6. Making the Most of Precision Ag Technology and Big Data

Terry Griffin **<twgriffin@ksu.edu>**

Dr. Terry Griffin is the cropping systems economist specializing in precision agriculture since joining Kansas State University in February 2015. He earned his bachelor's degree in agronomy and master's degree in agricultural economics from the University of Arkansas and his Ph.D. in Agricultural Economics with emphases in spatial technologies and farm management from Purdue University. He developed methods to analyze site-specific yield monitor data from field-scale experiments using spatial statistical techniques. Terry is a charter member of the International Society of Precision Agriculture. He received the 2014 Pierre C. Robert International Precision Agriculture Young Scientist Award for his work in data utilization. He has also received the 2012 Conservation Systems Precision Ag Researcher of the Year and the 2010 PrecisionAg Awards of Excellence for Research.

Abstract/Summary

Terry shares how farmers are implementing precision agriculture technologies at the farm level followed by how data collected by these systems are being used to make decisions. He explains how precision agricultural technologies such as yield monitors, GPS-enabled navigation, and automated application controllers are being used to empower farmers and their advisors to make better decisions. Terry describes how precision ag data evolved into today's 'big data'; and how the not-so-futuristic uses of farm-level data will generate value to be captured by farmers, landowners, and differing segments across the agricultural industry. Terry addresses the myths and realities of big data including a discussion of what the successful big data warehouse may look like. Terry briefly reviews ownership and access rights with respect to data; and how that data may impact farmland values and rental rates. He draws on examples regarding how the value of the initial uses of data differs from secondary and re-use of that data; and how those differences translate into perceived value from farm-level precision ag data to big data.

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Making the Most of Precision Ag Technology and Big Data

Terry Griffin
Cropping Systems Economist

@Space_Plowboy
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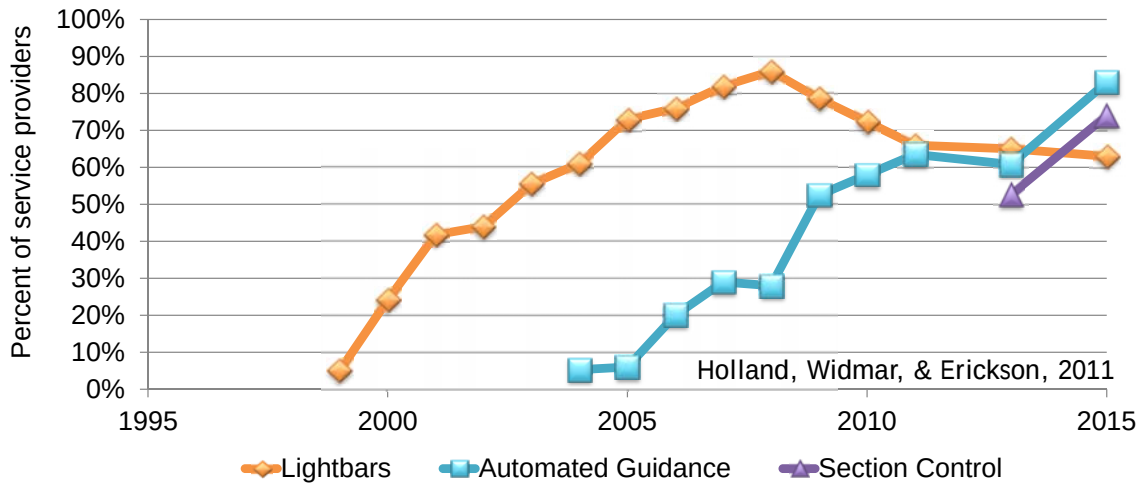
Precision Ag Success Stories



