

Data Science in L.A.'s “Silicon Beach”: Shadow Vocation or Emergent Profession?



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This PPT is available at:

smithw.org/csupom.pdf or github.com/wsphd/csupom/

Motivation

- Background/Preliminaries
- I apologize...
 - “cloud computing”, “big data”, “marketing analytics”, and worse of all, “data science”
 - These are *industry* “terms”, not ours
 - I prefer decision-support systems, *predictive modeling*, *statistical computing*, and *mathematical optimization*, but most of the folks I routinely work with prefer the term “data science” (I suppose we might agree on the terms *analytics* and *visualization*.)
- I am on the steering committee for the LA R/Data science Meetup group
 - There are a few other Ph.D.s heavily involved too—Szilard Pafka (primary), David McArthur, Rob Gould, Jeremy Miles, Tim Triche, Eduardo Arino de la Rubia, and others
- Opportunities and Challenges
 - Is there a perturbation (disequilibrium) in this labor market?
 - What should be our institutional role (if any) in this community?
 - Are we witnessing the emergence of a new *data guild* in the service economy?

Candidate Explanations (1/2)

- Behavioral Economics
 - “Extreme Discounting”
 - “I am deliberately overweighting of *short-term preferences* and underweighting of *long-term goals*.”
- Finance
 - “Loan-to-Value”
 - “I might not achieve my *potential*, but at least I’m not in *debt*.”
- Statistics (inference)
 - Privilege *specification* (narrow results) over *generalization* (broader theory development)
 - “If I have more *data*, then I have proportionally more *information*.”
- Computer Science (machine learning)
 - Demonstrated capability with the *current* (“right now”) platforms and languages is the valued skill.
 - “I need *Bayesian* approaches for large “samples”, not *frequentist* approach for small samples.”

Candidate Explanations (2/2)

- Psychology
 - “You don’t know me!”
 - “The UC, CSU, and CCC’s teach mostly theories and I mostly just learn how to write papers there.”
- Education
 - “I don’t need general education and extra-curriculars; I need *just-in-time* education (for life).”
 - “I need *just-in-time* theories for my practice (to answer the boss’ questions for next week).”
- Political Science
 - “Help! I’m scared and confused about the future and my role in it!”
 - “If I don’t take this job, someone with an H1-B visa might.”
- Historiography
 - “Merchant-Craftsmen” and “Craft Guilds” (apprentice, journeyman, master)
 - “Trades[men] and crafts[men] have always created local, persistent, supportive *communities*.”

**Gil Press**

Contributor

I write about technology, entrepreneurs and innovation.

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TECH 12/01/2012 @ 5:32PM | 15,988 views

Big Data News of the Week: Beautiful \$300,000 Minds

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Jeff Hawkins at eTech 2007 (Photo credit: Wikipedia)

While many saw big data as the winner of the recent elections, [I voted for](#) Big Intuition, citing [Bill Clinton](#)'s insight and advice as an example of how decisions and data science—in political campaigns or any other endeavor—cannot be automated and must rely on human judgment and domain expertise.

This week, Matthew Jones, a historian at [Columbia](#) who is working on the history of data mining, came to a similar [conclusion](#) after auditing Rachel Schutt's [introduction to data science](#) class: "Data science depends utterly on algorithms but does not reduce to those algorithms. The use of those algorithms rests fundamentally on what sociologists of science call 'tacit knowledge'—practical knowledge not easily reducible to articulated rules—or perhaps impossible to reduce to rules."

This irreducible knowledge is of two kinds: Expertise and experience in a specific domain (as in "Clinton knows how to run political campaigns"); and—specifically for data scientists—experience with and understanding of the tools they apply. Says Jones: "The hubris one might have when using an algorithm must be tempered through a profound familiarity with that algorithm and its particular instantiation."

