Intelligent Procurement: Demystifying Artificial Intelligence in Procurement

Len Prokopets
Managing Director,
KPMG

Pierre Mitchell
Chief Research Officer,
Azul Partners / Spend Matters
Some quick background on us

- 12 different sites/brands/research services
- 1,500-2,000+ unique companies visit daily
- 1,400+ subscribers (paid members)
- A large percentage of Fortune 500 readers monthly
- 125+ free and subscription articles published weekly across the network
- The only global procurement, supply chain and trade financing media and research platform
- A mix of expert contributing analysts and supporting editors and journalists
What you’ll find on Spend Matters network sites

Your Source for **Procurement Intelligence**

Unbiased, in-depth coverage by category, vendor reviews and big picture editorials

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**Benchmarking**

Azul does more than answer the question, “how well am I buying?” Benchmarking performance against peers, the industry or region quantifies current successes and opportunities.

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**Software Selection**

Over the last twelve years, buying organizations have come to rely on us for our vendor reviews, detailed analysis and thought leadership to make difficult decisions easier.

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**Education**

Azul’s extensive library of over 34,000 articles and research briefs help people quickly understand concepts they might know little about while our vendor reviews allow practitioners to get smart fast.

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**Market Insight**

Cutting through all the marketing noise can be a challenge for any procurement professional. Azul is in a unique position to provide objective analysis of solution providers, must-have capabilities and trends.

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**Business Strategies**

Our team of analysts understands the frameworks used to make decisions such as make vs. buy, or hedge vs. hold. Our research (and people) cut across industries, functions and companies.

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**Stakeholder Buy-in**

We know how to work with organizations that need to create stakeholder buy-in. Our research, advisories, and content offer strategic and tactical guidance for building support for procurement initiatives.
Artificial Intelligence – Not a Fad, but an Evolution

Programmable mechanical machine (Babbage)

Ada Lovelace (programming)

1840-1870

1950

1956

1958

1961

1965

1968

1979

1980s

1993

1997

2005

2011

>2013

Mobile Assistants: Siri/Cortana

IBM Watson wins Jeopardy

Behavior-based Robotics (Horswill)

KB medical diagnostics; Layered neural nets

Google Brain and Deep Mind

“Deep Learning”

Autonomous Vehicles

Amazon Alexa

“Strong AI” (General)

Advanced Robotics & “RPA”

50% of jobs gone by 2055?

Game AI (self-learning)

Industrial robot

MacHack (Chess)

Commercial expert systems

Kurzweil NLP

IBM Deep Blue

Recommendation Tech

IBM Watson and Deep Mind

Ada Lovelace (programming)

1957

1961

1965

1979

1987

1993

2007

2011

2012

2013

1950

1956

1958

1961

1965

1968

1979

1980s

1993

1997

2005

2011

>2013

“Strong AI” (General)

Advanced Robotics & “RPA”

50% of jobs gone by 2055?
Disrupting Industries (e.g., Automotive)

- “Next generation Audi A8 capable of fully autonomous driving in 2017” (Source: motoring.com.au, 2014-10-22)
- “Sergey Brin plans to have Google driverless car in the market by 2018” (Source: Driverless car market watch, 2012-10-02)
- “Audi to introduce a self-driving car by 2020” (Source: IEEE Spectrum, 2017-01-05)
- “NuTonomy to provide self-driving taxi services in Singapore by 2018” (Source: Yahoo News, 2016-08-29, 2016-05-24)
- “Nissan to provide fully autonomous vehicles by 2020.” (Source: Nissan Motors, 2013-08-27)
- “Ford CEO announces fully autonomous vehicles for mobility services by 2021” (Source: Reuters, 2016-08-16)
- “GM: Autonomous cars could be deployed by 2020 or sooner” (Source: Wall Street Journal, 2016-05-10)
- “BMW will launch a self-driving electric vehicle, the BMW iNext, in 2021”. (Source: Elektrek, 2016-05-12)
- “First autonomous Toyota to be available in 2020” (Source: Wired.com, 2015-10-08)
- “Elon Musk now expects first fully autonomous Tesla by 2018, approved by 2021” (Source: Borsen Interview on YouTube)
- “Baidu’s Chief Scientist expects mass-production of electric cars will be in full swing by 2021.” (Source: Quora, 2016-01-29)
- “Driverless cars will be in use all over the world by 2025.” US DOT (Source: Frankfurter Allgemeine Zeitung, 2015-09-19)
- “Uber fleet to be driverless by 2030”. (Source: Uber CEO via Mobility Lab, 2015-08-18)
- “Continental to make fully autonomous driving a reality by 2025” (Source: Continental, 2012-12-18)
- “NVIDIA will provide technology enabling Level-4 autonomous driving by 2018” (Source: NVIDIA, 2017-03-16)
- “Delphi and MobilEye to provide off-the-shelf self-driving system by 2019” Source: TheVerge, 2016-08-23

