Analytics: Sensemaking, Prediction & Performance

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The context
Why and what of analytics?
Examples
Colliding ideas
Organizations and the analytics model
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Organizations and the analytics model
http://www.slideshare.net/gsiemens/
August 5, 1949: Mann Gulch
December 2–3, 1984: Bhopal
April 14, 1994: Black Hawk Incident
Add:

terrorist attacks, Space Shuttle Columbia, 2008
financial crisis, etc, etc.
Progressive reliance on sensemaking in systems rather than as individuals
Sensemaking

“Sensemaking is a motivated, continuous effort to understand connections . . . in order to anticipate their trajectories and act effectively”

(Klein et al. 2006)
We can’t understand how people make sense without considering the system
Continual flow of information

Event-centred pattern recognition

2008, financial
Mann Gulch
SS Columbia
9/11
7/7
Bhopal

Sensemaking, prediction, & performance through analytics here

Mumbai
But it’s not only about sensemaking in crisis situations.

It can be far more mundane.
Domains of Sensemaking

- **Daily Sensemaking**
  - Daily Information • Informal • Personal/Work

- **Crisis**
  - SARS • Bhopal • Natural Disaster

- **Mapping to Existing Knowledge**
  - Formal Learning • Courses • Duplicating Knowledge

- **New Knowledge**
  - Scientific Knowledge • New Technology

**Dimensions**
- Individual • Collective
- Unstructured • Structured
The context

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Exceptional performance requires tight coupling of people, roles, systems, context, and actions
The problem is that our socio-technical systems are becoming more technical and less social.
To avoid getting lost in the “mass of inconsequential”

(Bush, 1945)

We still need control, but the points are different than where the education system has assigned them in the past.
How can centralized aims be achieved through distributed means?
The current state of work & the internet is antagonistic to existing practices in organizations.

Internet/mobiles/web fragments

Coherence is needed for action/performance.
In response, systems have become more rule or algorithmically based

Social systems don’t scale with information’s abundance/complexity
Hence, analytics
“Imagination no longer comes as cheaply as it did in the past. The slightest move in the virtual landscape has to be paid for in lines of code.”

Latour (2007)
Learning analytics is the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs.
Data Scientist (n.): Person who is better at statistics than any software engineer and better at software engineering than any statistician.
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Welcome to the Complete QS Guide to Self-Tracking!

Here you will find tools, apps, and projects that are tagged, rated, and reviewed by the global Quantified Self community (that includes you)! This guide is funded by the Robert Wood Johnson Foundation Pioneer Portfolio, which supports bold ideas at the cutting edge of health and health care, in partnership with Institute for the Future. Our goal is to gather and organize the world's collective self-tracking resources in one place, in a way that is useful and encourages collaboration between self-tracking experts and beginners who are just starting out. Dive in now and explore some of the Tools or Members who are part of this site...

What's New

**TrackMe**
TrackMe is an iPhone app that tracks your location permanently (in the background). TrackMe does not upload the location...

**textWeightTM 2.0**
Launched August 15, 2011 Free for new users during trial period! Receive a text message reminder each morning to reply with...

**voyuri**
Similar to how fitbit, mint.com, and nike+ help you quantify your life and get recommendations, voyuri helps you quantify...

What's Hot

**Meditation Journal**
Unlike Neurosky claims, you cannot actually see raw data with this app, it shows you to 0 to 100...

**Withings Wifi Bodyscale**
I've used the Withings scale since January 2010. I step on it most mornings before jumping in the shower...

**HeartMath Stress Reduction Tools**
As a Family Systems therapist, I often turn to Mindfulness techniques when a client expresses an interest to calm...

**moodscope**
Moodscope is a web based application for measuring, tracking and sharing your mood. Moods are measured using an online...

**Digifit**
The Digifit ecosystem is a full suite of Apple apps that records heart rate, pace, speed, cadence, and power...

**Withings Wifi Bodyscale**
Withings Wifi Bodyscale is...

Highest Rated

**Fitbit**
Fitbit is a small device to track your physical activity or sleep. You can wear the device all day...

**MoodScope**
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Withings Wifi Bodyscale is...
Aggregated networks of daily contacts

What if the topics of interaction are layered onto social networks?
Or actions (outcomes, sales, performance) are layered onto networks, discourse, etc.

http://www.plosone.org/article/info%3Adoi%2FF10.1371%2Fjournal.pone.0023176
Distributed, multi-level analytics

*Suthers & Rosen (2011)*
Attention metadata

Duval (2011)
Learning networks, crowds, communities

Haythornthwaite (2011)
Discourse analysis (automated and manual)

De Liddo & Buckingham Shum (2011)
Social learning analytics

Buckingham Shum & Ferguson (2011)
Participatory learning and reputation

Clow & Makriyannis (2011)
Early warning

Macfayden & Dawson (2010)
Learning Analytics in the workplace: Detecting and Analyzing Informal Workplace Learning

Schreurs & De Laat, 2012
Can Marketing Data Predict Life Spans?

Deloitte Consulting uses a hypothetical ‘Sarah’ and ‘Beth’ to promote technology for life insurers that promises to help size up people’s health risk using offline and online dossiers rather than blood tests.

