Predictive Analytics WORLD
Predictive Analytics: Delivering on the Promise of Big Data
CASACT Ratemaking & Product Management Seminar
March 2014
Eric Siegel, Ph.D.
Founder, Predictive Analytics World
Author, Predictive Analytics

BOOK:
Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die
www.thepredictionbook.com

CONFERENCE:
Predictive Analytics World
San Francisco, Chicago, Boston, Washington DC, Toronto, Berlin, and London
www.predictiveanalyticsworld.com

ONLINE PORTAL AND NEWS SITE:
Predictive Analytics Times
www.predictiveanalyticstimes.com

CONFERENCE:
Text Analytics World
San Francisco and Boston
www.textanalyticsworld.com

Online training:
*"*Predictive Analytics Applied" - *View it on-demand*
www.businessprediction.com

Predictive Analytics WORLD
MANUFACTURING
CHICAGO
June 17-18, 2014
Predictive Analytics WORLD
HEALTHCARE
BOSTON
October 6-7, 2014

PREDICTIVE ANALYTICS Times
The predictive analytics professionals' premier resource
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Wise Practitioner- Predictive Analytics Interview Series: Vikash Singh
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It is a Mistake to… Focus on Training Results
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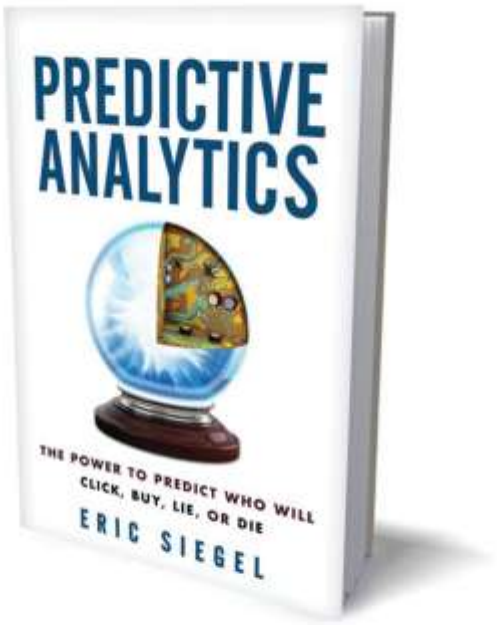
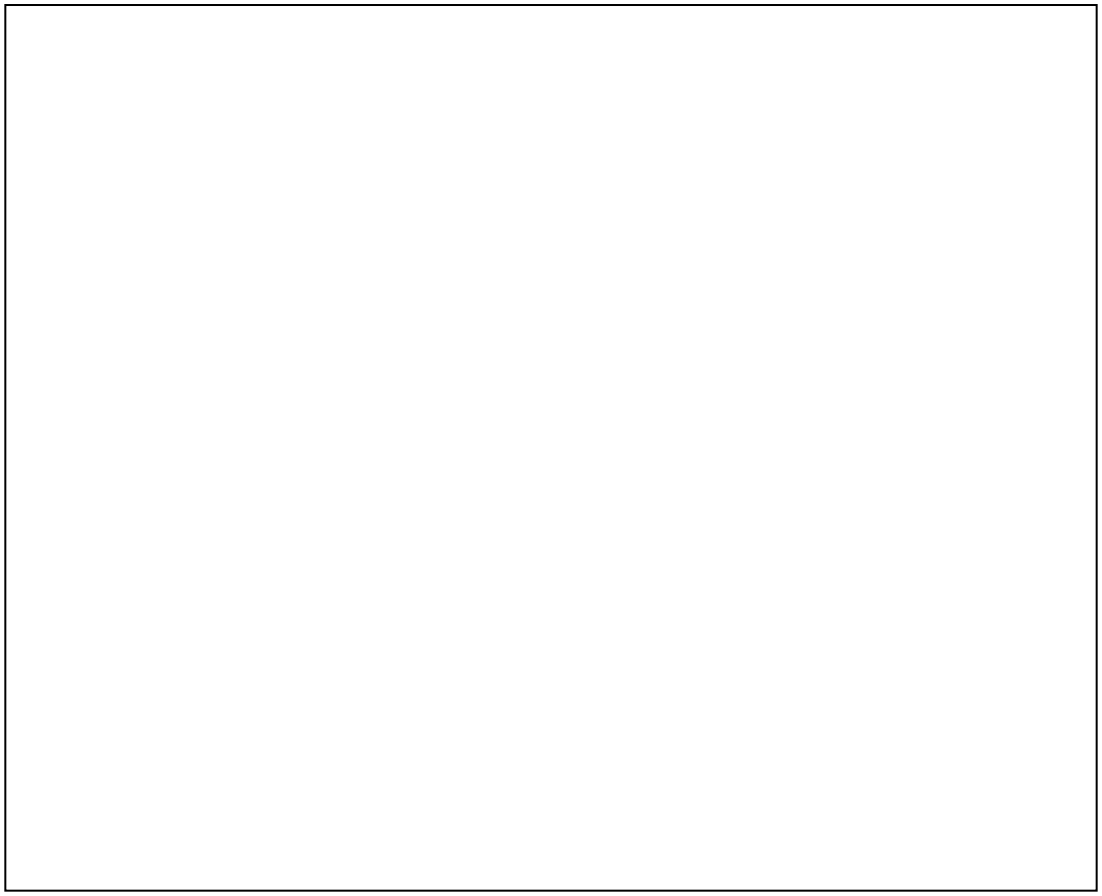


www.ThePredictionBook.com

Marketing (along with credit risk) is the foundational business application of predictive analytics.

Agenda

1) Risk
2) Intro to PA – *The Prediction Effect*
3) How it works – *The Data Effect*
4) How it bolsters insurance
5) Insurance case studies



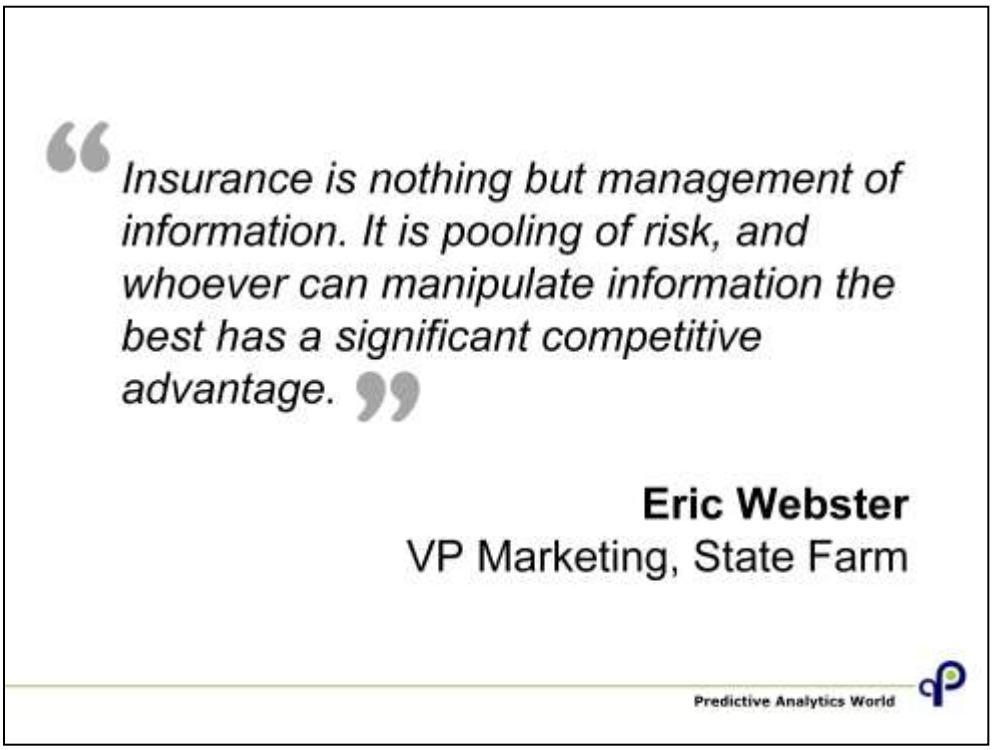
Product Failure

The concept of risk applies in:

- insurance
- financial credit
- health
- and even marketing

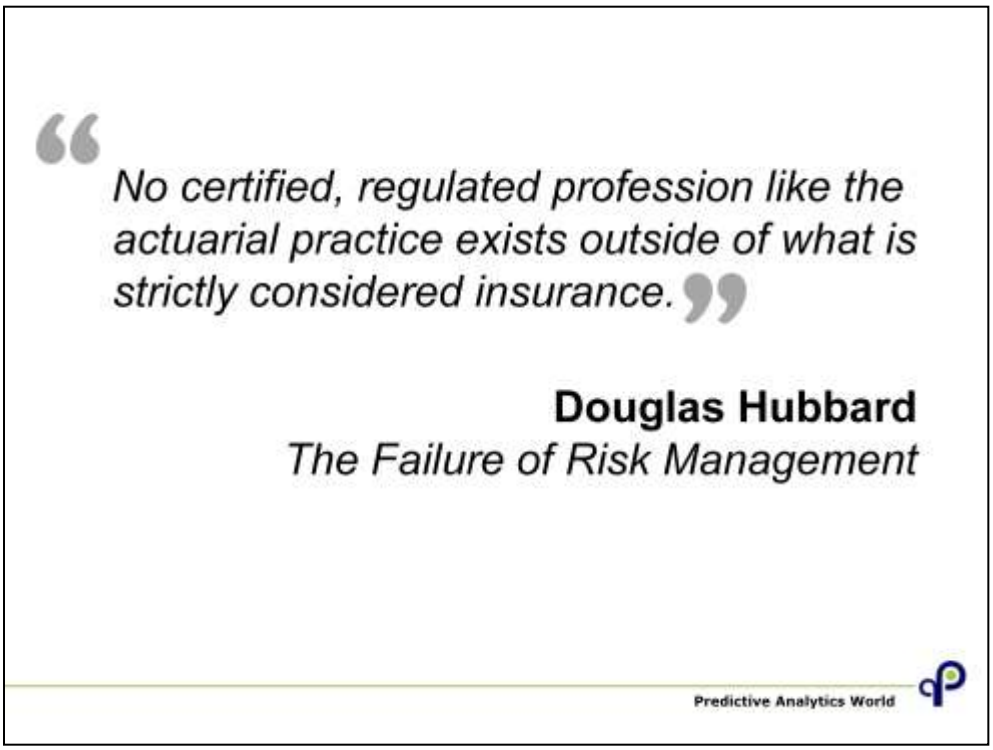
I am an individual patient, and an individual insurance policyholder. Risk effects all parties involved.

Insured “office workers”



"Discussion with State Farm's Eric Webster: Insurance and Data Mining," Gregory Piatetsky, Ph.D., KDNuggets.
http://www.kdnuggets.com/news/2009/n08/3i.html

Risk an individual may:
▪ Become a loss
▪ Become ill
▪ Not respond
▪ Commit fraud



Also: http://www.prnewswire.com/news-releases/deloitte-poll-37-percent-of-companies-report-having-no-consistent-risk-data-mining-reporting-and-analysis-116644679.html

Risky Business

What is predictive analytics?

How does it address micro-risk?

