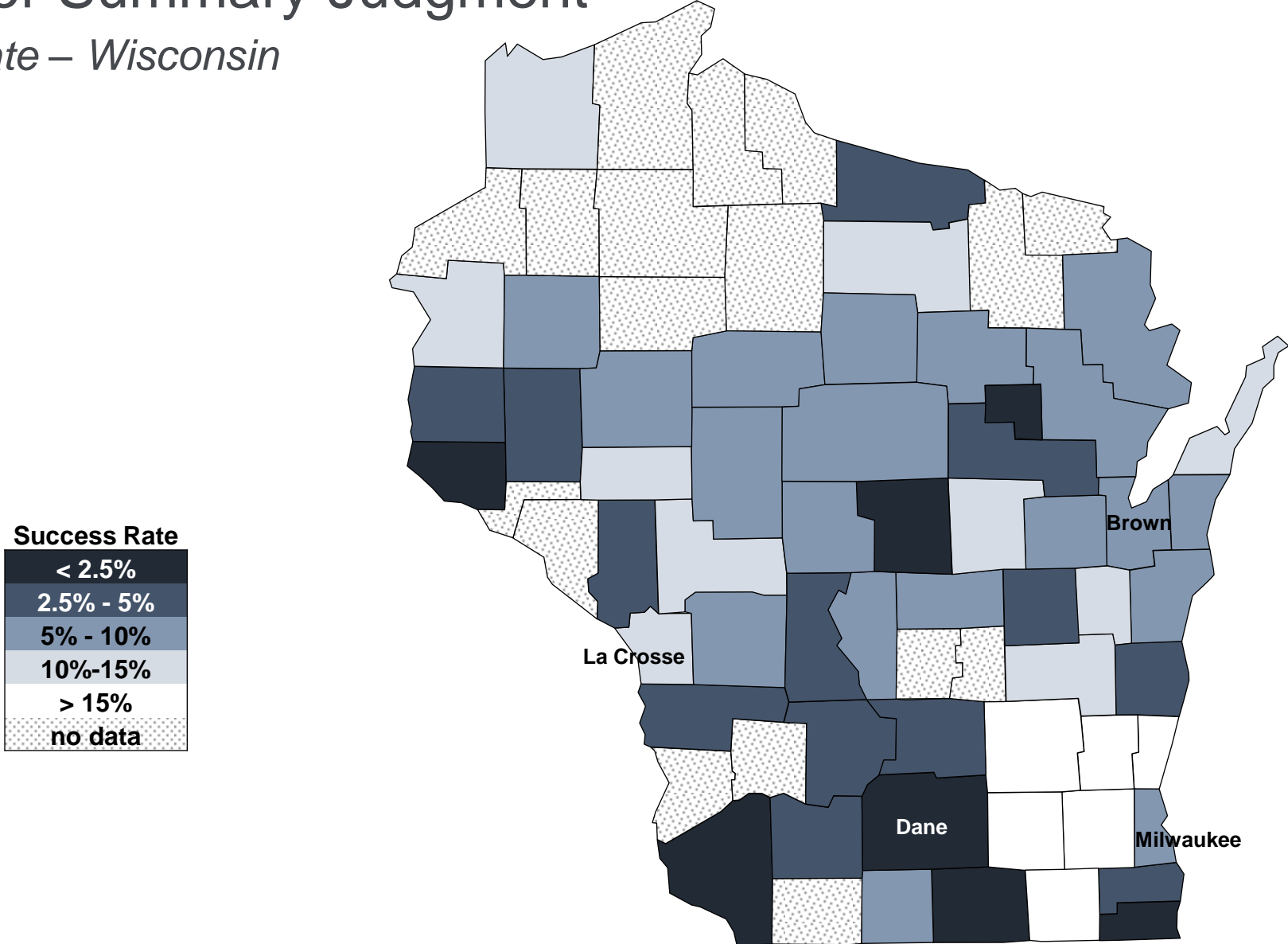
Success Rate – Countrywide



Defense Cost Insights

Motion for Summary Judgment

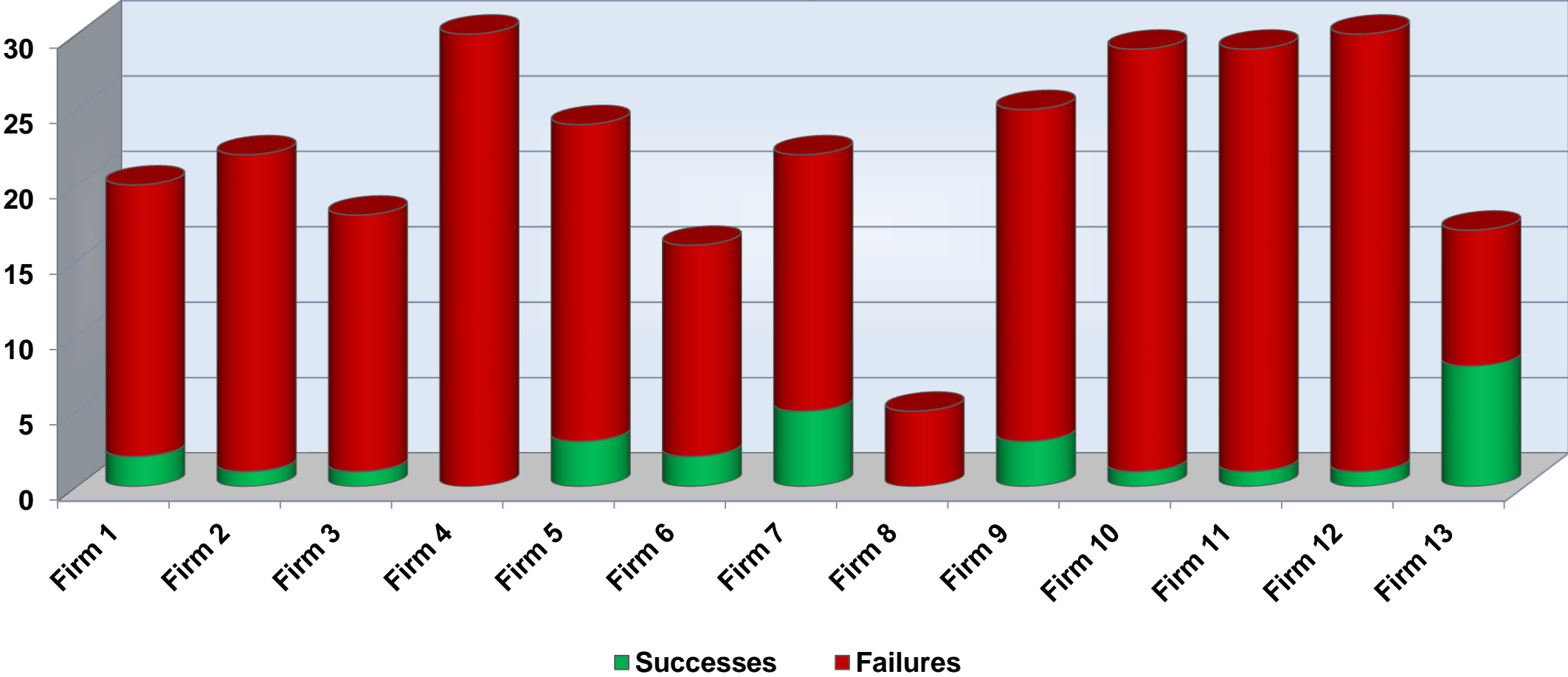
Success Rate – Wisconsin



Defense Cost Insights

Motion for Summary Judgment

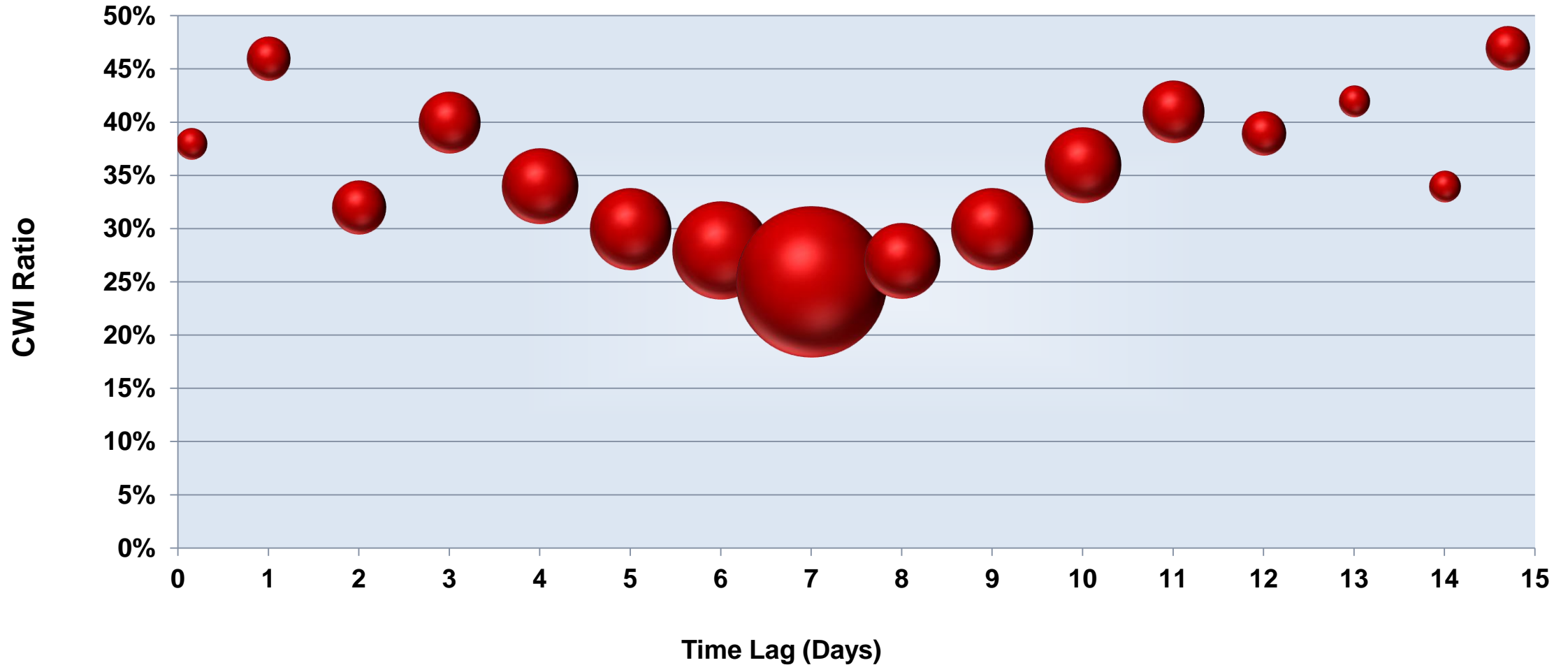
Number Filed and Success Rate



Defense Cost Insights

