Reskilling & Upskilling the GFM Workforce

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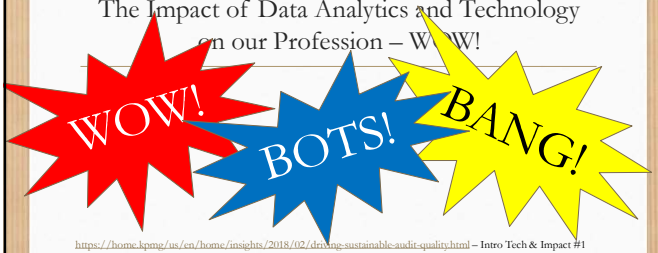
Mississippi College
March 2021

Sources Include: NASBA and AICPA

1

The Impact of Data Analytics and Technology on our Profession – WOW!



https://home.kpmg/us/en/home/insights/2018/02/driving-sustainable-audit-quality.html – Intro Tech & Impact #1

https://home.kpmg/us/en/home/insights/2017/12/intelligent-automation-for-audit.html – Intro Tech & Impact #3

2

2

The Impact of Data Analytics and Technology on our Profession – WOW!

- Hang ON
- ENJOY the RIDE!

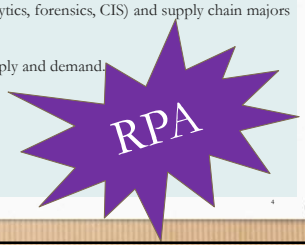
https://www.ey.com/en_gl/digital-audit/audit-digitization-transformative-age - EY Audit

3

3

The Impact of DA & Tech. on our Profession– WOW!

- The number of accounting majors is declining in some universities as students are moving toward data centric (data analytics, forensics, CIS) and supply chain majors
- Mississippi is slow in this trend
- Why? The basic economic law of supply and demand.



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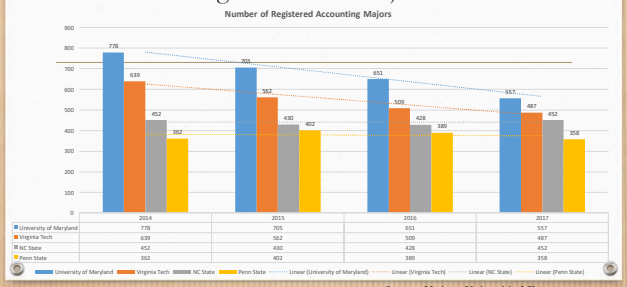
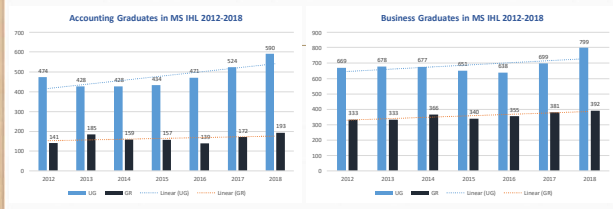
Trends in Accounting & Business Majors in Other Markets



Source: Various Universities' Data

5

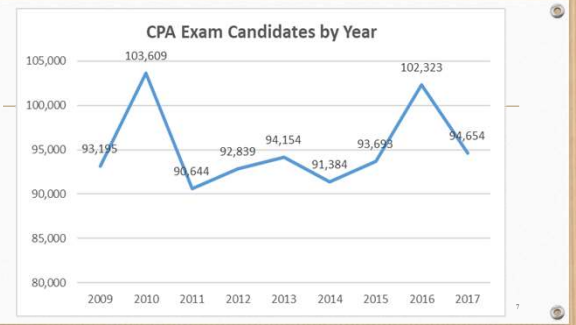
Trends in Accounting & Business Majors in MS



Source: Mississippi IHL

6

CPA Exam Candidates by Year



Source: AICPA

7

Why the Decline?

- Possible Cause #1 – Accounting degrees yield lower starting salaries compared with other fields related to information sciences & technology, cybersecurity, and technology digitization (RPA, AI and BC).

