

LAS VEGAS, NV
JUNE 18 - 22, 2016

**FAST-
FORWARD**

IMA'S ANNUAL
CONFERENCE & EXPO

ACE16

Using Analytics To Increase Customer Engagement and Revenue

- Tom Coghlan, CMA, Villanova University Center for Business Analytics
- Thom Rossi, PMP, Project Management Institute (PMI)



The Association of
Accountants and
Financial Professionals
in Business

Agenda

Framework for Benefits of Analytics

Illustrate Use of Analytics via Project Management Institute Case Study



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Learning Objectives

1. Describe analytical techniques that can be used to collaborate with operations and information technology.
2. Recognize how a successful organization developed and deployed an analytics strategy to achieve worldwide benefits.
3. Identify analytics tips that can be implemented in the workplace, regardless of size or technical sophistication.

The Story Starts With The CMA Exam

- Johnson & Johnson.
- Imperial Chemical Industries (ICI)
- IT consulting / Business Intelligence.
- Villanova University.
- Managerial Accounting in MBA program.
- Special Interest Group in Analytics.



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

What is Analytics?

“The extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions”.

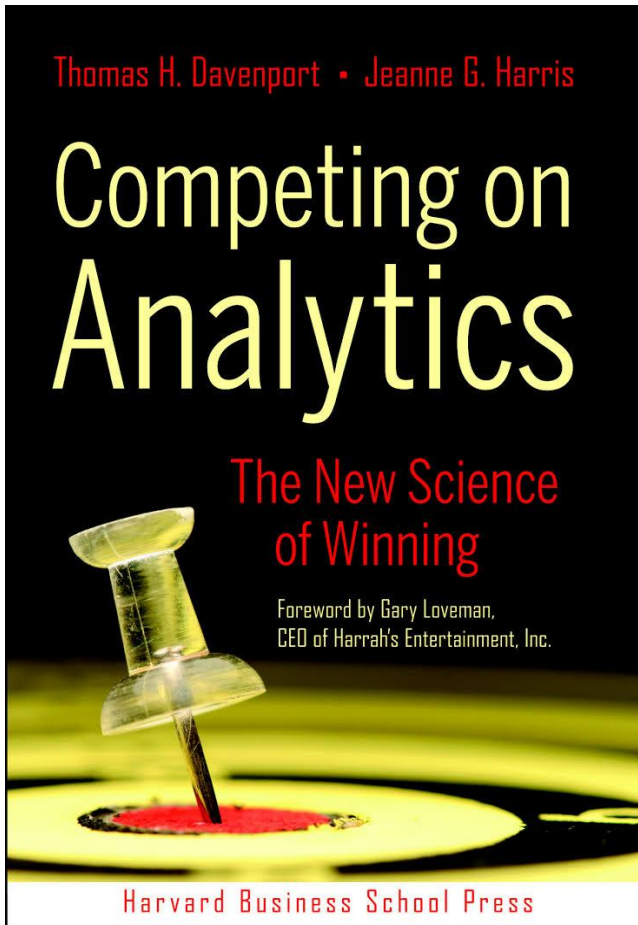
Thomas Davenport and Jeanne Harris
“Competing on Analytics”



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Analytics Is A Journey



“Competing on Analytics”

By Davenport and Harris

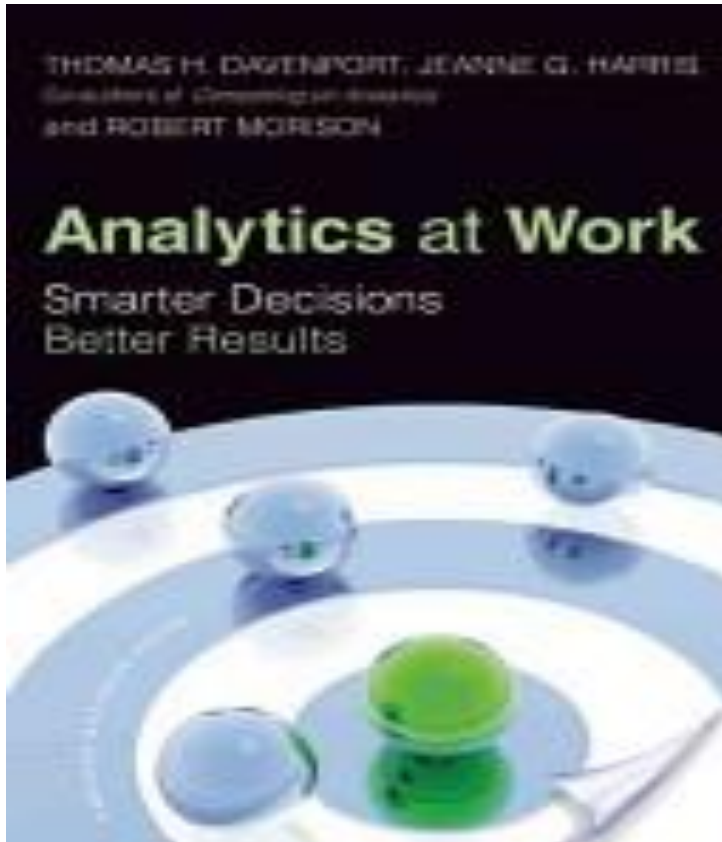
1. Impaired
2. Localized
3. Aspirations
4. Company
5. Competitor



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Getting Started With Analytics