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Source: Deere


Source: Beeline

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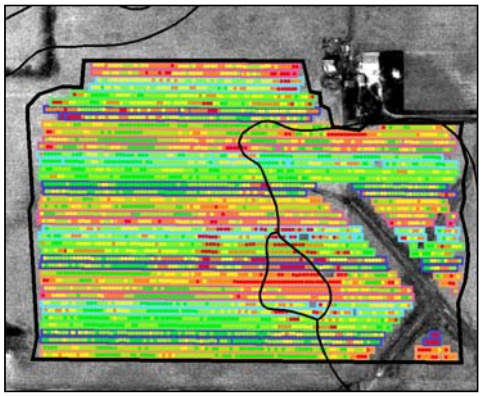
On-farm experiments

- Ranked as top 3 uses of yield monitor
  - USDA ARMS
- Automated controllers



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From one-field-at-a-time to Big Data

- Data maybe considered
  - "non-rival"
  - "Excludable" and/or "non-excludable"
- Copies of digital data identical to original
- Value lies in its use, not in the possession
  - Data tombs are common (and worthless)
  - 'one who controls the data enjoys the value'

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Community Data Analysis

- "Network effects" rule
- Society's Value of Farmer Participating in Community is Greater than Value to the Farmer
  - secondary use value > primary use

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Value of Secondary Use of Data > Primary Use

Data	Primary Use	Secondary Use
Yield monitor data	Documenting yields On-farm trials	GxExM analyses
Soil sample data	Fertilizer decisions	Regional compliance
Scouting	Spray decisions	Regional analytics

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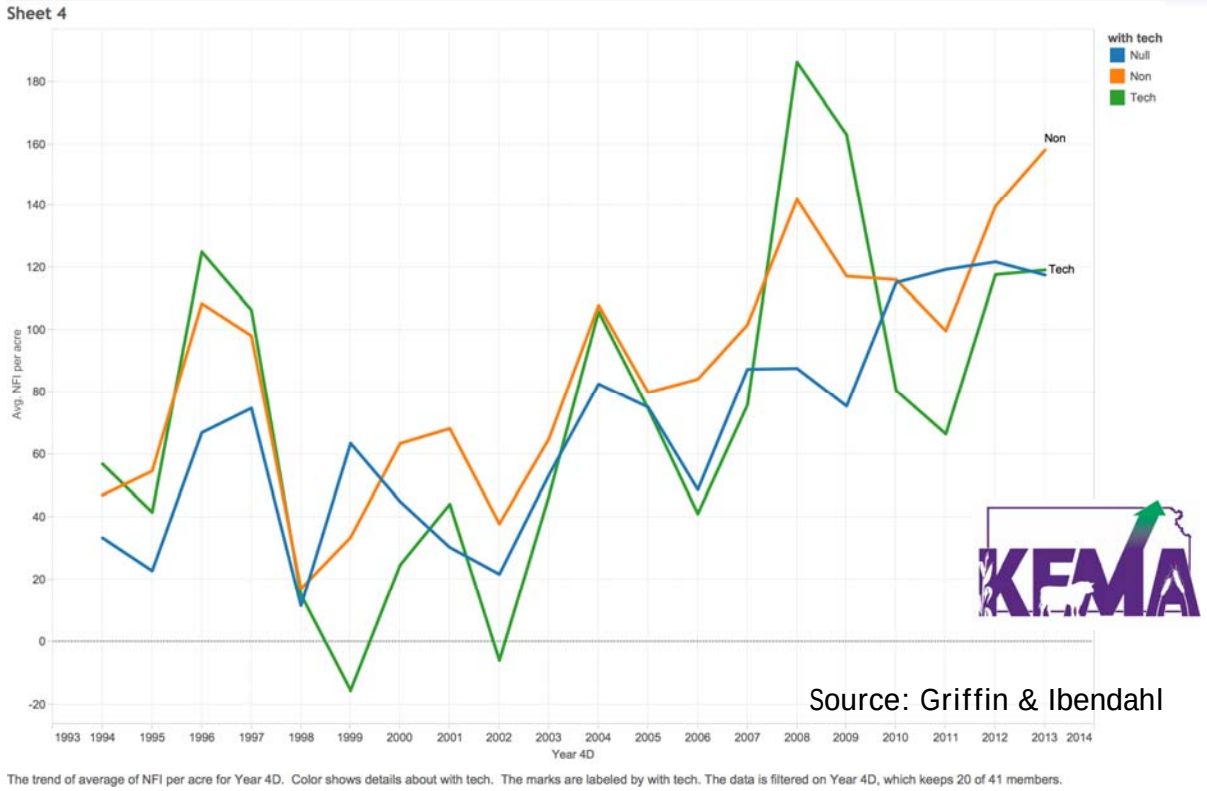
KFMA Precision Ag Pilot