“IEEE predicts up to 75% of vehicles will be autonomous in 2040” (Source: IEEE)
Artificial Intelligence – Some Background

“Within a generation… the problem of creating artificial intelligence will substantially be solved.” - Marvin Minsky (1967)
AI → “Collective Intelligence”

- Value Chains are going digital and creating “big data”. AI and data science is becoming strategic competency to tapping this power
- SaaS providers and “BPaaS” providers (e.g., BPO, MSPs, consulting) are using their collective scale to “learn” from their customers and derive intelligence: Platform/Network effects
- Procurement must help harness this power (and reduce risk) from such provider ecosystems and also for itself as a BPaaS provider itself!
  - Cyber / Risk Management from Big Data sources
  - Supplier power and switching costs
  - Building your own ‘cognitive’ capabilities
    - “Amplifying” procurement productivity
    - Performing/delivering new value streams
AI in Procurement: Current/Future Implementations

**Impact (Risk or Reward)**

- Low
- Medium
- High

**Maturity**

- Low
- Medium
- High

**Key**

- Spend/Cost/Price
- Risk/Compliance/Intel
- Supply Chain
- Process Automation
- Future Procurement
- DIY / Strategic

**Existing Categories:**
- Ridesharing
- BPO, 3PL
- MRO, IT
- Marketing

**Future Procurement**

**AI-based Demand Planning**

**Guided Contracting Agent**

**Guided Sourcing Agent**

**Commodity Management Analytics**

**Pricing Agents**

**IoT and Robotics (SCM)**

**Supply Chain Risk**

**Supply Market Intelligence**

**Data Management Tools (e.g., MDM)**

**Invoice OCR / auto-match**

**Existing Categories:**
- Ridesharing
- BPO, 3PL
- MRO, IT
- Marketing

**Compliance / Fraud Detection**

**Contract Analytics**

**Supplier Risk Analytics**

**Spend Analytics**

**Predictive Cost Analytics and Benchmarking (services too!)**

**“Custom” Analytics Platforms** (customer; internal; supplier)

**Chatbots (ePro; SRM)**

**Guided Buying and Intelligent Search**

**RPA (not much AI!)**

**CRM Analytics**

**Guided Sourcing Agent**

**Sourcing Optimization+**

**AI-based Demand Planning**

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Overview of KPMG procurement advisory

Introduction

**OUR PEOPLE**

- U.S. Procurement and Operations professionals
  - 200+

- Global Procurement and Operations professionals
  - 1100+

- Dedicated Higher Education, Research, and Not-for-Profit professionals
  - 490+

**OUR PRACTICE**

- Global Operations Center of Excellence acts as a hub of knowledge, thought leadership and insights for our consultants and our clients around the world.

- 200+ professionals working on innovative technology solutions for our clients in our unique Ignition Centers

- KGS is an offshore global delivery arm that supports KPMG member firms with a range of services and scalable solutions to deliver value for our clients in a cost-efficient manner.

**OUR CLIENTS**

- In the U.S., KPMG provides:
  - Professional services to 31 percent of Higher Education institutions


**MEASURABLE CLIENT BENEFITS**

- 75,000 Savings initiatives delivered
- 10,000 Training participant days for buyers & supply chain managers
- >8,000 Projects successfully delivered
- >450 International procurement and product category specialists
- 430 bn USD procurement spend analysed
- 300 Studies and professional articles
- 26 bn USD savings generated
- >10 Awards in recent years
- <6 Months to ROI
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 30 percent.

MarketsandMarkets estimates that the AI, or cognitive computing marketplace, will generate revenue of $12.5 billion by 2019.

A recent study by HfS Research and KPMG LLP reports that 55 percent of North American enterprises are looking at new opportunities available with RPA systems.

Recent research from London School of Economics suggests a return on investment in robotic technologies of between 600% and 800% for specific tasks.

According to Quid, from 2010 to 2014, private investment in AI has grown from $1.7 billion to $14.9 billion, and was on track to grow nearly 50 percent year-on-year in 2015 alone.