The Association of
Accountants and
Financial Professionals
in Business

“Analytics at Work”

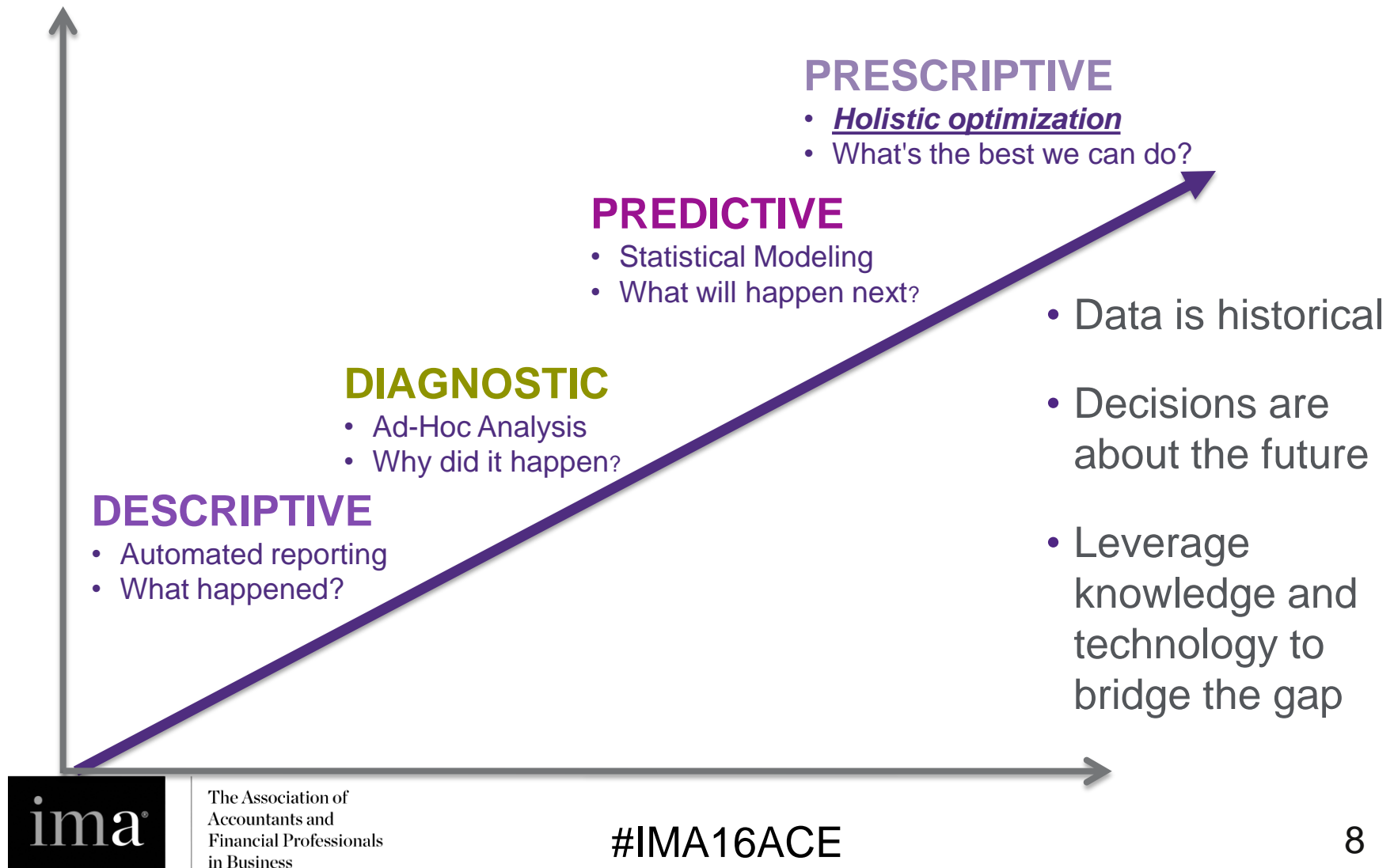
By Davenport, Harris and Morrison

DELTA MODEL

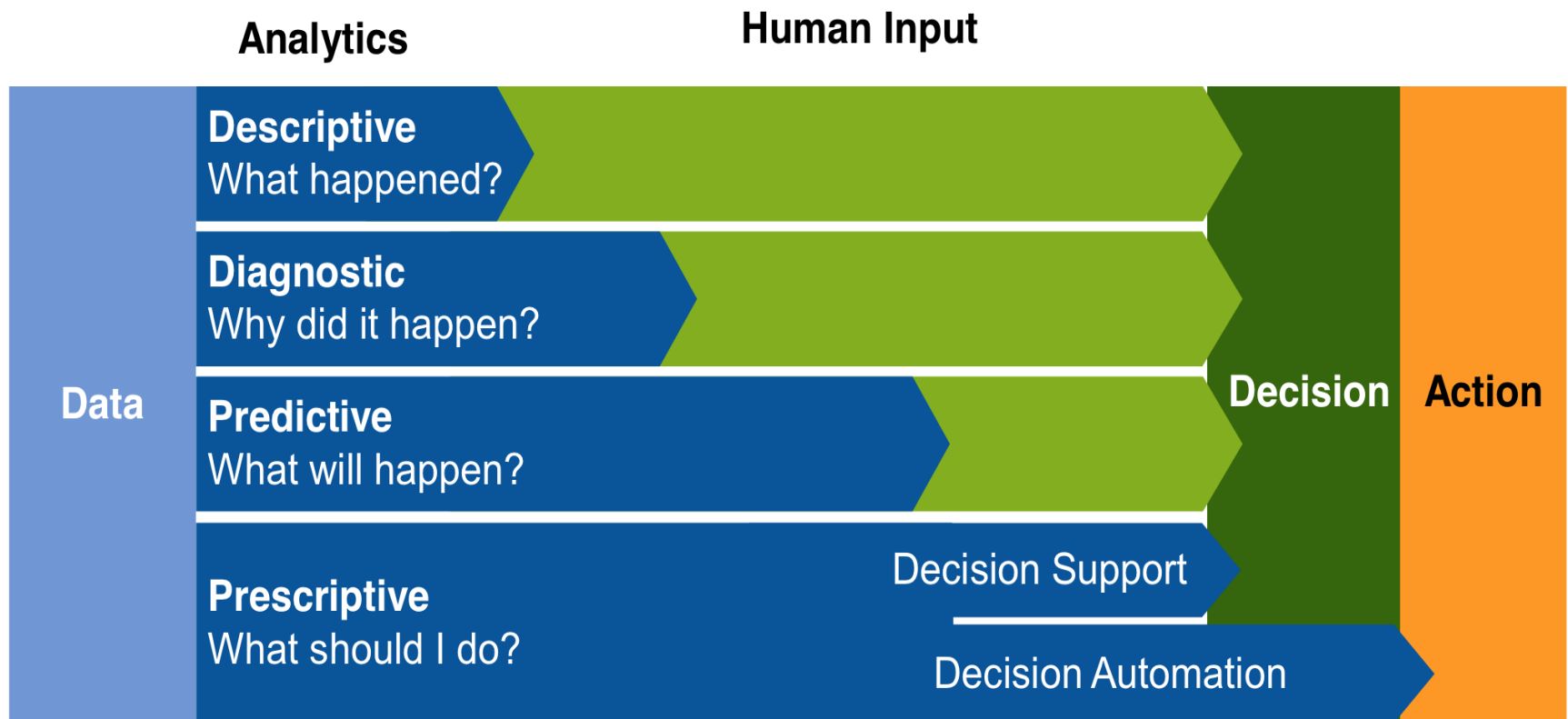
- **Data**
- **Enterprise**
- **Leadership**
- **Targets**
- **Analysts**

#IMA16ACE

Stages of Analytics



What, Why, What, What?



Where To Start?

Balanced Scorecard Perspectives

1. Customer
2. Internal Processes
3. Learning and Innovation
4. Financial



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

2016 Top Issues for CFO's

“The Digital Finance Imperative”, Oracle sponsored research study conducted by the AICPA and CIMA.

- The survey asked respondents to rank the most **important determinants of value**.
- The **top 3** are:
 1. Customer satisfaction (76%).
 2. Quality of business processes (64%).
 3. Customer relationships (63%).



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Importance of Intangible Assets

Intangible assets comprised 84% of the S&P 500 corporate valuations in Jan 2015, up from 20% in 1975.

- 2015 study by Ocean Tomo, Mgt. Advisory Firm

Uber – Worlds largest car service; owns no cars.

Apple – Outsources almost its entire value chain; yet has over \$175 billion of capital.