This article is related to: Business, Eric Garcetti, ,
Marissa Mayer, LAX

Playa Vista turning into Silicon Valley South as tech firms move in



Yahoo has signed a long-term lease for about 130,000 square feet at the new Collective campus, which is still under construction in Playa Vista. (Marcus Yam / Los Angeles Times)

By **ANDREA CHANG AND PETER JAMISON**
contact the reporters

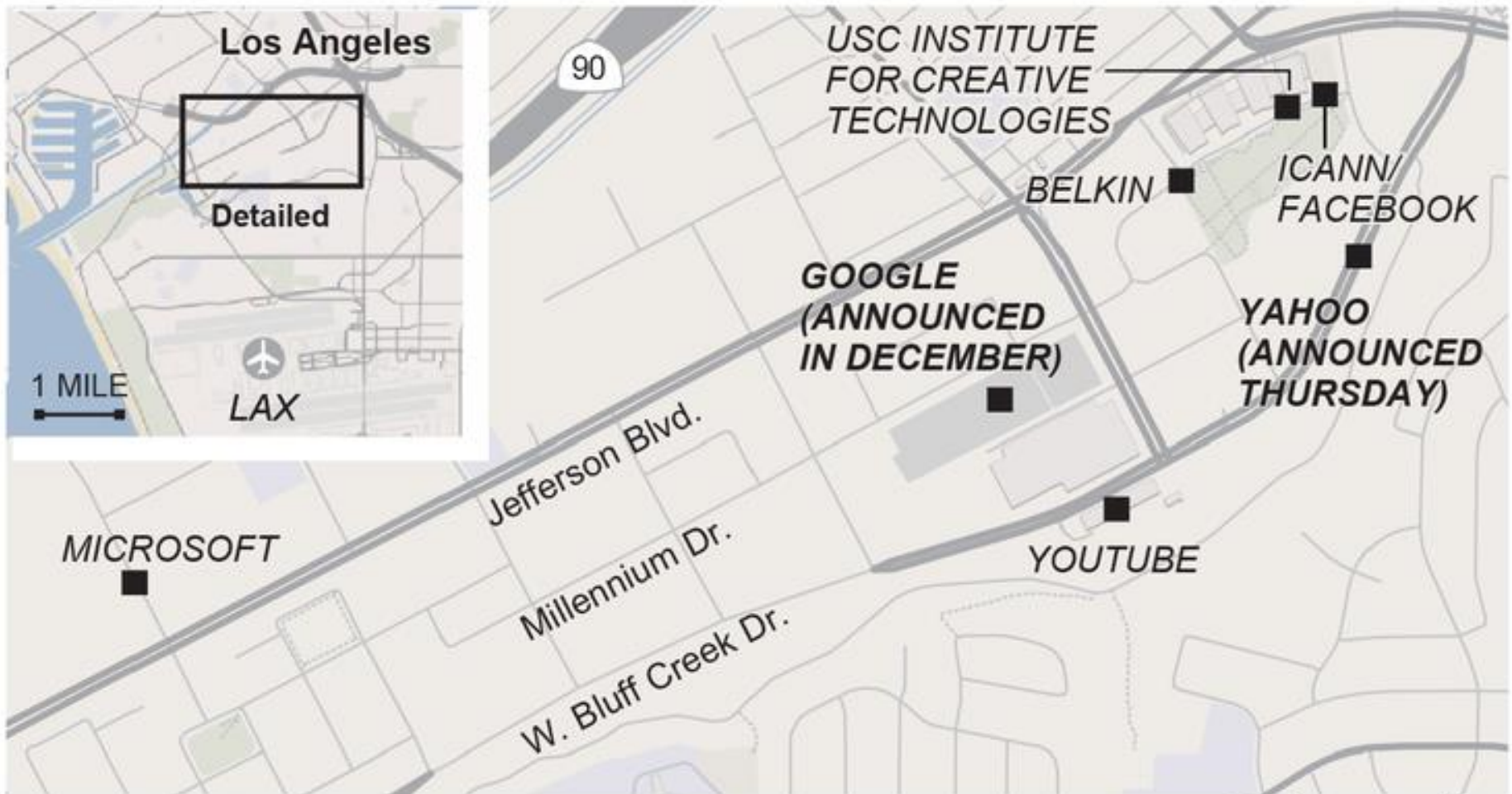
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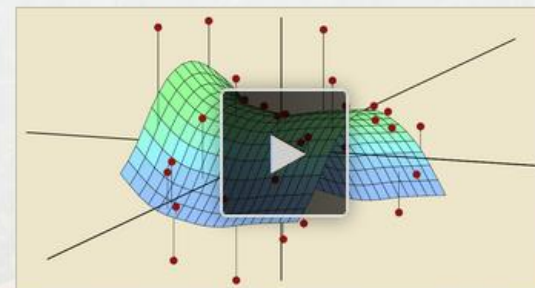
Coordination