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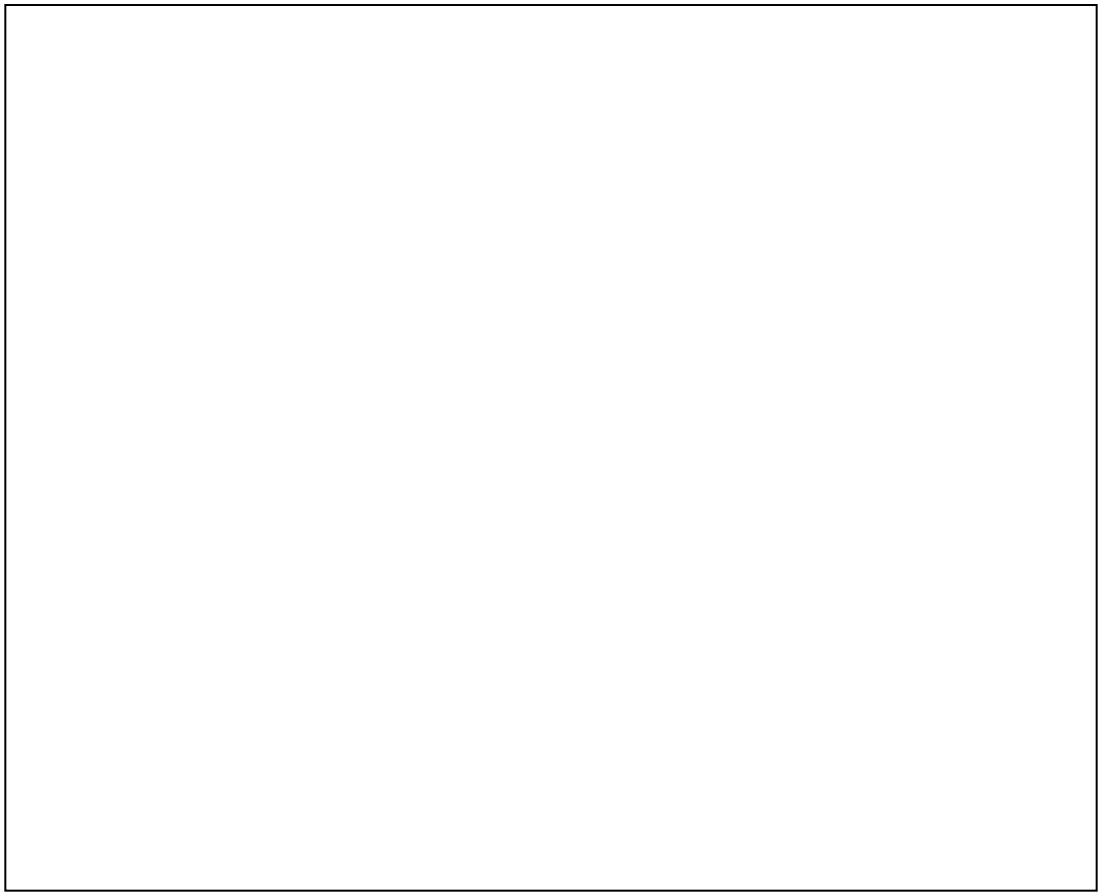
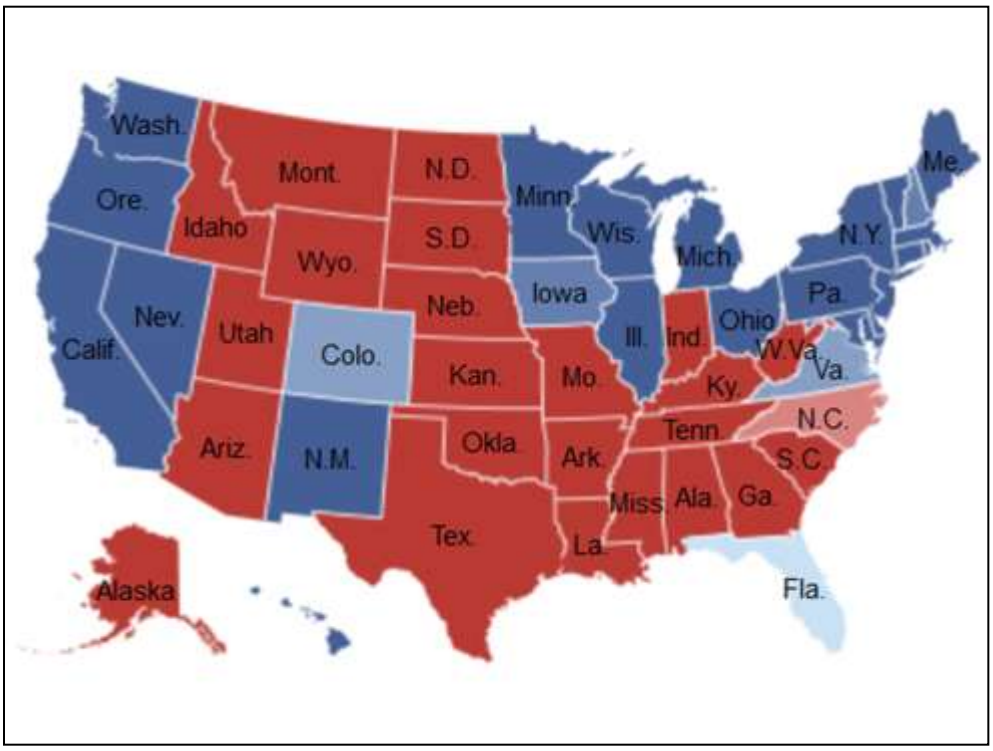
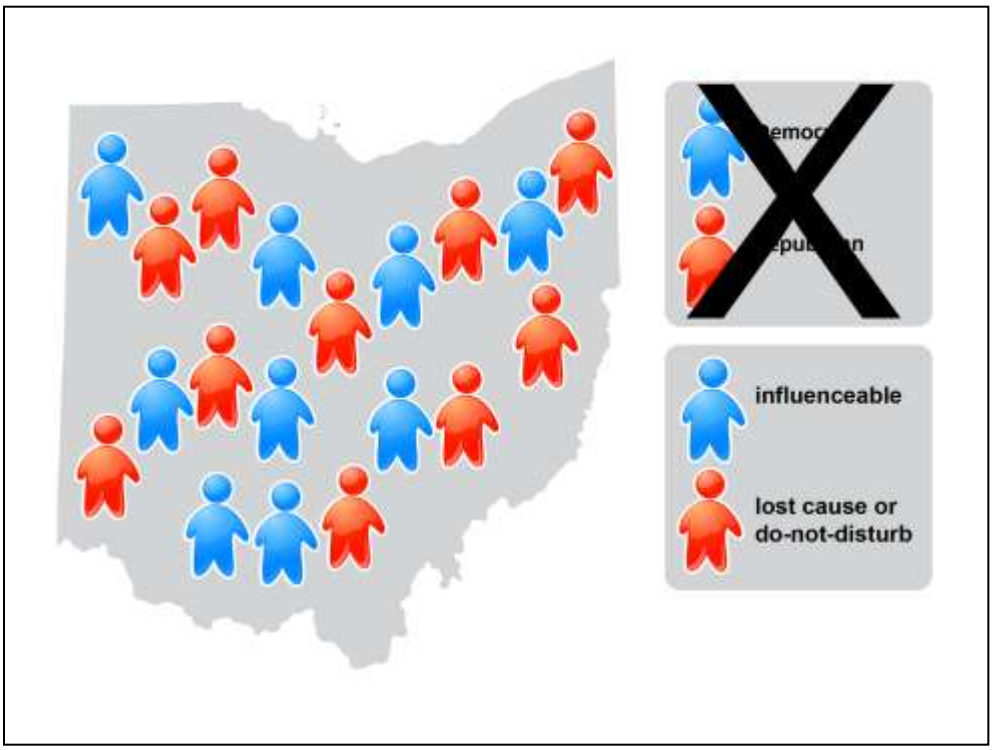


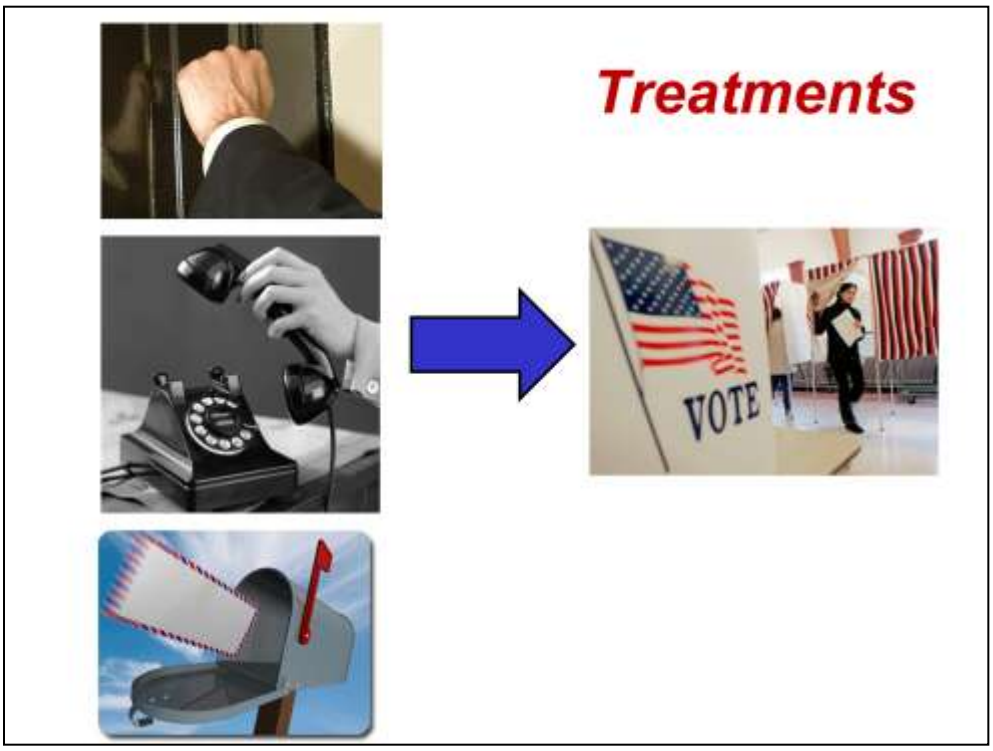
For the story on exactly how Obama's campaign used predictive analytics in 2012:

http://bigthink.com/experts-corner/team-obama-mastered-the-science-of-mass-persuasion-and-won

http://www.predictiveanalyticsworld.com/patimes/obama/


Wash.
Ore.
Calif.
Nev.
Idaho
Mont.
Wyo.
Utah
Ariz.
Colo.
N.M.
N.D.
S.D
Neb.
Kan.
Okla
Tex.
Minn.
Iowa
Mo
Ark.
La.
Wis.
Ill.
Mich.
Ind.
Ohio
Ky.
Tenn.
Miss.
Ala.
Ga.
Fla.
S.C.
N.C.
W.Va.
Va.
Pa.
N.Y.
Me.
Alaska


influenceable
lost cause or
do-not-disturb


Treatments
VOTE

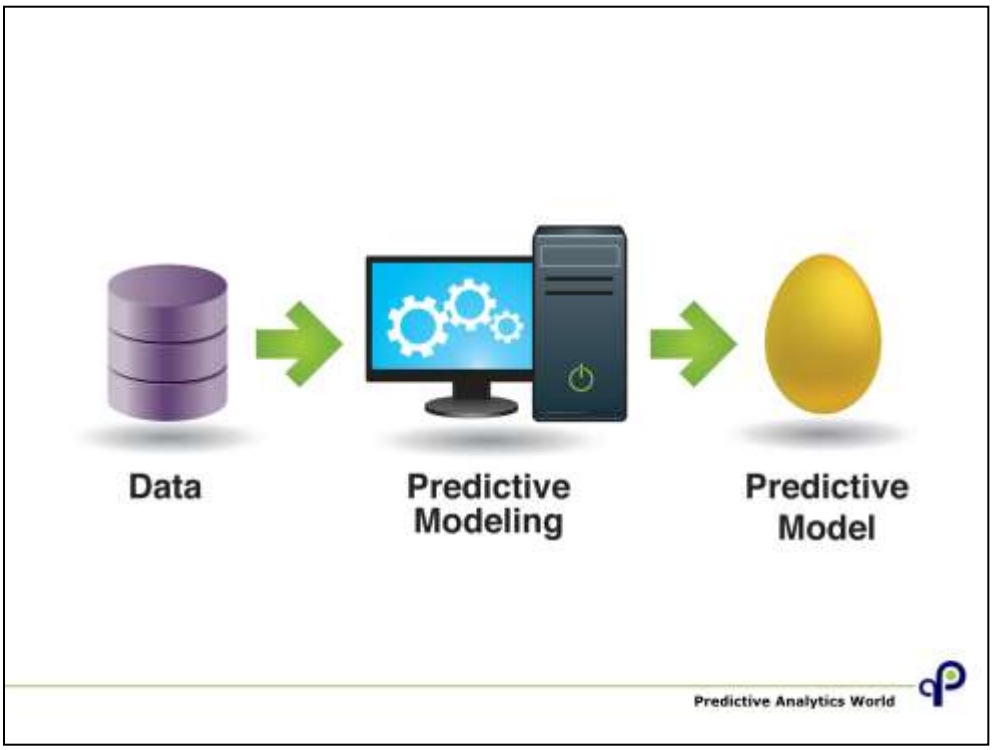
PREDICTIVE ANALYTICS
FORECASTING
SILVER
PRESIDENCY
OBAMA

Predictive Analytics:

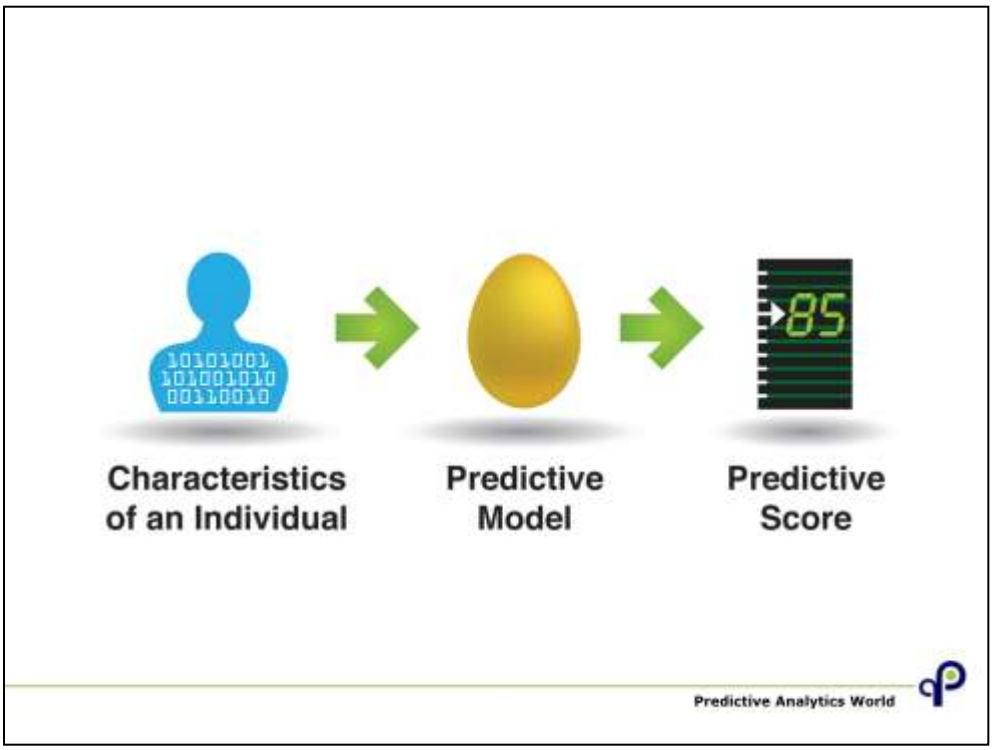
(data)

Technology that learns from ***experience*** *to predict the outcome/behavior of individuals*

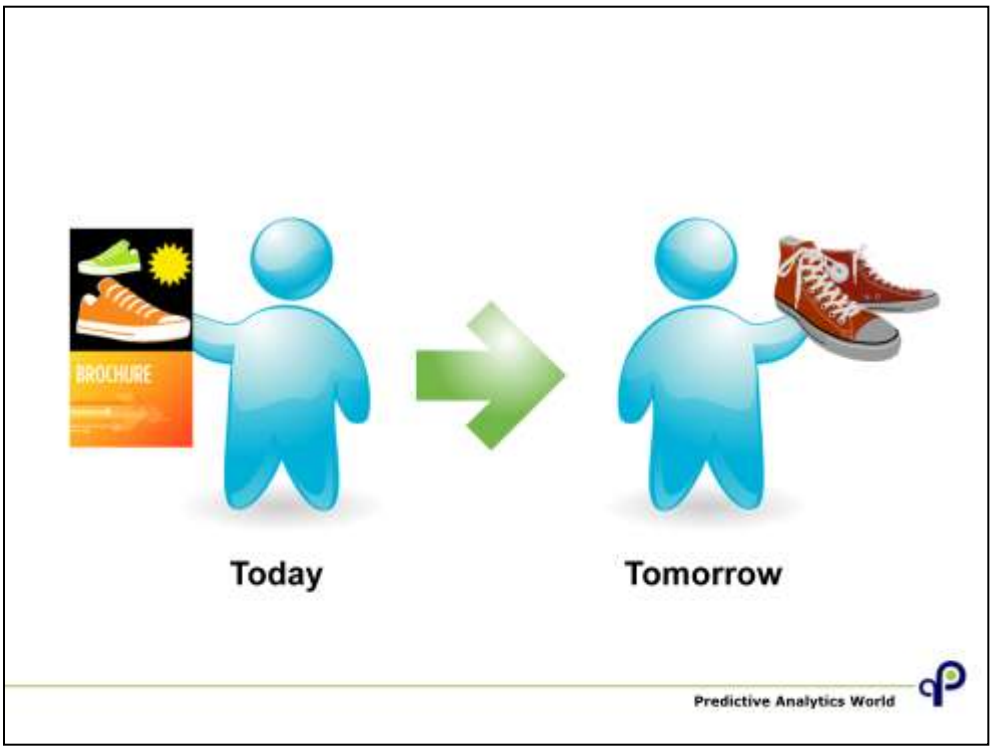
… in order to drive better decisions.