- iCloud is run on outsourced hardware.



Villanova Center for Business Analytics

Center for **BUSINESS
ANALYTICS**



**VILLANOVA
UNIVERSITY**
Villanova School of Business

The mission of the Center for Business Analytics is to spearhead the development of the analytical capabilities of business students, conduct applied research, and disseminate best practices to improve organizational performance.



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Strategic Pillars

Center for **BUSINESS
ANALYTICS**



**VILLANOVA
UNIVERSITY**
Villanova School of Business

Provide focus for the development, execution and tracking of strategic objectives.

1. Curriculum
2. Research
3. Practice



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

About PMI

- World's leading not-for-profit professional membership association for the management of:
 - Projects
 - Programs
 - Portfolios
- Over 2 million project management professionals in nearly every country



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

IMA and PMI Similarities

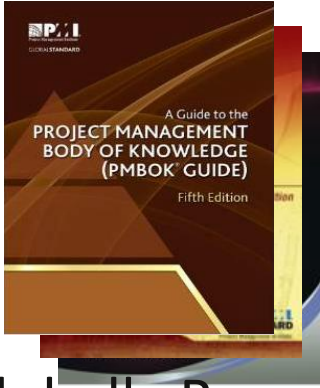
1. International.
2. Members pay annual dues.
3. Certifications.
4. Continuing education (CPE and PDU).
5. Local chapters.
6. Thought leadership.
7. Annual meetings.