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Big Data impact on Farmland Values

- Data known to impact farmland values
  - Soil productivity indexes
  - Soil test results, historical yield records
- Compared to mineral rights
  - Separable from surface rights
  - Multiple copies of electronic data identical to original
- When 'big data' system mature
  - Premium commanded for data-endowed farmland
  - Penalty to farmland values sans data
  - Farmland value depends on broadband connectivity
- Griffin and Taylor (2015)
  - http://www.agmanager.info/

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Valuation of Precision Ag Data

- Consider the value of ‘lost data’
- Court system likely decide value
  - rather than free market

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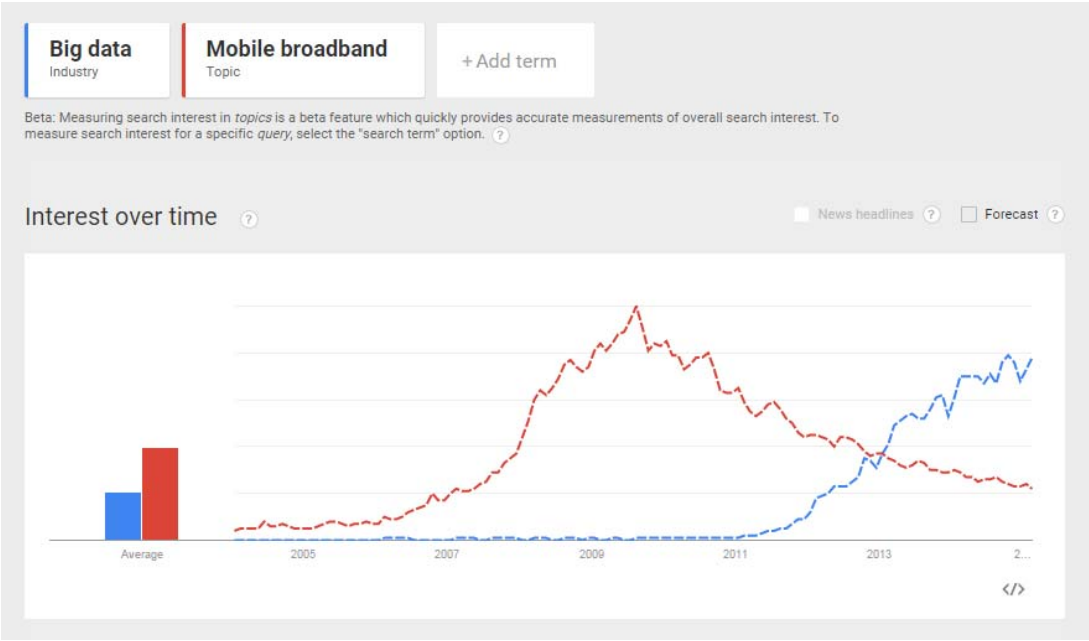
Big Data and Wireless Connectivity