Predictive modeling learns from data in order to generate a predictive model. For details on how this work see Chapter 4 of the book "Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die" (http://www.thepredictionbook.com).



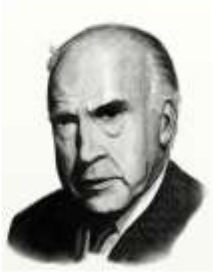
A predictive model generates a predictive score for an individual. For details on how this work see Chapters 1 and 4 of the book "Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die" (http://www.thepredictionbook.com).



Marketing targets an individual predicted as likely to buy. For details on how this work see the Introduction and Chapter 1 of the book "Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die" (http://www.thepredictionbook.com).

Prediction

Prediction is very difficult, especially if it's about the future.
- Niels Bohr



How come you never see a headline like "Psychic Wins Lottery"?
- Jay Leno

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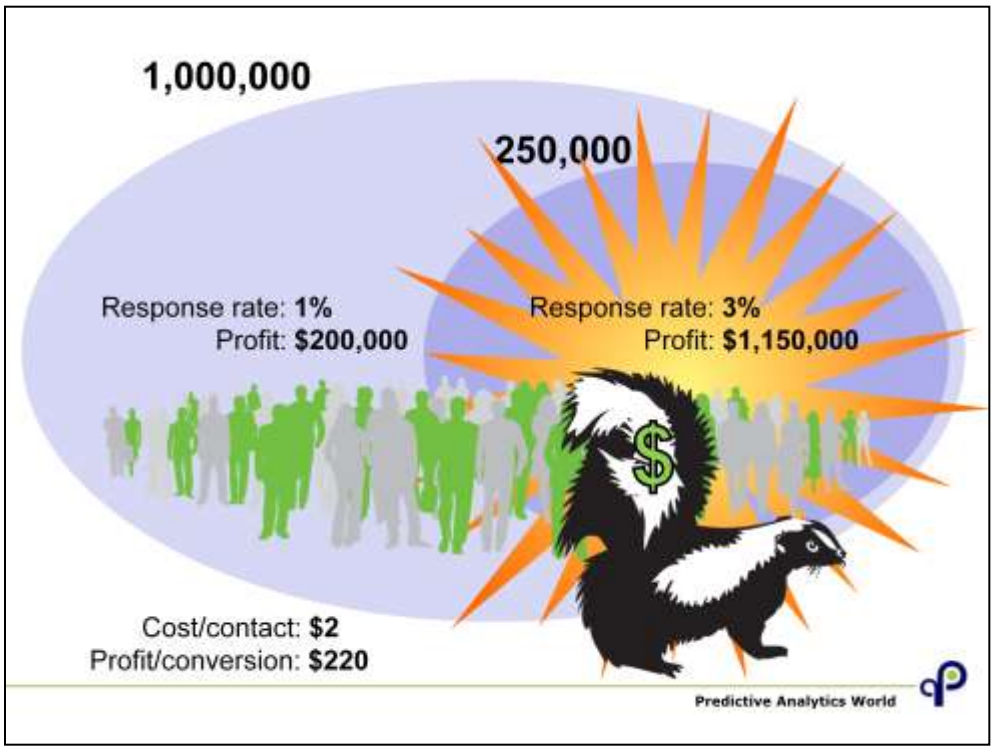
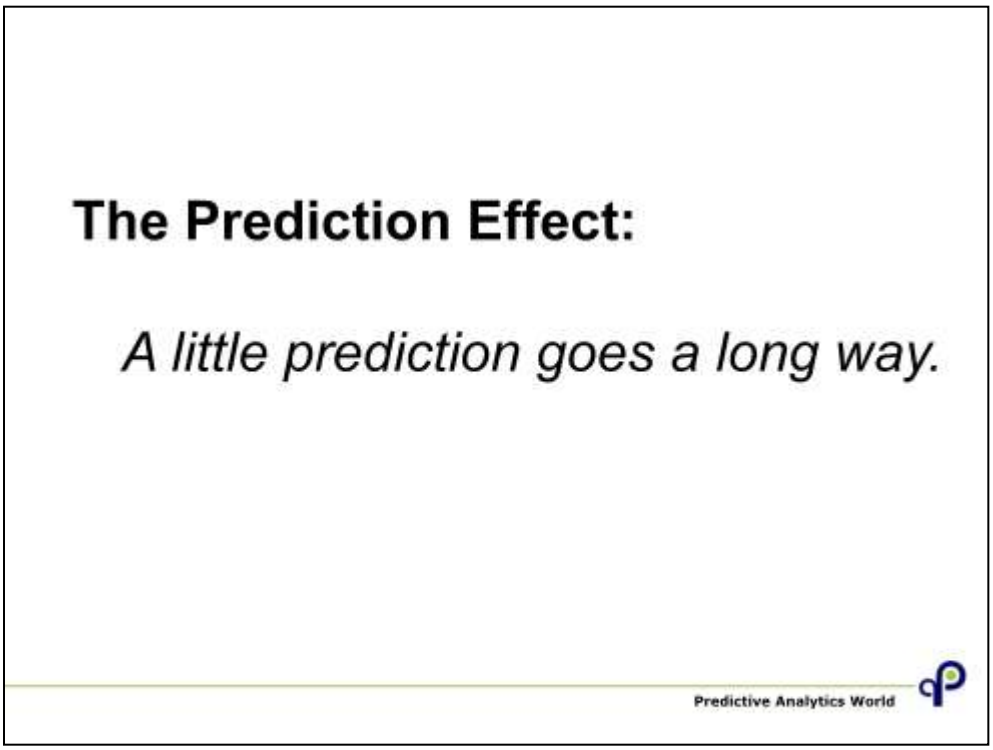
Is prediction an audacious goal? Isn't prediction impossible? For details on how why predictive analytics predicts well enough, see the Introduction and Chapter 1 of the book "Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die" (http://www.thepredictionbook.com).



A crummy predictive model delivers big value. It's like a skunk with bling.

Simple arithmetic shows the bottom line profit of direct mail, both in general and then improved by predictively targeting (and only contacting 25% of the list). The less simple part is how the predictive scores are generated for each individual in order to determine exactly who belongs in that 25%. For details on how this work see Chapter 1 of the book "Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die" (http://www.thepredictionbook.com).



Put another way, predicting better than guessing is often sufficient to generate great value by rendering operations more efficient and effective. For details on how this works, see the Introduction and Chapter 1 of the book "Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die" (http://www.thepredictionbook.com).

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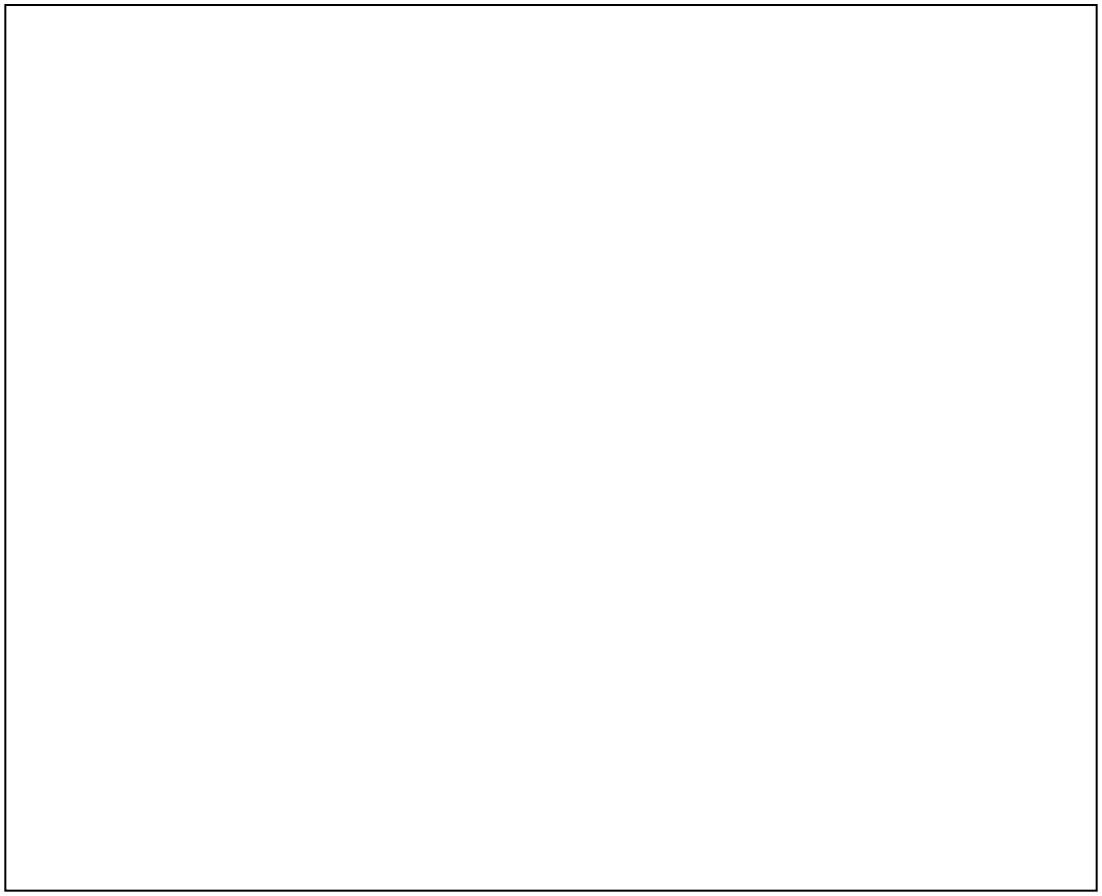
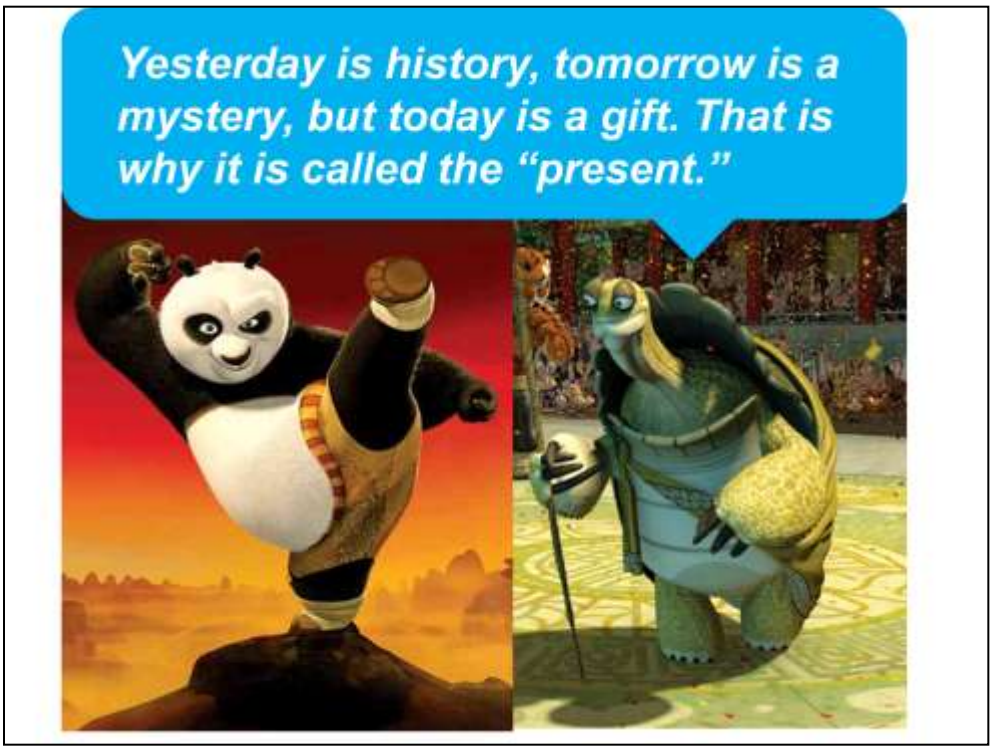
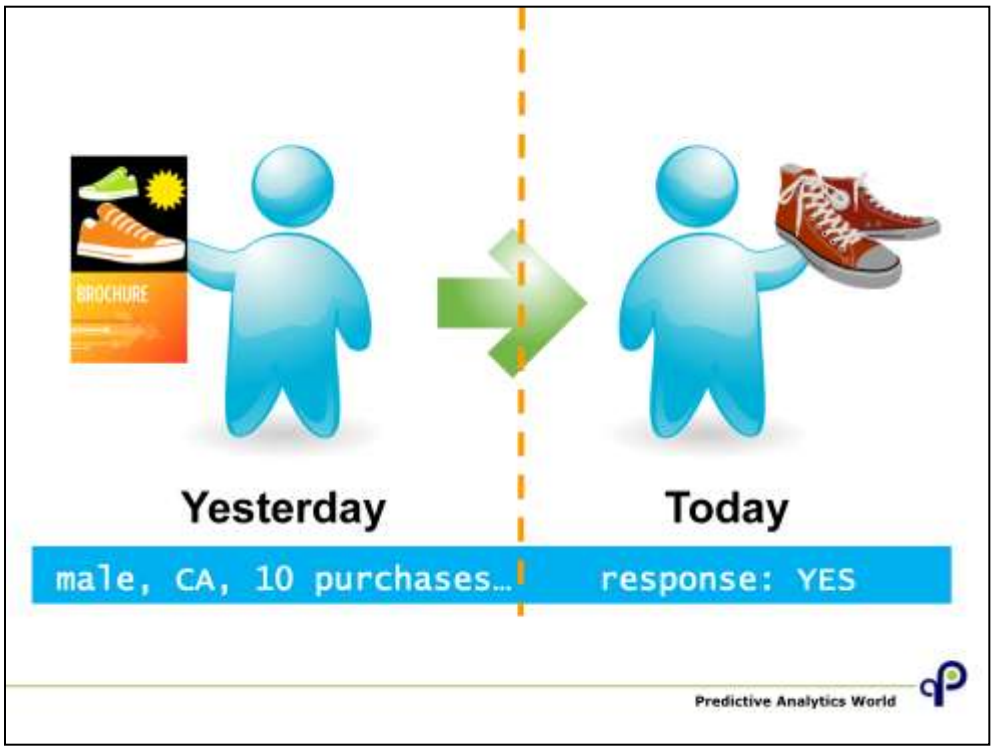
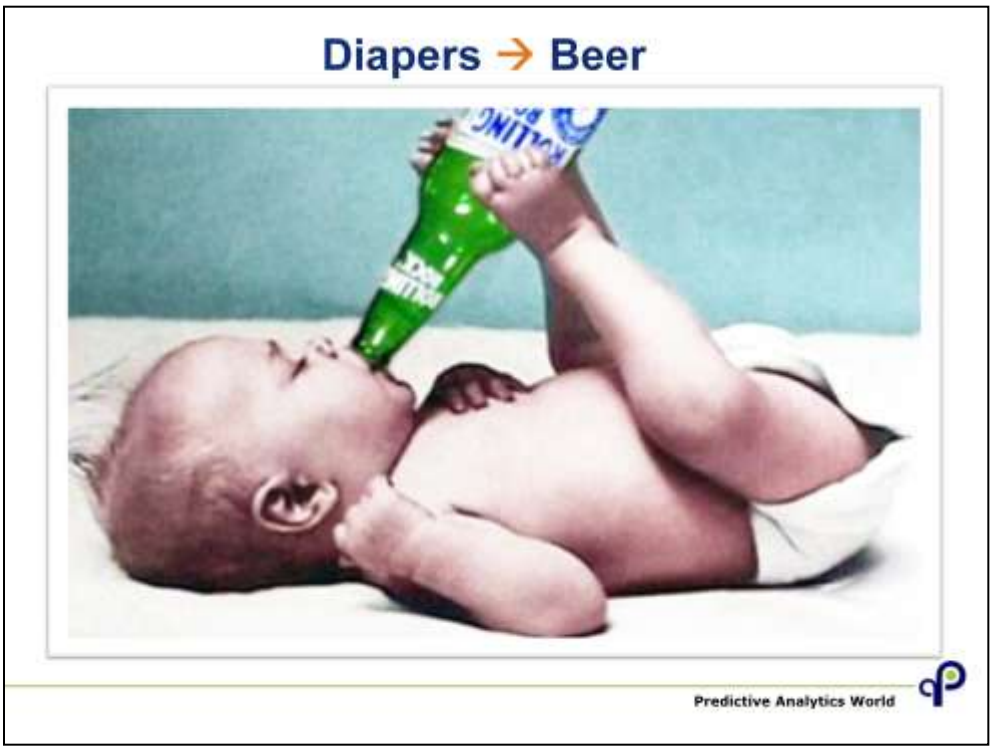



