How digitization of business is redefining financial reporting

June 6, 2017
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How digitization of business is redefining financial reporting

Quality + Insight = Value
KPMG audit
AAA webinar

June 6, 2017
## Presentation agenda

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Today’s presenters

Marc T. Macaulay is KPMG’s Cognitive Technology Audit Leader. He is responsible for the development and implementation of a national cognitive technology strategy in support of the firm’s Audit practice. Marc is a SEC review partner and has served as the lead audit partner on a number of the firm’s most prominent global financial services clients.

Contact: mmacaulay@kpmg.com

Dr. Arvind Sathi is the Chief Architect for KPMG Watson Platform with IBM® and a faculty member with University of California. Dr. Sathi worked under Nobel Prize-winner Dr. Herbert A. Simon and was a pioneer in developing AI solutions at Carnegie Group. Dr. Sathi has led several AI and Data Science programs at IBM and has published four books on analytics – Cognitive (Internet of) Things, Engaging Customers Using Big Data, Big Data Analytics, Customer Experience Analytics. Dr. Sathi is a member of IBM’s Academy of Technology. Contact: asathi@us.ibm.com
Presentation summary

This presentation looks at the digitization of business and how artificial intelligence is redefining financial reporting. Artificial intelligence is not just science fiction anymore. Increasingly, AI – also referred to as cognitive technology – is being used in business to improve operational processes and support management decision making, including financial reporting.

This session will explore some of the technological advancements, obtainable insights and key concerns that are part of an organization’s digital journey, including those relevant to successfully implementing digital transformation in financial reporting.
The digitization of business
An explosion of data

How do we obtain decision-relevant information from this explosion of data?

*Source: Go-Global, website, 2016*
<table>
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<th>What do you need?</th>
<th>Where does it come from?</th>
<th>How can you get it?</th>
<th>What can you leverage?</th>
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<td>Number</td>
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<td>Semantic relations</td>
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<td>Domain general inference</td>
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<td>Textual inference</td>
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<td>Pattern (SSN, Address)</td>
<td>Table</td>
<td>Domain-specific</td>
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<td>Business rule inference</td>
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<td>Client’s client-specific</td>
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<td>List</td>
<td>Client-specific</td>
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Changing the way business is done

The explosion of data in business has fostered unprecedented advances in digital processing power and the capacity to support decision making across multiple activities and operations.

- The global market for robots and artificial intelligence is expected to reach \$152.7 billion by 2020.
- The adoption of these technologies could improve productivity by 39 percent.\(^1\)

- Research indicates a return on investment in robotic technologies of between 600% and 800% for specific tasks.\(^2\)

- Research suggests that smart robots will replace more than 100 million knowledge workers – or one-third of the world’s jobs – by 2025.\(^3\)

\(^1\)“Robot Revolution – Global Robot & AI Primer” – Bank of America Merrill Lynch 2015
\(^2\)“LSE – The IT function and Robotic Process Automation” – The London School of Economics and Political Science 2015
\(^3\)McKinsey Global Institute: Disruptive technologies: Advances that will transform life, business and the global economy” – McKinsey & Company May 2013
CEO views on disruptive technologies

65% of CEOs believe that the next three years will be more critical for their industry than the previous 50 years.

39% of CEOs feel they will be running significantly transformed companies in the next three years.

81% of CEOs believe that their organizations are not keeping up with the emergence of new technologies.

Other top concerns:
- 76% New entrants are disrupting their business model.
- 66% Their organization is not disrupting business models in the industry.
- 59% They need to develop an effective strategy to counter convergence in the market.

Source: U.S. CEO Outlook 2016 survey: Now or never offers insights into the greatest concerns of CEO’s and how they plan to mobilize for the fourth industrial revolution. Findings based on a study of the 3-year outlook of nearly 400 U.S. CEOs, with annual revenues greater than U.S. $500 million; 32% have greater than U.S. $10bn in revenues.
## Recent PCAOB commentary

Based on recent remarks by Steven Harris\(^1\) and the March 31, 2017 PCAOB standard setting agenda

<table>
<thead>
<tr>
<th>Impact on the audit</th>
<th>Matters to consider in possible PCAOB standard changes</th>
<th>Tasks for educators</th>
</tr>
</thead>
<tbody>
<tr>
<td>— Mine and analyze large volumes of data</td>
<td>— New tools being used in audits</td>
<td>— Students must have the ability to work with large quantities of data and possess strong analytical skills</td>
</tr>
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<td>— Test up to 100% of transactions</td>
<td>— Changes to firms’ audit methodologies</td>
<td>— Educators must teach students the skills needed for changing audit environment</td>
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<td>— Automate routine tasks</td>
<td>— C&amp;A of data sets</td>
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<td>— Identify anomalies and risks</td>
<td>— Academic research</td>
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<tr>
<td>— Track and analyze trends and risks against industry and geographical datasets</td>
<td>— Activities of others, including auditing standard setters (e.g., IAASB’s data analytics working group)</td>
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\(^1\) Speech by Steven B. Harris, PCAOB Board Member, to the PCAOB/AAA Meeting, April 20, 2017
The classes of digital labor