- *Monthly Meetups* (physical, not virtual)
 - E.g., www.datascience.la
 - Monthly meetings (50-200 people)
 - By language/platform/environment: R, Python
 - By technology/workflow: Visualization, DW/BI, Machine Learning
 - By sector/domain: AdTech, FinTech
 - By management “level”: a few directors- and managers-only events (by invitation only)
- *Annual Conferences* (physical, not virtual)
 - E.g., “Big Data camp” at Direct TV (El Segundo)
 - <http://insidebigdata.com/2014/06/03/free-conference-big-data-camp-2014/>
 - Multiple, parallel tracks
 - Vendor support (all expenses covered fully)
 - Last three years’ attendance—200 (2013), 500 (2014), 800 expected (2015)

R and/or other tools

- COTS (Non-FOSS)
 - SAS, IBM SPSS, Stata, S-PLUS, BMDP, Lisrel, EQS, HLM, MPLUS, SmartPLS, ...
 - Mathematica, @Risk, Excel add-ins, RATS, Matlab, Simscript, Arena, etc.
 - IBM Netezza, MS Anal. Srv., Oracle Adv. Anal., Teradata Miner, etc.
 - UCINET/NVivo/Tropes, ConQuest, ArcGIS, etc.
 - IBM CPLEX, MOSEK, GUROBI, Frontline, etc.
- FOSS/GNU
 - Domain-specific?
 - GRETL/xBUGS, Ggobi, Pajek, lisp-stat, Netlib/BLAS/LAPACK/FFTPACK, etc.
 - Sage, octave, Scilab, Java/Colt/JFreeCharts, incanter, Protovis, D3, etc.
 - GNU LP, COIN-OR, NASTRAN/BLAS, NETLIB, WordNet, statconn, etc.
 - General-purpose?
 - jQuery/jqueryUI/flot/jstat, BIRT, RapidMiner, Pentaho, etc.
 - Apache Solr/Hadoop/Spark/Lucene/OpenNLP/Mahout/Velocity, etc.
 - Python — iPython/NumPy/matplotlib/statmodels/Blaze/Bokeh/scikit-learn, etc.
 - Julia — iJulia/Juno/MultivariateStats/MLBase/TimeSeries/Gadfly/JuMP, etc.

Statistical Learning

[REGISTER FOR STATLEARNING](#)[overview](#)

ABOUT THIS COURSE

This is an introductory-level course in supervised learning, with a focus on regression and classification methods. The syllabus includes: linear and polynomial regression, logistic regression and linear discriminant analysis; cross-validation and the bootstrap, model selection and regularization methods (ridge and lasso); nonlinear models, splines and generalized additive models; tree-based methods, random forests and boosting; support-vector machines. Some unsupervised learning methods are discussed: principal components and clustering (k-means and hierarchical).

This is not a math-heavy class, so we try and describe the methods without heavy reliance on formulas and complex mathematics. We focus on what we consider to be the important elements of modern data analysis. Computing is done in R. There are lectures devoted to R, giving tutorials from the ground up, and progressing with more detailed sessions that implement the techniques in each chapter.