Yesterday is history, tomorrow is a mystery, but today is a gift. That is why it is called the “present.”

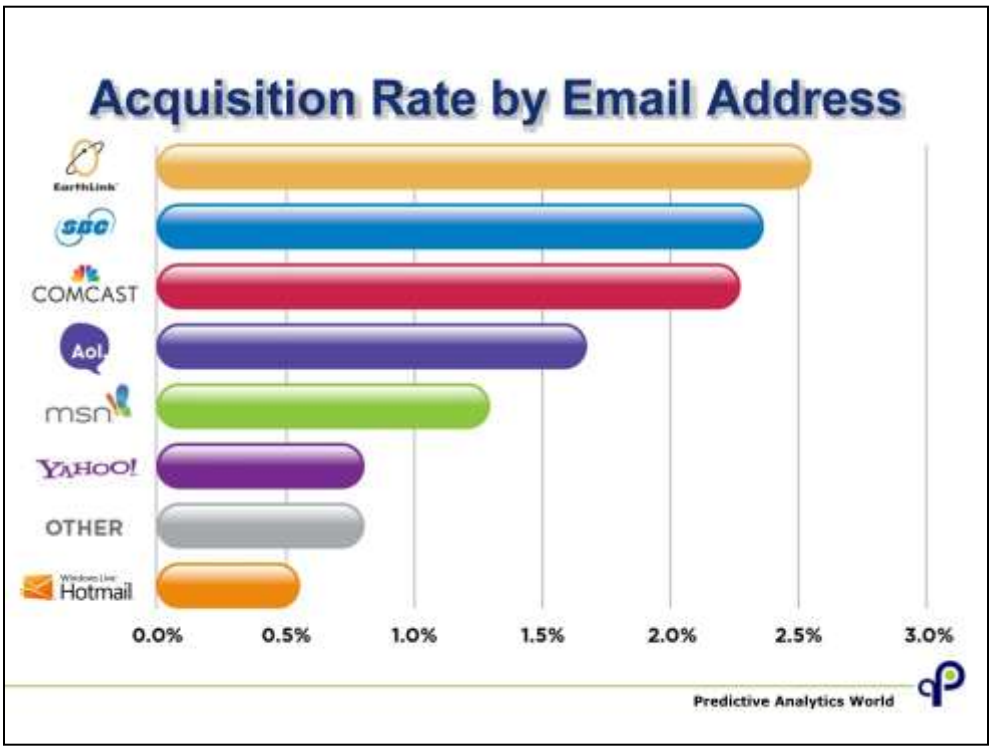


Each row of *training data* corresponds to one individual – first the individual's facts and figures are listed (predictor variables, aka independent variables), and then the target variable (aka dependent variable) – ie, the thing you're trying to predict – is listed.

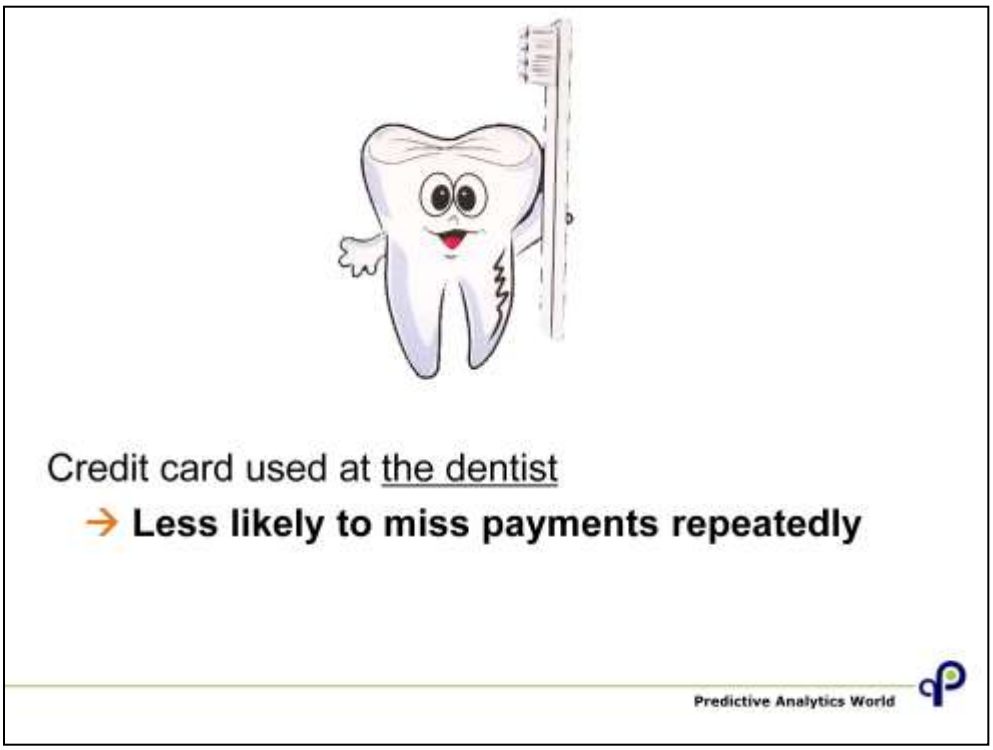
A table of such rows composes the training data, on which predictive modeling operates.



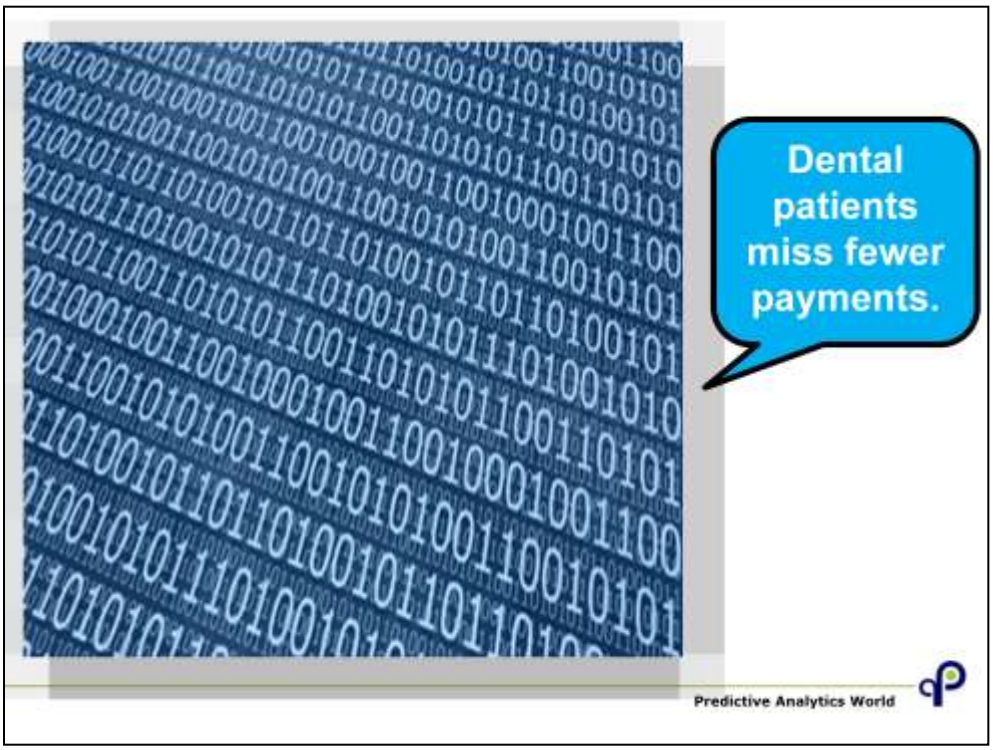
Urban myth to some, but based on reported results:
http://www.dssresources.com/newsletters/66.php



Online conversion to paying membership, by email domain. Customers who sign up with "Hotmail" and "Yahoo" email accounts are far less likely (20 - 25% as likely) to convert to a paid subscription than users with email addresses that may be more "permanent," such as ".net" or "EarthLink" email addresses. This insight speaks directly to business strategy, such as employing incentives for customers to provide permanent email addresses, or partnering with certain email service providers.



Candian Tire example, from "What Does Your Credit-Card Company Know About You?" New York Times, May 12, 2009.
http://www.nytimes.com/2009/05/17/magazine/17credit-t.html


Dental patients miss fewer payments.
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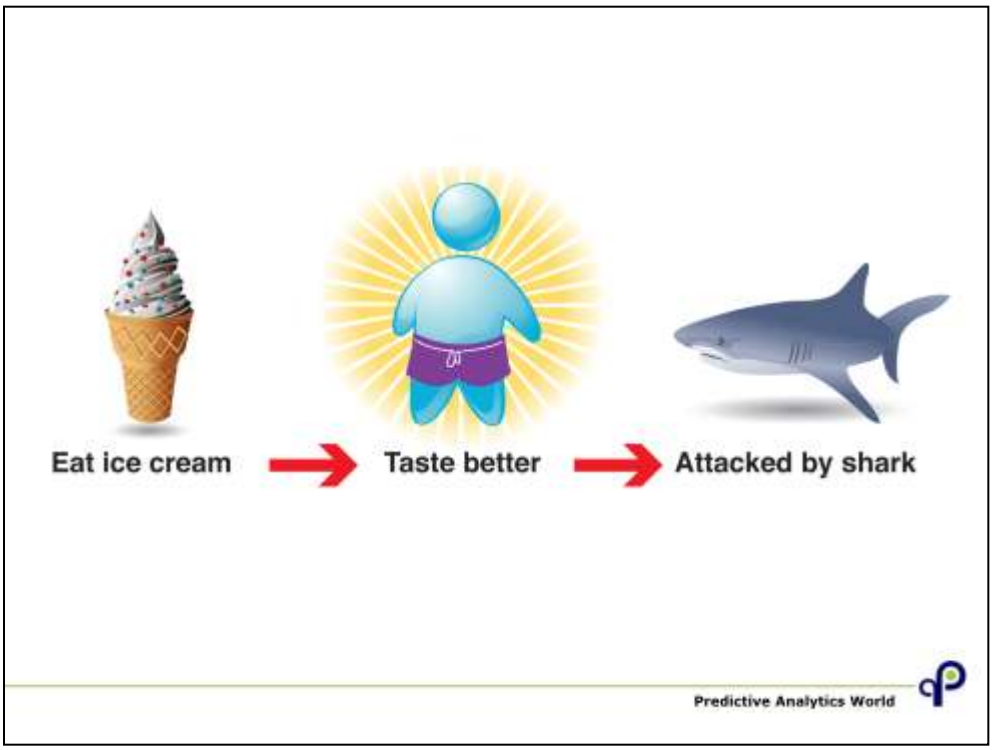
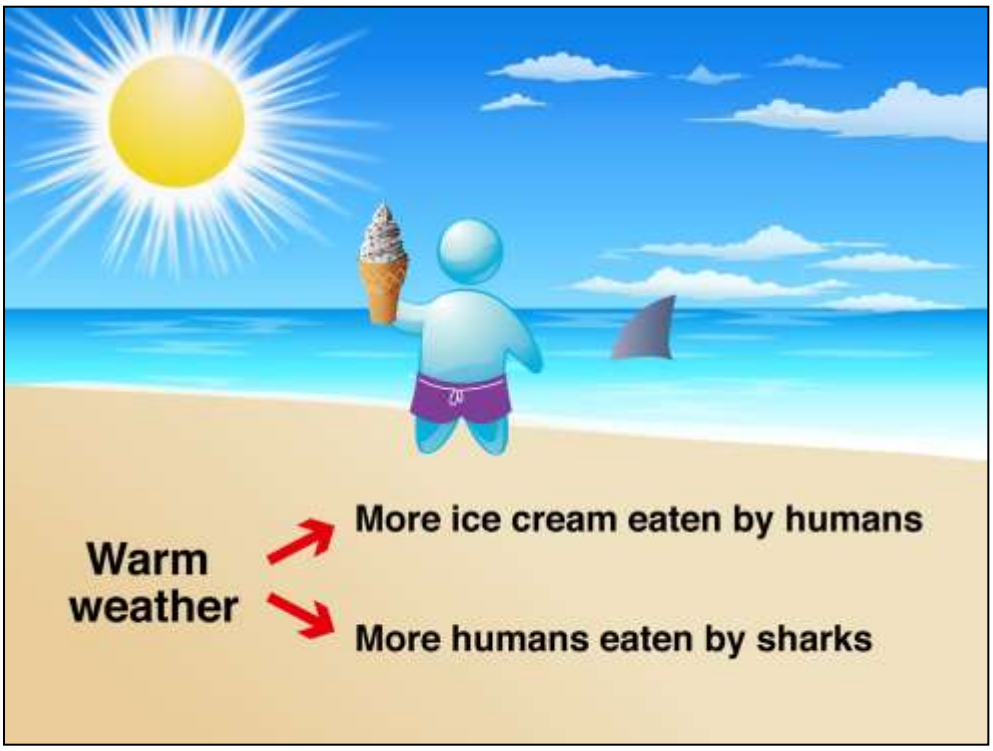
The Data Effect:

Data is always predictive.