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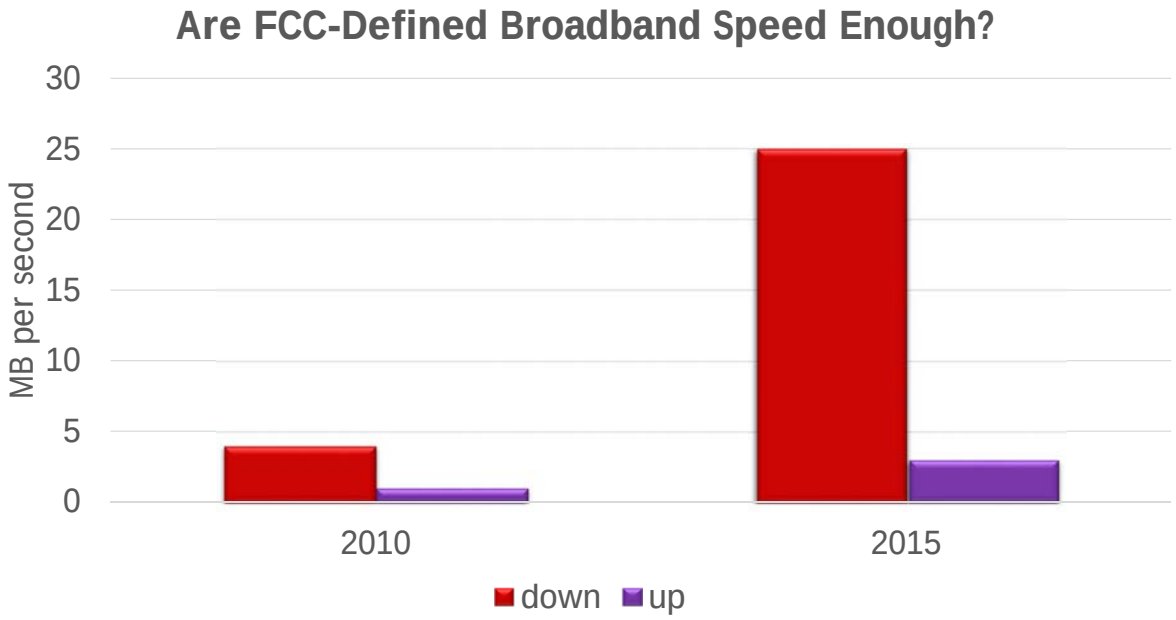

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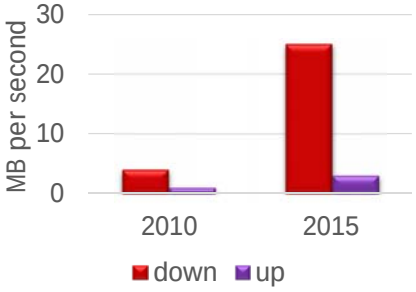
Is Broadband Speeds Enough?

- UAV imagery example (Buschermohle, U of Tennessee)
  - 40 acre field with 17 pictures ~ 111 MB (almost 3 MB/acre)
  - 92 acres with 152 pictures ~450MB (almost 5 MB/acre)

- Other sensor and prescription data (Shearer, tOSU)
  - Spraying 0.3 MB/acre
  - Planting 5.5 MB/acre
  - Yield data 4.2 MB/acre
  - Soil /Fertility Data 0.6 MB/acre
  - Prescription files 0.01 MB/acre



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Weaknesses in Current System