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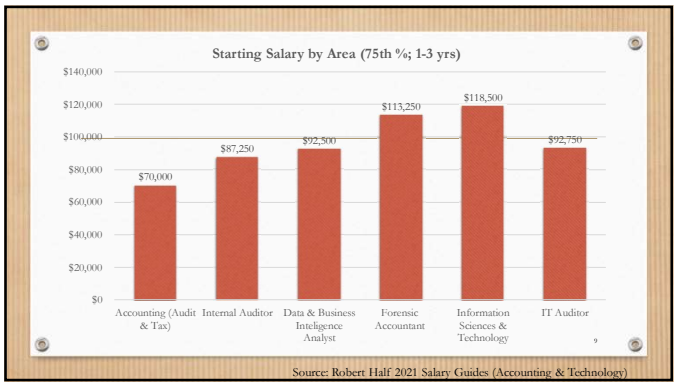
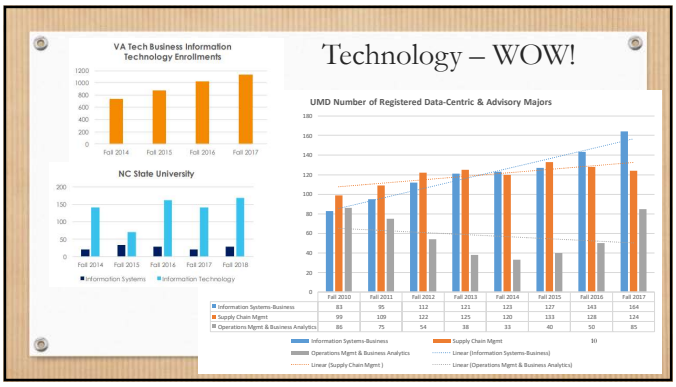
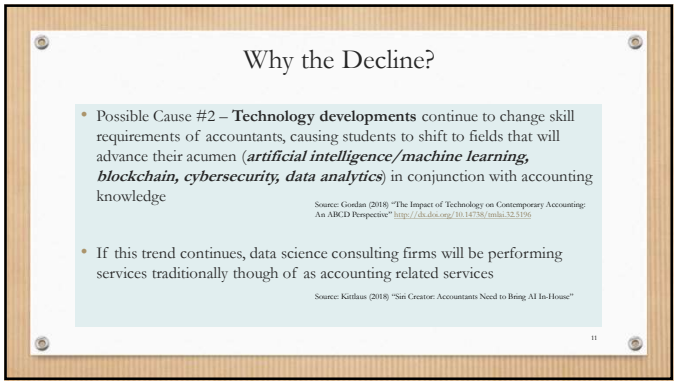

Starting Salary by Area (75th %; 1-3 yrs)
$140,000
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$0
$70,000
$87,250
$92,500
$113,250
$118,500
$92,750
Accounting (Audit & Tax)
Internal Auditor
Data & Business Inteligence Analyst
Forensic Accountant
Information Sciences & Technology
IT Auditor
9
Source: Robert Half 2021 Salary Guides (Accounting & Technology)

9


VA Tech Business Information Technology Enrollments
Fall 2014
Fall 2015
Fall 2016
Fall 2017
NC State University
Fall 2014
Fall 2015
Fall 2016
Fall 2017
Fall 2018
Information Systems
Information Technology
Technology – WOW!
UMD Number of Registered Data-Centric & Advisory Majors
Fall 2010
Fall 2011
Fall 2012
Fall 2013
Fall 2014
Fall 2015
Fall 2016
Fall 2017
Information Systems-Business 83 95 112 121 123 127 141 164
Supply Chain Mgmt 99 109 122 125 120 133 128 124
Operations Mgmt & Business Analytics 86 75 54 38 33 40 50 85
Information Systems-Business
Supply Chain Mgmt
Operations Mgmt & Business Analytics
Linear (Information Systems-Business)
Linear (Supply Chain Mgmt.)
Linear (Operations Mgmt & Business Analytics)
10

10


Why the Decline?
Possible Cause #2 – Technology developments continue to change skill requirements of accountants, causing students to shift to fields that will advance their acumen (artificial intelligence/machine learning, blockchain, cybersecurity, data analytics) in conjunction with accounting knowledge
Source: Gordan (2018) "The Impact of Technology on Contemporary Accounting: An ABCD Perspective" http://dx.doi.org/10.14738/tmlai.52.5196
If this trend continues, data science consulting firms will be performing services traditionally though of as accounting related services
Source: Kitflaus (2018) "Sin Creator: Accountants Need to Bring AI In-House"
11

