

# IEMS Board Meeting

*Remarks by*

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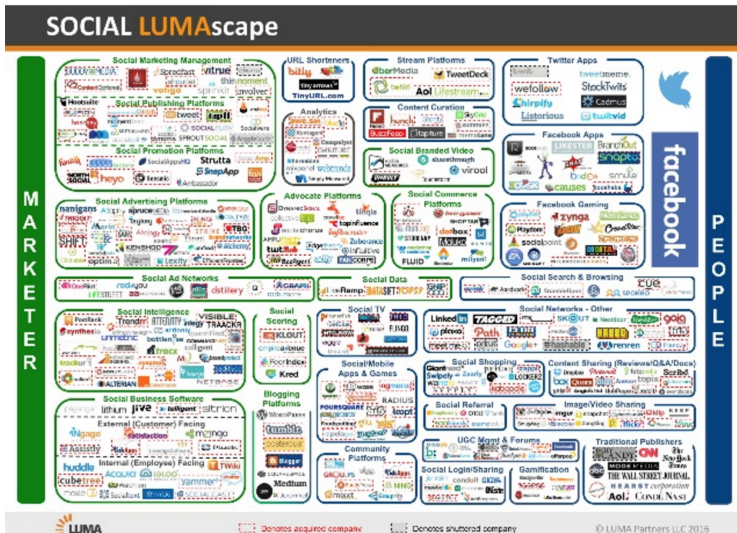
IEMS-Northwestern  
Chicago  
October 2016

[http://srdas.github.io/Presentations/IEMS\\_2016.pdf](http://srdas.github.io/Presentations/IEMS_2016.pdf)

# Current State

# Lumascape (example of a complex ecosystem in analytics)

<http://www.lumapartners.com/resource-center/lumascape-2/>



# Role of Analytics

- Four Vs of Big Data: Volume, Velocity, Variability, Veracity are critical for competitiveness of a large institution. (A fourth commonly asserted V is Volatility.)
- Decisions based on big data are less judgmental. Creates a new culture of good judgment based on data.
- The decision process is repeatable and automatizeable.
- Analytics leads to new business opportunities through uncovering unexpected correlations in the data.
- Scope now extends to system wide risk and return, and generates useful data aggregates.
- Data models lead to real time decision-making.
- Better communication and information sharing across the organization.

## Example, Finance: Benefits of Analytics for Large Banks

- Monitoring corporate buzz.
- Analyzing data to detect, analyze, and understand the more profitable customers or products.
- Targeting new clients.
- Customer retention.
- Lending activity (automated)
- Market prediction and trading.
- Risk management.
- Automated financial analysts.
- Financial forensics to prevent rogue employees.
- Credit cards: optimizing use, marketing offers.
- Fraud detection.
- Detecting market manipulation.
- Social network analysis of clients.
- Measuring institutional risk from systemic risk.

# Pitfalls of Big Data Analytics

- Garbage in, garbage out.
- Collecting too much data and not using it correctly.
- Big data leads to bigger errors if misused.
- Confusing correlation with causality.
- May involve expensive infrastructure.
- Privacy issues.
- Excessive misdirected automation leading to poor client service.

# Designing an Analytics Degree

- 1 Data Science (CS+Stats) vs Business Analytics (CS+Stats+Business+Economics).
- 2 Full pipeline person: problem statement, extract, analyze, recommend, visualize, communicate.
- 3 Story telling with data, humanize data.
- 4 Ensure employer goals are met. Role of Advisory Board: <https://www.scu.edu/business/ms-business-analytics/advisory-board/>.
- 5 Importance of Practicum.
- 6 External interface, role of meetups: <https://www.meetup.com/>.
- 7 Ethics course, working with government. (data provenance, cybersecurity, privacy, etc.)
- 8 Online: Coursera, Udacity nanodegrees, DataCamp, BigDataU, etc.
- 9 Cutting edge training, e.g., deep learning tensorflow workshops.
- 10 Industry symposiums.