Class 1
Basic process automation

Automation of entry-level, transactional, rule-based, and repeatable process

Macros-based
Unstructured data
Natural Language Processing
Knowledge Base
Adaptive Alteration

Key Features
- Predictive Analysis
- Machine Learning
- Reasoning
- Large-scale Processing
- Big Data Analytics

Class 2
Enhanced process automation

Processing of unstructured data and base knowledge

Macros-based
Unstructured data
Natural Language Processing
Knowledge Base
Adaptive Alteration

Key Features
- Predictive Analysis
- Machine Learning
- Reasoning
- Large-scale Processing
- Big Data Analytics

Class 3
Cognitive automation

Automation driven by self learning and adaptive technologies

Macros-based
Unstructured data
Natural Language Processing
Knowledge Base
Adaptive Alteration

Key Features
- Predictive Analysis
- Machine Learning
- Reasoning
- Large-scale Processing
- Big Data Analytics
Benefits of cognitive technology

1. Extract key attributes from unstructured data
2. Train the cognitive system to perform judgmental activities
3. Engage machine learning to enhance items 1 and 2 above
4. Generate richer, more detailed audit evidence for evaluation and provide insights on systems, risks, processes and controls

Inputs
- Analyze data
- Generate hypothesis
- Evaluate evidence

Outputs
- Judgment based decisions
- Business insights
- Transformed sampling techniques

Cognitive technology
Why now?

— Human experience and knowledge shared freely on the internet along with billions of connected devices are creating explosive, exponential growth of digital data

— Exponential improvement in technology accelerates at more meaningful baselines, beyond Moore’s Law

— Frictionless access to technology (mobile, cloud)

— Advancements in machine learning, analytics and cognitive technology

— Global demographic shifts, reduction in working age population and need for talent
Question #1

Which is not a benefit of cognitive technology?

A. Extracts key attributes from unstructured data

B. Trains the cognitive system to perform judgmental activities

C. Completely eliminates need for human interaction in financial reporting

D. Provides insights on systems, risks, processes and controls
Question #1 (continued)

Which is not a benefit of cognitive technology?

A. Extracts key attributes from unstructured data

B. Trains the cognitive system to perform judgmental activities

C. Completely eliminates need for human interaction in financial reporting

D. Provides insights on systems, risks, processes and controls
Automation in action
Cognitive technology in action

**KPMG’s alliance with IBM Watson**

— Integrates machine learning and other artificial intelligence technologies with KPMG’s audit methodology

— Makes it possible for auditors to analyze larger volumes of both structured and unstructured data

— Enhances the ability to identify data outliers and anomalies and provides deeper insights into risks, processes and controls

Today, KPMG is exploring the application of IBM Watson’s capabilities to demonstrate the impact and benefits of cognitive technology on audit processes, decision support and engagement deliverables.
Where are we today?

Deep learning methods have had a profound impact on a number of areas in recent years

- Image understanding and speech recognition
- Natural language processing, biomedical image analysis, and the analysis of sequential signals in a variety of application domains

As good as they may be at recognizing patterns in images, AI researchers know that neural networks have limitations.
### Artificial intelligence techniques comparison

<table>
<thead>
<tr>
<th>Machine learning</th>
<th>Knowledge graphs</th>
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<tbody>
<tr>
<td>Discovers patterns by creating one or more layer of connected nodes to connect results to its inputs.</td>
<td>Discovers patterns by explicitly reasoning about entities and relationships.</td>
</tr>
</tbody>
</table>

Couple of images and lots of repetition (let it sink) repeat again

How do we define grand-parent?
How do we decide which technique to use?

How are John’s grand-parents?
Application of techniques

Lots of examples
Low ability to explain

Discover patterns

Extract facts from text

Resolve differences

Compare facts

Check for compliance with policies

Recommend or choose an option

Summarize results

Explain the logic

Machine learning

Knowledge graph

Formal logic or reasoning
Driven High ability to explain
AI decision-making considerations

- Transparency
- Private vs. public data
- Decision-complexity
- Number of variations
- Availability and application of taxonomy
Some cognitive use cases

**Commercial loan grading**
- Objective: Process loan documentation, relevant external information and KPMG IP to generate a loan grade for each loan, indicative of the loan’s creditworthiness
- Ingest loan documentation, external data and KPMG IP
- Extract key attributes from the data
- Train system on KPMG loan grading IP
- Generate a loan grade based on KPMG loan grading scale