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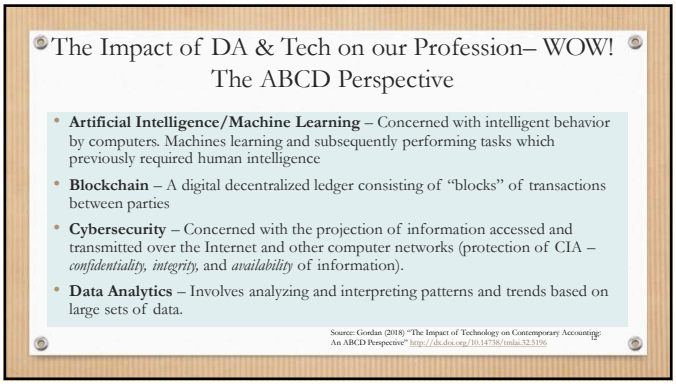
The Impact of DA & Tech on our Profession– WOW!
The ABCD Perspective
Artificial Intelligence/Machine Learning – Concerned with intelligent behavior by computers. Machines learning and subsequently performing tasks which previously required human intelligence
Blockchain – A digital decentralized ledger consisting of "blocks" of transactions between parties
Cybersecurity – Concerned with the projection of information accessed and transmitted over the Internet and other computer networks (protection of CIA – confidentiality, integrity, and availability of information).
Data Analytics – Involves analyzing and interpreting patterns and trends based on large sets of data.
Source: Gordan (2018) "The Impact of Technology on Contemporary Accounting: An ABCD Perspective" http://dx.doi.org/10.14738/tmlai.52.5196
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Technology - WOW!

- **Machine Learning** – algorithms used to predict future events based on based experience and data patterns (regression and clustering analysis)
- **Natural Language Processing (NLP)** – used for content categorization, contextual extraction, sentiment analysis, document summarization, and more.
- **Natural Language Generation (NLG)** – Used to convert nonlinguistic information in to human understandable natural language for machine-human communications, data interpretation, and more.

Source: AICPA - 2018

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Technology - WOW!

- **Computer Vision** – enables computers to obtain information from images, videos, or other multi-dimensional data used in facial recognition, self-driving cars, disease diagnosis, automated stores, and more.
- **Virtual Agent** – can respond to human questions and perform adequate nonverbal behavior. Used in Alexa, Ok Google, chatbots, Siri, customer service, etc.
- **Cognitive Computing** – augments human capabilities by providing relevant information or recommendations to help humans make better decisions (Evans, D. ,2017). It brings together ML, NLP, NLG, CV and VA used in disease diagnosis, investment recommendations, Google Maps, etc.

Source: AICPA - 2018

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Technology – WOW!

- https://www.youtube.com/watch?v=cT8igWvi1FY – ACCA Impact of DA on Audit & Finance
- https://www.youtube.com/watch?v=yKyhRA6gsdc&feature=emb_rel_pause – Deloitte Audit Assurance
- https://home.kpmg/us/en/home/insights/2018/01/a-journey-in-audit-innovation.html – Intro Tech & Impact #2

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Skills in Demand

As technological innovation and changing client demands are rapidly transforming the skills accountants need to thrive, standard accounting and audit tools along with skillsets need to be in line with the digital transformation. Source: AICPA (2018) RPA Fundamentals for Accounting & Finance Professionals

- Strong written and verbal communication skills
- Interpersonal skills (working with teams, getting along with others)
- Strong critical thinking and technical aptitude
- Time management and organizational skills

Source: Morehead, Deal (2018) Building the Workforce & Workplace in GFM

- Technical Skills
- Excel
- Data Visualization
- Analtyic Modeling
- ETL – Extract, transform, and Load tools
- Accounting concepts

Source: Jamila Webb (2018) Grant Thornton Audit Partner and University Recruiter

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WOW! What Does This Mean for Universities?

- Retooling the Academy
- Training – Increase offerings in IT, Data Analytics, RPA, etc.
- AACSB – Data Analytics in EVERY accounting course

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NASBA & AICPA Accounting Evolution Project

"Reimagining the CPA learning & licensure approach"

- Education Requirements
  - No additional hours
  - More course technological & analytics assessment content added (AACSB has already implemented this change)
- CPA Exam
  - Longer exam?
  - Depth and breadth on testing certain topics
- Experience requirements to sign accountant's report (beyond initial licensure presented to Uniform Accountancy Act Committee for review)

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THE CHANGING MARKETPLACE

Reimagining licensure in an era of rapid change

Technological innovation	New marketplace demands	Pipeline and hiring trends

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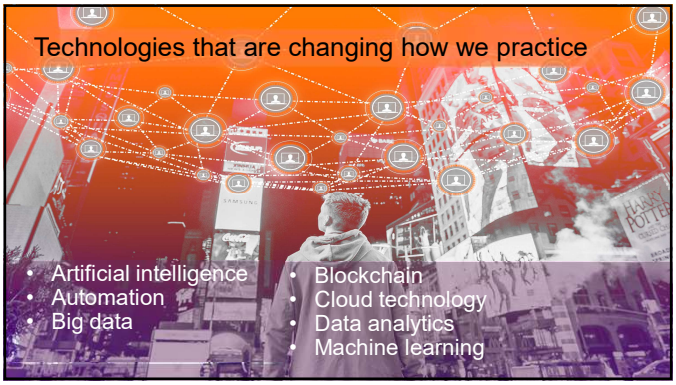
Technologies that are changing how we practice