Gartner predicts that by 2020, smart machines will be a top five investment priority for more than 30% of CIOs.

McKinsey research suggests that smart robots will replace more than 120 million knowledge workers by 2025.

Economic impact
The current knowledge worker economy employs ~240 million with a cost of $9 trillion (27% of employment costs). Almost half of currently performed activities will be automated by 2025 – with the productivity of $5.5 – 6.4 trillion in equivalent labor.
Procurement priorities

Organizations across industry verticals are focused on maximizing value through their procurement departments. Following are some of the top priorities of CPO’s worldwide:

**Improve Cost Performance**
Renewed focus on Category Management is amongst the key drivers for improving cost performance. With greater CFO collaboration, the procurement departments are increasingly showing impact on both the top line and bottom line.

**Increase spend under management**
The ability of the procurement department to increase their footprint through more spend under management continues to remain as an area of priority. Every additional $ under management increases the leverage of procurement departments to drive cost savings and cost avoidance.

**Spend Visibility & Spend Compliance**
New and better ways of looking at spend through technological enhancements are fuelling the next wave of opportunities. This area remains amongst the top priorities of procurement departments.

**Improve Process Automation Level**
Improving process automation across the Source to Pay process remains one of the key priorities. Procurement departments depending on their maturity are addressing this area through piece meal approach or through phased implementations in line with their technology roadmaps.

**Rise of the Contingent Workforce**
Skill shortages are continuing to confound the procurement departments and leading to an increase in the use of Contingent workforce as a short gap arrangement or as a part of long term strategy.

**Risk Mitigation**
Cost volatility, supply disruptions and impact due to regulatory non-compliances are ensuring high visibility but also high focus from the procurement departments.

**Improve Supplier Innovation**
Supplier collaboration is amongst the top areas in Value Beyond Cost that can not only retain the value driven by procurement departments but also help enhance it through joint collaboration and innovation.

**Multiple industry based surveys**
Leading procurement functions can drive measurably superior performance levels when compared to organizations with average maturity.

### Better Spend Management

<table>
<thead>
<tr>
<th>Metric</th>
<th>Leading</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total annual spend cost savings</td>
<td>5.34%</td>
<td>2.97%</td>
</tr>
<tr>
<td>Percentage of spend controlled by procurement</td>
<td>92%</td>
<td>85.5%</td>
</tr>
<tr>
<td>Suppliers per $ billion spend</td>
<td>1,959</td>
<td>5,806</td>
</tr>
<tr>
<td>Procurement contract compliance</td>
<td>88%</td>
<td>64%</td>
</tr>
</tbody>
</table>

### Improved Transactional Efficiency

<table>
<thead>
<tr>
<th>Metric</th>
<th>Leading</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cost of the procurement cycle per purchase order</td>
<td>$125.15</td>
<td>$58.02</td>
</tr>
<tr>
<td>Percentage of purchase orders approved electronically</td>
<td>92%</td>
<td>75%</td>
</tr>
</tbody>
</table>

### Enhanced Productivity

<table>
<thead>
<tr>
<th>Metric</th>
<th>Leading</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROI on procurement total operating cost</td>
<td>9x</td>
<td>4x</td>
</tr>
<tr>
<td>Number of FTEs for $1B spend</td>
<td>43.6</td>
<td>59.5</td>
</tr>
<tr>
<td>Procurement cost as a percentage of spend</td>
<td>0.62%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>
We view Procurement as an end-to-end process whose value contribution to the business is maximized only when the component gears work in unison.
Value leakage occurs at every stage of the source-to-pay cycle

AI can help address this value loss by improving, transforming or replacing current capabilities

Source: Cross-industry benchmarks from APQC, Hackett Group, CAPS Research, Aberdeen.
Procurement AI: Perspectives

Digital technologies

successful companies

USE A COMBINATION OF CAPABILITIES TO SOLVE BUSINESS PROBLEMS

Mobility

Cloud

Digital Labor

Autonomous Vehicles and UAVs

Social and Collaborative Technologies

Artificial Intelligence

Cyber Security

Robotics

Augmented Reality and Virtual Reality

Data & Analytics

Internet of Things and Sensors

Additive Manufacturing

Blockchain
Procurement AI: Perspectives

Spectrum of process digitization

Digital labor employs a spectrum of capabilities replace, enhance, and/or transform existing procurement activities

CLASS 1: Basic Process Automation

Automating human interfaces between systems, e.g., when output from one screen is copied into another or used in a formula for another function. Can replace manual effort and postpone expensive system integration.