Correlation does not entail causation. For more information, see Chapter 3 of the book "Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die" (http://www.thepredictionbook.com).


Warm weather
More ice cream eaten by humans
More humans eaten by sharks

Mysterious chemical in your bloodstream

More prone to cigarette addiction

Less prone to carpal tunnel

Smoke

Take more breaks →

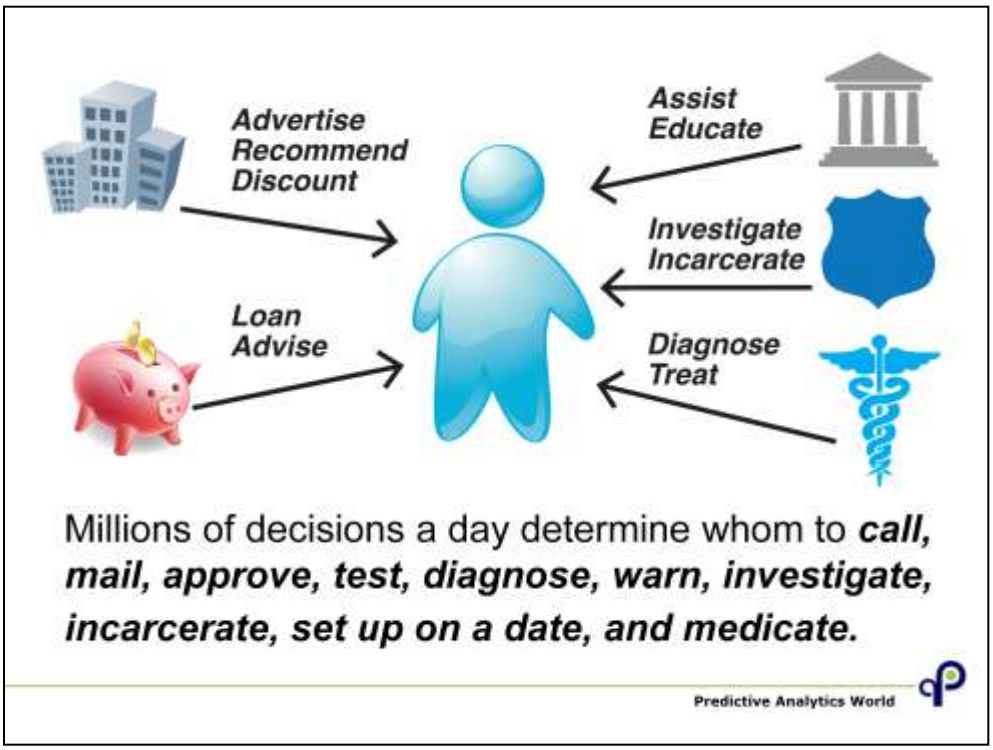
Less carpal tunnel

...and many more, such as Cox Communications, FedEx, Sprint, etc. - see the book "Predictive Analytics" (www.thepredictionbook) for many case studies, including a central compendium of 147 mini-case studies, of which 37 are examples in marketing applications of predictive analytics.

PREMIER Bankcard also lowered delinquency to increase net by over $10 million

More information about First Tennessee Bank and other case studies are available at http://tinyurl.com/PAExamples

Dan Marks, First Tennessee Bank, "First Tennessee Bank: Analytics Drives Higher ROI from Marketing Programs," IBM.com, March 9, 2011. www.ibm.com/smarterplanet/us/en/leadership/firsttenbank/assets/pdf/IBM-firstTennBank.pdf


Advertise
Recommend
Discount
Loan
Advise
Assist
Educate
Investigate
Incarcerate
Diagnose
Treat
Millions of decisions a day determine whom to call, mail, approve, test, diagnose, warn, investigate, incarcerate, set up on a date, and medicate.
Predictive Analytics World

like, love, procreate

buy, cancel, click

default on payment, crash your car

quit job

vote, qualify for benefits, drop out

commit crime, fraud, murder

get sick, die

think, lie

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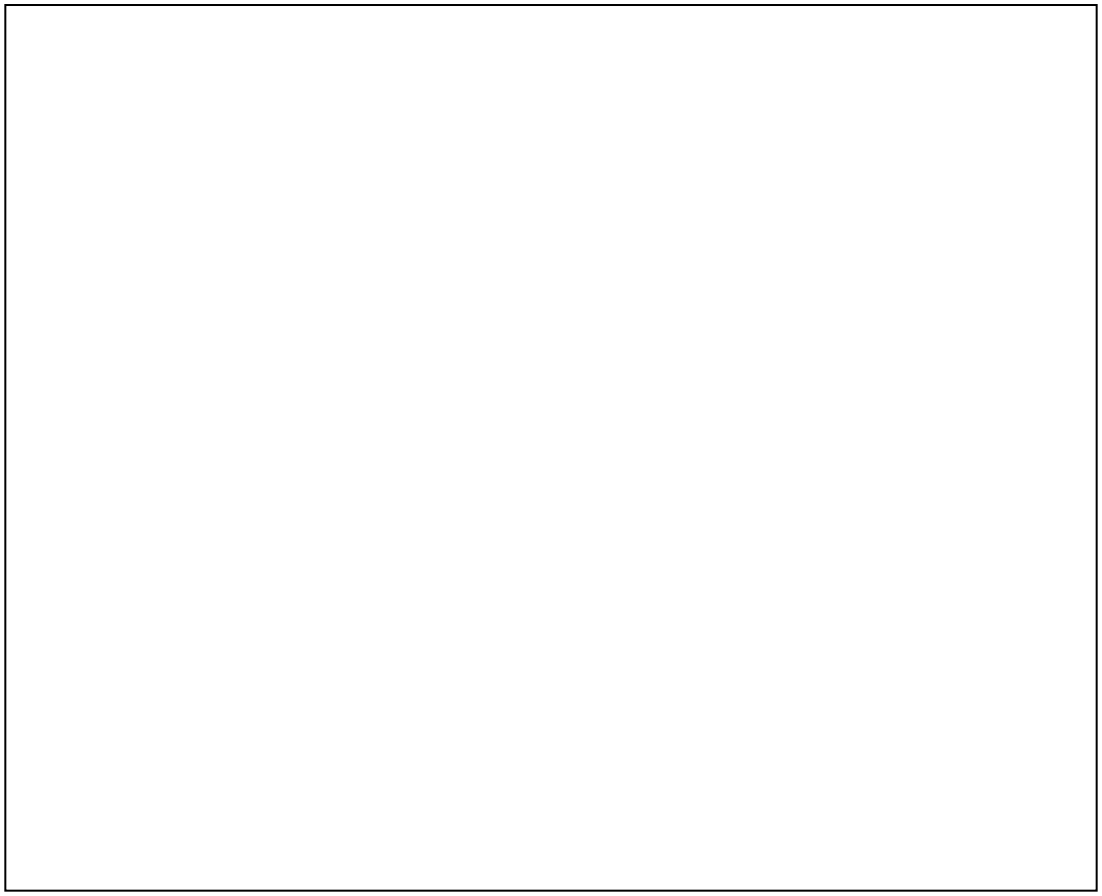
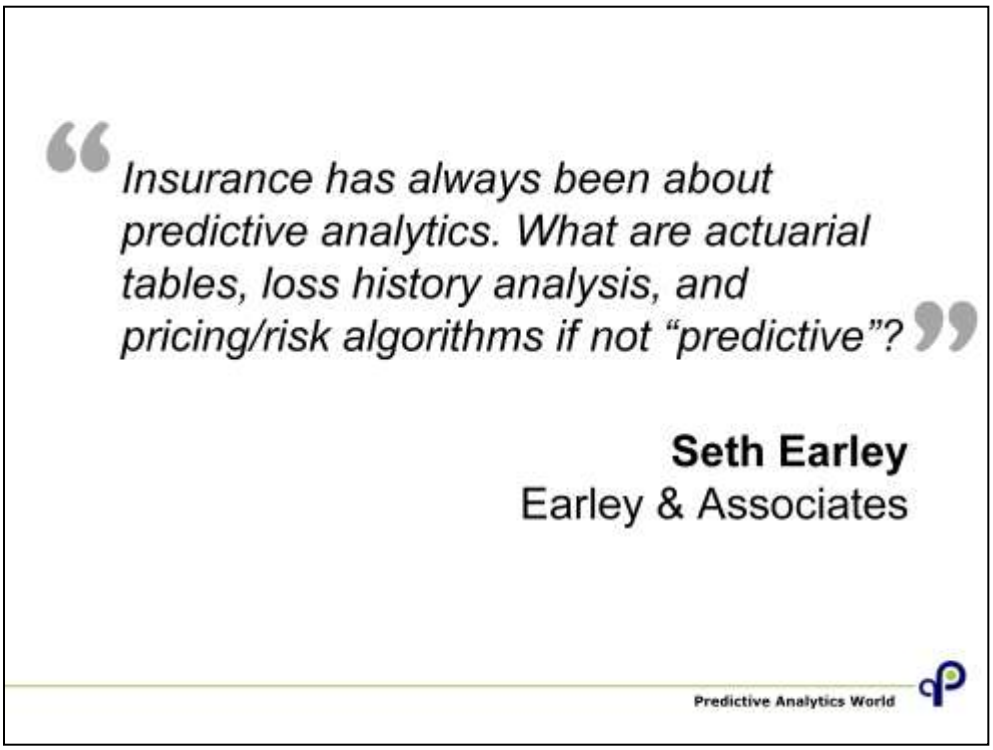
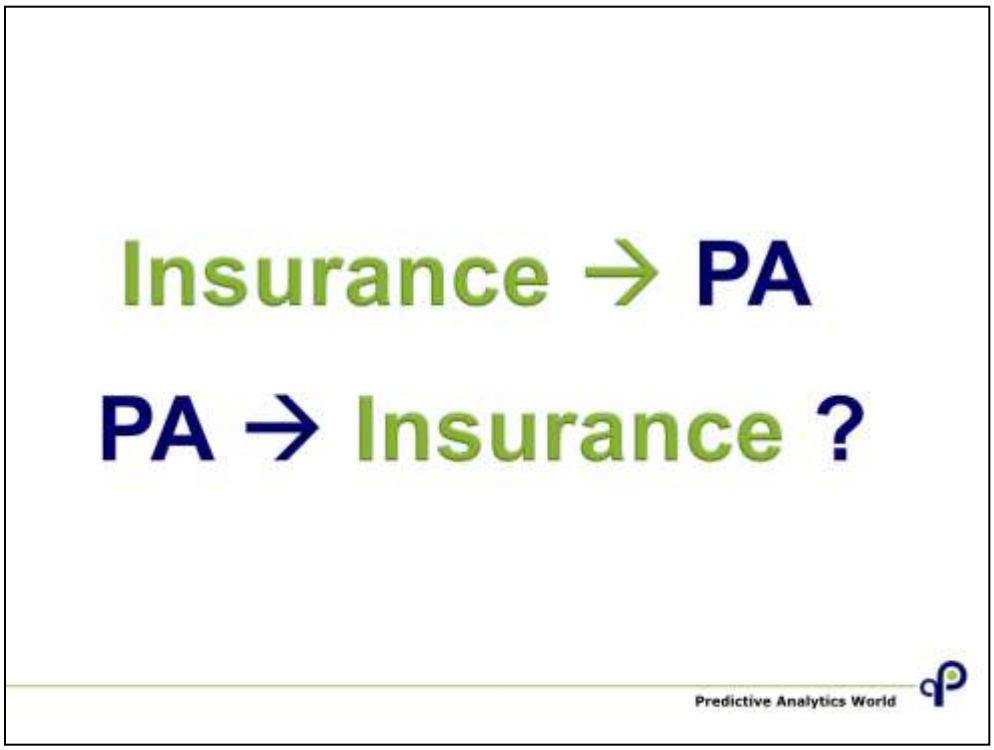