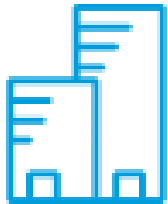
The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

PMI Member Engagement



Globally Recognized
Standards



Professional
Development



Publications



Certifications



Academic Research



Networking
Opportunities



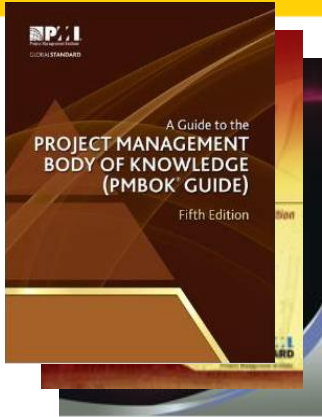
Tools



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Keeping Track of Members



Electronic
Downloads



Certifications



Chapters



#IMA16ACE



The Association of
Accountants and
Financial Professionals
in Business

Understanding Members

**Monthly
Reporting**

Dashboards



Ad-Hoc Reports

**Data Analytics
Projects**



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Origin of PMI/Villanova Collaboration

- **PMI internal resources constrained**
- **Interns/Co-ops**
 - 6 month duration
- **Villanova Center for Business Analytics Consulting**
 - Phased project approach
 - Scope of work with deliverables
 - Timeline with milestones and fixed price



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

How You Start Is How You Finish

1. Start with end in mind

Scope, deliverables and timeline clearly defined

2. Integrated project team

Client: Sponsor, managers, subject matter experts

Center for Business Analytics: Student consultants, technical advisors, project manager/mentor

3. Communications are key

Internal team, PMI/Villanova weekly calls; on-site checkpoint reviews



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Need Data To Prove “Beliefs”

PMI “Believed”

1. There was a drop-off in member renewals after the initial membership year.
2. After members renew the first time (renew for their second year) they were likely keep renewing in subsequent years.



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

First Two Deliverables

#1. Determine if there are differentiating factors between:

Members **who renewed** their memberships versus

Members who **do not renew** their memberships.

#2. Based on the findings of #1, **develop a model** to predict the likelihood of member renewal.



Some Technical Details

Cloud Development Environment

- Fully secure.
- View of PMI data warehouse.
- No member personal identity information; member # and country.
- Over 100 tables, updated monthly.
- Access via remote desktop connection.



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Scope of Member Data Analyzed

PMI members who joined between 01/01/2003 and 01/01/2013.

- Exclude members who joined after 1/1/2011
- Retention for three years after joining PMI.
- Includes approximately 850,000 members.

“Join Year”

- People who joined in the same calendar year.



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Key Attributes

- Person ID (identity is anonymized)
- Join date
- Region
- Certified (PMP, others)
- Chapter member
- Electronic downloads



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Early Finding: Need for Visualization

- **Number of members who join each year is increasing**
 - Increasing from 2006-Present
- **Overall retention rates are decreasing**
 - Decreasing from 2005-Present



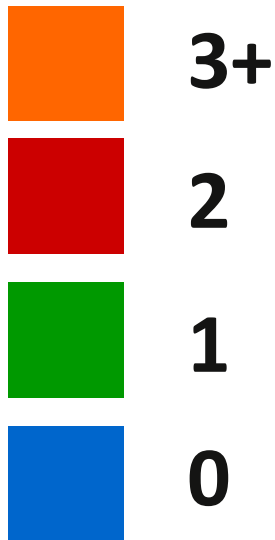
The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