- Artificial intelligence
- Automation
- Big data
- Blockchain
- Cloud technology
- Data analytics
- Machine learning

20

20

New marketplace demands … and opportunities

- Internal control reporting
- Continuous reporting
- Social media
- Deep fakes
- Sustainability
- Digital/crypto assets
- Blockchain implications on SOC 1 and SOC 2
- SOC for Cybersecurity
- Privacy/GDPR
- Data integrity
- Certifications/HITrust

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U.S. public accounting firm hiring

In 2016, there were

19% ↓

fewer accounting graduate firm hires since 2014

Source: 2017 AICPA Trends Report

In 2018, there were

29% ↓

fewer accounting graduate firm hires since 2014

Source: 2019 AICPA Trends Report

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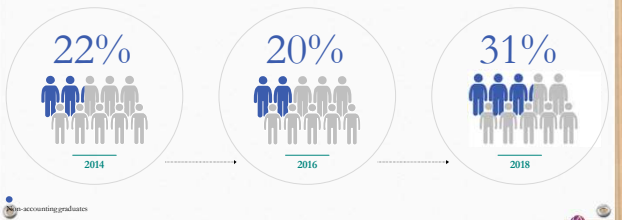
Non-accounting graduate degree hires

Supply Demand

Non-accounting hires as a percentage of all new graduate hires are up 11%.



AICPA

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CPA Evolution progress

- Circulated/ discussed conceptual licensure model
- Drafted guiding principles
- Leveraging feedback to inform an evolving licensure model

Jan.- Oct. '18 | Nov. '18- Jan. '19 | Feb. '19 | Spring '19 | Today | 2020

- Working Group formed; provided perspective
- Exposed draft guiding principles; received feedback
- **Build out model, gather feedback and finalize; vote & adopt**

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Guiding Principles

- We must adapt quickly
- Technological expertise is essential
- Licensure requires rethinking
- We must expand our view of the CPA candidate
  - All must demonstrate core competencies
- Change should be rapid yet deliberate

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What AICPA and NASBA heard

Focus on…

- A core that includes accounting, auditing, tax and technology
- Education that aligns with the core
- Experience requirements that support audit quality
- Supporting existing CPAs
  - Reskilling
  - Promoting emerging services

…while developing appropriate messaging to modify licensure in current environment

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This should be about more than just technology.

To future-proof the profession, we must **think differently.**

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Body of knowledge for newly licensed CPAs is growing…

Body of knowledge

Compared to 1980, today there are:

3X as many pages in the Internal Revenue Code

4X as many accounting standards

5X as many auditing standards

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Body of knowledge for newly licensed CPAs is growing…

Body of knowledge

CPA firms told us:

- Procedures historically performed by newly licensed CPAs are being:
  - Automated
  - Off-shored
  - Performed by paraprofessionals

Result: Newly licensed CPAs need to know more earlier in their career

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Body of knowledge for newly licensed CPAs is growing…

Body of knowledge

Demands of practice require deeper skillsets

- Critical thinking
- Professional judgment/skepticism
- Problem solving
- Understanding of business
  - Systems, controls, risk
- Data management and analysis
- SOC engagements

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…but Exam stays the same size.

Exam

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What is the exam like today?

Then

- Paper exam offered twice annually
- Take all un-passed sections at each sitting
- Multiple choice, problems and essays
- Exams were taken on piers, in gymnasiums

Now

- Computerized exam offered 280 days annually
- Take one section at a time
- Multiple choice, task-based simulations, constructed response questions
- Exams taken in Prometric testing centers

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Stretch to cover more material with less depth

Exam and Education

Impact
- Requirements for licensure are watered down
- Candidates know less about what matters most

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Increase Exam and curriculum hours

Exam and Education

Impact
- Increases barriers to entry, impacting pipeline
- Unsustainable approach over long term

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Other models considered

- CPA – Audit, CPA – Tax, etc.
- Two tier
- Medical
- Legal
- Engineering

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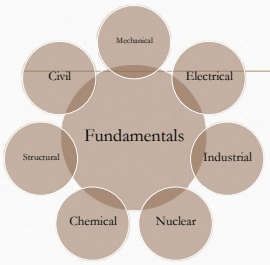
Engineering Model