**Leasing**
- Objective: Process lease documentation, relevant external information and KPMG IP to assess the classification, recognition and measurement of leases in the financial statements
- Ingest lease documentation, external data and KPMG IP
- Classify the documentation
- Extract key attributes from the data
- Apply KPMG IP to assess the classification, recognition and measurement of the lease in the financial information

**Financial statement disclosures**
- Objective: Process financial statement information, relevant external information (including the corresponding GAAP being applied in the financial statements) and KPMG IP to assess the financial statements and footnotes for conformity with GAAP/IFRS/other
- Generate a financial disclosure checklist that determines conformity with generally accepted accounting principles and identifies anomalies versus these principles

**Revenue, sales invoices, procurement**
- Objective: Process client documentation, third-party information and KPMG IP to assess revenue or expense information contained in the client ledger
- Ingest revenue contracts, invoices, trial balances and other data and assess the completeness and accuracy of the client’s ledger
Learnings to date

— Data: The biggest constraint today is “digital” data; the procurement, curation and maintenance of digital data to enable digital tools
— Align your technology solution to the business challenge
— Cognitive applications typically have longer investment cycles and higher resource requirements
— Digitizing your organization will help facilitate your digital journey
— Visual data (i.e., charts and graphs) continues to be a challenge for many cognitive tools to process
— Digital capabilities can
  - Help drive quality
  - Provide an enhanced user experience
  - Unleash deeper insights into available data

Don’t wait... You should consider embarking on your journey now because your customers, your businesses, your people are all making decisions based on their “user” experience.
Question #2

True or False: Cognitive applications typically have longer investment cycles and higher resource requirements

True
False
Question #2 (continued)

True or False: Cognitive applications typically have longer investment cycles and higher resource requirements

True

False
Academic considerations
People and talent

Experts are required to train and oversee design, content management, data analytics and technology development and improvement on the platform i.e., Digital Work.

Talent becomes more critical as a differentiator as many of the routine activities are automated at a low cost and skill, innovation and agility becomes the competitive advantage.

Technological unemployment may occur in lower skilled areas but demographic shifts are putting pressure on labor supply and demand.
The challenges we face in the 21st century

**Academic Challenge**

- Accounting and audit curriculum is not changing fast enough to incorporate data and analytics.
- Our talent therefore lack the practical knowledge to implement a data and analytics strategy when hired.

**Challenge of a Master’s Degree**

- A large percentage of top talent from campuses do not obtain a Master’s Degree due to its cost, despite the immediate and long term career value.
What is expected of professionals

- **42%** Critical thinking and judgment
- **42%** Understanding of data and analytics
- **52%** Experience in Industry
- **41%** Communication skills

**Technical skills**
- Core accounting, tax and advisory
- Understanding of statistics and probability
- Application of data and analytics technologies

**Soft skills**
- Interpersonal
- Leadership
- Continual commitment to learning

Forbes Insights
kpmg.com/us/audit
Based on a survey of 151 U.S.-based respondents, including audit committee chairs and members, C-level financial executives, audit associates and accounting students.
What can students do now?

Gain data and analytical skills

Challenge yourself to think critically

Seize industry opportunities

Learn effective communication
# KPMG master of accounting with data and analytics program

<table>
<thead>
<tr>
<th>Developed and hosted at</th>
<th>Data and analytics focused curriculum, aimed at our profession</th>
</tr>
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<tbody>
<tr>
<td>The Ohio State University Max M. Fisher College of Business</td>
<td>Fully funded tuition for “Top Talent” students</td>
</tr>
<tr>
<td>Villanova School of Business</td>
<td>Internship assignments with unparalleled access to hands-on experience</td>
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<tr>
<td>Expanding in 2018</td>
<td>Accelerated career and leadership development</td>
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<td>Additional major universities to be added in the near future</td>
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Many graduates don’t have the skills businesses need most. The IBM Academic Initiative helps better prepare students for careers as business analysts, data scientists, cybersecurity professionals, software engineers and more.

- University Courses
- Great Mind Challenge
- Use Case Study
- Watson Case Competition
- Hackathons and Showcases
- Watson Academy
Question #3

Which of the following is not a case for the application of the Knowledge Graph AI technique?

A. Discover patterns

B. Explain the logic

C. Compare facts

D. Recommend an option
Question #3 (continued)

Which of the following is not a case for the application of the Knowledge Graph AI technique?

A. Discover patterns

B. Explain the logic

C. Compare facts

D. Recommend an option
Questions?
Perspectives on innovation

For more information visit KPMG’s website: www.kpmg.com/us/audit
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Back by Popular Demand: Young Professionals Panel, New Big Data Cases, and Technology Visionaries Panel

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Brooklyn, NY 11201

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Brooklyn, NY

9/7/2017 - 9/8/2017
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