27

Start By Visualizing the Data

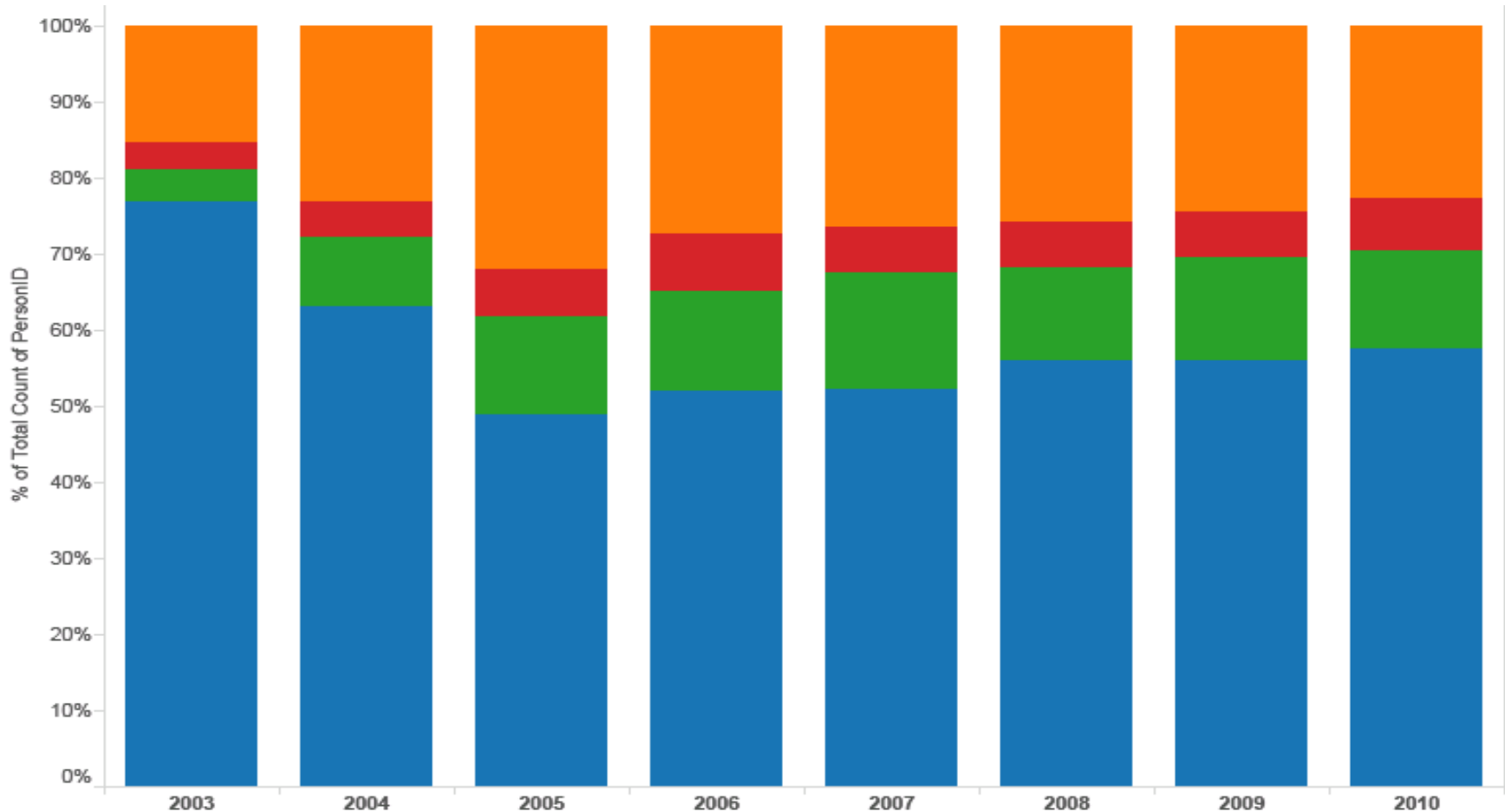
Number of times renewed



Retention

of times a member renewed their membership

Retention By Join Year



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Present Insight, Not Data

For insights to be actionable, you need to :

- Develop an understanding of what **levers** are available to the business.
- Conceptualize how those recommendations can impact the business.



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

30

Impact of Certification on Renewals

Certification increases membership length

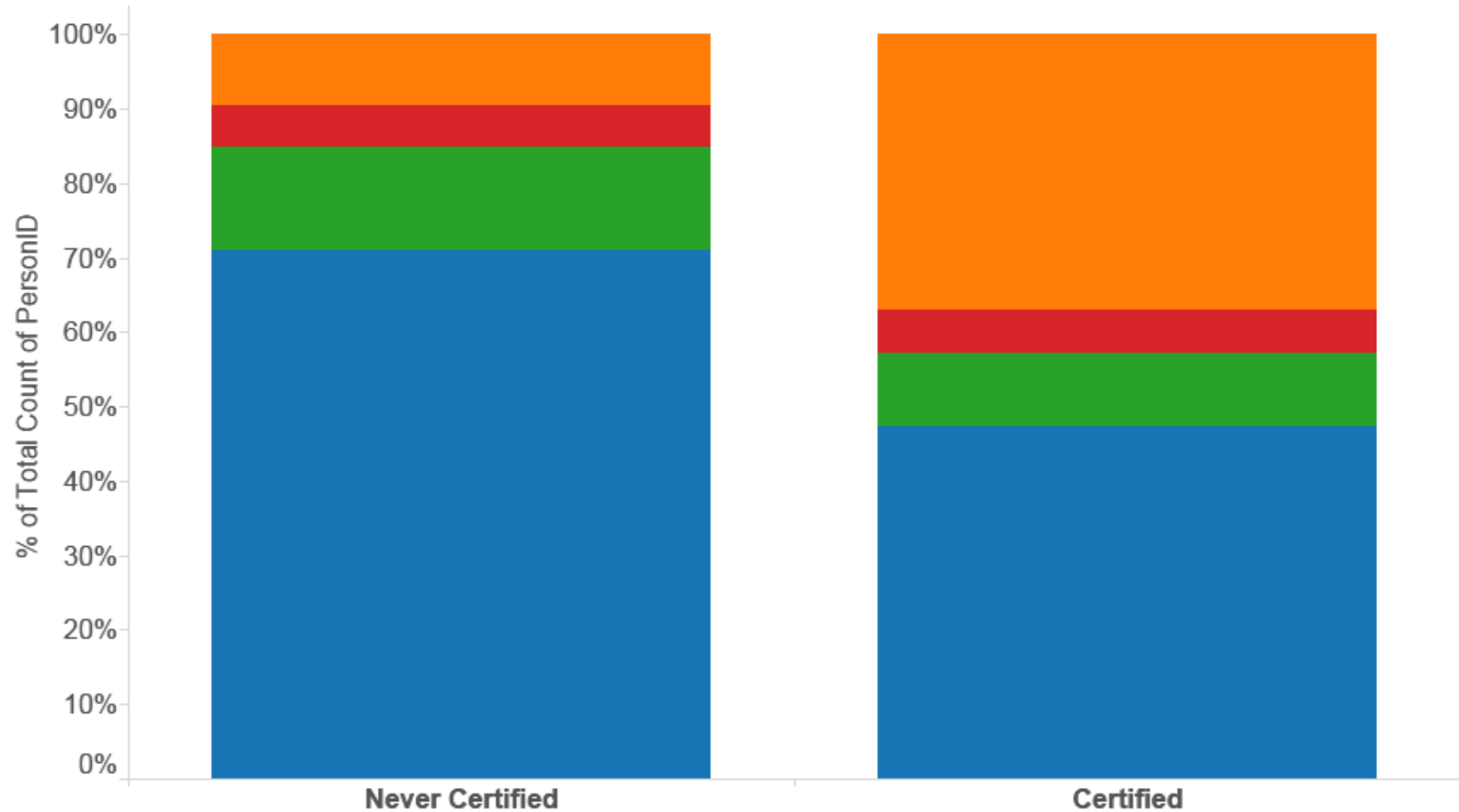
- 55% of members are certified
- Nearly twice as likely to renew 1st year if certified

Four times as likely to remain a member for 4 years or greater

- 37% of certified members were members for over 4 years.