Professional Engineer (PE)

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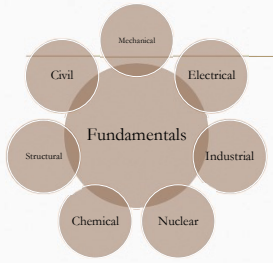
Engineering Model



+ Competence

= PE

With signing authority

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AICPA-NASBA leadership current thinking

- AICPA volunteer leadership
- NASBA volunteer leadership
- State Society, State Board leadership
- Senior AICPA and NASBA staff

- Small firm
- Top 100 firm
- Big 4 firm
- Technology expertise
- Tax expertise

- A&A expertise
- Governmental expertise
- Consulting expertise
- Regulatory expertise
- Testing/Exam expertise

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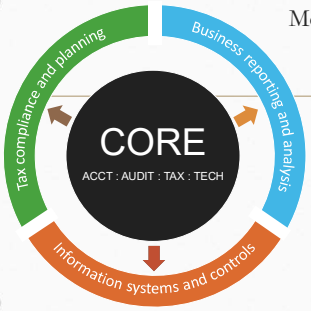
Model for Approved 5/20/20



= CPA

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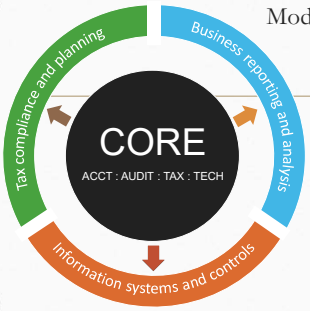
Model for Approved 5/20/20



- Strong core with accounting, auditing, tax and technology
- Deeper knowledge in three primary disciplines
- Reflects reality of practice
- Adaptive and flexible
- One CPA license
- Enhances public protection

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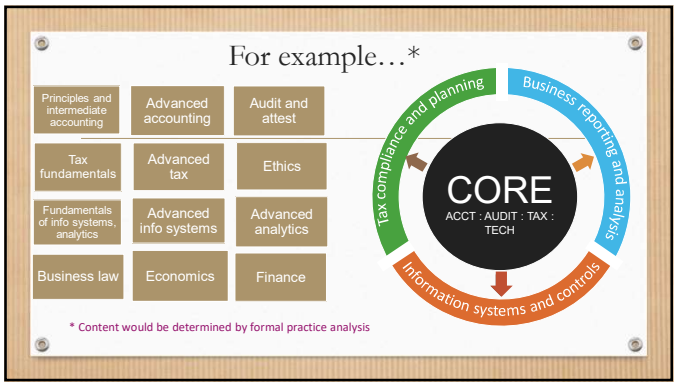
For example…*
Principles and intermediate accounting
Advanced accounting
Audit and attest
Tax fundamentals
Advanced tax
Ethics
Fundamentals of info systems, analytics
Advanced info systems
Advanced analytics
Business law
Economics
Finance
CORE
ACCT : AUDIT : TAX : TECH
Tax compliance and planning
Business reporting and analysis
Information systems and controls
* Content would be determined by formal practice analysis

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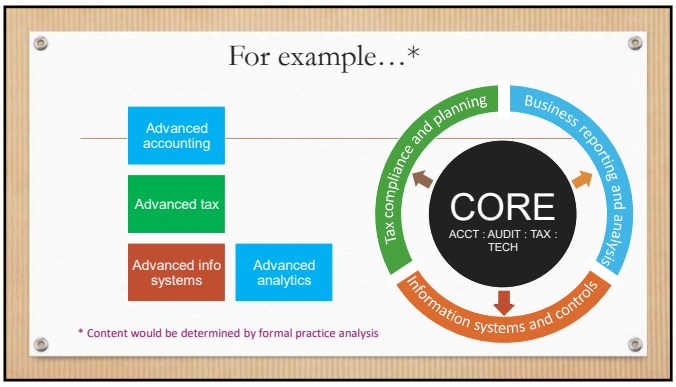
For example…*
Advanced accounting
Advanced tax
Advanced info systems
Advanced analytics
CORE
ACCT : AUDIT : TAX : TECH
Tax compliance and planning
Business reporting and analysis
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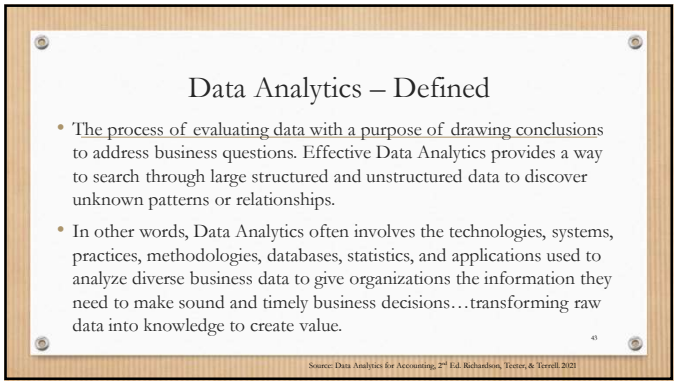
Data Analytics – Defined
The process of evaluating data with a purpose of drawing conclusions to address business questions. Effective Data Analytics provides a way to search through large structured and unstructured data to discover unknown patterns or relationships.
In other words, Data Analytics often involves the technologies, systems, practices, methodologies, databases, statistics, and applications used to analyze diverse business data to give organizations the information they need to make sound and timely business decisions…transforming raw data into knowledge to create value.
43
Source: Data Analytics for Accounting, 2nd Ed. Richardson, Teeter, & Terrell. 2021