CLASS 2: Enhanced Process Automation

Extraction data from unstructured documents for use in KYC, or contract review, or compliance reporting and providing traceability of data back to sources; Replacing ‘stare and compare’ activities using unstructured data where rules are clear.

CLASS 3: Autonomic/Cognitive

Complex diagnostic applications where rules are unclear or expensive to model, e.g., Risk scoring, transaction monitoring, or collateral optimization.

Big Data Analytics

Supporting Architecture

Processing of Unstructured Data and Base Knowledge

“Big Data” Analytics

Supporting Architecture

Supporting Architecture
Opportunities in procurement digitization

Digital Labor, including AI can be applied to address leakage and target opportunities across the Source to Pay lifecycle.
Procurement AI: Perspectives

Procurement digitization prioritization example

Digital Labor Type
- Class 1: Rule-Based Automation
- Class 2: Machine Learning
- Class 3: Cognitive Learning

Benefits
- Spend Savings
- Process Efficiency
- Risk
- Other

Process Area
- 1.0 Business Partnering
- 2.0 Category Management
- 3.0 Strategic Sourcing
- 4.0 Contract Management
- 5.0 Supplier Management
- 6.0 Transactional Procurement
- 7.0 Support Processes

Digital Labor Applicability
- High Benefit, Low Applicability
- High Benefit, High Applicability
- Low Benefit, Low Applicability
- Low Benefit, High Applicability

Client Example

Example: AI Spend Classification

Example: Cognitive Contract Review

Example: Cognitive Supply Market Analysis

Example: Cognitive Management

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Cognitive Contract Review
Professional Services firm leverages cognitive technology to automate contract review process through analytics and machine learning

<table>
<thead>
<tr>
<th>Client Challenge</th>
<th>A leading professional services firm sought to improve speed and accuracy of identifying specific language modification within all of their contracts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 500 new contracts per week</td>
<td></td>
</tr>
<tr>
<td>Need to assess use of standard templates, changes to that template, existence of various keywords or clauses.</td>
<td></td>
</tr>
<tr>
<td>Long cycle times for manual reviews by dedicated team of multiple FTEs in the firm’s information management group and legal department</td>
<td></td>
</tr>
<tr>
<td>Each manual contract review took 1-2 hours and still resulted in many errors</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KPMG Response</th>
<th>Developed a Contract Analytics cognitive analytics platform that combines OCR and text similarity analysis to review and score contracts</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the first phase, contracts and templates were scanned, keywords and phases were identified and weighted, and contracts were compared to templates to identify differences.</td>
<td></td>
</tr>
<tr>
<td>In the second phase, user input was combined with machine learning and cognitive automation capabilities to permit more granular scoring and categorization as well as predictive search capabilities.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benefits to Client</th>
<th>Significantly reduced the time, effort and costs associated with manual contract review and variance identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>A weekly review of newly signed contracts that required up to 80 man hours is now completed in as little as an hour, freeing time and resources for higher-value activities, and providing a higher degree of accuracy.</td>
<td></td>
</tr>
</tbody>
</table>
## Machine Learning-Based Spend Analysis

**Global Banking Group leverages Machine Learning Technology to conduct Spend Analysis**

<table>
<thead>
<tr>
<th>Client Challenge</th>
<th>A Global Top Ten Banking Group engaged KPMG to establish a sustainable monthly spend analysis process.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>•</strong></td>
<td>£5B Global Spend, across US, Europe and Middle East</td>
</tr>
<tr>
<td><strong>•</strong></td>
<td>40 source systems</td>
</tr>
<tr>
<td><strong>•</strong></td>
<td>2 million transactions per year</td>
</tr>
<tr>
<td><strong>•</strong></td>
<td>Complicated by ongoing divestment activity</td>
</tr>
<tr>
<td><strong>•</strong></td>
<td>Monthly Spend Analysis and Compliance Needed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KPMG Response</th>
<th>Utilized Machine Learning technology to establish an on-going spend analysis capability. Key actions included:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>•</strong></td>
<td>Developed integrated Data Model covering spend from 40 countries</td>
</tr>
<tr>
<td><strong>•</strong></td>
<td>Utilized Machine Learning technology to recommend a classification assignment to invoice line item, assigning a likelihood based on similarity to a massive knowledge-base of historical spend transactions</td>
</tr>
<tr>
<td><strong>•</strong></td>
<td>Developed dashboard</td>
</tr>
<tr>
<td><strong>•</strong></td>
<td>Developed rules for procurement compliance enabled by spend visibility</td>
</tr>
<tr>
<td><strong>•</strong></td>
<td>Introduced a Monthly spend analysis refresh cycle</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benefits to Client</th>
<th>• Increased spend visibility to greater than 99% across multi-billion dollars of spend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Compliance and spend reporting available within 12 working days every month (previously compliance reported semi-annual))</td>
</tr>
<tr>
<td></td>
<td>• Savings identified in excess of 5% in first year equating to millions of dollars.</td>
</tr>
</tbody>
</table>
Procurement AI: Case Studies