Impact of Certification on Renewals



Impact of Joining a Chapter

Joining a chapter increases membership length

Twice as likely to renew 1st year if in a chapter

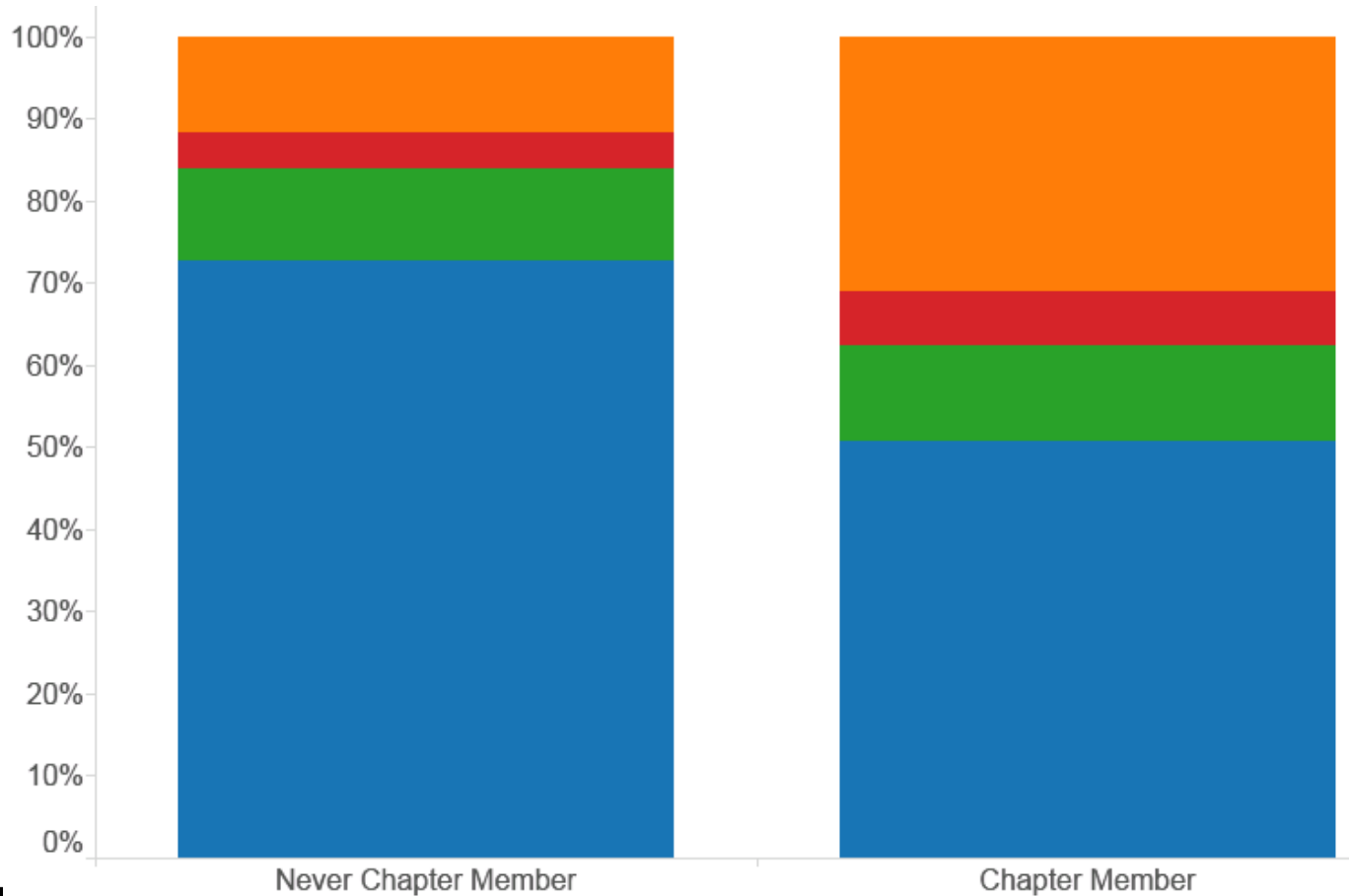
Over three times as likely to remain a member for 4 years or greater



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

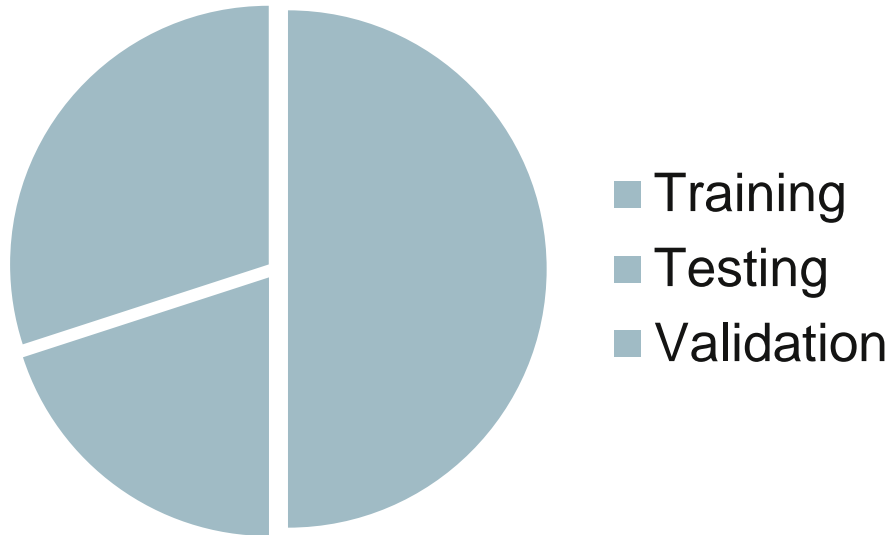
Impact of Joining a Chapter



Developing a Prediction Model

- Data in the data warehouse
 - In-depth profile of all members.
 - Data about who did or did not renew.
- Data became knowledge
 - Which attributes contribute most to member renewal.
 - Predict whether a specific member will renew or not.