Scott Kelly @StationCDRKelly · Jun 23

#Aurora I don't think I will ever see another quite like you again. #YearInSpace

2K 2.8K

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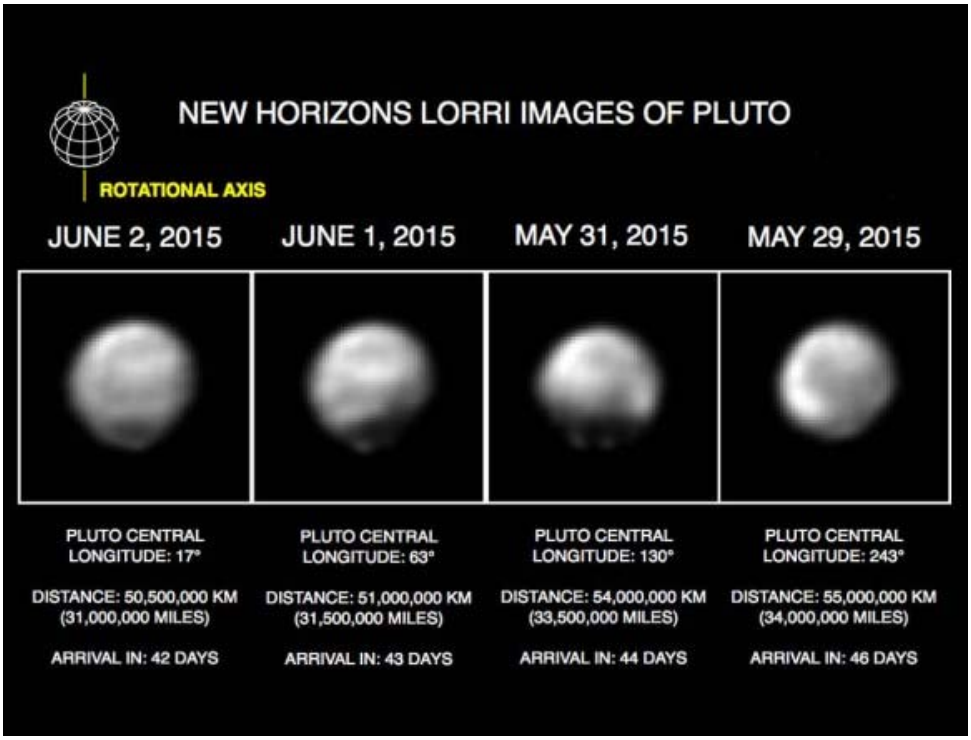
Weaknesses in Current System



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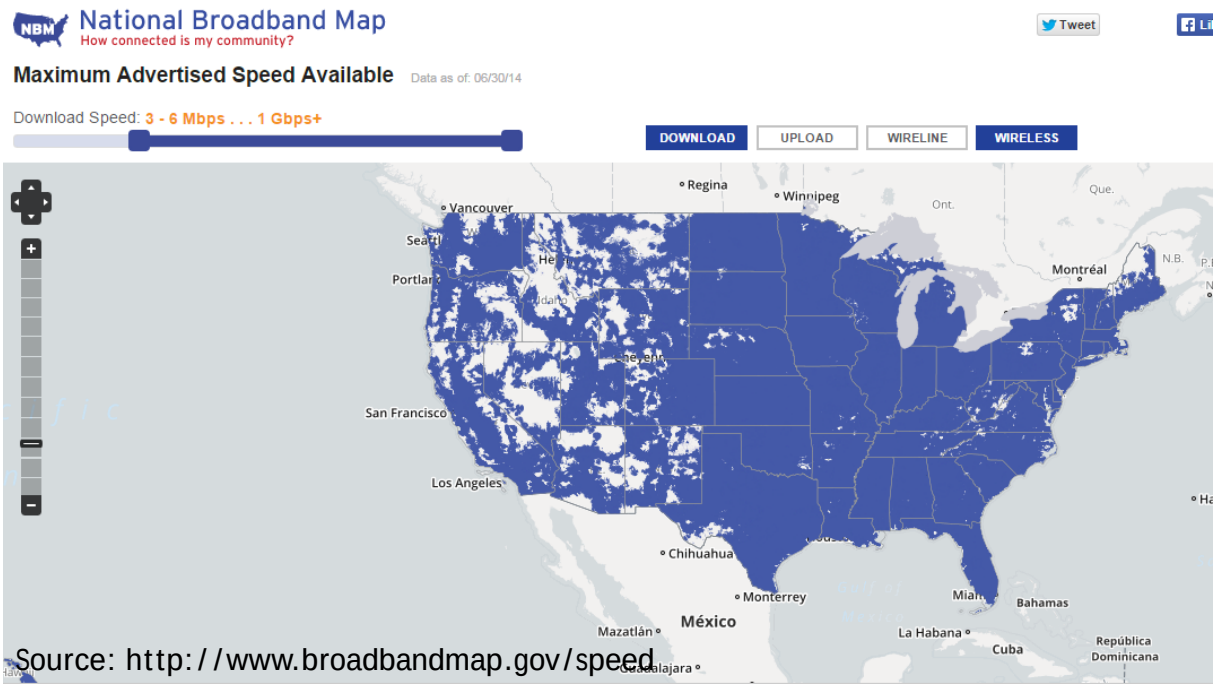
FCC Broadband Definition: 2010 to 2014



