

Working Paper

Reimagining Professional Services with Cognitive Technologies at KPMG

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Research on Business Services Automation

Research Objective:

We aim to assess the current and long-term effects of business services automation on client organizations. While using software to automate work is not a new idea, recent interest in service automation has certainly escalated with the introduction of new technologies including Robotic Process Automation (RPA) and Cognitive Automation (CA) tools. Many potential adopters of the new types of service automation tools remain skeptical about the claims surrounding its promised business value. Potential adopters need exposure to actual and realistic client adoption stories. Academic researchers can help educate potential adopters by objectively researching actual RPA and CA implementations in client firms, by assessing what the software can and cannot yet do, and by extracting lessons on realizing its value.

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“Reimagining Professional Services with Cognitive Technologies at KPMG” by Mary Lacity is one of the working papers delivered from this research project. We appreciate and thank the customers, providers, and advisors who were interviewed for this research. We also acknowledge and thank KPMG for their participation.

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Dr. Mary C. Lacity is Curators' Distinguished Professor at the University of Missouri-St. Louis and a Visiting Scholar at MIT CISR. She has held visiting positions at the London School of Economics, Washington University, and Oxford University. She is a Certified Outsourcing Professional®, Industry Advisor for Symphony, and Co-editor of the Palgrave Series: *Work, Technology, and Globalization*. Her research focuses on the delivery of business and IT services through global sourcing and automation. She has conducted case studies and surveys of hundreds of organizations on their outsourcing and management practices. She has given keynote speeches and executive seminars worldwide and has served as an expert witness for the US Congress. She was inducted into the IAOP's Outsourcing Hall of Fame in 2014, one of only three academics to ever be inducted. She was the recipient of the 2008 Gateway to Innovation Award sponsored by the IT Coalition, Society for Information Management, and St. Louis RCGA. She has published 26 books, most recently [Robotic Process Automation and Risk Mitigation: The Definitive Guide](#) (2017) and [Service Automation: Robots and the Future of Work](#) (2016)(SB Publishing, UK, co-author Leslie Willcocks). Her publications have appeared in the *Harvard Business Review*, *Sloan Management Review*, *MIS Quarterly*, *MIS Quarterly Executive*, *IEEE Computer*, *Communications of the ACM*, and many other academic and practitioner outlets.

Reimagining Professional Services with Cognitive Technologies at KPMG

“Whereas RPA disrupts operating models, cognitive will disrupt business models.” — Todd Lohr, Principal, US Transformation Enablement Leader at KPMG

In this report, we examine how KPMG, a global professional services network of independent firms, is deploying Cognitive Automation (CA) technologies to reimagine professional services. CA technologies are distinguishable from other automation tools, such as robotic process automation (RPA) and business process management (BPM) tools, by the characteristics of the services they aim to automate or augment. CA technologies are software tools designed to automate tasks that use *inference-based* processes to interpret *unstructured* (and structured) data, resulting in a set of likely results as opposed to a single result, i.e., a *probabilistic outcome*. In contrast, RPA and BPM tools are designed to automate tasks that use *rules* to process *structured* data, resulting in a single correct answer, i.e., a *deterministic outcome* (see Figure 1).

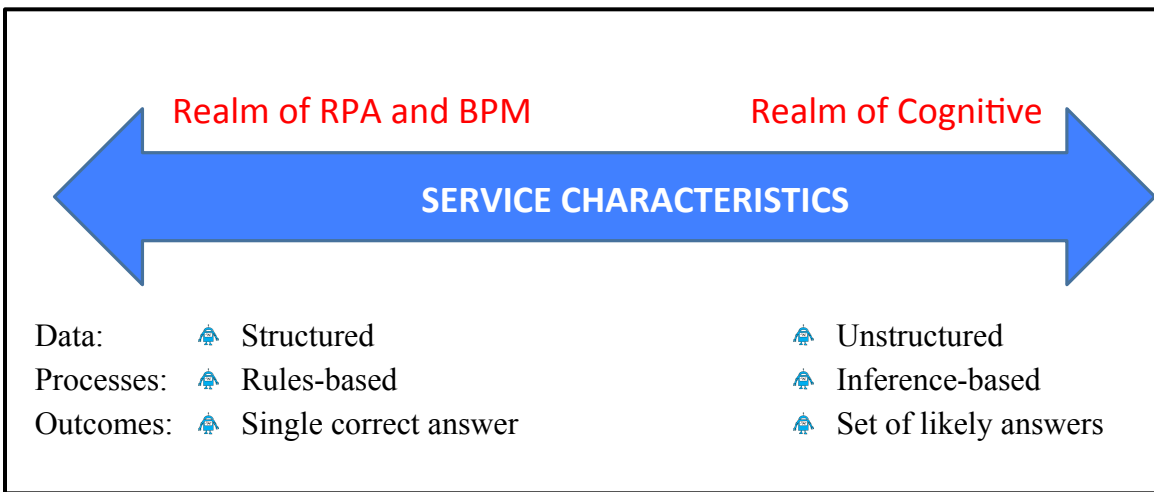


Figure 1: The Service Automation Landscape

Adapted from Lacity and Willcocks (2016)¹

While prior research² has been able to study a number of early-adopters of RPA and BPM technologies, there are few visible adopters of cognitive technologies beyond the widely covered IBM Watson applications in healthcare (e.g., Cleveland Clinic, Memorial Sloan Kettering, and WellPoint). The initial enthusiasm of Watson’s *Jeopardy!* win in 2011 signaled a new age of machine learning, yet few organizations outside of healthcare have shared in detail their implementation journeys, which makes non-healthcare “big idea” exemplars so valuable. In this report, we examine how KPMG is deploying cognitive technologies, most notably IBM Watson, to reimagine professional services. We explain how KPMG assessed cognitive tools,

why it selected the tools it did, how it experimented with the technology, the status of its current deployments, and what it has been learned thus far. As of December 2016, KPMG’s cognitive capabilities include a tracking service of well over 100 cognitive technologies, development of many IBM Watson use cases (of which three are discussed in detail in this report), and use cases in other CA products, most notably Microsoft’s Cortana Intelligence Suite. KPMG continues to explore how new technologies, like Blockchain, will further advance the delivery of professional services.