Best Practice in Developing Models



- **Building the model**
 - Choose rules to best predict the training set
 - Adjust rules based on how they perform for a validation set
- **Testing the model**
 - Measure the accuracy by how well rules perform on a hold out testing set

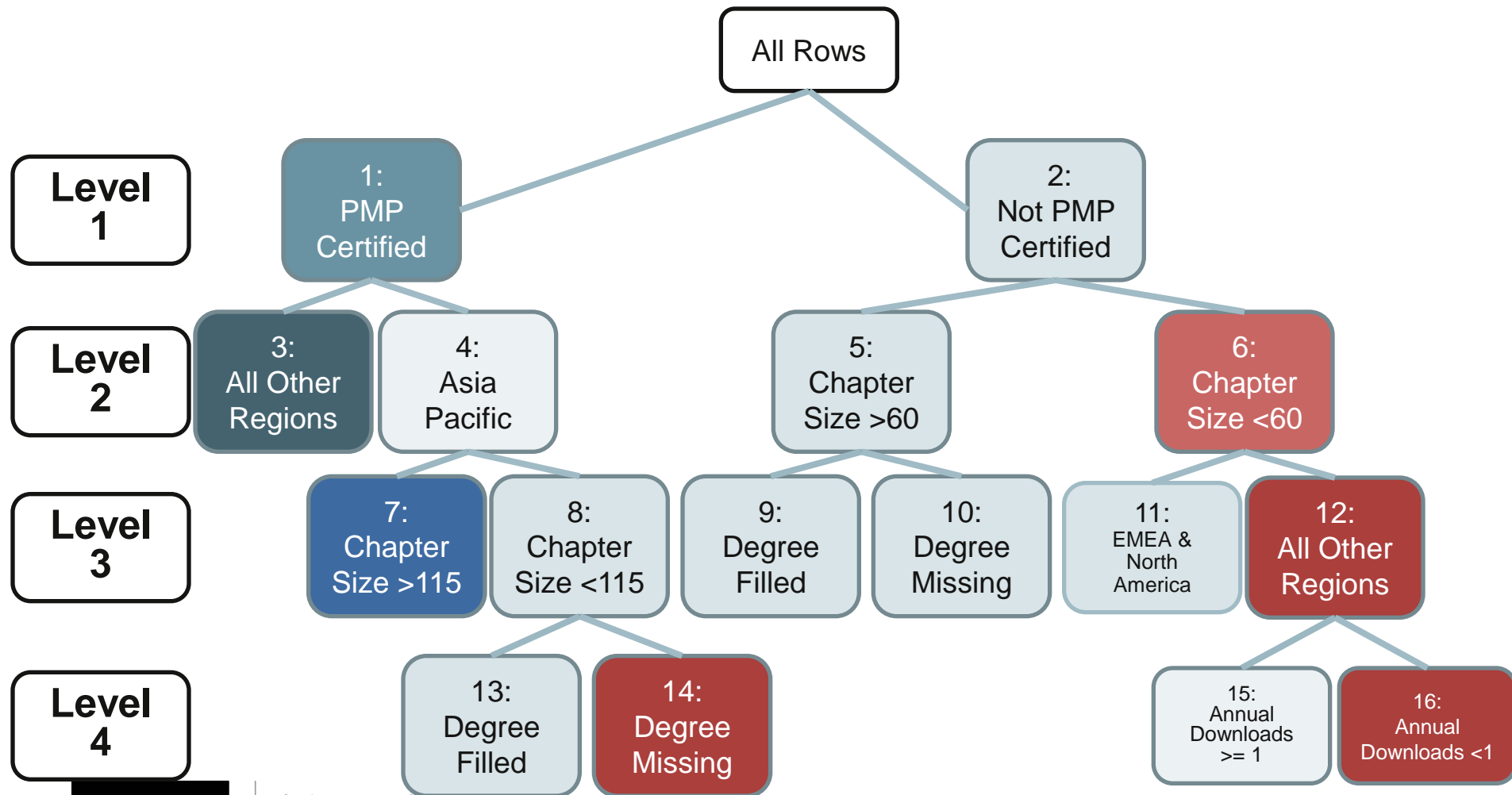


Decision Tree Analysis

- Determine **most important** predictors of 1st year membership renewal
- Categorize into 2 groups:
 - 1. Members who renewed**
 - 2. Member who did not renew**
- Establish set of rules to predict whether or not someone will renew



Decision Tree



Measuring Model Accuracy: “Confusion Matrix”

	Predicted to Renew	Predicted to NOT Renew
Actually Did Renew	True Positive	False Positive
Actually Did NOT Renew	False Negative	True Negative

Key Learning: Avoid Being Too Technical

The term “confusion matrix” is widely used in data mining.