Predictive Analytics – Timing of Deposition

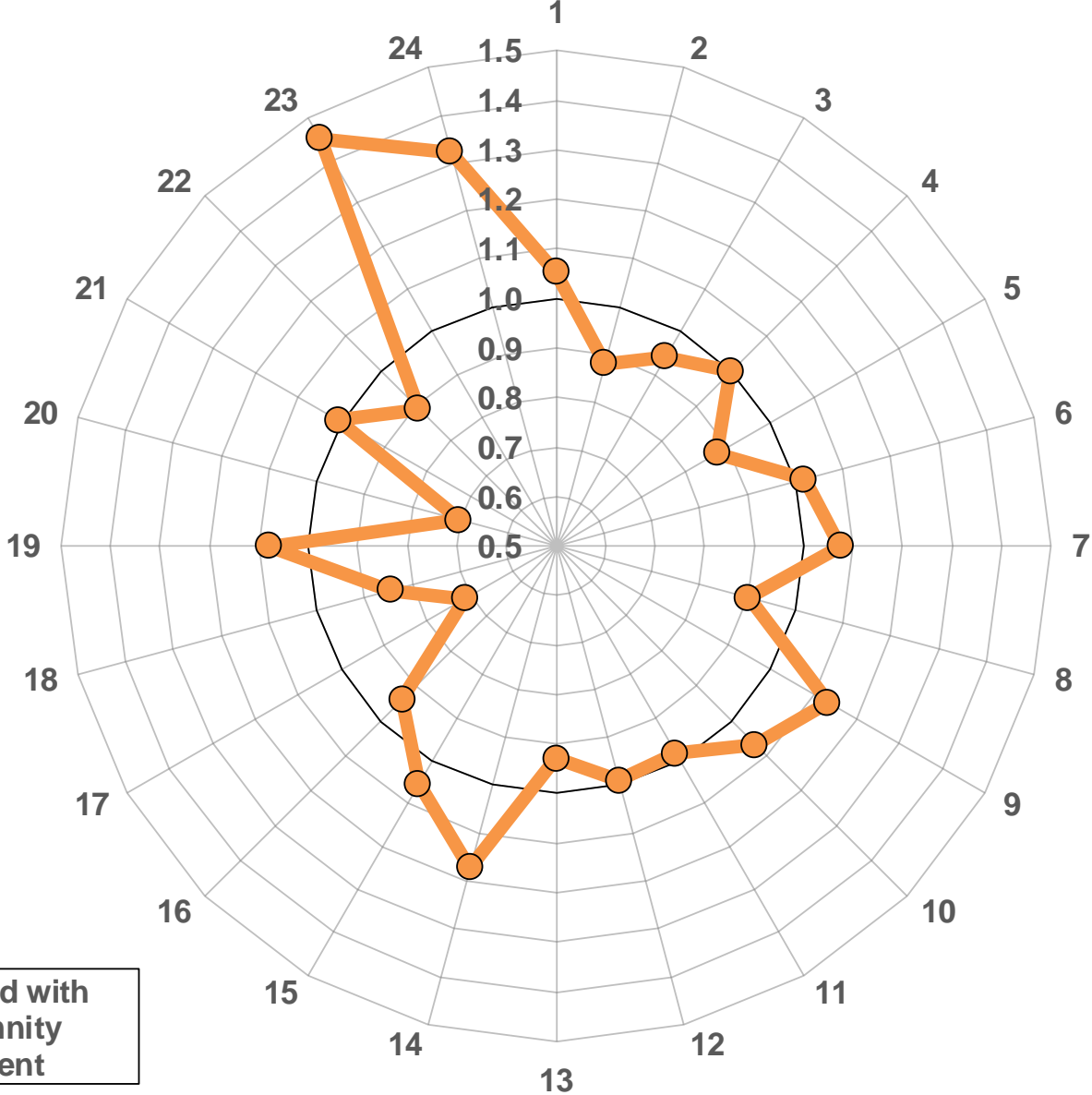
Claim Result Grouped by Deposition Lag



Defense Cost Insights

Loss Cost Components

Actual versus Predicted CWI Claims



Source: Milliman analysis of Datalytics client data

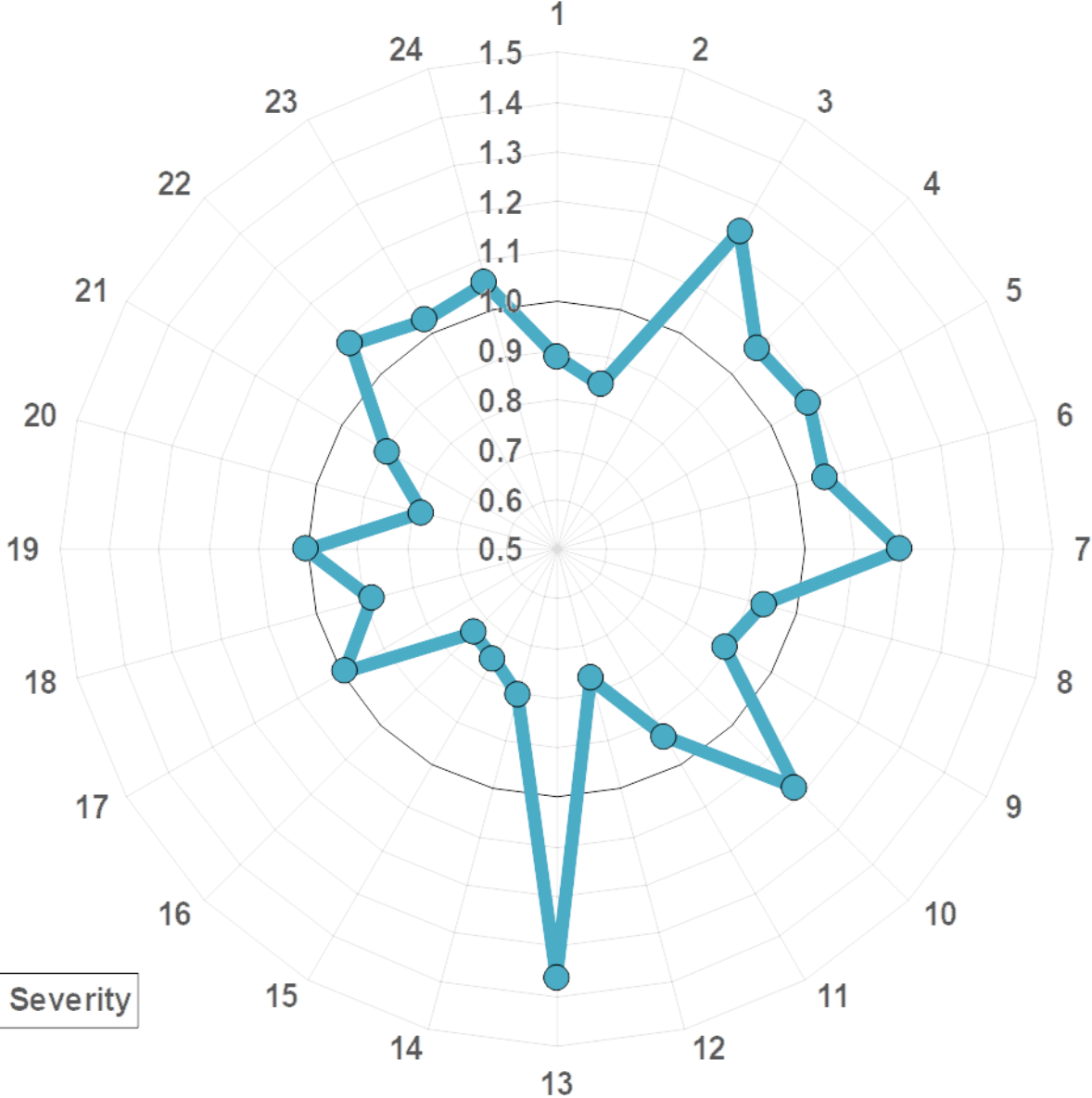