KPMG - The Business Context for Cognitive Automation

To put the cognitive technology journey into context, we here explain KPMG’s business background. KPMG is a multinational cooperative of national professional services firms with headquarters in Amstelveen, the Netherlands. It is considered one of the “Big Four” professional services firms along with PricewaterhouseCoopers (PwC), Deloitte, and Ernst & Young (EY).³ Each national KPMG firm is an independent legal entity and is a member of the KPMG International Cooperative. In 2016, KPMG earned global revenues of \$25.42 billion and employed nearly 189,000 people worldwide. John B. Veihmeyer, based in New York City, is Global Chairman of KPMG International.⁴ KPMG’s motto is “Passion. Purpose. Perspective.”⁵

Focusing in on its main service lines, the KPMG network of member firms offers audit, tax, and advisory services (see Figure 2). According to the figures posted in 2014,⁶ audit represented 42 percent of the network’s global revenues, followed by advisory with 37 percent and tax with 21 percent. The service lines are supported by a number of groups, including Innovation and Enterprise Solutions (I&ES), the program owner for exploring cognitive innovations.

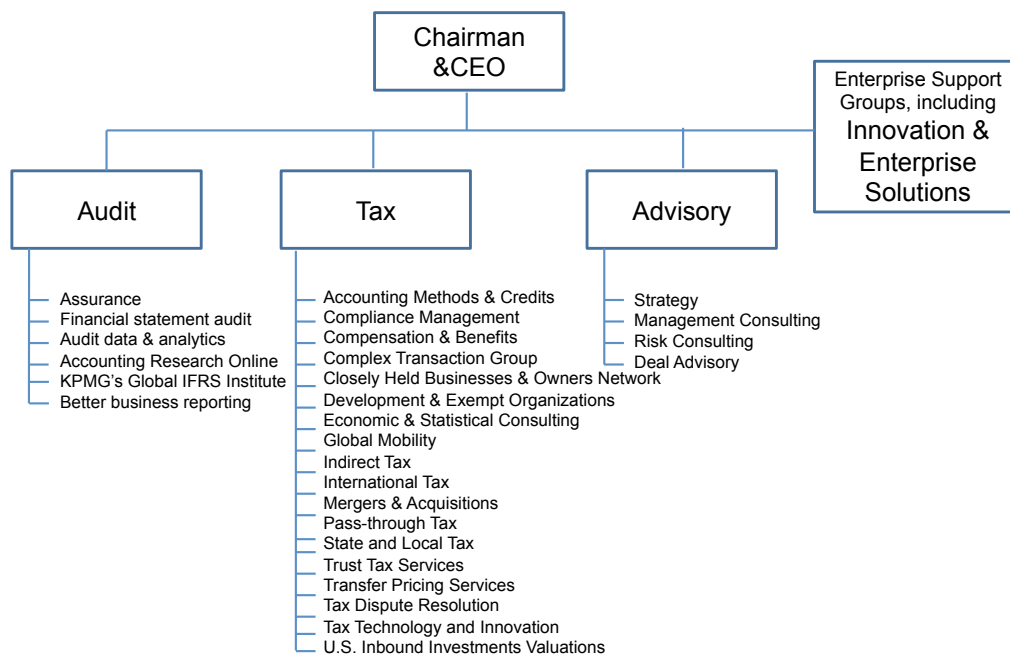


Figure 2: KPMG’s Major Service Lines

What made KPMG’s leadership team recognize that cognitive automation was not only imminent but something KPMG needed to embrace? KPMG began tracking cognitive technologies that were in various stages of development and deployment in the market. Some tools were quite impressive, but the maturity of IBM Watson in the healthcare sector gave KPMG’s leaders the most confidence in the potential of cognitive technologies to transform the professional services industry. Both healthcare and professional services require advanced expertise and both industries are highly risk aware and highly regulated. KPMG visited the key players at Watson’s signature adopters—WellPoint and Memorial Sloan-Kettering. KPMG had enough preliminary data to envision how cognitive technologies could redesign professional services.

A Vision for the Future of Work

“We are at an inflection point in the way that humans relate to technology. This will be as impactful to labor as mechanical enablement was to workers in the Industrial Revolution. We may see history record this exciting window of change as the Cognitive Revolution.” — Steve Hill, Global Head, Innovation and Investments, KPMG⁷

A 2016 white paper summarizes KPMG’s views on how cognitive technologies will transform work (see Figure 3). KPMG asserts that cognitive technologies can accelerate the time required to make an employee proficient, augment decisions with machine generated insights, and scale expertise across the enterprise. As will be illustrated through the use cases described in this report, KPMG has proven this vision is achievable.