Source: http://www.broadbandmap.gov/speed

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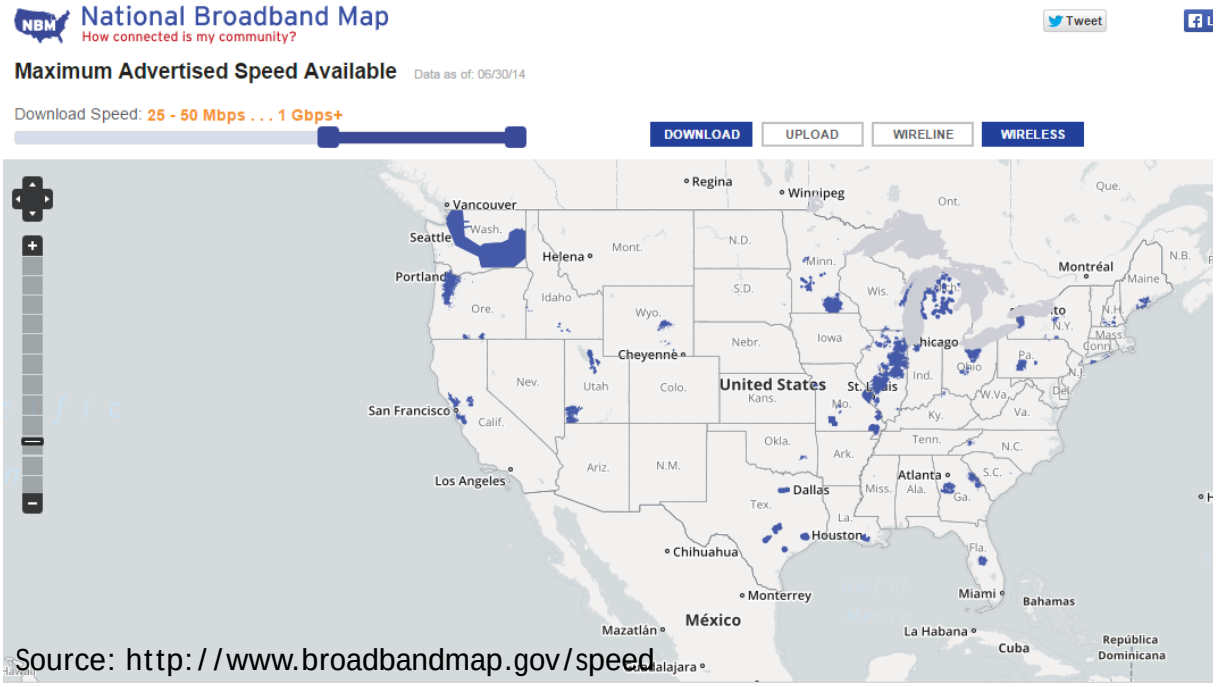
FCC Broadband Definition: 2015