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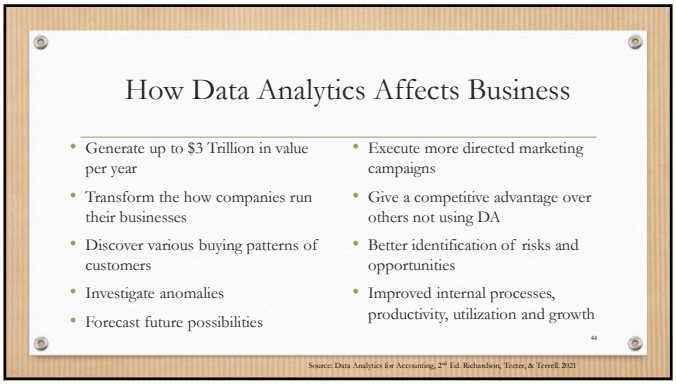
How Data Analytics Affects Business
Generate up to $3 Trillion in value per year
Transform the how companies run their businesses
Discover various buying patterns of customers
Investigate anomalies
Forecast future possibilities
Execute more directed marketing campaigns
Give a competitive advantage over others not using DA
Better identification of risks and opportunities
Improved internal processes, productivity, utilization and growth
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Source: Data Analytics for Accounting, 2nd Ed. Richardson, Teeter, & Terrell. 2021

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How Data Analytics Affects Accounting

AUDIT:

- Audit MUST better embrace technology.
- Technology will enhance the quality, transparency, and accuracy of the audit.

TAX:

- Sophisticated Tax Planning (minimize tax liability, avoid or prepare for audits, predictive analytics)

FINANCIAL REPORTING:

- Improve quality of estimates and valuations
- Address A/R Collection
- Allowance for losses
- Inventory obsolescence (out of date? need to discount and sale?)
- Valuation at Cost or Market
- Goodwill been impaired?
- Valuing Warranty Claims or Litigation

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Source: Data Analytics for Accounting, 2nd Ed. Richardson, Teeter, & Terrell. 2021

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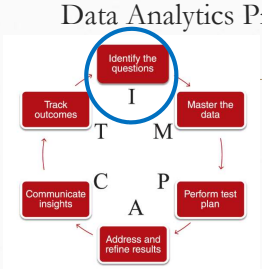
Data Analytics Process – IMPACT Cycle



Identify the Questions:

- Are employees circumventing internal controls?
- Any suspicious travel and entertainment expenses?
- How can we increase the "add-on" sales of items to customers?
- Are customers paying timely?
- Finding risky transactions?
- Who authorizes checks over $100,000?
- How can errors be identified?

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Source: Data Analytics for Accounting, 2nd Ed. Richardson, Teeter, & Terrell. 2021

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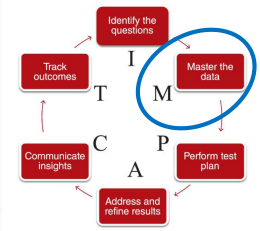
Data Analytics Process – IMPACT Cycle



Master the Data:

- Review data availability in internal systems
- Review data availability in external networks
- Use of data dictionaries and other contextual data
- Extraction, transformation and loading (ETL)
- Data validation and completeness (reliability)
- Data normalization (redundancy, integrity)
- Data preparation and scrubbing (50 to 90% of DA time spent cleaning data to be analyzed)