A different kind of leverage model	
Cognitive automation is poised to remove constraints on people, time, and capital throughout the enterprise:	
Casual expert → Skilled expert	Accelerate time to employee proficiency
Inexperienced employee → Seasoned veteran	
Speed and responsiveness	
Value through new insights	Augment decisions in the moment
Reduced risk	
Consistency of output	
Pursuit of adjacencies	Scale expertise within the enterprise
Revenue growth – without the proportional growth in headcount	

Figure 3: KPMG’s Vision for Cognitive Automation

Source: Swaminathan (2016)⁸

KPMG has a clear vision for how cognitive automation technologies will affect its workforce. Like all the “Big Four” professional service firms, KPMG relies heavily on their highly educated and highly certified workforces. ***KPMG aims to apply cognitive technologies to liberate skilled workforce from routine tasks to more fully use their qualifications and critical thinking skills.*** KPMG recruits thousands of employees each year, often people with advanced professional degrees and certifications. In the tax service line, for example, employees hold professional qualifications like Certified Public Accountants (CPAs) and many have passed their State’s bar exams. Such professionals expect their careers to be filled with challenging work that use their expertise, judgment, problem-solving, and decision-making skills. The reality in most organizations is that highly skilled professionals still spend too much time focused on mundane tasks. Auditors often search manually through reams of financial information to hunt down the anomaly that may give pause to the appropriateness of a company’s assertion; Lawyers spend too much time researching case law precedents and regulatory actions instead of advising courses of action. The mundane work, however, does not lend itself to RPA because audit, tax, and advisory work largely deal with vast amounts of unstructured data. Furthermore, outcomes are often multi-faceted and probabilistic rather than deterministic. For example, there could be multiple ways a client could comply with a regulation. How might cognitive technologies help professionals do their jobs better? According to Cliff Justice, Partner, US Leader, Cognitive Automation and Digital Labor, *“Cognitive is a net positive for people to innovate and to allow people to invent new things.”*

Cognitive technologies could increase profitability by taking out costs for many services, but cost reduction is not KPMG’s major aim. KPMG recognized that a liberated workforce would yield a number of business benefits, most notably better services for clients and a distinct competitive advantage to being an early adopter. Todd Lohr, Principal, US Transformation Enablement Leader at KPMG, summarized the advantage as follows: *“Both within our internal services and for the services we provide to customers, automation is going to change the landscape of services and change the labor model.”*

By 2015, KPMG leaders had enough compelling arguments and evidence to move forward with exploring cognitive technologies. The head of I&ES charged his group with figuring out how cognitive technologies could be infused in the overall digitization of KPMG’s core business lines, thus launching KPMG’s cognitive journey.

KPMG’s Cognitive Journey

The cognitive project was approved to go through I&ES’s standard three-phased innovation process (see Figure 4 for an overview of KPMG’s innovation process). Here’s how the process typically works: During the first phase, KPMG experiments with an innovation to assess its technical capabilities and suitability for the specific context of KPMG. Vinodh Swaminathan, Managing Director, Innovation & Enterprise Solutions at KPMG, explained the reasoning for this phase: *“There’s only so much we can rely on other people’s experiences. We needed to experience cognitive for ourselves. We wanted our own fact base that is relevant to us.”* The

results of the experimental phase are reviewed to determine whether the innovation should proceed to the next phase. If approved, KPMG develops a prototype that applies the technology to a specific business service. Business sponsors are engaged; the prototype is tested using engagement data. Based on results, the business case is revised and reviewed for approval. If approved, KPMG develops and scales the application so that it will be ready for enterprise deployment. Once in the prototype phase, every innovation is owned by the business service sponsor with I&ES employees serving as internal consultants and technicians.

KPMG’s holistic innovation execution approach

Balancing speed and risk while assisting clients execute their vision for transformation through cognitive automation

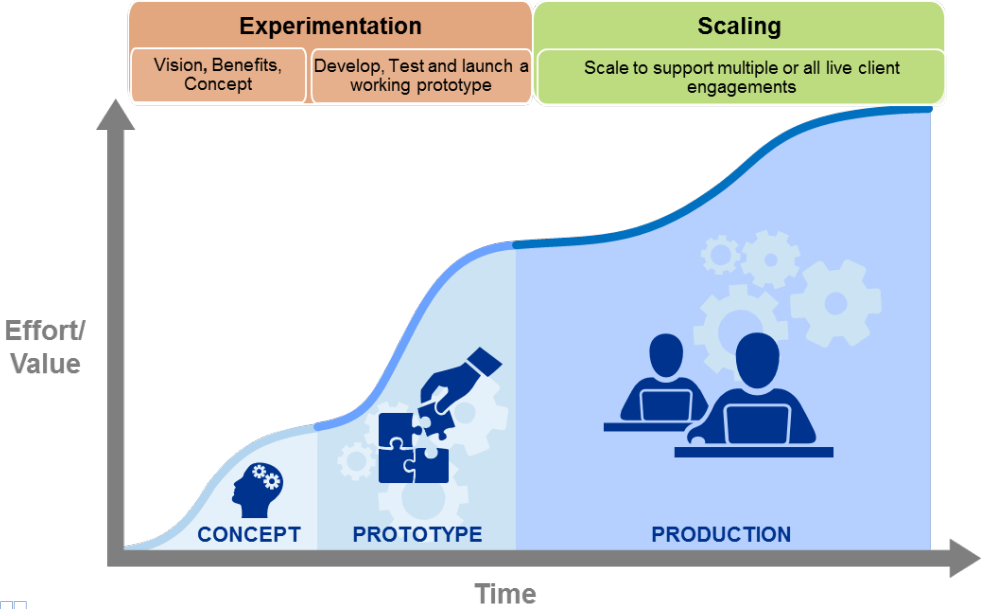


Figure 4: Conceptual Overview of KPMG’s Innovation Process
(Source: KPMG, reprinted with permission)

KPMG initially selected two use cases that could assess the value of cognitive, namely, business development and risk assessment of asset backed securities. An additional use case in audit was subsequently added. The company chose small projects that could serve as proxies for the type of work KPMG actually does at scale. Vinodh Swaminathan, Managing Director, Innovation & Enterprise Solutions at KPMG explained the logic, “We wanted a contained environment where we could test this technology and concept in a relatively risk free setting.” KPMG aims to “buy and configure” solutions over “build and train” solutions. Internally, KPMG was tracking over 100 cognitive products, and realized early on that the business development case would likely be a “buy and configure” project and the risk assessment case would likely be a “build and train”. Next are the stories of the use cases.