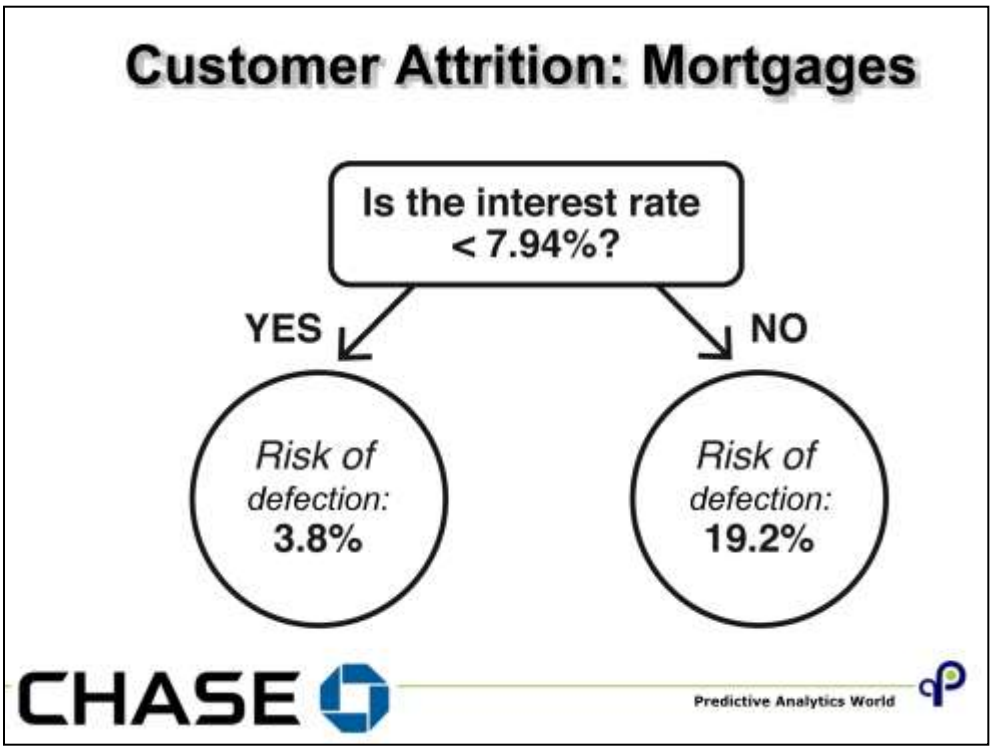
http://uk.smartgridupdate.com/fc_fcbi1lz/lz.aspx?p1=056892S4006&CC=&p=1&cID=0&cValue=1

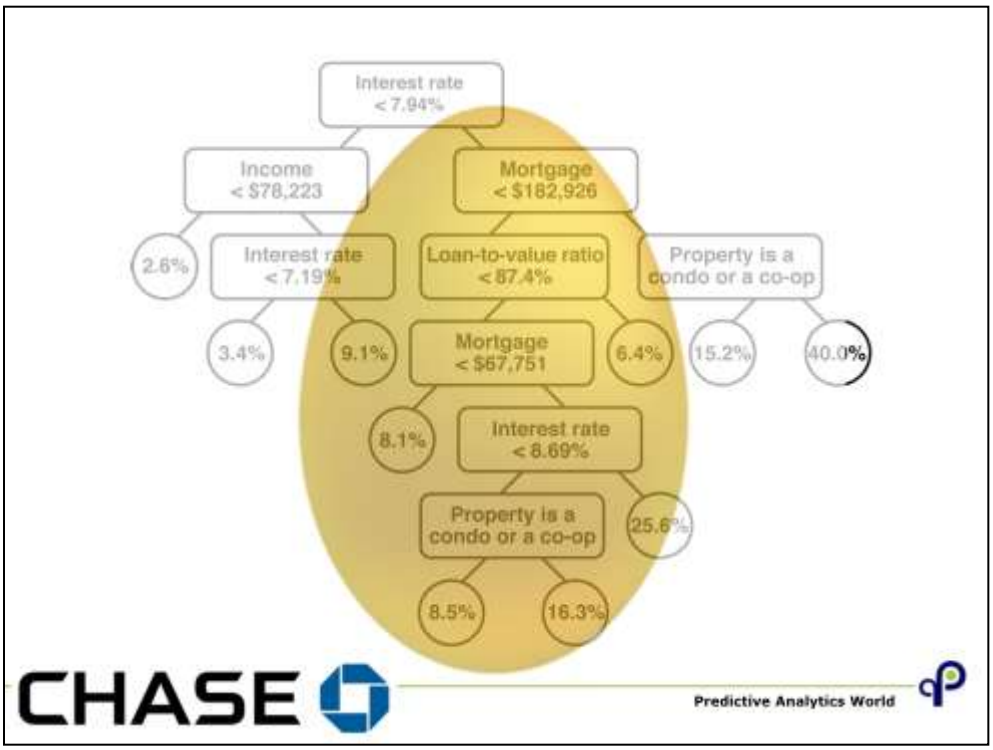


As Janet Jackson asked, "What have you done for me lately?"

Advantages of Predictive Analytics

1. Data elements
2. Mathematical models


Customer Attrition: Mortgages
Is the interest rate < 7.94%?
YES
NO
Risk of defection: 3.8%
Risk of defection: 19.2%
CHASE
Predictive Analytics World


Interest rate
< 7.94%
Income
< $78,223
Mortgage
< $182,926
2.6%
Interest rate
< 7.19%
Loan-to-value ratio
< 87.4%
Property is a
condo or a co-op
3.4%
9.1%
Mortgage
< $67,751
6.4%
15.2%
40.0%
8.1%
Interest rate
< 8.69%
Property is a
condo or a co-op
25.6%
8.5%
16.3%
CHASE
Predictive Analytics World

IF:

the mortgage is greater than or equal to $67,751 and less than $182,926

AND:

the interest rate is greater than or equal to 8.69 percent

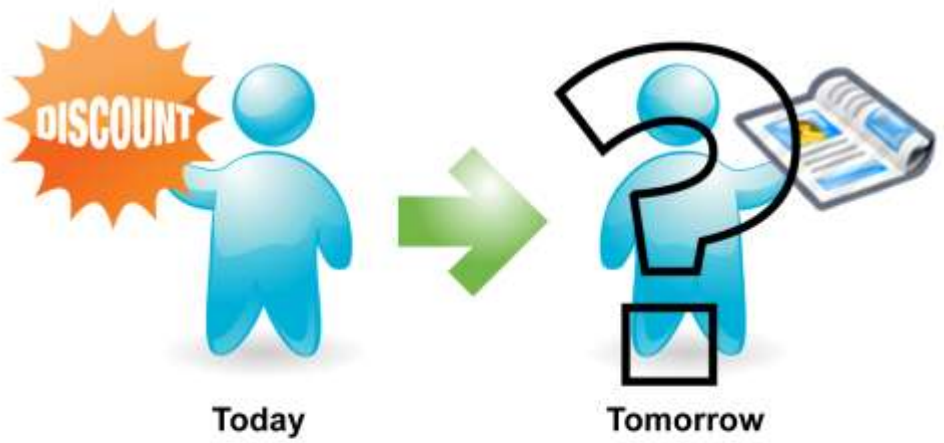
AND:

the loan-to-value ratio is less than 87.4 percent

THEN:

the probability of prepayment is 25.6 percent.

Much higher than the overall average of 9.4% prepayment rate.



Today

Tomorrow

RENEW YOUR
CELL PHONE
CONTRACT...
AND
GET A FREE
PHONE!

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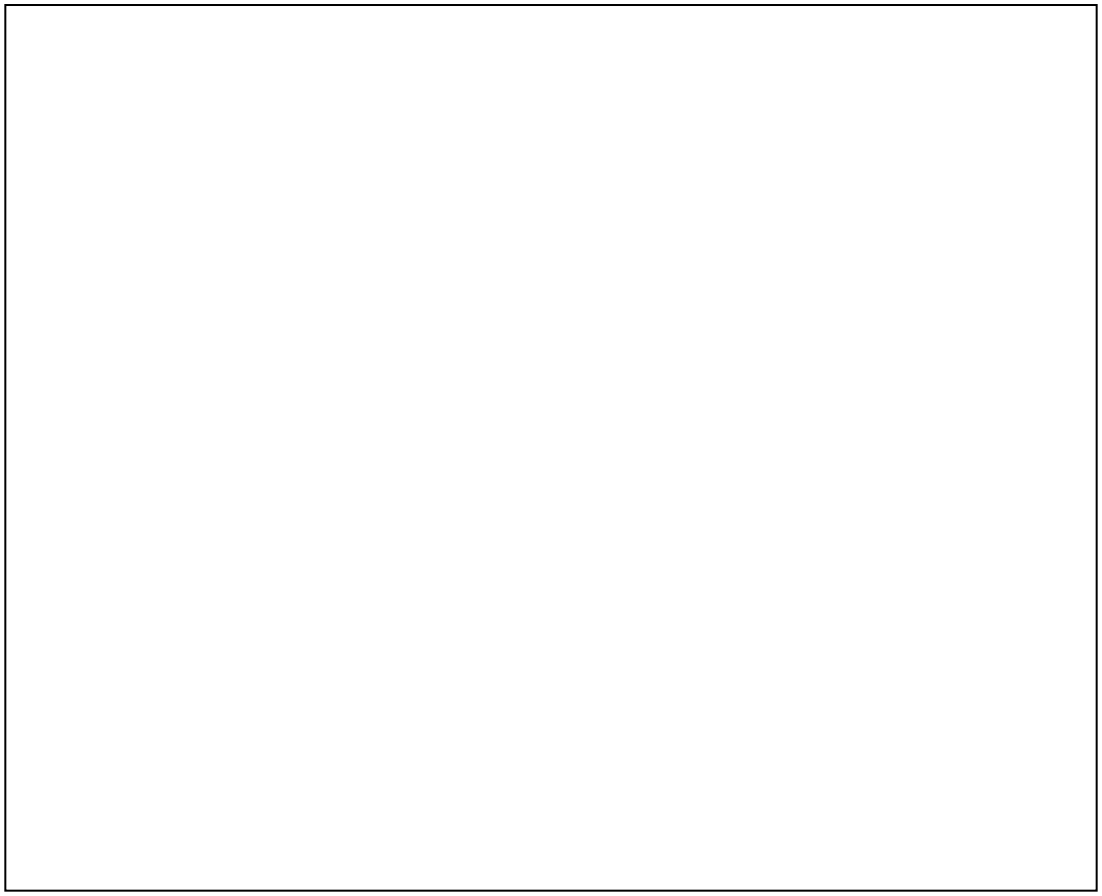
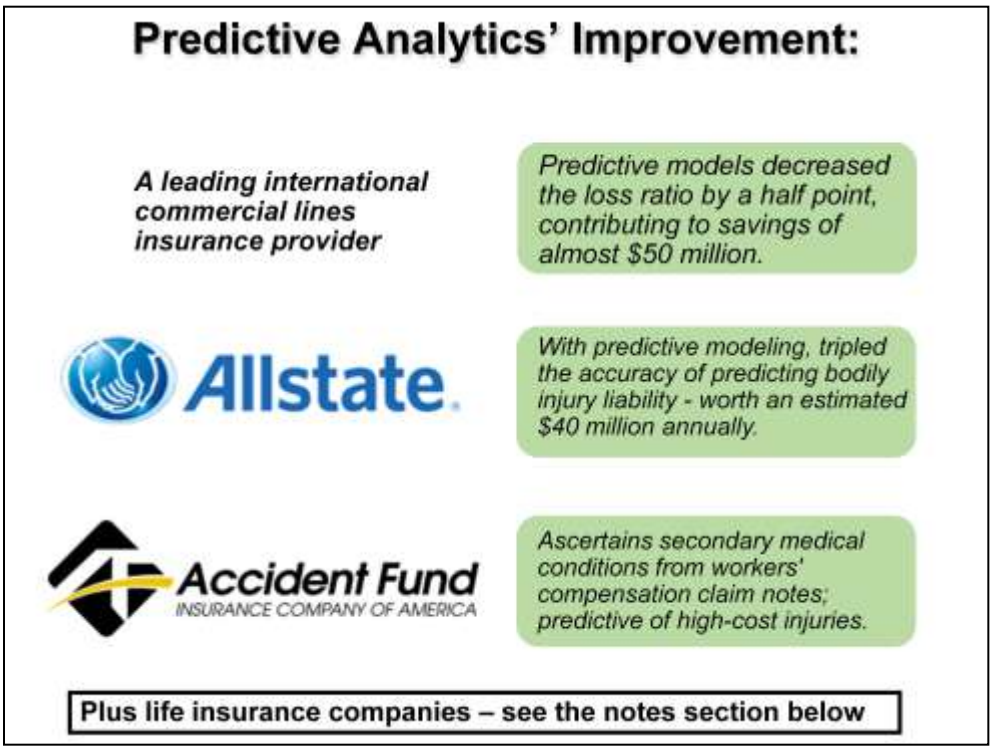
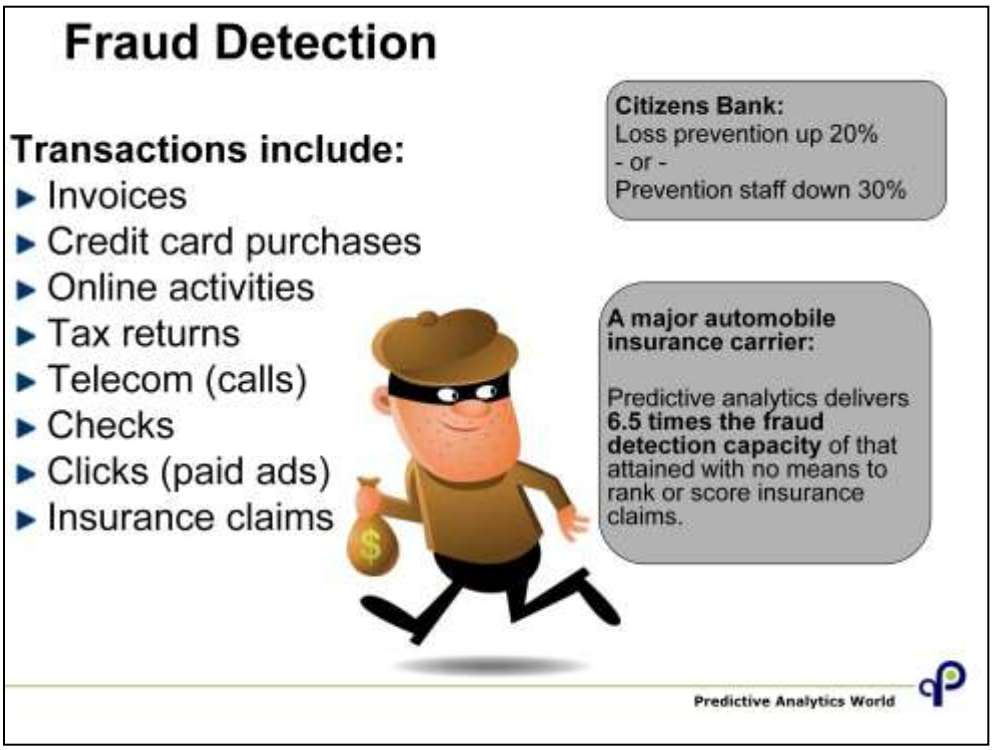