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Source: Data Analytics for Accounting, 2nd Ed. Richardson, Teeter, & Terrell. 2021

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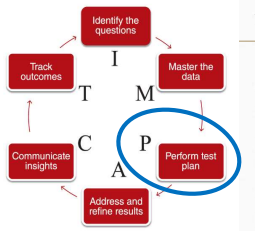
Data Analytics Process – IMPACT Cycle



Perform the Test:

- Using all data available, see if we can identify relationships between the response (dependent) variables and those items that affect all response (predictor, explanatory, independent) variables.
- **Classification** – assign units to a few categories (teacher/student)
- **Regression** – predict specific dependent variables based on independent variable inputs (loan default – income, GPA, age)
- **Similarity Matching** – match based on known data
- **Clustering** – Segment individuals into groups
- **Co-occurrence grouping** – Associations between individuals and transactions; "frequently bought together"
- **Profiling** – Characterizing "typical" behavior
- **Link Prediction** – Predict a relationship between two data items
- **Data Reduction** – reduce volume (highest cost, risk, impact)

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Source: Data Analytics for Accounting, 2nd Ed. Richardson, Teeter, & Terrell. 2021

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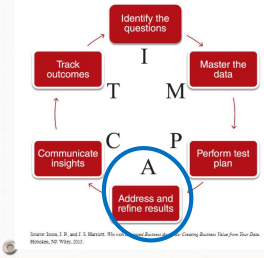
Data Analytics Process – IMPACT Cycle



Address and Refine Results:

- DA is iterative
- Slice and Dice data
- Find correlations
- Ask additional questions
  - Of ourselves
  - Of others (colleagues, stakeholders, etc.)
- Refine, revise and rerun the analysis

Source: Data Analytics for Accounting, 2nd Ed. Richardson, Teeter, & Terrell 2021

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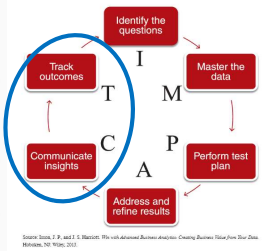
Data Analytics Process – IMPACT Cycle



Communicate Insights & Track Outcomes:

- Static Reports
- Digital Dashboards
- Data Visualizations

Source: Data Analytics for Accounting, 2nd Ed. Richardson, Teeter, & Terrell 2021

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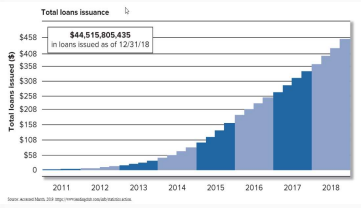
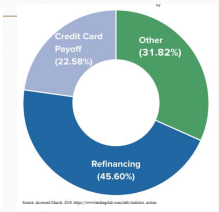
Live Example of Data Analytics Using Excel & Tableau





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Data Dictionary

RejectStats File	Description
Amount Requested	Total requested loan amount
Application Date	Date of borrower application
Loan Title	Loan title
Risk_Score	Borrower risk (FICO) score
Dept-To-Income Ratio	Ratio of borrower total monthly debt payments divided by monthly income.
Zip Code	The first 3 numbers of the borrower zip code provided from loan application.
State	Two digit State Abbreviation provided from loan application.
Employment Length	Employment length in years, where 0 is less than 1 and 10 is greater than 10.
Policy Code	policy_code=1 if publicly available. policy_code=2 if not publicly available

Source: Accessed March, 2019. Available at https://www.lendingclub.com/info/download-data.action

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Live Example of Data Analytics Using Excel & Tableau

DATA – Excel File Snap Shot

Amount Requested	Application Date	Loan Title	Risk_Score
2175	12/19/2012	major_purchase	850
35000	8/13/2012	other	850
10000	9/19/2012	major_purchase	850
10000	11/9/2012	car	850
3000	11/27/2012	vacation	850
5000	5/20/2012	Lower Rate	850
20000	9/8/2012	Home loan	850
8000	10/22/2012	Loan is for new kitch	850
18500	7/19/2012	bussiness loan	850
10000	7/11/2012	car	850
25000	10/6/2010	debt_consolidation	849
1000	9/9/2012	Hospital expenses	849
35000	5/26/2012	small_business	849
6800	7/13/2012	Be my Own Boss	849
25000	8/10/2012	home_improvement	849
35000	12/2/2012	debt_consolidation	848
1500	11/13/2012	other	848

Source: Microsoft Excel, 2016.