Business Development Use Case

Business development was the first use case. At KPMG, an account manager is in charge of the client relationship. He or she coordinates the day-to-day account management activities and delivers on current obligations. The account manager also supports business development, such as identifying and proposing new services that will be valuable to the client.⁹ Business development is challenging because of the data deluge. On the front end, the account manager has to keep track of the client's current challenges and opportunities vis-à-vis the client's competitors and emerging trends to identify new service opportunities. Then, the account manager has to develop a compelling proposal that should draw on the experience from across KPMG. With 189,000 people working in member firms around the world, over 250 services in the service catalog, and thousands of client case studies of prior proposals, it's impossible for an individual account manager to know all what KPMG knows. For example, how does an account manager in Louisville Kentucky confidently determine that she has accessed the best resources from the KPMG global network of member firms to pitch an optimal solution to her current client? And how might cognitive help? KPMG first looked for existing solutions to answer this question.

KPMG initially evaluated four different cognitive solution providers for the business development use case: IBM, two of IBM's ecosystem partners that use Watson, and an analytics company. IBM's Watson-based capability was the most closely aligned to KPMG's preference to "buy and configure" approach for this use. IBM had already tested a business development-specific application based on Watson and IBM had already piloted its own application internally to help IBM's sales force become better students of their own clients.

KPMG bought and configured Watson to help KPMG client account managers with business development. Six client account managers were recruited to work with the innovation team. One of their roles was to assess the quality of Watson's output. Watson's sweet spot is accessing vast volumes of structured and unstructured data from a variety of sources and using inference-based logic to suggest options. KPMG gave Watson access to four news sources so KPMG's account managers could better track their clients: Twitter, Google news, S&P and Dunn & Bradstreet. Watson was also fed client-specific priorities, notes from account managers' meetings, and access to the clients' websites. Watson was also given access to KPMG's service catalog that explains each service offering, the method for deploying the service, and additional context on when to suggest a particular service to clients. For one account manager, Watson suggested 10 service opportunities. The account manager was quite amazed—he had six of these on his radar but he never thought of the other four opportunities. He sold two of the four opportunities to his client. According to Cliff Justice, Partner, US Leader, Cognitive Automation and Digital Labor, *"Those account managers were pretty excited about the initial results."*

The prototype worked technically, but deployment was stalled by issues with some of the third-party content providers. Their revenue models charge for the number of *humans* who have access to their data. That model is easy to price and monitor. In a cognitive world, many content providers struggle with a pricing model. If a customer only needs Watson to read the

data, process it, and retain it, what does this mean for their revenue model? It took months for the parties to work out an equitable arrangement. Ensuring the protection of data was another issue that delayed the launch. KPMG had to make sure that they had client consent related to the use of their data.

By end of 2016, KPMG had resolved the major issues and were scaling the use case and recruiting account teams across the organization. KPMG planned to deploy this capability in a phased manner, keeping in mind that as a “learning system”, the application will continue to grow in expertise with exposure to more real-world situations. KPMG planned to add functionality after deployment, such as possibly extending Watson’s natural language generation capabilities to actually build service proposals. Cliff Justice, for example, envisioned that in the future, businesses may move to completely digital business proposals and engagements for very small projects: *“So if you’re a client, you might get an alert from your KPMG app that says, ‘you have this problem in this part of your business, would you like a proposal from KPMG to address it?’ The client hits a button to request a proposal. If Watson’s confidence score is high enough, Watson can send it through. If the confidence score is low, Watson can send it to the partner to review and sign off on it. It’s a new way of engaging.”*

Risk Assessment Use Case

The second use case was assessing risk associated with financial investment instruments (e.g. securities), a service provided by Advisory. KPMG knew this would be a bespoke solution because no other cognitive providers had developed an application for this particular context.

So what is this context? Investment banks hire KPMG to serve as an independent third party to make sure the bank followed procedures to create and offer new investment grade financial instruments. Only when KPMG is confident that the bank followed agreed upon procedures to create and offer the financial instrument will KPMG sign the official “comfort letter”. A comfort letter is one of many artifacts used by banks to demonstrate compliance.

The process works as follows. A bank hires KPMG to examine if the bank has followed all the agreed upon procedures that are associated with that particular financial instrument. The bank hands over all of the documents tied to the financial instrument. Each financial instrument is typically attached to a certain class of asset – e.g., residential property loans, commercial property loans, commercial loans, student loans, consumer loans and credit, etc. The underlying asset contains many supporting documents – for example imagine all the documents a bank associates with a residential mortgage or commercial mortgage: promissory notes, environmental reports and surveys, tax returns, property photos, personal financial statement and capital improvements summaries. All of this includes both structured and unstructured data. In the real world, sometimes these assets have changed ownership several times before becoming a part of the bank’s portfolio of holdings. Collectively such documents hold a lot of information and insight into whether or not the bank followed due procedure and process to create the financial instrument. Using all of this data, KPMG builds its own independent assessment of risk. Vinodh Swaminathan, Managing Director, Innovation & Enterprise Solutions

at KPMG, explained, *“in this particular service, it requires us to look at every single asset that is packaged as part of the financial instrument.”* Once KPMG independently builds their assessment, the team evaluates the bank’s compliance. KPMG informs the bank of any discrepancies the bank needs to fix. The bank and KPMG go through iterations of this process until KPMG can officially sign the “comfort letter”, attesting that the bank followed all of the agreed upon procedures to create the financial instrument properly.

For this use case, KPMG once again selected IBM Watson. The vision was that Watson would liberate the human experts from reading through documents so they could focus more of their time on gaining insights and doing analyses. Watson would be in charge of extracting risk related information from the documents to build KPMG’s version of the truth. The human experts would be in charge of training Watson, doing the comparative analysis, suggesting changes, and ultimately approving the comfort letter.

