Introduction to Data Analytics 2019

INTRODUCTION

- Travis Scheopner
  - 8 years with Koch Ag & Energy Solutions
  - Data Analytics Leader/Data Architect
  - Recovering Accountant (bachelor's degree from Friends University)
  - Wichita State University Alum (MBA, concentration in Analytics, 2017)
AGENDA

• What is Business Analytics
• I am an accountant. Why should I care?
• Business Analytics in Action at Koch Ag & Energy Solutions
• Open Q&A

WHAT IS BUSINESS ANALYTICS/DATA ANALYTICS?

• “Data is the new oil.”

• “Data is the new oil. Oil is valuable, but if unrefined it cannot really be used. It has to be changed into gas, plastic, chemicals, etc to create a valuable entity that drives profitable activity; so must data be broken down, analyzed for it to have value.” --Clive Humby, UK Mathematician and architect of Tesco’s Clubcard
Business Analytics is the process of refining data into actions that create value for society.

“We (Koch) earn profit by creating value – for customers, society, our partners, and every employee who contributes. That is good profit.” --Charles Koch
WHAT IS BUSINESS ANALYTICS/DATA ANALYTICS?

• Just like Oil is refined to fuel your car...

• Today, Data is refined to fuel business
Just like a set of blueprints is needed to refine oil...

High-Level Architecture  Blueprints are needed to refine data
Technology is a competitive advantage

• What IS Data Analytics?
  • Analytics is the discovery, interpretation, and communication of meaningful patterns in data. - Wikipedia
  • Analytics is an encompassing and multidimensional field that uses mathematics, statistics, predictive modeling and machine-learning techniques to find meaningful patterns and knowledge in recorded data. – SAS
  • Analytics is enabled by providing users access to data, tools, and technology; and by encouraging users to explore, discover, and analyze.

Analytics Applications

• Analytics Value Chain
  • Analytics creates value by refining data into actions.
    • Data → Information → Insights → Knowledge → Decisions → Action → Value
    • Note: Analytics uses the same value chain whether performed by human, machine, or a combination. We analyze data and we make decisions that create actions; sometimes valuable (profitable), sometimes not.

• What can Analytics do?
  • Outcomes
    • Automates (or accelerates) decisions by recognizing patterns and applying existing models.
    • Can improve upon existing mental models by updating them with new evidence (augmented intelligence)
    • Can create entirely new decision models by discovering previously unknown patterns (artificial intelligence)
  • Benefits
    • Scalability is nearly limitless.
      • As humans we attempt to boil problems down to the most critical key drivers in order to make decisions. We intentionally disregard many variables and classify them as insignificant to hear the signal amongst the noise. With machine learning, all the variables can be considered and new signals can be discovered in what was previously deemed as noise.
    • Reduces decision bias from existing mental models.
      • We always do Y when X happens. What if Y is not a function of X?
Analytics Advantage – Mental Model

Data

- **Descriptive**
  - What happened?
  - Did we make money?
  - Did the machine break?

- **Diagnostic**
  - Why did it happen?
  - Why did we make money? Was it position, price, market?
  - Why did the machine stop?

- **Predictive**
  - What will happen next?
  - Will we make money on this deal?
  - Is the plant running optimally?

- **Prescriptive**
  - How could we improve upon what is likely to happen next?
  - How can we get the plant to run until the next TA? What do we fix?

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**Data Analytics**

- **What is Data Analytics?**
  - Organizations use analytics to answer questions and drive action
    - Descriptive - What happened?
    - Did we make money?
    - Did the machine break?
    - Diagnostic - Why did it happen?
    - Why did we make money? Was it position, price, market?
    - Why did the machine stop?
    - Real time Decision Support - What is happening?
      - Are we making money on this deal?
      - Is the plant running optimally?
    - Predictive - What is likely to happen next?
      - Will we make money on this deal?
      - Will the plant run until the next Turnaround?
    - Prescriptive - How could we improve upon what is likely to happen next?
      - How could we make more money on this deal/this position?
Business Analytics
I am an Accountant. Why Should I Care?
While these principles may be “unique” to Koch, the concepts are broadly at work in almost all industries. Many/Most companies and universities are undertaking (or will soon) some type of Digital Transformation effort.
CHANGING ROLE OF THE ACCOUNTANT

• From Managing Debits and Credits → To Business Partner/Consultant
  • If the debits and credits are automated, businesses will need people (accountants with analytical skills) to derive meaning from the data and optimize business decisions.

• From Rows and Columns → To Charts, Graphs, Dashboards, and Natural Language
  • The demise of the “coffee” report.
  • Modern toolset

• Audits: From “reasonable assurance” → to “almost absolute assurance”
  • Most significant change in the audit process in 30+ years. Big firms utilizing technology and analytics to revolutionize the practice.