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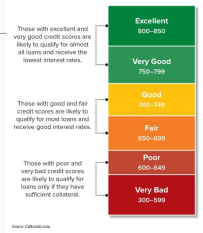
Live Example of Data Analytics Using Excel & Tableau

Question: Will I receive a loan from Lending Club?

- We'll analyze:
  1. Debt to Income ratios & # of rejected loans
     - High – debt is > 20% of Income
     - Medium – debt is > 10% and < 20% of income
     - Low – debt is < 10% of income
  2. Length of Employment & # of rejected loans
     - 1 through 9 years; then 10+ years
  3. Credit (or risk) score & # of rejected loans.



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Live Example of Data Analytics Using Excel & Tableau

1. Debt to Income ratios & # of rejected loans

Row Labels	Count of Rejected Loans
High	312,986
Low	171,228
Mid	161,200
Grand Total	645,414

PivotTable Fields

Choose fields to add to report:

- ☑ Rejected Loans
- ☐ Amount Requested
- ☐ Application Date
- ☐ Loan Title
- ☐ Risk_Score
- ☐ Risk Score Bucket
- ☐ Debt-To-Income Ratio
- ☑ DTI Bucket
- ☐ Zip Code
- ☐ State
- ☐ Employment Length
- ☐ EmploymentNum

Source: Microsoft Excel, 2016.

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Live Example of Data Analytics Using Excel & Tableau

2. Length of Employment & # of rejected loans

Row Labels	Count of Rejected Loans
< 1 year	495,109
1 year	20,732
2 years	21,987
3 years	17,487
4 years	13,848
5 years	12,865
6 years	9,829
7 years	7,221
8 years	6,652
9 years	5,083
10+ years	34,601
Grand Total	645,414

PivotTable Fields

Choose fields to add to report:

- ☑ Rejected Loans
- ☐ Amount Requested
- ☐ Application Date
- ☐ Loan Title
- ☐ Risk_Score
- ☐ Risk Score Bucket
- ☐ Debt-To-Income Ratio
- ☐ DTI Bucket
- ☐ Zip Code
- ☐ State
- ☑ Employment Length
- ☐ EmploymentNum

Source: Microsoft Excel, 2016.

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Live Example of Data Analytics Using Excel & Tableau

3. Credit (risk) score & # of rejected loans

Row Labels	Count of Rejected Loans
Excellent	2,494
Very Good	20,036
Good	96,555
Fair	207,234
Poor	151,716
Very Bad	167,379
Grand Total	645,414

PivotTable Fields

Choose fields to add to report:

- Rejected Loans
- Amount Requested
- Application Date
- Loan Title
- Risk_Score
- Risk Score Bucket
- Debt-To-Income Ratio
- DTI Bucket
- Zip Code
- State
- Employment Length
- EmploymentNum

MORE TABLES...

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Live Example of Data Analytics Using Excel & Tableau

Three-way analysis:

How many loans rejected from applicants who had

1. excellent credit;

2. worked more than 10 years; and,

3. asked for a loan of less than 10% (low DTI)

365 out of 645,414 (0.057% of the total)

Row Labels	Count of Rejected Loans
Excellent	2,494
High	762
< 1 year	543
1 year	14
10+ years	89
2 years	26
3 years	16
4 years	16
5 years	14
6 years	20
7 years	10
8 years	7
9 years	7
Low	1339
< 1 year	457
1 year	38
10+ years	365
2 years	68

PivotTable Fields

ACTIVE ALL

Choose fields to add to report:

Search

- Rejected Loans
- Amount Requested
- Application Date
- Loan Title
- Risk_Score
- Risk Score Bucket
- Debt-To-Income Ratio
- DTI Bucket
- Zip Code
- State
- Employment Length
- EmploymentNum

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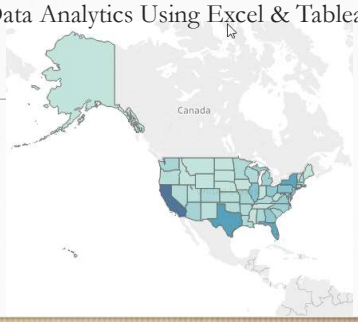
Live Example of Data Analytics Using Excel & Tableau

Tableau Visualization



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Transformation of the Profession 2.0 – WOW!

- Hang ON
- ENJOY the RIDE!

https://video.search.yahoo.com/yhs/search?fr=yhs-pty-pty_converter&hsimp=yhs-pty_converter&hspart=pty&p=clara+video#id=1...8e5a7a5c1587e42ed...section=click

Clara – Audit 2021

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