During the prototype phase, KPMG trained Watson using historical data from one bank. The first task was to digitize all relevant documentation for Watson, such as using Optical Character Recognition (OCR) to scan paper documents. Watson was also fed a semantic ontology to define words and phrases used in the financial instrument context. Whenever Watson encountered a word or phrase that it could not confidently process, a human expert intervened. The human gave Watson the correct interpretation, thus training Watson and improving its accuracy over time. The results were promising according to Vinodh Swaminathan, Managing Director, Innovation & Enterprise Solutions at KPMG, *“Watson cranked through documents a lot faster.”*

When scaling this use case, KPMG ran into a common front-end data problem that delayed the project by a few months. Although business strategists speak frequently about “digital business”, the reality is that many organizations still deal with scanned paper. Watson cannot easily read many PDF files of scanned documents. At KPMG, when Watson was making mistakes during training, one of the reasons was poor data quality. Once KPMG pre-processed the data, Watson’s ability to read and identify potential risk factors improved.

For this use case, Watson showed promise. However, when KPMG calculated the hours saved if this application was scaled, the estimated ROI would not be large enough to justify the investment if Watson was deployed only on this one service. The use case did enable KPMG to recognize that cognitive technologies could be applied to other services. Vinodh Swaminathan said, *“It opened our eyes to how we could completely transform the audit profession.”* This prompted their most ambitious use case: auditing.

Audit Use Case

The third use case was auditing, a service provided by the Audit business line. Organizations hire KPMG to serve as an independent third party to give assurance over financial information used by investors and the capital markets. Only when KPMG has obtained sufficient audit evidence will KPMG sign the Report of Independent Registered Public Accounting Firm that accompanies the organization’s official filing of its financial statements.

Given the explosion of data and the digitization of the business environment, KPMG determined that it was imperative that the firm evolve its tools and approach to allow for richer, more

detailed audit evidence and provide its audit professionals with insights over processes, risks and controls to drive audit quality. Specifically, KPMG is embracing advanced technologies, including data and analytics, robotics and cognitive technology to manage processes, support planning and inform decision making.

As a result of this, KPMG saw the potential for cognitive technologies to radically redesign the audit process. Once again, KPMG selected IBM Watson for the use case. According to a press announcement by KPMG and IBM, *“Cognitive technology helps allow for the possibility of a larger percentage of the data to be analyzed [during an audit], providing KPMG professionals the potential to obtain enhanced insights into a client’s financial and business operations. At the same time, cognitive-enabled processes allow auditors to focus on higher value activities, including offering additional insights around risks and other related findings.”*¹⁰ In the long term, instead of *statistical sampling*, a review of the *population* of documents could be possible.

KPMG focused the use case on auditing a financial instrument, thus piggybacking on the work of the previous use case. In a traditional audit, KPMG would audit a sample of commercial loans to assess the creditworthiness of individual loans. Depending on the size of the loan portfolio, a typical sample size would range from 40 to 150 loans. With Watson, all of the loan documents can potentially be read and the Watson tool is trained to determine a ‘confidence-based’ loan grade, which is intended to be representative of the creditworthiness of the loan. This functionality can be expanded beyond the original sample size, and in some instances, can perform this activity for up to 100% of the population. Vinodh Swaminathan, Managing Director, Innovation & Enterprise Solutions at KPMG, explained how Watson was trained, *“The machine was trained using our subject matter professionals, including financial services auditors and credit risk professionals, and was also trained using historical data which provides a treasure-trove of information.”*

As of fourth quarter 2016, this use case was on track. Vinodh Swaminathan reported, *“We’re well on our way to completion of this project and we are excited with the progress we have made to date.”* Compared to the other use cases, no significant issues had delayed the project even though this use case required more sophisticated algorithms than the previous two. Several reasons account for this performance. First, KPMG was able to leverage its learning from the first two use cases, thus accelerating Watson’s training process on this use case. Second, Watson has more data input options for this use case. For example, if the OCR quality for one document is too poor to read, Watson can extract the data from an alternative source. Vinodh Swaminathan concluded, *“It’s been so successful that we have parts of our business now that are very keen to go to market. Although it doesn’t provide the entire audit solution, they are comfortable selling just that piece of the capability.”*

The Journey so far and Future Use Cases

Within nine months of announcing its partnership with IBM in March 2016, KPMG built a substantial internal cognitive capability. For the initial IBM Watson use cases, KPMG co-developed them with significant help from IBM technicians. Future use cases are expected to be developed using KPMG resources, with limited need for outside help. Use cases might include cognitive solutions for tax services, compliance services, regulatory risk consulting, due

diligence, disclosures, contract analysis, contract compliance, call center, contact center, and customer care.

Lessons Learned

As an early adopter of cognitive technologies, KPMG’s case study offers a number of insights for other organizations considering similar technologies. Given KPMG’s ambitions to reimagine professional services and its subsequent adoption the most formidable of all cognitive tools — IBM Watson — the discussion points may not apply to organizations seeking more modest aims. Where possible, lessons from KPMG are corroborated with other adopters of Watson, including WellPoint, MD Anderson Cancer Center, Memorial Sloan Kettering, LifeLearn, Baylor College of Medicine, Cleveland Clinic, Deakin University and Citigroup.

