Big Data/Modern Analytic Techniques
Presentation to Crawford Fund 2017 Annual Conference
Steve Mathews

8 AUGUST 2017 - CANBERRA
# McKinsey Global Institute Digitization Index

<table>
<thead>
<tr>
<th>Sector</th>
<th>Assets</th>
<th>Usage</th>
<th>Labor</th>
<th>Overall digitization</th>
<th>GDP share</th>
<th>Employment share</th>
<th>Productivity growth, 2005-14²</th>
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<td>Agriculture and hunting</td>
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</tbody>
</table>
Taxonomy

- Plant kingdom
  - Vascular
    - Seed bearing: angiosperms, grasses
    - Spore bearing: gymnosperms
  - Non-vascular
    - Algae
Gro’s Proprietary Ontology
The Problem

Lack of normalized, reliable, and real-time information makes agricultural markets inefficient and risk management difficult.

Agriculture market participants suffer from significant amounts of information asymmetry.

There is no common language that the industry uses to understand and analyze all data related to agriculture.
Satellite Pictures to Actionable Indices
Mbeya, Kenya: 2017 Drought

Monthly Evapotranspiration Anomalies (ETa percent of median (2003-2013)) - Mbeya

Monthly Precipitation Anomalies (Modeled rainfall difference from 5-yr trailing mean) - Mbeya

Data: NOAA CPC, SAGE, USGS FEWSNET, Gro Intelligence
Yield Forecast and Drought Index Approach

1. Ecological Indicators
3. Metamodel
4. Final Forecast/Index
Gro’s 2017 US Corn Yield Forecast Breaks Higher

bu/acre

175

170

165

160

155

150

145

MAY 4, 2017
MAY 12, 2017
MAY 20, 2017
MAY 28, 2017
JUN 05, 2017
JUN 13, 2017
JUN 22, 2017
JUN 29, 2017
JUL 07, 2017
JUL 15, 2017
JUL 23, 2017
JUL 31, 2017

tonnes/ha

10.98

10.67

10.36

10.04

9.73

9.42

9.10

Gro’s 2017 US Corn Yield Trend

Gro’s 2017 US Corn Yield Forecast

Data: USDA NASS Crops, Gro Intelligence Yield Model

www.gro-intelligence.com
# Sub Saharan Africa Data Wishlist

Sample of data categories we believe would be critical to collect for African countries at a more frequent and granular level

<table>
<thead>
<tr>
<th>Agronomy</th>
<th>Production</th>
<th>Supply</th>
<th>Use</th>
<th>Prices</th>
<th>Economics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag equipment in use (c)</td>
<td>Seed production (a)</td>
<td>Imports (m)</td>
<td>Upstream - Oilseed processing (m)</td>
<td>Inputs - fertilizers (a)</td>
<td>Land rent/water rights (a)</td>
</tr>
<tr>
<td>Fertilizer use per acre (a)</td>
<td>Acres Planted - County (a)</td>
<td>Stocks - Province/State level (q)</td>
<td>By type - maize, cornmeal (a)</td>
<td>Ag labor rates (a)</td>
<td>Total input Costs (m)</td>
</tr>
<tr>
<td>Pesticide use per acre (a)</td>
<td>Acres Harvested - County (a)</td>
<td>Stocks by type - grain, silage (q)</td>
<td>By use - seed, food, industrial (a)</td>
<td>Farm-gate (w)</td>
<td>Producer Margin-by-crop (a)</td>
</tr>
<tr>
<td>GMO seed use (a)</td>
<td>Yield - County (a)</td>
<td>Grain-Cold storage capacity (a)</td>
<td>Per-capita consumption (a)</td>
<td>Export prices (m)</td>
<td>Avg. farm size (c)</td>
</tr>
<tr>
<td>Soil conditions (a)</td>
<td>Crop Progress Reports (m)</td>
<td>Grain shipments-deliveries (q)</td>
<td>Domestic govt. tenders (w)</td>
<td>Domestic freight rates (m)</td>
<td>Avg. farm income (a)</td>
</tr>
<tr>
<td>Fallowed acres (a)</td>
<td>Harvest grading - ergot levels (a)</td>
<td>Grain handling capacity - port level (a)</td>
<td>Exports (m)</td>
<td>Byproducts - wholesale (d)</td>
<td>Avg. farm debt (a)</td>
</tr>
<tr>
<td>Irrigated acres (a)</td>
<td>Byproduct - meat, feed (m)</td>
<td>Obsolescence-Loss Rates - (a)</td>
<td>Retail expenditures (m)</td>
<td>Processed - retail (d)</td>
<td>Storage, insurance rates (m)</td>
</tr>
</tbody>
</table>

Frequency Code:  C-census, A-annual, M-monthly, W-weekly, and D-daily.
Blue items may not be applicable to USDA reports.
User Survey

Where are you located and what are you interested in?

NORTH AMERICA
38% PERCENTAGE OF USERS
SOUTH AMERICA
4% PERCENTAGE OF USERS
AFRICA
35% PERCENTAGE OF USERS
EUROPE
16% PERCENTAGE OF USERS
ASIA
5% PERCENTAGE OF USERS
OCEANIA
2% PERCENTAGE OF USERS

TOP COMMODITIES OF INTEREST

1st
Corn
1st
Corn
1st
Corn
1st
Corn
1st
Cereals
1st
Cereals
1st
Cereals
1st
Cereals
1st
Cereals
2nd
Soybeans
2nd
Soybeans
2nd
Soybeans
2nd
Soybeans
2nd
Cereals
2nd
Cereals
2nd
Cereals
2nd
Cereals
2nd
Cereals
3rd
Wheat
3rd
Vegetables
3rd
Vegetables
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Vegetables

If you could have a ‘dream data dashboard’, what would it monitor?

1. Poultry
2. Rice
3. Food Security
4. Yield
5. Commodity Prices
6. African Agriculture
7. Weather
8. Food Security African Trends
9. Crop
10. Supply and Demand
11. Cost
12. Dashboard
13. Credit
14. Risk
15. Vegetables
16. Fundamental
17. Weather East Africa
18. Crop
19. Agricultural Growth
20. Industry
21. Basis

What commodity groups are you interested in?

- Cash crops
- Cereals
- Vegetables
- Oilseeds and proteins
- Animal products
- Livestock
- Forest and wood

What are you expecting to get out of Clews?

- Education 71%
- Fact checking/cross-referencing 68%
- Saving time/optimizing current analysis practices 60%
- Other 7%

*Confidential

Sources: Gro Intelligence Sample Survey Oct. 12, 2016

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Credit/Insurance

Lowering the cost of capital and expanding access to credit is critical.

Better credit models can be developed by incorporating “market risk” data into the models.

- Variables well beyond existing credit history of borrower are data series that are available in Gro
  - Growing Cycles
  - Climate and growing conditions
  - Perils (fire, flood, infestations, predation)
  - Price of crop
  - Price of other commodities
  - National and regional programs and restrictions
  - Trade policies