RCA and Big Data-
The Future State of Problem Solving?

Chris Eckert
President
Sologic, LLC
Chris.eckert@sologic.com
989-835-3402
www.sologic.com

Overview

- Cognitive Computing and Problem Solving
  - What have we seen so far?
  - Possible, Future capabilities?
  - Limiting Factors

Cognitive Computing and Problem Solving

The question that has been asked for years:

Can Cognitive Computing/AI replace human (expert) capabilities?

Cognitive Computing

- Self-Learning systems that can quickly mine mountains of data
    - Recognize patterns in unstructured data
    - Bridge the semantics gaps
    - Normalize different descriptions of same thing
        - Different words/languages
        - Stop vs Halt vs Arrêt—same thing
- Experts have been able to do this for a long time, but computers haven't…..but change is upon us

Cognitive Computing

- 'Deep Learning' & 'Narrow AI'
- Solutions:
  - IBM Watson
  - Microsoft Cognitive Services
  - Google Brain
  - Apple Siri
  - Other players
    - Highspot
    - Enterra®
    - Kyield
    - Datalingvo
    - .....

Cognitive Computing and RCA—What we have seen so far

- Voice to text
- Narratives, such as preliminary incident reports, analyzed for causes
  - PDF's, Word docs, Excel, etc.
- Solution evaluation based on user defined criteria
- Find other related incidents that share similar causes
  - Including past, unstructured incident reports (in any text form)
- Find/recommend solutions based on similar incidents

*Based on work with IBM Watson in 2015 with RCA data sets

Cognitive Computing and RCA—Where can it go in the future?

- Time will tell…..
  - Understand causal patterns and recommend causes and/or ask targeted questions. I.e.
    - For inputs such as "Shaft Broke", responses like
      - "What was the force exerted on the shaft?"
      - "What were the shaft material /physical properties at the time of fracture?"
      - "How much force was exerted on the shaft?"

Cognitive Computing and RCA— Where can it go in the future?

- As data sets grow, the questioning and/or suggestions will get more targeted. I.e.;
  - The 4th broken shaft on the Scrubber Fan F-502 this year.
    - "Is the fan still running with a 4 belt sheave and operating at 10,000 CFM?
      - "If so, prior failures revealed the shaft was overloaded due excessive belt tension caused by overtightening. This was done in an attempt to avoid belt slippage. The slipping belts are being caused by a fan that is being operated beyond its rated capacity."

Cognitive Computing and RCA— Where can it go in the future?

- As data sets build:
  - Most likely causes will be presented to the analyst
  - Underlying systemic causes revealed
  - Solutions that have been applied in past, similar situations

Cognitive Computing and RCA—Where can it go in the future?

Will AI yield better results on a 'one-off' incident than a team of experts?

Not likely, but…..

- It will reduce the number of cause paths that get overlooked
- It will leverage more solutions on more problems beyond what one team of experts could ever deliver
- Enables more generalists to engage in problem solving
- "Lessons Learned" will move from the pipe-dream to reality

Cognitive Computing and RCA—Where can it go in the future?

- Predictive?
  - In theory, once the data sets mature, causal patterns will come into focus along with basic probabilities of recurrence
    - Better data feed will be fed into risk models
    - Probabilistic determinations of future events
  - An informed analyst will still be needed to evaluate the overall risk
    - Less time spent building the cause/effect chart
    - More time spent the high value-add evaluations

The Dilemma?

Everyone wants the data, but not many are willing to contribute

Moving Forward

Data sets have been around for years:

- Highly specialized and not broadly applicable
- Cause and effect data sets not as common
  - FMEA/troubleshooting guides
  - Expert systems (initial AI groundbreakers)

Who has cracked the code for the masses?

- Ya, these guys

Big Data

- In the consumer world, billions of people provide the data in return for 'free' apps.
  - Many unknowingly
  - Some just don't care
  - Google saw this a long time ago and commercialized it

- This model doesn't work out so well in the corporate world

What comes next in this story?

- ???

- In order to reap future benefits…..
  - Start capturing RCA data now
    - On the consumer side:
      - Most likely the "Google model": Free app but data is mined by others
        » Will take a long time to accumulate reliable, usable data
        » Won't be very useful for industry
    - Industry
      - Pay-to-play model using internal data
      - Organizations with decent historical RCA data will obtain results immediately

Our involvement in the future

- We plan to continue work with Watson to see if it can/will deliver usable results and benefits
  - Primary target is industry where the need is clear
  - Prototype with a few interested clients with historical data

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