● Closed with Indemnity Payment

Defense Cost Insights

Loss Cost Components

Actual versus Predicted ALAE Costs

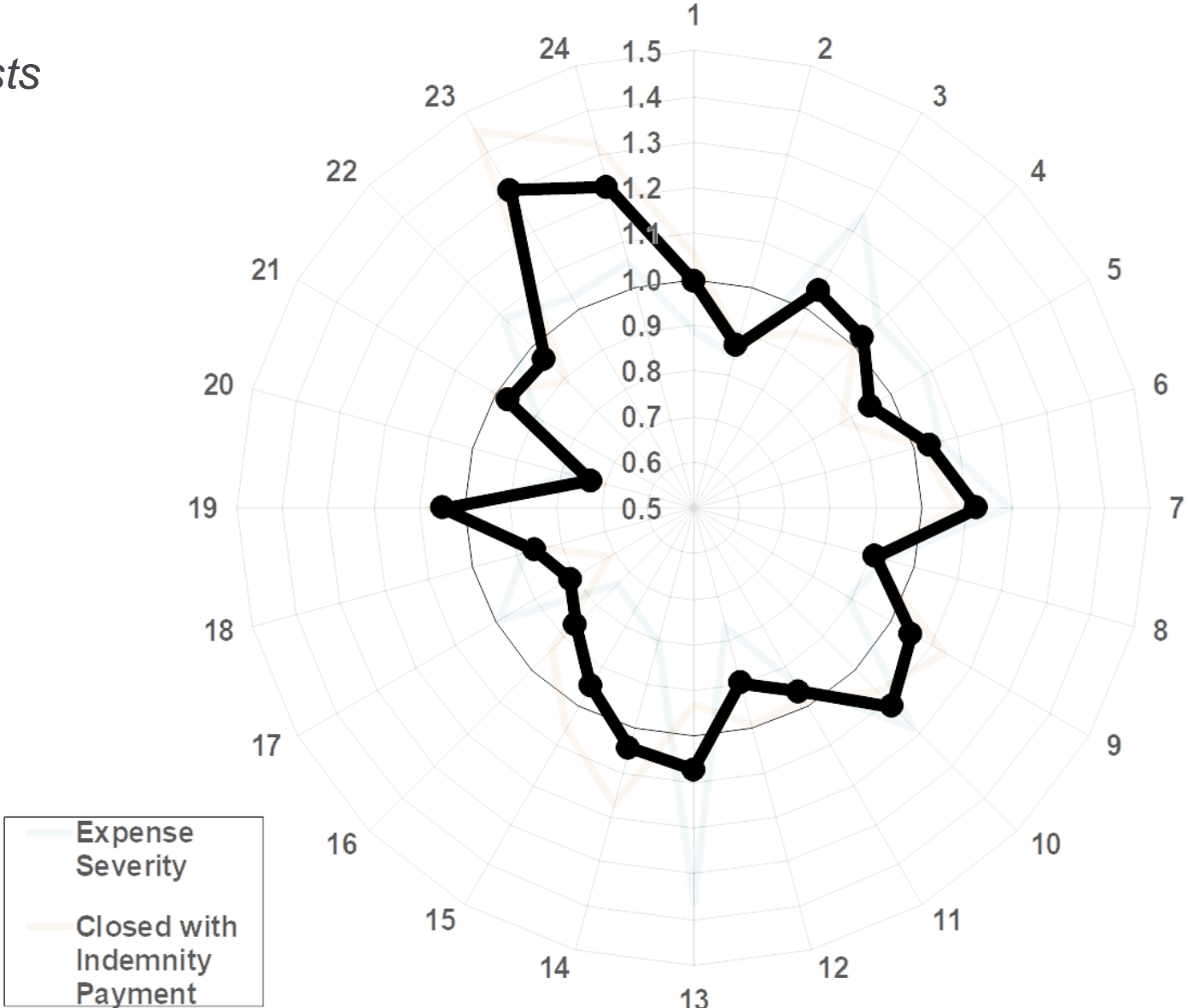


Source: Milliman analysis of Datalytics client data

Defense Cost Insights

Loss Cost Components

Actual versus Predicted Total Costs



Source: Milliman analysis of Datalytics client data

Other Considerations

Other Considerations

Accompanying Oral Discussion

- This document is not complete without the accompanying oral discussion and explanation of the underlying information and concepts as well as any interpretational limitations.

Limited Distribution

- This document should not be distributed, disclosed or otherwise furnished, in whole or in part, without the express written consent of Milliman.

Data Reliance

- We have relied upon data and other background information prepared by others, as documented throughout this presentation. We have performed a limited review of the data for reasonableness and consistency and have not found material defects in the data. If there are material defects in the data, it is possible that they would be uncovered by a detailed, systematic review and comparison of the data to search for data values that are questionable or relationships that are materially inconsistent. Such a review was beyond the scope of our assignment.