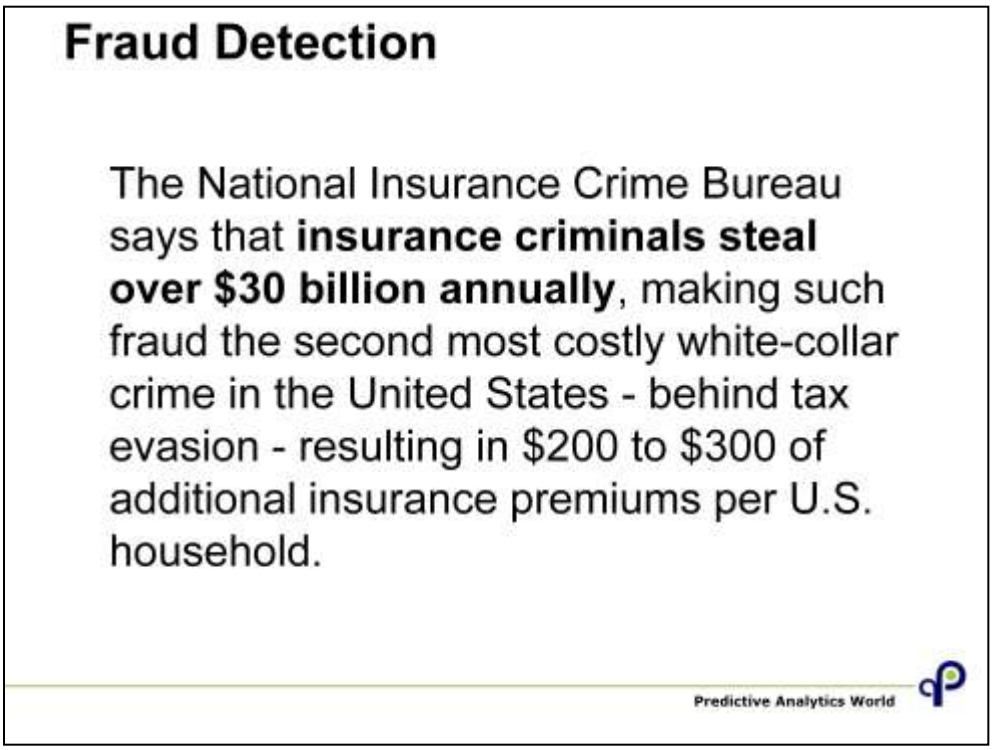
Leading international commercial lines insurance provider: This was from a case study at a conference presentation; however, the insurance company later rescinded authorization to be named in connection with this example. Here is a reference on the general principle that predictive modeling improves upon standard actuarial methods: Guillaume Briere-Giroux, FSA, MAAA, CFA, "Predictive Modeling Applied to Variable Annuity Lapse Rates," Predictive Modeling for Variable Annuities. www.claudepenland.com/2011/02/12/predictivemodeling-applied-to-variable-annuity-lapse-rates/.

Allstate: With a predictive modeling competition in 2012, tripled the accuracy of predicting bodily injury liability based solely on the characteristics of the insured vehicle. This could be worth an estimated $40 million annually to the company -- Kaggle, Allstate, "Predicting Liability for Injury from Car Accidents," Competition, April 13, 2012. www.kaggle.com/host/casestudies/allstate. Here is how the $40 million estimate is derived. Allstate's 2010 annual report puts bodily injury claims at roughly $1.6 billion. Industry insiders suggest 20 percent of bodily injury claims actuarially relate to vehicle. If we assume that a 1 percent improvement in error rate impacts claims costs by 0.25 percent, even just doubling the accuracy comes to a $40 million savings. See also www.iihs.org/research/hldi/fact_sheets/BodilyInjury_0911.pdf.

Accident Fund Insurance: Ascertains secondary medical conditions (such as obesity and diabetes) from written workers' compensation claim notes. These conditions are predictive of which injuries will be high-cost so that, for example,



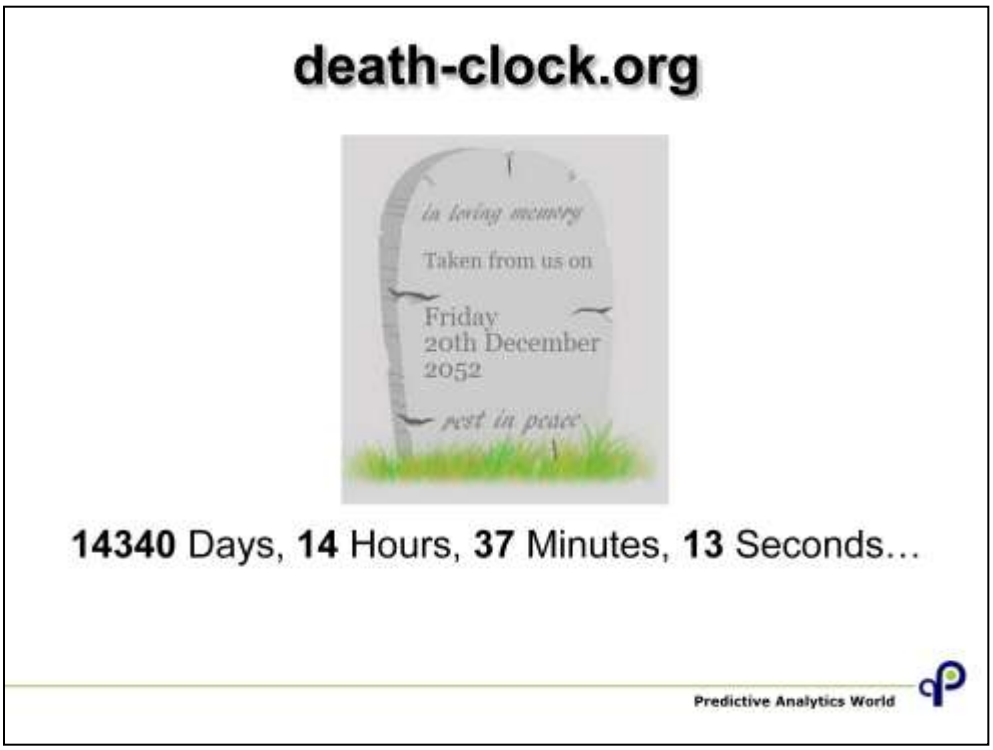
See also: http://www.abbottanalytics.com/data-mining-case-study-1.php



Progressive Insurance Special Investigative Unit Report from the National Insurance Crime Bureau (NICB). www.progressiveagent.com/claims/special-investigations-unit.aspx.

James Taylor, JT on EDM, "Putting Predictive Analytics to Work at Infinity Insurance," DecisionManagementSolutions.com, September 15, 2009. http://jtonedm.com/2009/09/15/putting-predictive-analytics-to-work-at-infinity-insurance/

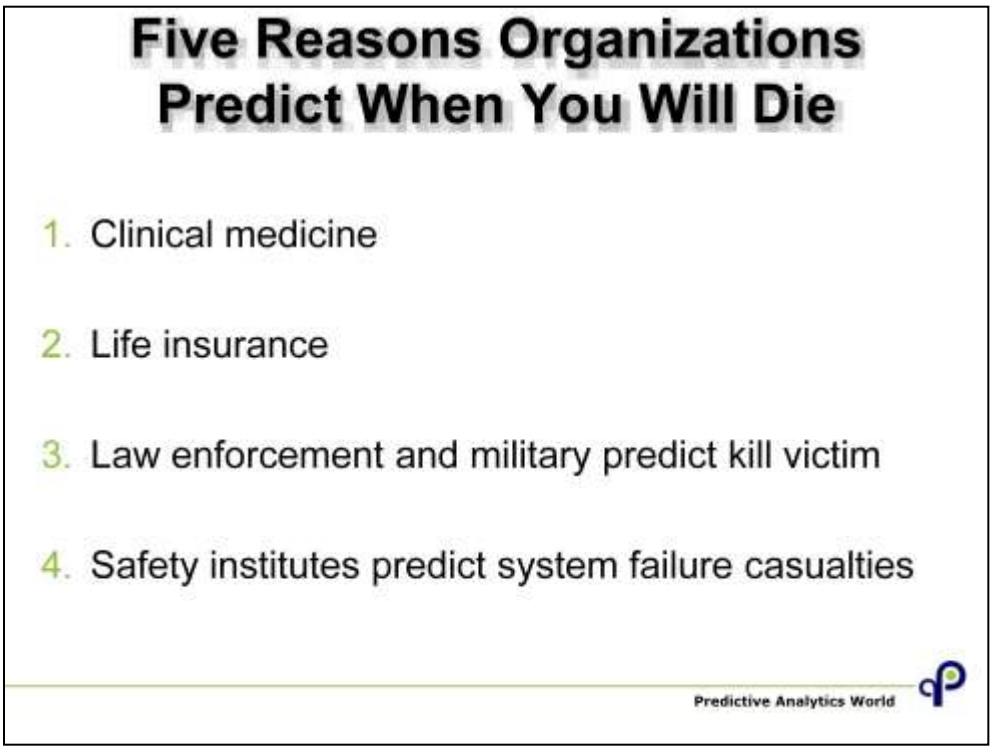
James Taylor, "Putting Predictive Analytics to Work," Predictive Analytics World Washington, DC, Conference, October 19, 2009, Washington, DC. www.predictiveanaly ticsworld.com/dc/2009/agenda.php#day1¶.5



More on mortality prediction:

Solo rockers die younger than those in bands. Although all rock stars face higher risk, solo rock stars suffer twice the risk of early death as rock band members. This may be due to the fact that band members benefit from peer support and solo artists exhibit even riskier behavior (factoid courtesy of public health offices in the UK).

Men on the Titanic faced much greater risk than women. A woman on the Titanic was almost four times as likely to survive as a man. Most men died and most women lived. This may be due to the fact that priority for access to life boats was given to women.



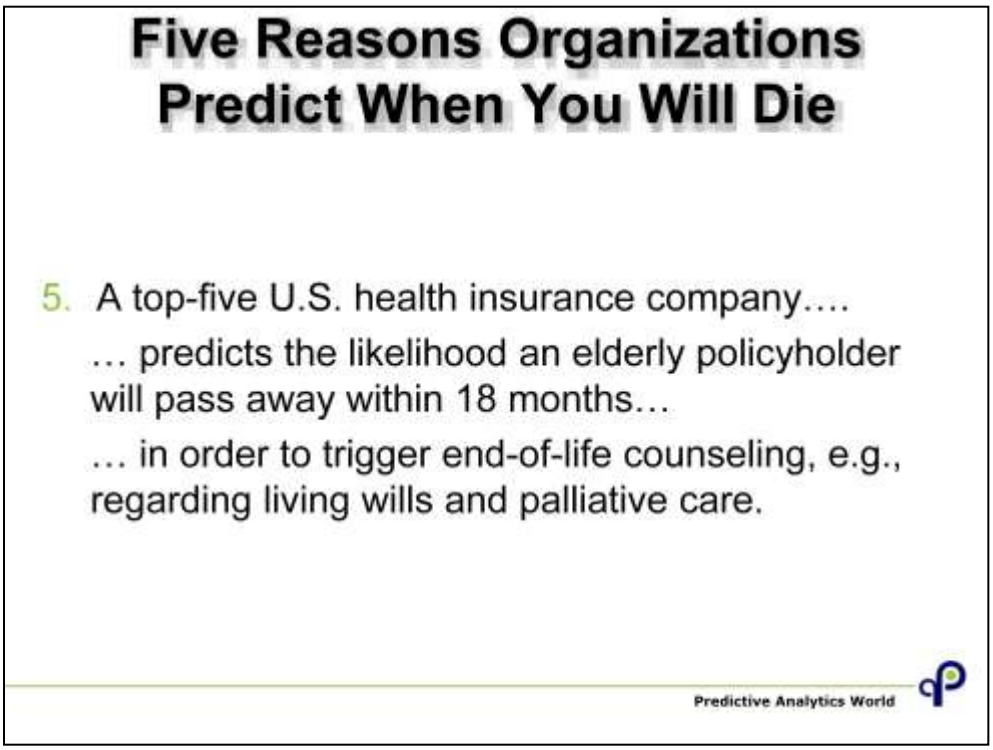
For more details, see the article, "Deathwatch: Five Reasons Organizations Predict When You Will Die": http://www.predictiveanalyticsworld.com/patimes/deathwatch-five-reasons-organizations-predict-when-you-will-die/

Safety institutes: e.g., aviation accident mortality.

According to an industry poll, a growing number of life insurance companies go beyond conventional actuarial tables and employ predictive technology to establish mortality risk. They calculate when you are going to die.

This Atlantic article about gun violence prediction proposes a database that would lead the way to predicting offenses, including random killing sprees related to mental illness: http://www.theatlantic.com/politics/archive/2012/12/how-big-data-can-solve-americas-gun-problem/266633/

... and is there prediction after death? It turns out that death is not the final event to be predicted for a life. The Chicago Police Department predicts whether a murder can be solved. The department found that characteristics of a homicide and its victim help predict whether the crime will be solvable.



Beyond life insurance, one top-five health insurance company predicts the likelihood that elderly insurance policy holders will pass away within 18 months, based on clinical markers in the insured's recent medical claims.