CHANGING WORLD

• Speed to value
  • Good, fast = $$$$
  • Slow, perfect = < $ >

• Customer engagement
  • Self-sufficient
  • Forward looking

• Product/business lifecycle
  • Provide meaning
  • Think Larger
DATA LITERACY
– A “BASE” EXPECTATION IN THE WORKPLACE OF THE FUTURE

• Data Literacy (definitions from Gartner)
  • Formally: The ability to read, write, and communicate data in context, including an understanding of data sources and constructs, analytical methods and techniques applied, and the ability to describe the use-case application and resulting value.
  • Informally: Do you “speak data”? 

DATA LITERACY
– A “BASE” EXPECTATION IN THE WORKPLACE OF THE FUTURE

• Data Literacy
  • Start of the 20th century, one could get a job without being English literate.
    • By the end of the 20th century, those jobs almost all disappear.
  • Start of the 21st century, one could get a job without being Data literate
    • By 2038, those jobs almost all disappear.
    • Maybe sooner…2025…2020?
DATA LITERACY – A “BASE” EXPECTATION IN THE WORKPLACE OF THE FUTURE

• ISL: Information as a Second Language
• Languages include:
  • Base vocabulary (common language)
  • Set of dialects (Operations, Finance, Logistics, etc.)
  • Levels of proficiency (Conversational, Literate, Competent, Fluent, Multilingual/Translator)
  • Continual development (Living language, new words, new skills, community contributions, leading/learning by example)

Data Analytics

Examples
Descriptive Analytics

How much did we spend on maintenance?

Descriptive Analytics

What machines did we repair?
Descriptive Analytics

How much product are we producing?

Diagnostic Analytics

What IS happening with our machines right now? Why? What are the trends?
Diagnostic Analytics

What IS happening with our machines right now? Why? What are the trends?

THE CHALLENGES

Extend our business vision and align our architecture to include what is possible!

Shifting from Descriptive/Diagnostic to Predictive/Prescriptive

“While I do agree that the future is unknown and unknowable; I also believe that in many cases, it is at least reasonably predictable.”

-- Travis Scheopner?
THE CHALLENGES
Extend our business vision and align our architecture to include what is possible!
Shifting from Descriptive/Diagnostic to Predictive/Prescriptive

Use our data as an asset to:
- Provide forward looking decision making – provide insight at the time of the decision.
- Embed business knowledge into our analytics.
- Reduce analyst labor.
- Facilitate analysis on the vast amount of data that is too large for a person to process it.
- **Predictive** – analytics that “predict” what might happen. Detect patterns in historical and transactional data and apply statistics to identify risks and opportunities for the future.
- **Prescriptive** – analytics that “prescribe” a number of different possible actions to and guide users towards a solution. Over time, one can choose to fully automate decisions.

Shifting from Descriptive/Diagnostic to Predictive/Prescriptive requires the utilization of new and transformative technologies.

Human’s “view” of information

$$\text{Who do you think is going to make a more profitable decision?}$$

$$\text{Machine’s “view” of information}$$

We will never be able to put enough “eyes” on a problem to compete with the scale and speed of machine learning, computer vision, and artificial intelligence.
Predictive Analytics

Building models using historical data.

Predictive Analytics

Can we predict what WILL happen by analyzing real time data with historical models?
Predictive Analytics


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Predictive Analytics

Can we predict what WILL happen by analyzing real time data paired with historical models? Using Satellite Imagery, Historical Data, and Machine Learning to monitor and predict demand quicker and with more precision.
Prescriptive Analytics

Based on our historical knowledge and our predictive models, we should do...
Given Origin A and Destination B, we should contract with Carrier X at Price Y.

Prescriptive Analytics

Based on our historical knowledge and our predictive models, we should do...
Okay, then just do it for us.

“Read” an invoice, ask some questions, pay the bill.
No human involved. Manage by exception enabled.
Advantaging Data Analytics

• Different skills and mindsets required
  • Amazon model –
    • ALL the data is available. EVERYONE knows how to use the data AND does use the data to make decisions.
  • Amazon has won retail analytics. Facebook has won social analytics. Google has won internet analytics. Someone will “win” analytics in the industries you are involved in and thus win those markets...
  • Businesses must evolve/obtain resources in order to advantage analytics.
    • Must shift mindset from “Analytics is done by IT” or “Analytics is a role on my team” to “Analytics is part of every role on every team”.
    • Must shift process from Analytics team fishing for the business (IT delivering a report) to teaching and enabling talent to fish for themselves.
    • An analytics team can make the data available and train people how to get to it, but businesses need resources who can use the data and who know what relationships in the data are valuable.

Data Analytics – What type of Talent is necessary?

- Substantive Domain Expertise
- Hacking Skills
- Math & Statistics Knowledge
- Traditional Research
- Data Analytics
- Machine Learning
- DANGER ZONE
The “number one” skill required to be successful in Analytics

• Intellectual Curiosity
  • Have you ever interacted with a 3-year-old?
    • What is the first (and usually only) question they ask about everything?

  • **WHY?**

  • Do you question the processes?
  • Do you question the answers?
  • Do you question the questions?

Conclusion

• Be Curious

• Be a life-long learner

• Learn a new language (Data)

• Be you