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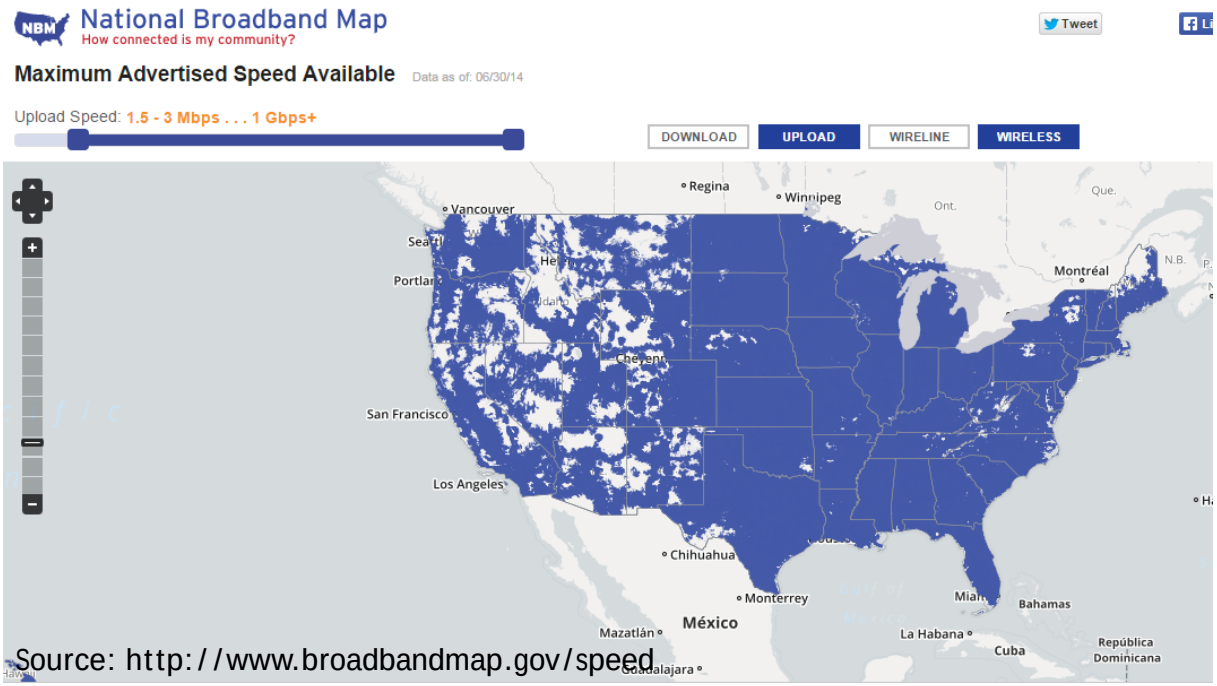

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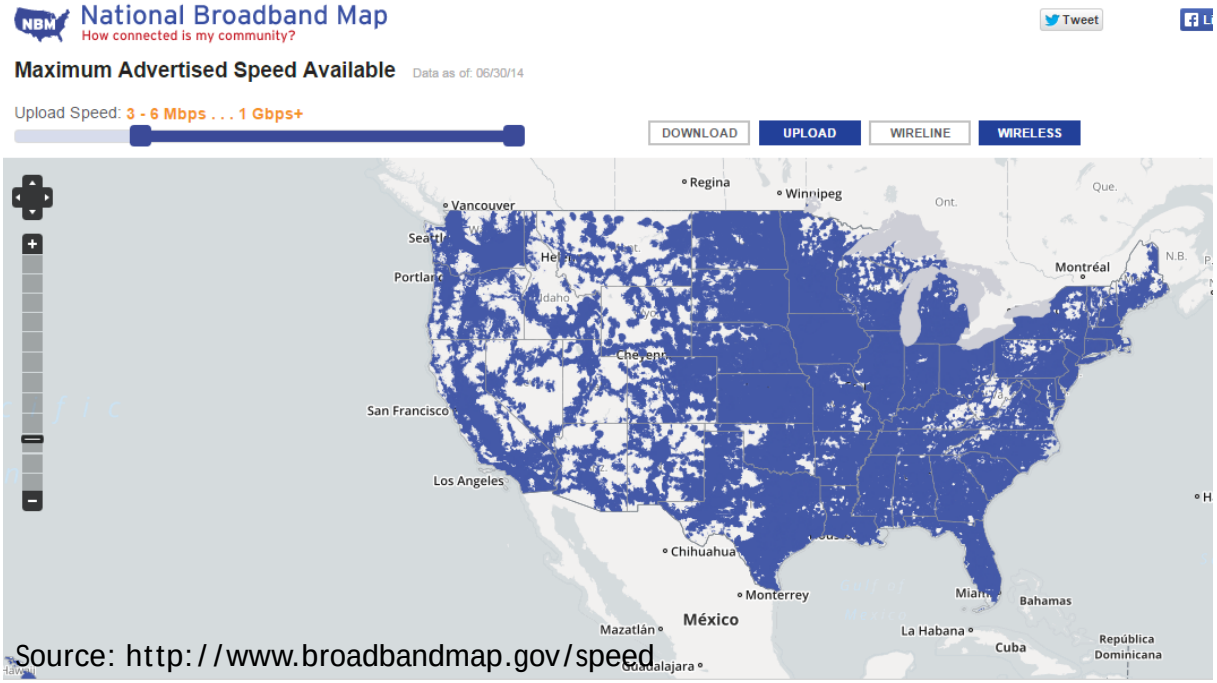