Course Number	StatLearning
Classes Start	Jan 19, 2015
Classes End	Apr 05, 2015
Estimated Effort	3 hours per week
Price	Free

OUR RESEARCH COMMUNITY¹⁰

Stanford University pursues the science of

An Introduction to Statistical Learning

with Applications in R

Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani

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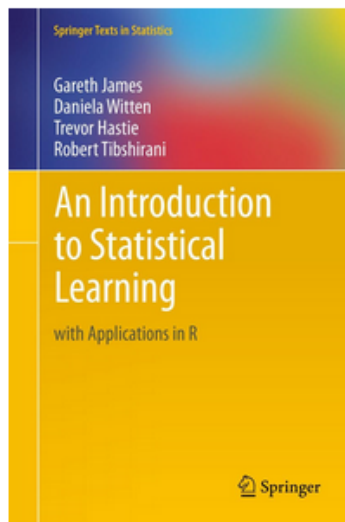
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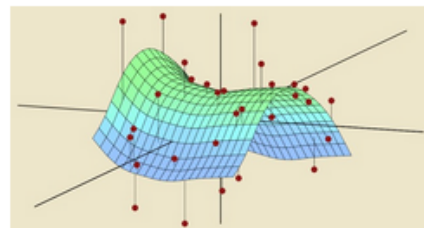
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Statistical Learning MOOC covering the entire ISL book offered by Trevor Hastie and Rob Tibshirani.

This book provides an introduction to statistical learning methods. It is aimed for upper level undergraduate students, masters students and Ph.D. students in the non-mathematical sciences. The book also contains a number of R labs with detailed explanations on how to implement the various methods in real life settings, and should be a valuable resource for a practicing data scientist.

For a more advanced treatment of these topics: [The Elements of Statistical Learning](#).

Slides and videos for Statistical Learning MOOC by Hastie and Tibshirani available separately [here](#). Slides and video tutorials related to this book by Abass Al Sharif can be downloaded [here](#).

"An Introduction to Statistical Learning (ISL)" by James, Witten, Hastie and Tibshirani is the "how to" manual for statistical learning. Inspired by "The Elements of Statistical Learning" (Hastie, Tibshirani and Friedman), this book provides clear and intuitive guidance on how to implement cutting edge statistical and machine learning methods. ISL makes modern methods accessible to a wide audience without requiring a background in Statistics or Computer Science. The authors give precise, practical explanations of what methods are available, and when to use them, including explicit R code. Anyone who wants to intelligently analyze complex data should own this book.

Larry Wasserman, Professor, Department of Statistics and Department of Machine Learning, CMU.

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DATA SCIENCE GOES TO COLLEGE WITH DATAFEST

📅 AUGUST 6, 2014 📁 EDUCATION 👤 AMELIA MCNAMARA 💬 LEAVE A COMMENT ❤️ 0

Below is the first of several exciting data science developments for the younger generation, happening right here in Los Angeles. This project is unique because it engages undergraduates in *real* data analysis, something that happens quite rarely in a classroom. If projects like this catch on as a new trend, we're going to have some real competition for our jobs in a few years!

DATAFEST



2014 UCLA DataFest contestants

DataFest is an event for undergraduates that began at UCLA and is now spreading across the country. Each year, we find an interesting “data sponsor” (i.e. an active company willing to share their data) and give students 48 hours to come up with interesting insights. We provide the food, coffee, energy drinks and wifi, they do the data cleaning, exploratory data analysis, and presentations. This is similar to the ‘hackathons’ many in our group are familiar with, with a data twist.



INTRODUCTION TO DATA SCIENCE FOR HIGH SCHOOL STUDENTS

📅 AUGUST 20, 2014 📁 EDUCATION 👤 AMELIA MCNAMARA 💬 LEAVE A COMMENT ❤️ 0

Another exciting development in data science coming from our department at UCLA is a high school class called Introduction to Data Science (IDS). This project has been made possible by a National Science Foundation grant to support [Mobilize](#), for which [Rob Gould](#) (mentioned in my [previous post on DataFest](#)) is the Principal Investigator.