- True positive
- False positive
- True negative
- False negative

Labeling the analysis of the accuracy as a “confusion matrix” **confused** most of the attendees at a meeting.

Initial Model Accuracy

	Predicted to Renew	Predicted to Not Renew
Actually <u>did</u> renew	69.8%	30.2%
Actually <u>did not</u> renew	30.0%	70%

Initial model had **70% prediction accuracy**

- Correctly predicts renewal in 69.8% of cases.
- Correctly predicts non-renewal in 70% of cases.

About the First Model

- “Member Lifetime Experience” Model
- Analyzes engagement from date member joins PMI.
- Determined most important **lifetime attributes** that predict membership renewal. E.g.
 - “Was member **ever** certified?”
 - “Was member **ever** a chapter member?”



Phased Approach

- Start small.
- Deliver.
- Show success.
- Develop credibility.
- Look to extend initial success with another small project.



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Phase Two

1. Test existing “Member Lifetime Experience” model.
2. Develop new “Member Renewal Decision” model
3. Analyze new factors such as chapter size, regional differences and gender.



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Member Renewal Decision Model

- Second model developed.
- Analyzes current level of member engagement **at the time of renewal decision**.
- Determined most important attributes that predict membership renewal. E.g.
 - “Is the member **currently** certified?”
 - “Is the member **currently** a chapter member?”



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Differences in the Models

Critical Moment of Renewal

- What attributes are pertinent **at the time** members decide to renew?

Member Lifetime Experience model

- Members **who ever became certified** **were** more likely to renew.

Member Renewal Decision model

- Members **who were certified at the time of renewal** are more likely to renew.



Answering a Business Question

Business Question: Are there regional differences in the factors that influence renewal and non-renewal?

- Developed regional **member renewal decision** models:
 - North America
 - EMEA
 - Latin America
 - Asia Pacific (China only and without China)



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Regional Models

Except for Asia-Pacific, the regional models **did not** reveal any major differences from the worldwide “all members” model.

- **PMP certified** is the first indicator for predicting renewal in all regions **except in Asia-Pacific**
- **Chapter size** is the first indicator for predicting renewal in Asia-Pacific.



Key PMI Takeaways and Learnings

1. Organization needs to buy-in.
2. Start small.
3. Some “anecdotal” beliefs were proved.
4. Data “under the microscope” needs to be clean.
5. Correlation does not lead to causation.
6. Educated the organization on what is possible.

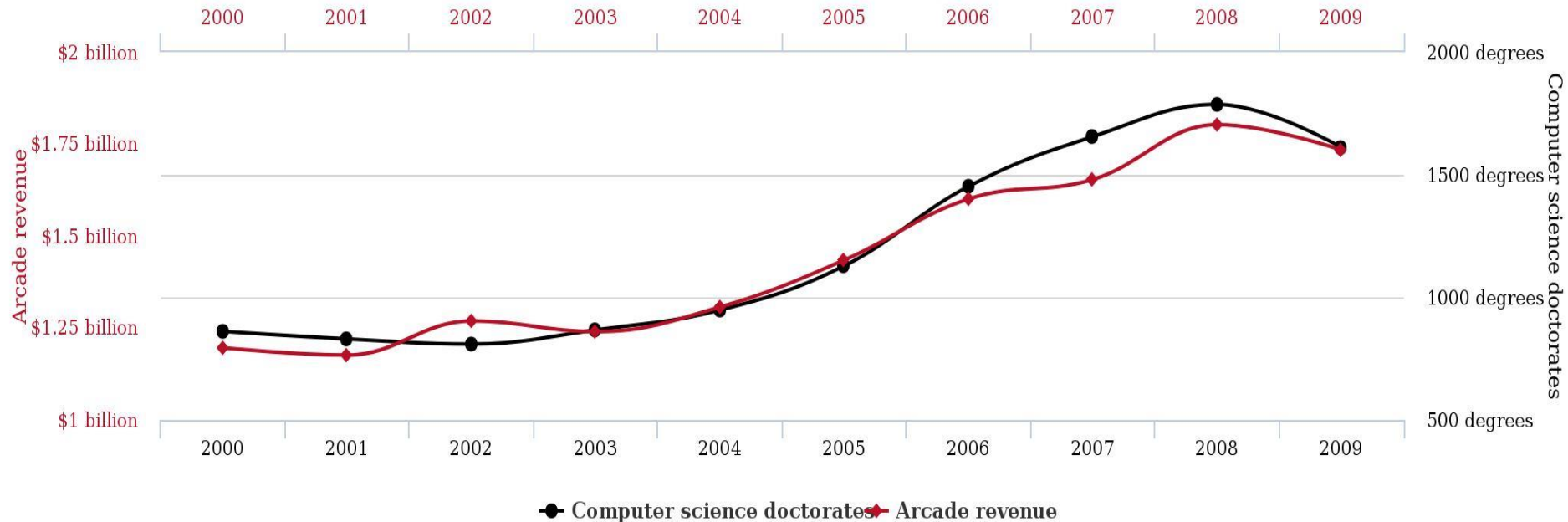


The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

Correlation Does Not Lead to Causation

Total revenue generated by arcades
correlates with
Computer science doctorates awarded in the US



tylervigen.com



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE

50

Thanks!

Tom Coghlan

- Thomas.coghlan@villanova.edu

Thom Rossi

- trossi@pmi.org



The Association of
Accountants and
Financial Professionals
in Business

#IMA16ACE