1. Have a higher purpose

Given the investment of time and resources required to implement Watson and other advanced cognitive capabilities, it is no surprise that adoptions were driven by higher purposes other than cost cutting (see Table 1). In the healthcare sector, early adopters such as Cleveland Clinic, Memorial Sloan-Kettering, MD Anderson Cancer Center and WellPoint, aimed to use Watson “to improve patient healthcare”, primarily by assisting physicians with the diagnosis and treatment of disease. At Deakin University in Australia, the vision was to innovate student engagement with Watson so that students would become more successful and satisfied.¹¹ So far, early adopters all espouse the plan to use Watson to *augment* rather than *replace* human expertise.¹²

Table 1: Prominent IBM Watson Adopters

Organization	IBM Watson Announcement Date	Vision/Purpose
WellPoint	Sept 2011	“Improve patient care” ¹³
MD Anderson Cancer Center	Feb 2012	“Recommend cancer treatments” ¹⁴
Memorial Sloan Kettering	March 2012	“Advancing the future of personalized cancer care” ¹⁵
Citigroup	March 2012	“Provide our customers with new, secure services designed around their increasingly digital and mobile lives” ¹⁶
Cleveland Clinic	Oct 2012	“Uncover new patient treatment options and deliver personalized medicine” ¹⁷
LifeLearn	April 2014	“Transform how veterinarians access and interpret unlimited amounts of structured and unstructured information” ¹⁸
Baylor College of Medicine	Aug 2014	“proof-of-principle to help researchers mine all public medical literature and formulate hypotheses that promise the greatest reward when pursuing new scientific studies.” ¹⁹
Cleveland Clinic	Oct 2014	“uncover new patient treatment options and deliver personalized medicine” ²⁰
Deakin University	Oct 2014	“improve student experience” ²¹

For KPMG, the higher purpose remains “reinforcing confidence in capital markets”. KPMG plans to achieve this by reimagining how professional services would be delivered, with implications on liberating highly skilled professionals to focus on solving problems rather than only finding problems. As Todd Lohr, Principal, US Transformation Enablement Leader at KPMG explained, *“IBM markets Watson around solving problems for higher purposes such as eradicating cancer. Our use case with them is to reinforce confidence in the capital markets. How do we instill more integrity around capital markets globally?”*

2. Manage as an Innovation program

Early adopters expect Watson to eventually improve cost efficiency, but adopters seemed to understand that positive returns on investment might be years away. As such, adopters are advised to manage Watson projects as an innovation program. Unlike RPA programs that are typically managed as business projects within business operations, the scope, scale, and cost of Watson seems to suggest it should be managed as a centralized, innovation program. The benefit of this approach is an enterprise-wide innovation strategy that is consistent, coherent, and aligned with the broader business strategy.²²

KPMG chose to house the IBM Watson program within its Innovation and Enterprise Solutions (I&ES) group. It wants the program to focus on transforming the entire professional services business, not just one service silo. Vinodh Swaminathan, Managing Director, Innovation & Enterprise Solutions at KPMG explained: *“We did not want to experiment with cognitive in one business unit, somewhere in a corner. When the entire firm gets behind something like this, it helps us to scale it very effectively.”*

Housed in the centralized I&ES group, KPMG made a substantial investment in developing human resources that will build KPMG’s long-term cognitive capability. For each use case, KPMG assigned about eight people to shadow the IBM technical teams so KPMG could learn how to harness Watson. And to date, thousands at KPMG are trained across various disciplines in cognitive automation.

For organizations that do not possess KPMG’s level of resources, they can engage partners to help build cognitive capabilities. As Vinodh Swaminathan said, *“Our lesson on this topic is that cognitive is not for the faint of heart – it is really for people who understand how to implement and manage impactful innovation programs. If they don’t have it, they should find a partner who can help. Disciplined execution of an innovation approach can help accelerate time to value from cognitive investments.”*

3. Since Watson is trained (not programmed), compare cognitive training to human training to demonstrate value

Watson may take years to train because of the vast corpus of knowledge needed for many of the applications. Watson’s corpus of knowledge in healthcare, for example, had 1.5 million patient records, 600,000 pieces of medical evidence, two million pages of text from 42 medical journals and clinical trials in the area of oncology research as of 2013.²³ Helping Watson

interpret such a large amount of knowledge required thousands of hours of supervised machine learning. IBM Watson adopters often compare the time it takes to train Watson with the time it takes to train a human, arguing that Watson learns much faster than humans. For example, Mike Rhodin, head of IBM's Watson business unit, told Professor Thomas Davenport, *"People ask me why it takes Watson a few years to learn oncology, but I ask them how long does it take a human to learn it? The oncology leaders we are working with have spent decades learning what they know, so a few years for Watson seems reasonable."*²⁴

At KPMG, all of the use cases used supervised machine learning. A human expert interacts with Watson through a natural language interface using a keyboard to "talk" to Watson and monitor to "listen" to Watson. Watson indicates on the monitor when it can not confidently interpret a phrase so the human can provide feedback, thus adding to Watson's capabilities. This takes time, but Vinodh Swaminathan, Managing Director, Innovation & Enterprise Solutions at KPMG explained that training Watson takes less time than training a human: *"Yes, training Watson is a long process because even in machine terms, it is the equivalent of taking 16 years of education for a human, plus years of an apprenticeship, and compressing it in time; so it could take 18 months to train Watson instead of 18 years for a human, but it still takes 18 months."*

4. Treat cognitive technologies as lifelong learners

Organizations are also advised to think differently about when cognitive technologies projects are "finished". Like human learners, cognitive technologies are never "finished" because they can continually improve performance over time as more data is entered and as more users provide feedback. Based on early adopters of Watson, one can infer the lesson to treat a cognitive technology-based application like Watson as a lifelong learner. Deakin University actually made Watson's incompleteness a selling point for its users by recruiting students to help train Watson. It launched Watson with only 2000 question-answer pairs. During a student orientation week, the university explained that Watson was still learning and that the university needed each student's assistance to further train Watson. Students were given buttons with the slogan "I'm helping train Watson" to engage students and staff.²⁵ Students asked Watson over 55,000 questions during the first twelve months.²⁶ Deakin continued to expand Watson's capabilities. By November 2015, Watson was connected to Deakin's website and online handbook to find more answers, was further programmed to personalize information based on campus and student type (domestic vs. international), and started to share its confidence ratings for its answers with students.²⁷

At KPMG, the required level of cognitive accuracy depends on the use case. Some business services such as audit and risk assessment cannot afford false positives, much like healthcare. Other use cases, like the business development case, have more leeway; Watson is not expected to identify every single relevant opportunity and it's understandable if Watson initially suggests some unlikely services. Across all use cases, humans will continue to check and verify Watson's outputs and humans will continue to help Watson improve with time. Ultimately, the thresholds of acceptable performance will be set by the business sponsors of each service.