Digital Platform for Category Management

Platform for end-to-end Category Management and Source to Contract collaboration and automation in a major Telecom provider

<table>
<thead>
<tr>
<th>Client Challenge</th>
<th>KPMG Response</th>
<th>Benefits to Client</th>
</tr>
</thead>
<tbody>
<tr>
<td>A client defined a vision to be the first fully digitalized procurement company in the world and needed to develop the capabilities to operationalize its ambition and drive effectiveness</td>
<td>KPMG supported the client in developing a strategy and designing and building digital tools and processes</td>
<td>KPMG’s digital procurement platform utilized cognitive tools and capabilities to pave the way for procurement organizations to enter the digital age. Category management is now carried out continuously as a core procurement function. The client is benefiting from substantial effectiveness and efficiency gains including</td>
</tr>
<tr>
<td>• Global organization and supply base</td>
<td>• Communication, social network and messaging applications were used to enable Category Management collaboration and cognitive tools were to enhance analytics and market intelligence processes. • The platform facilitates a structured virtual collaboration to drive stakeholder alignment across the global procurement organization. • The strategy room of the platform offers a collaborative workspace to participate in strategic projects in a cloud-based environment • Cognitive tools are embedded to automate strategic processes including preparation of analysis and recommendation of market intelligence sources</td>
<td>• Improved effectiveness through enhanced business partner alignment resulting in higher compliance and purchasing power. • Reduced efforts in “manual” communication and administration that has helped free up category manager time for core value-adding tasks</td>
</tr>
</tbody>
</table>

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A KPMG client sold $5 billion of assets to an acquiring firm and needed to review all documents to ensure that sensitive documents were held back while documents of the sold assets go to the acquirer. The complex file structures and documents types, plus highly specialized technical and proprietary content, created a challenge for the client that would best be served through leveraging cognitive automation technology.

KPMG developed a tool that met the client’s need for an efficient, and highly technical review of all applicable documents. Leveraging cognitive automation technology, KPMG helped the client:

- Acquire, scan, and ingest 2 million documents
- Implement a 3-tiered strategy to classify documents: Seller vs Acquirer
- Review sensitive content and metadata
- Utilize file and directory copy detection
- Conduct internal document cross-reference analysis
- Document risk scoring for review by Seller subject matter experts
- Engage in reporting, visualization, and interactive refinement

The results were massive gains in cost reduction, efficiency, and coverage as described in the table below. It also ensured a clear audit trail of documents to be disclosed/retained, and reasons for determination.

<table>
<thead>
<tr>
<th>Benefits to Client</th>
<th>Traditional Manual Sample Approach</th>
<th>KPMG Automated Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coverage</td>
<td>5% sample</td>
<td>100% coverage</td>
</tr>
<tr>
<td>Time &amp; Effort</td>
<td>8 FTEs for 12 months</td>
<td>4 FTEs for 16 weeks</td>
</tr>
<tr>
<td>Manual Reviews</td>
<td>&gt;12,000</td>
<td>2,500</td>
</tr>
<tr>
<td>Cost / document</td>
<td>$28.00 / document</td>
<td>$0.45 / document</td>
</tr>
<tr>
<td>Analysis</td>
<td>Content-only</td>
<td>3-Tiered Strategy</td>
</tr>
</tbody>
</table>
Considerations for CPOs approaching AI

- AI is a means to an end in supporting your procurement/digital transformation
- Learn about the possible, but implement the plausible and profitable
- Select the right providers and partners; consider application of specialized AI tools and of capabilities being embedded in Cloud procurement tools
- Consider AI as part of the broader technology sourcing and roadmap but also look for early wins
- Help yourself, but collaborate internally on digital business opportunities
- It’s not too early to think about change management
Questions?
See you next time!

Pierre Mitchell
pierre@spendmatters.com

Len Prokopets
lprokopets@kpmg.com

Brianna Tonner
btonner@spendmatters.com