The year-long IDS course is piloting in 10 [LAUSD](#) high schools this academic year. For the pilot year, we've recruited 10 brave classroom teachers who were willing to learn a lot of new material and pedagogy. Most of the teachers have taught statistics before (either "regular" statistics or Advanced Placement) however they are not experienced with data science.

IDS is a computation-heavy course, as a major component of the course are completed using hands-on labs using [R](#) within [RStudio](#). The team has written an [R package](#) to simplify some of the R syntax issues that trip up beginners, and instead of teaching traditional statistical tests and formulas the course is focused on randomization as a basis for making inference, both formal and informal.

Engineering

Director of Engineering - Customer Support

Venice, CA

Front End Software Engineer

Venice, CA

Information Security Engineer

Venice, CA

Live Video Specialist Engineer

Venice, CA

Mobile Software Engineer

Venice, CA

Security Systems Engineer

Venice

Software Engineer

Venice, CA

Software Engineer Intern

Venice, CA

Software Engineer in Test

Venice, CA

Software Engineer (University Grad)

Venice, CA

Technical Program Manager (Security)

Venice, CA

Relative importance of “data science”

Figure 41: Employers rate the importance of candidate skills/qualities

Skill/Quality	Weighted Average Rating*
Ability to work in a team structure	4.55
Ability to make decisions and solve problems	4.50
Ability to plan, organize and prioritize work	4.48
Ability to verbally communicate with persons inside and outside the organization	4.48
Ability to obtain and process information	4.37
Ability to analyze quantitative data	4.25
Technical knowledge related to the job	4.01
Proficiency with computer software programs	3.94
Ability to create and/or edit written reports	3.62
Ability to sell or influence others	3.54

*5-point scale, where 1=Not at all important; 2=Not very important; 3=Somewhat important; 4=Very important; and 5=Extremely important

Business Education: Should Harvard Business School Hit Refresh? --- Some Students, Faculty and Alumni Say the Elite M.B.A. Program Has Been Slow to Teach Management for a Tech Era

Korn, Melissa ; Gellman, Lindsay. **Wall Street Journal, Eastern edition** [New York, N.Y] 05 Feb 2015: B.7.

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Abstract (summary) [Translate](#)

[...]competitors like Stanford University's Graduate **School** of **Business** and Massachusetts Institute of Technology's Sloan **School** of Management have established themselves as pre-eminent tech-industry feeders, according to the **schools'** annual career reports.

Full Text [Translate](#) | [Turn on search term navigation](#)

Does **Harvard Business School** need to **hit refresh**?

The institution that required students to carry laptops as early as 1984 and sent graduates to top posts at Hewlett-Packard Co. and Facebook Inc. is not keeping up when it comes to teaching management in a tech-focused era, say students, faculty and alumni. Meanwhile, competitors like Stanford University's Graduate **School** of **Business** and Massachusetts Institute of Technology's Sloan **School** of Management have established themselves as pre-eminent tech-industry feeders, according to the **schools'** annual career reports.

To be sure, HBS is still in high demand among b-**school** applicants, and it accepts only 12% of those who apply to its two-year M.B.A. program. But the **school's** size and legacy may complicate its attempts to keep ahead of rapid changes in technology and **business**.

Compared with MIT and Stanford, "we have, in a sense, less tech in the air," says the **business school's** dean, Nitin Nohria, though he points out that HBS sends many graduates to leading tech companies each year.

Students, faculty and alums, say HBS's strict adherence to the case-study teaching method focuses on **business** dilemmas from years or decades past, rather than the current forces shaping the **business** of technology, which include issues in which graduates are expected to be well versed.

4-year Schools in this New “Service” Economy in CA?

- USC, M.S. (part of the C.S. Dept.)
 - <http://www.cs.usc.edu/academics/masters/msdata.htm>
- UCI Extension, certificate
 - http://unex.uci.edu/areas/it/data_science/
- UC Berkeley, M.S. (online) (part of the School of Information)
 - <http://datascience.berkeley.edu/>
- CSU Fullerton, certificate, online, accelerated
 - <http://extension.fullerton.edu/professionaldevelopment/certificates/data-science>
- Is undergraduate appropriate?
- Is CSU (mainstream) appropriate?
- Other approaches/ideas?