5. Focus on the long-term value

Another benefit of managing cognitive innovation as an innovation program is that senior managers tend to be more patient waiting on positive returns with innovation projects than with business operations projects. Watson comprises a number of technologies, and the full cost will depend on the parts of Watson used. In general, people interviewed for this research indicated that proof of concepts for a full Watson implementation cost between \$500,000 and \$1 million dollars and a full blown deployment might cost over \$20 million. Unlike RPA adoptions that delivered double or triple digit ROIs within six months to a year²⁸, many organizations found that IBM Watson adoptions took several years before investments paid off financially.

Indeed, many early IBM Watson adopters argue that returns on investment are difficult to calculate. For example, Gartner reported that Deakin University has an “untested ROI” and wrote: *“The university does not yet have hard return on investment (ROI) metrics for the Watson deployment. Attributing ROI budget benefits in terms of reputation and student satisfaction will likely remain hard to quantify. Part of the reason for this is the difficulty of attributing benefits to individual IT systems such as Watson.”*²⁹ Although IBM Watson may not yield positive ROI on tangible costs and benefits in the short-term, adopters expect long-term value based on business re-design, strategic enablement, competitive advantage, and brand reputation.

For KPMG, the value proposition is concentrated on “reinforcing confidence in capital markets” , and empowering a highly qualified workforce to focus on high-value work. In KPMG’s experience, value is realized along the journey at various milestones if managed in a disciplined way. Vinodh Swaminathan, Managing Director, Innovation & Enterprise Solutions at KPMG said, *“It all comes down to the level of thought and diligence that goes into setting up the innovation journey and cognitive project.”*

6. Find new data sources if dirty data cannot be cleaned

In Ginni Rometty’s¹ keynote address at the 2016 IBM World of Watson conference, she acknowledged four main lessons/challenges for Watson applications based on input from 700 Watson clients. The first lesson was “better data, better outcome”, or what long-time computers programmers might call, “garbage in, garbage out”. Cognitive technologies like Watson claim to understand unstructured natural language data, but in reality humans reign superior in interpreting photos, language, and fuzzy PDF files, at least for now. Beyond ambiguity, a lot of data can be incomplete or inaccurate. Front-end data inputs are often significant obstacles to Watson and to other cognitive technologies. Like KPMG, organizations often need to pre-process data before feeding it into their cognitive tools.

¹ Ginni Rometty has been CEO of IBM since 2011.

² Cortana is Microsoft’s personal assistant software that uses voice recognition; It competes with Apple’s Siri and Google Now.

³ Azure machine-learning studio is part of Microsoft’s Cortana Intelligence Suite. It provides data Page 15

What else can be done besides pre-processing data? Progressive companies, like KPMG and Standard Bank in South Africa³⁰, find alternative data sources when possible. In KPMG's audit use case (described above), we saw that KPMG enabled Watson to extract a single needed attribute from multiple data sources, thus accelerating the front-end data feed. Standard Bank in South Africa eliminated old data sources altogether. Its use case was a customer application process to apply for a current account and overdraft. In the legacy world, the process required the customer to provide pay slips, three months of bank statements, identification such as a passport, and utility bills to confirm their income, identity, and residency. The OCR technology often had difficulty interpreting poor quality images, resulting in bank employees calling the customer to gather all the required data. The entire process took 22 days on average. Standard Bank re-imaged the entire process, beginning with using the newly available digital data services prompted by the South African government's Know Your Customer (KYC) regulations. Using these digital services, combined with credit checks to serve as a proxy for employment, and robotic process and cognitive automation technologies, the new system pulls the required data from the third-party databases, performs 19 verification checks, loads the data into the legacy systems, and passes the outcome back to the customer in just 5 minutes.³¹

7. Find the “Lewis and Clark” program champions

Decades of project management research identify a project champion as a critical success factor for project success.³² Normally, the project champion is the person within an organization who takes on the burden of ensuring everyone involved is on board and behind the eventual success of the project.³³ In the case of IBM Watson programs, this role does not seem to just fall upon one individual—it seems to require a team of program champions with the vision and leadership influence required to overcome obstacles stemming from internal employees, technology partners, and twitchy executives.

The program champions need that single-minded focus that Meriwether Lewis and William Clark had when leading US President Thomas Jefferson's Corps of Discovery Expedition. Lewis and Clark's objective was to find a practical route across the western half of United States. They faced a perilous journey that took over two years to complete, lasting from May 1804 to September 1806. They succeeded despite near starvation, bitter winters, and brutal terrains. Their success was largely credited to Lewis and Clark's ability to build relationships within their own team as well as with over 20 Native American tribes.³⁴

At KPMG, the program champions include Steve Hill, Global Head of Innovation & Investments, Cliff Justice, Partner, US Leader, Cognitive Automation and Digital Labor, Vinodh Swaminathan, Managing Director, Innovation & Enterprise Solutions, and Todd Lohr, Principal, US Transformation Enablement Leader. These program champions prophesize the vision of cognitive technologies both internally and externally through white papers, presentations, demonstrations and interviews. Cliff Justice, for example, wrote “*cognitive technologies are the game-changer: They learn from humans who provide expert knowledge as well as their own trial and error and interactions with other humans.*”³⁵ These program champions report that compared to other organizations, KPMG leaders are highly supportive of the cognitive strategy.