For more details, see the article, "Deathwatch: Five Reasons Organizations Predict When You Will Die": http://www.predictiveanalyticsworld.com/patimes/deathwatch-five-reasons-organizations-predict-when-you-will-die/

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TAKE-AWAYS:
Predictive Analytics for Insurance

- Applies across a range of functions
- Complements standard actuarial methods
  - Leverage ~~big~~ wide data
  - More types of models
- The Data Effect
- The Prediction Effect

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See the following few slides

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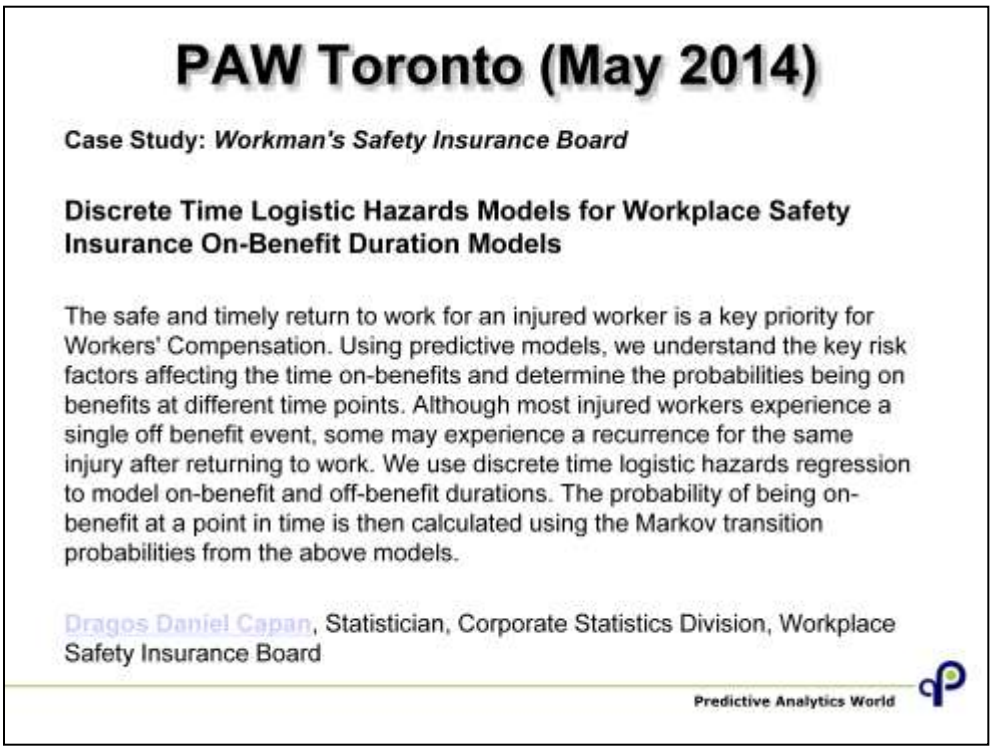

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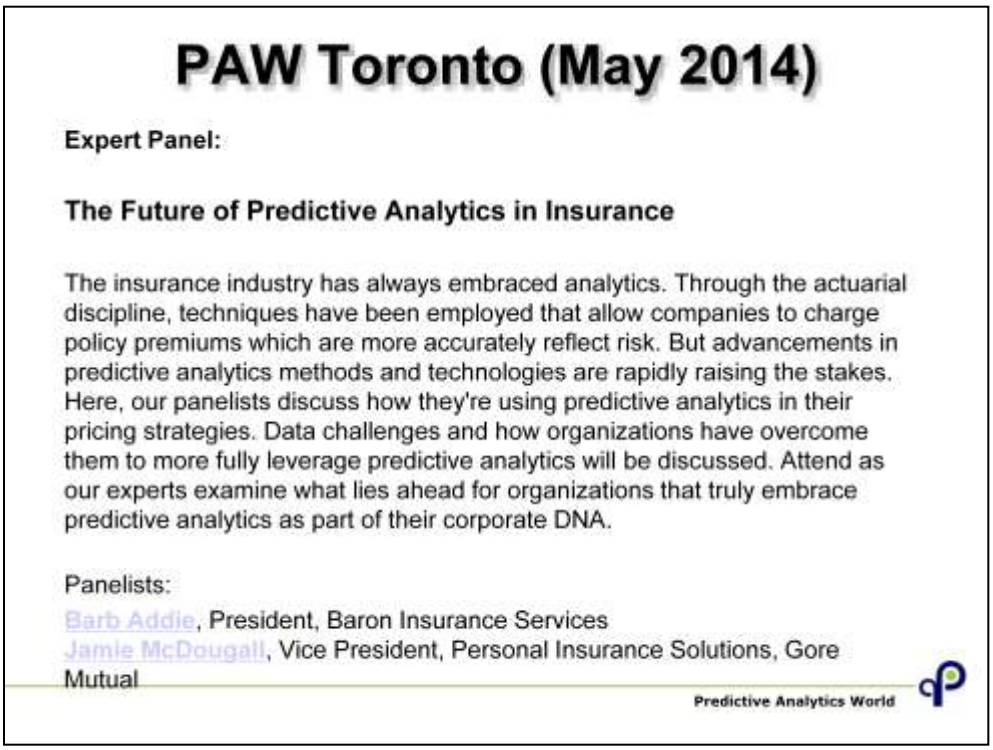

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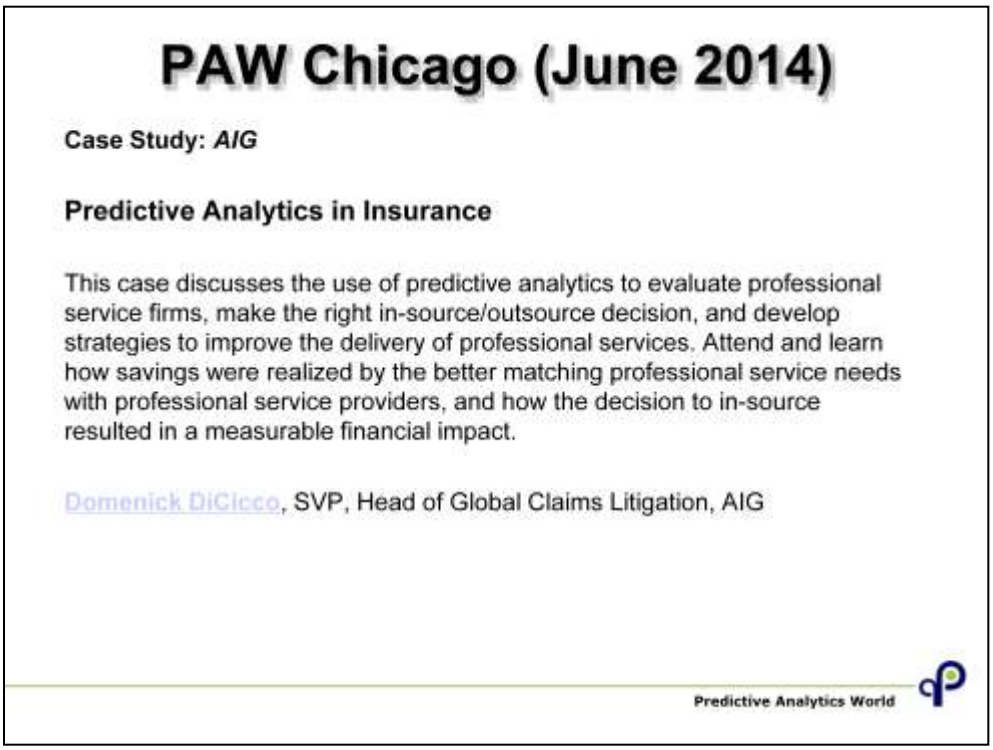

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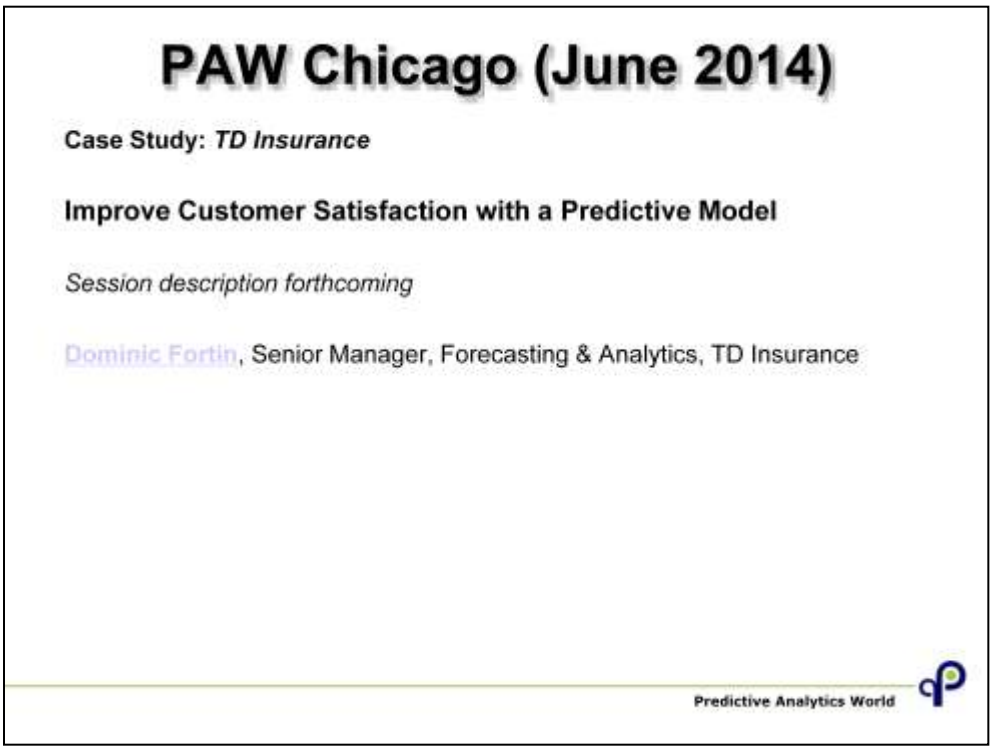

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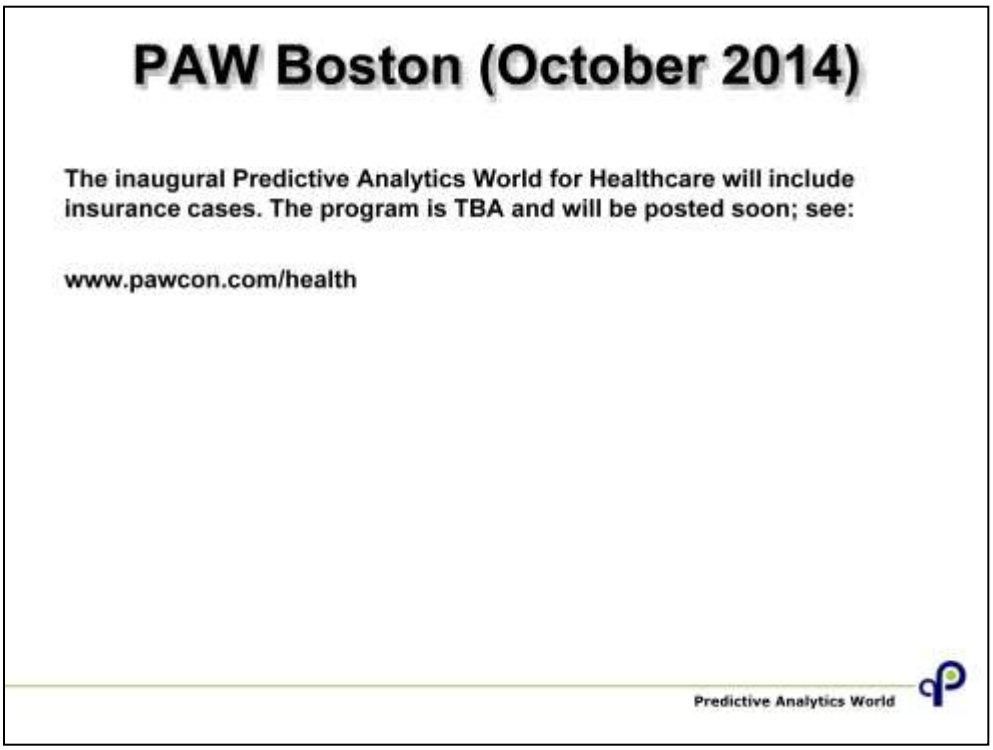

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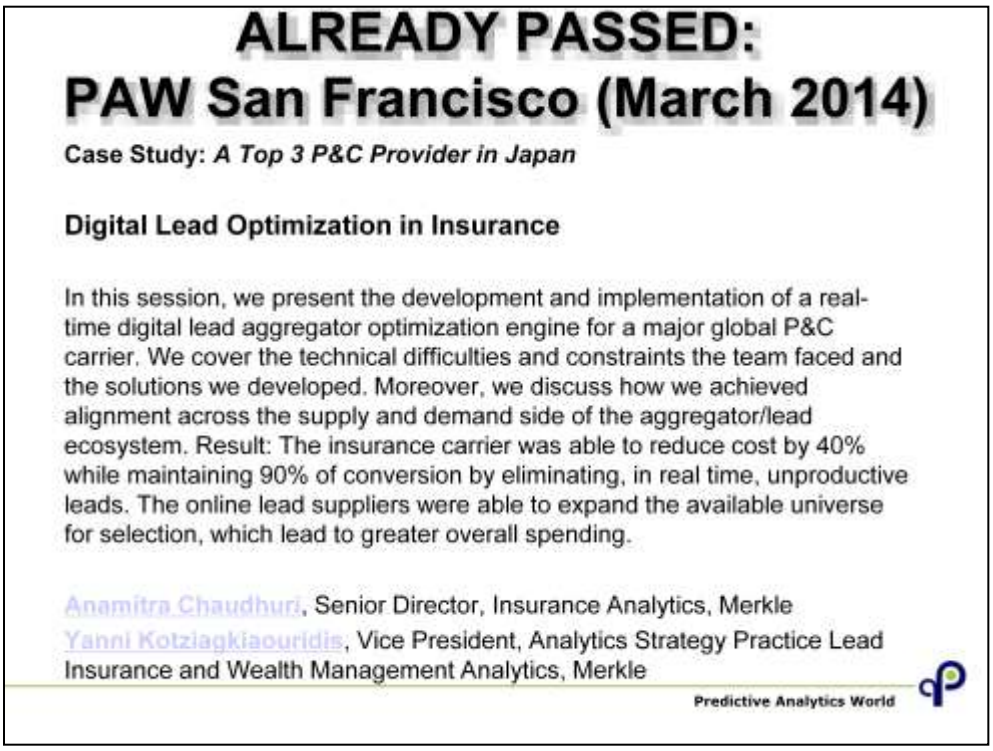

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