# Future State



# Basic Skills Needed out of an Analytics Program

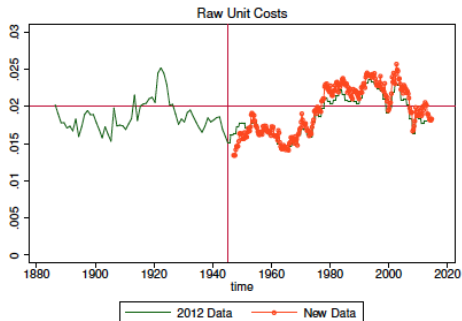
- Python
- R
- Database Management (SQL, noSQL)
- Visualization (Tableau)
- Cloud computing: Hadoop, Spark, AWS, etc.
- Econometrics
- Machine Learning
  - Supervised vs Unsupervised learning
  - Regression vs Classification techniques
- Business skills
- Advanced skills, e.g., Deep Learning: TensorFlow, Caffe, Torch, Theano.

# Future Developments affecting Program Design

- Domain expertise becoming critical.
- Cross-discipline training. E.g., field experiments, psychology.
- Data Integration (data lakes). e.g. firms like TreasureData.
- Handling large data and reproducibility of results. E.g., noSQL frameworks with map-reduce, e.g., Spark (DataBricks), Apache Zeppelin, Notebooks, etc.
- Online training programs.
- Hardware changes. E.g., TPUs.
- The unreasonable effectiveness of linear algebra!
- For IEMS, FinTech is a huge area of focus. Many trading firms in the Chicago area. See conferences, such as <http://www.rinfinance.com/>.

# Unit Cost of Financial Intermediation

The high cost of financial intermediation is being dis-intermediated by data-driven technologies.



Philippon (2016)

# Areas in FinTech 1

- Systemic risk: Espinosa-Vega (2010); Espinosa-Vega and Sola (2010); Billio, Getmansky, Lo, and Pelizzon (2012); Merton, Billio, Getmansky, Gray, Lo, and Pelizzon (2013); and Das (2016).
- Consumer finance: Wei, Yildirim, den Bulte, and Dellarocas (2015), application using social media interactions. Lin, Prabhala, and Viswanathan (2013) exploit friendship networks in peer-lending. Big data helps eliminate bias from small data, see Choudhry, Das, and Hartman-Glaser (2016), ills are outlined in detail in O'Neill (2016).
- Nowcasting: Evans (2005); Giannone, Reichlin, and Small (2008); and Babura, Giannone, Modugno, and Reichlin (2013).
- Text analytics: Das (2014); Jegadeesh and Wu (2013); Loughran and McDonald (2014). Topic analysis, Blei, Ng, and Jordan (2003).
- Cybersecurity is a huge area.  
<https://www.sans.org/media/critical-security-controls/critical-controls-poster-2016.pdf>.

## Areas in FinTech 2

- High frequency trading: TradeWorx (<http://www.tradeworx.com/>) and Automated Trading Desk (ATD, bought by Citibank for \$680M in 2007) were pioneers in the field. Algorithmic trading, 50% of executed trades in the equity markets, down from around 2/3 of stock trades in late 2000s, profits from algorithmic trading are under competitive pressure, and regulatory oversight.
- Blockchains. A decentralized record, with copies of the blockchain being maintained by several entities, with (hopefully) comprehensive security and consensus updates.
  - ① Acronym DIST (a file that is Distributed, Immutable, Secure, and Trusted).
  - ② Banks are experimenting with blockchains for automated settlement, and have formed consortiums such as R3 (<https://r3cev.com/>).
  - ③ USC (Utility Settlement Coin) from UBS and three other major banks, as well as SETL coin from Goldman Sachs.

# Expected Benefits from Analytics Staff

Managerial focus: Students need to be aligned with top-level goals of the organizations they will go to work for:

- Develop a data-driven decision-making culture.
- Higher customer satisfaction.
- Streamline revenue acquisition; pare down costs.
- Translate small data driven gains into large bottom line because of the volume in banking.
- Profile customers and achieve better customer and price segmentation.
- Role of IT: not a cost center any more.
- Overall, a more competitive organization.