Vinodh Swaminathan explained, *“Maybe KPMG is different, but every time I’ve gone to my leadership team and demonstrated Watson in action for different use cases, they’re very excited about the possibilities. Our leadership team is focused on the legacy we are going to leave to our future employees. They know that the world is going to be different five to ten years from now, and it’s our responsibility as leaders to make sure that the brand, the enterprise, and the firm successfully navigates this and places us in a great position to succeed in that new world.”*

8. Use RPA as forward reconnaissance

This rather intriguingly worded lesson is actually based on a rather mundane reality. Before many senior executives are willing to invest in expensive and time-consuming cognitive technology programs, they may need to see substantial results from the less expensive and faster deployed RPA automation projects. RPA can often generate enough in savings to help fund the next investment in cognitive tools. Todd Lohr, Principal, US Transformation Enablement Leader at KPMG explained that companies that have been successful with RPA programs, will have a higher rate of experimentation in cognitive. He said the RPA program heads could say to senior managers, *“We’ve done automation. We’ve built 290 bots. We’ve saved a ton of money. RPA just scratches the service on what automation can do. The transformative value is in the cognitive-type technologies. We want to start experimenting with those, finding use cases and investing in that area. Are you supportive? They say ‘Yes!’ If they had asked for that 12 months ago before delivering tens of millions of dollars in savings, they would have been denied.”*

9. Identify suitable services for cognitive augmentation

Potential adopters of cognitive technologies will want to know how to assess the suitability of the technologies to their existing services. ***Cognitive experts and early adopters report that cognitive is most suitable for services that rely on vast amounts of unstructured data and expertise, have enough scale to justify the investment, and are strategic to the business.*** For KPMG, selecting services across all service lines—advisory, audit, and tax—meet these criteria for cognitive adoption. For organizations in other industries, Todd Lohr, Principal, US Transformation Enablement Leader at KPMG predicted that cognitive technologies will be widely applied in organizations with large customer service centers: *“If your competitive differentiator is customer service and if you have a huge call center and spend large sums of money on maintaining and providing that center, you should probably be thinking seriously about what cognitive automation can do for your business on a very real way.”* Todd Lohr also noted why scale matters: *“You’re not going to see small companies investing in cognitive because they won’t have the volume. It will be cheaper for them to put 10 employees on the task. You need the people that are putting thousands of employees on it.”*

10. Look behind the provider’s curtain

In 2016, KPMG was tracking 120 tools being sold as some form of cognitive automation. Because the space is relatively new to many clients, it is difficult to assess the actual

capabilities and suitability of these tools. Clients must be aware of hype and “automation washing”. The term “automation washing” refers to the phenomenon of providers spending more resources on advertising and marketing claiming to have new service automation capabilities than actually building new automation capabilities. Cliff Justice, a partner at KPMG said, *“Absolutely, we see evidence of ‘washing’; we see real differences in capabilities across the tools and providers. This is a new market with emerging technologies. Some are more mature than others.”*³⁶

Some software providers are immature, have unproven track records, negative cash flows, and uncertain futures. Some software providers have invested millions in infrastructure and only collect revenues from licensing fees—will they remain viable? Todd Lohr, Principal, US Transformation Enablement Leader at KPMG added, *“You can’t expect someone to just pick up and throw a few data scientists at it to build a cognitive solution in a year based upon the disruption that they are claiming.”* Organizations are advised to select a software provider with a sound financial position and with stable customers who have been using the technology successfully. For KPMG, IBM was the right partner at the right point in their cognitive innovation journey. *“At the end of the day, IBM has been doing this for 20 years, they’ve made the investment.”*—Todd Lohr. KPMG also uses Microsoft’s cognitive tools, such as Cortana² and Azure machine-learning studio³.

Some organizations aim to leverage their existing BPO providers for automation. Traditional BPO providers meet the criteria of sound financial positions and stable customers, but here too potential adopters are advised to “look behind the curtain” to assess the provider’s actual capability. Todd Lohr warned, *“There is also a lot of behind-the-curtains automation where you see the results of automation with the traditional BPOs, but there’s not a lot of visibility into how they are doing it, and what the underlying technology is which makes me a little suspect to how the work is actually getting done and how far along they are.”*

Conclusion: What’s next?

Although this report focused on KPMG’s use of IBM Watson, it is vital to understand that the business strategy to transform professional services is leading KPMG. As such, KPMG does not have a Watson strategy or even a cognitive strategy—tools just enable the business strategy. Beyond cognitive technologies, KPMG is also looking to transform professional services with other emerging technologies like Blockchain. We believe that Blockchain is to transactions as the Internet is to information: it will likely decentralize, democratize, and disintermediate transactions.³⁷ How will the role of auditors be transformed where EVERY transaction in a Blockchain is public and verified over and over again? How will the role of lawyers be transformed when a Blockchain facilitates and executes smart contracts? There is

² Cortana is Microsoft’s personal assistant software that uses voice recognition; It competes with Apple’s SIRI and Google Now.

³ Azure machine-learning studio is part of Microsoft’s Cortana Intelligence Suite. It provides data interaction and predictive analytics capabilities using natural language text and speech through Cortana.

already nearly \$2 billion invested in Blockchain technologies³⁸, and KPMG is one such investor. Vinodh Swaminathan notes, *“KPMG is investing in Blockchain. If you look at life-cycle management, I would say it’s probably where cognitive and digital labor was maybe 12 to 18 months ago, but that doesn’t mean it’s going to take 12 to 18 months to gestate. Technology cycles are getting faster. We’re figuring out what Blockchain means for our business already. We’re asking, ‘How does Blockchain innovate the professional services we provide?’”*

Endnotes

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