**Some data collected**
- Sarah:
  - SECOND CHILD BORN LAST YEAR
  - HIGH INVESTMENT RISK TOLERANCE
  - LIVED IN HOME - TWO YEARS
  - OWNS HOME
  - COMMUTING DISTANCE - ONE MILE
  - READS DESIGN AND TRAVEL MAGAZINES
  - URBAN SINGLE CLUSTER
  - PREMIUM BANK CARD
  - GOOD FINANCIAL INDICATORS
  - ACTIVE LIFESTYLE: RUN, BIKE, TENNIS, AEROBICS
  - HEALTHY FOOD CHOICES
  - LITTLE TO NO TELEVISION CONSUMPTION

- Beth:
  - CURRENT RESIDENCE - FOUR YEARS
  - LIVED IN SAME HOMETOWN - 15 YEARS
  - CURRENTLY RENTING
  - COMMUTING DISTANCE - 45 MILES
  - WORKS AS ADMINISTRATIVE ASSISTANT
  - DIVORCED WITH NO CHILDREN
  - FORECLOSURE/BANKRUPTCY INDICATORS
  - AVID BOOK READER
  - FAST-FOOD PURCHASER
  - PURCHASES DIET, WEIGHT LOSS EQUIPMENT
  - WALKS FOR HEALTH
  - HIGH TELEVISION CONSUMPTION
  - LOW REGIONAL ECONOMIC GROWTH

**Some risk-assessment factors**
- Sarah:
  - Actively pursue for new business and retention efforts
  - Quickly issue a preferred policy and avoid further medical tests

- Beth:
  - Do not send offers
  - Do not pursue aggressive retention efforts
  - Collect more information; send to senior staffer for review

Source: Deloitte Consulting
“Whether from government transparency initiatives, leaks or Freedom of Information requests, journalists are drowning in more documents than they can ever hope to read.

We’re building an interactive system where computers do the visualization, while a human guides the exploration.”

http://overview.ap.org/about/
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Half-ideas colliding to form new (innovative) knowledge wholes:

Massive Open Online Courses
Creating: artifacts, stuff, remixing, new assemblies, novel connectedness
Stigmergic/self-organizing social systems
Synchronization
Capacity for innovation & change a function of which/how entities are networked
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What might we want to predict?

Composition of teams

Skillsets needed for particular outcomes

Resilience and adaptive teams in unsettled contexts (rapidly changing)

Trends (for re/up skilling)
<table>
<thead>
<tr>
<th>Percentage of total respondents</th>
<th>ASPIRATIONAL</th>
<th>EXPERIENCED</th>
<th>TRANSFORMED</th>
</tr>
</thead>
<tbody>
<tr>
<td>32%</td>
<td>45%</td>
<td>24%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analytic use</th>
<th>Basic user</th>
<th>Moderate user</th>
<th>Strong and sophisticated user</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliance on analytics</td>
<td>To guide decision making in financial management and supply chain management</td>
<td>To guide future strategies, and increasing reliance on analytics to guide activities in marketing and operations</td>
<td>To guide decision making in day-to-day operations and future strategies across the organizations</td>
</tr>
<tr>
<td>Information foundation</td>
<td>Few standards are in place; structured, siloed data supports targeted activities</td>
<td>Enterprise data integration efforts are underway</td>
<td>Enterprise data creates integrated view of the business with an growing focus on unstructured data</td>
</tr>
<tr>
<td>Analytics tools</td>
<td>Primarily uses spreadsheets</td>
<td>Expanding portfolio of analytics tools</td>
<td>Comprehensive portfolio of tools to support advanced analytic modeling</td>
</tr>
<tr>
<td>Analytics skills</td>
<td>Ad hoc analysis is done at point-of-need; has difficulty hiring analytics talent</td>
<td>Analysts work in line-of-business units with growing focus on cross-training and hiring skills externally</td>
<td>Many are combining line-of-business units with centralized units that provide advanced skills and governance</td>
</tr>
<tr>
<td>Culture</td>
<td>Managers are focused on executing day-to-day activities</td>
<td>Open to new ideas but lacks top-line leadership and champions to support changes</td>
<td>Strong top-line mandate to use analytics supports a culture open to new ideas and champions who shepherd methodology and skills</td>
</tr>
</tbody>
</table>

Analytics Model

Data Sources:
- Datamarts
- LMS
- SIS
- Sensors
- Manual entry

Data Team:
- Sponsor/Stakeholder
- Data scientist
- Programmer
- Statistician
- End user experience (visualization, reporting)

Collection & Acquisition

Storage

Cleaning

Multiple datasets/formats

Analysis

Integration

Representation & Visualization

Action

Technology & Tools:
- SNA
- NLP
- Concept Development
- Prediction
- Risk Determination
- Course Sequencing
- Help seeking

Intervention
Optimization
Alerts and warning
Guiding/nudging
Systemic improvements (design, teaching)

Depends on purpose:
- Marketing
- Advising
- Faculty Impact
- Learning
- Administration
- Institutional Research
Analytics Model

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Sensemaking, prediction, performance

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Learning Analytics: Practitioners Workshop

Purdue: Oct 1-3, 2012

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www.connectivism.ca

www.learninganalytics.net