CCC's in this New "Service" Economy?

- 15 CA Community Colleges will offer Bachelor's Degrees beginning in 2017.
- Airframe manufacturing technology, [Antelope Valley College](#)
- Industrial automation, [Bakersfield College](#)
- Emergency services and allied health systems, [Crafton Hills College](#)
- Mortuary science, [Cypress College](#)
- Equine industry, Feather River College
- Dental hygiene, Foothill College and West Los [Angeles College](#)
- Bio-manufacturing, [Mira Costa College](#)
- Respiratory care, [Modesto Junior College](#) and Skyline College
- Automotive technology, [Rio Hondo College](#)
- Health information management, [Mesa College](#)
- Occupational studies, [Santa Ana College](#)
- Interaction design, [Santa Monica College](#)
- Health information management, [Shasta College](#)

Open Questions

- Is this observation an *itinerant, ephemeral fad* or a *persistent structure*?
- Is this eco-system *geographic-specific* or due to its virtual nature, *widespread*?
- *Vis-à-vis* other paid work, is this type of work off-shorable over time?
- If this sector is indeed *growing*, is it still just a *small part* of the economy anyway?
- Is this phenomenon (like some other aspects of IT) *gender-skewed*?
- Does the evidence suggest privileging *competencies* over *degrees*?
- Is my experience with these “professionals”, ultimately, the triumph of *practice* over *theory* (as seen from the perspective of a prospective, potentially confused *soon-to-be-in-some-debt-from-a-student-loan* CSU student)?

Open Questions

- Without college degrees, how will these “data scientists” eventually lead/be ethical/well-rounded, etc. over a 40-year career arc?
 - Licensing? Certifications? “Badges”?
 - How will they get promoted?
 - Can they can just enroll into holistic B.S./B.A. (pre-M.S./M.B.A.) programs later in life?
 - If applied math, computer science, statistics, and business were all individual degrees *before*, then how could we possibly make a single “data science” degree (all of them together) *now*?
- What is the role of Ph.D.’s and academics (other than paid consulting)?
 - If we help (e.g., lectures, provide experts, networking, etc.), are we, in fact, directly or inadvertently helping young folks *not* go to College?
 - What do we tell our Deans and Provosts about our deep involvement with individuals who aren’t in going to college?
- Isn’t this phenomenon, if evident, just a new version of (yet one more) vocation?
 - The CSU, as one component of the CA Master Plan, doesn’t “train” individuals (non-professionals) into vocations. We “educate” individuals for broader success.
- Does any of this matter to our programs in either the short-run or long-run?
 - Your thoughts?

Further Reading

- Davenport, T., and Patil, D. J. (2012), “Data Scientist: The Sexiest Job of the 21st Century”, *Harvard Business Review*, October.
- History of the Organization of Work
 - <http://www.britannica.com/print/topic/648000>
- Los Angeles Economic Development Corporation
 - High Tech in LA (October, 2014)
 - http://laedc.org/wp-content/uploads/2014/10/High-Tech-in-LA_20141006_FF.pdf
- McAfee, A., and Brynjolfsson, E. (2012), “Big Data: The Management Revolution”, *Harvard Business Review*, October.

Further Reading

- Journals:
 - *Journal of Data Science*
 - *Data, dikw, big data and data science*
- “Academic” Conferences
 - INFORMS Big Data conference (April, 2015) (Huntington Beach, CA)
 - <http://meetings2.informs.org/wordpress/analytics2015/>
 - ACM SIGMOD “Management of Data” conf. (May/June, 2015) (Melborne, VIC, AU)
 - <http://www.sigmod2015.org/>
- “Practice” Conferences
 - TDWI Big Data conference (February, 2015) (Las Vegas, NV)
 - <http://meetings2.informs.org/wordpress/analytics2015/>
- Periodicals
 - Analytics Magazine
 - <http://www.analytics-magazine.org/>