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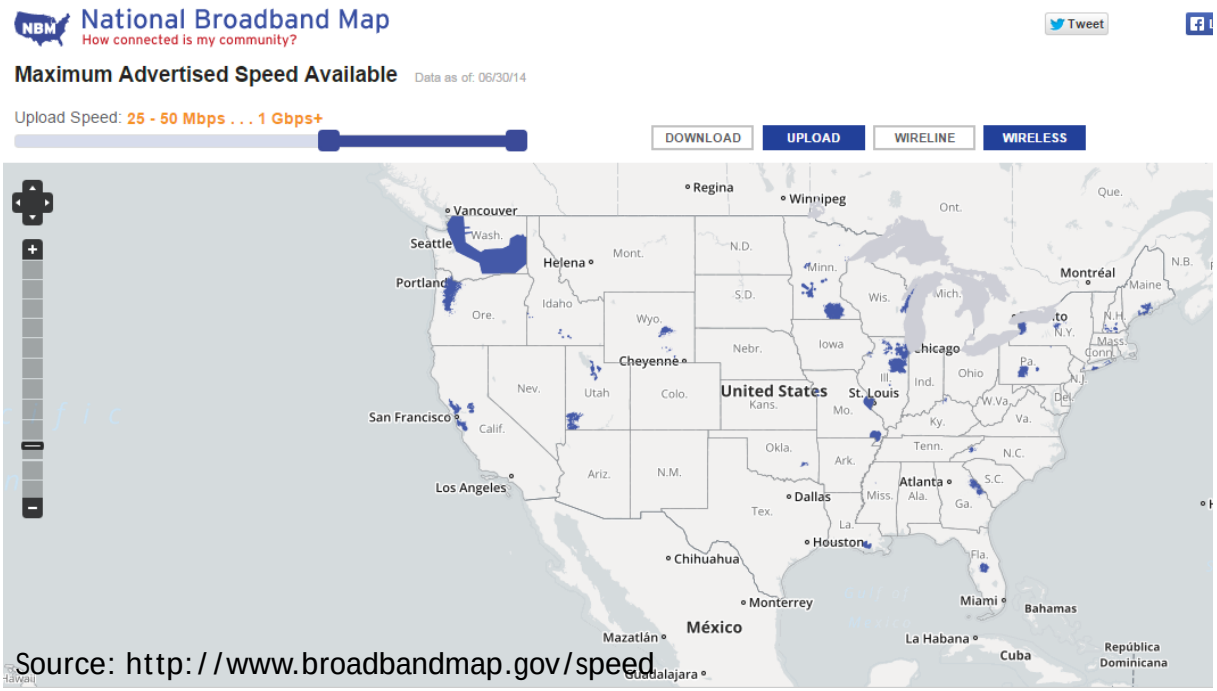
What if upload similar to download?



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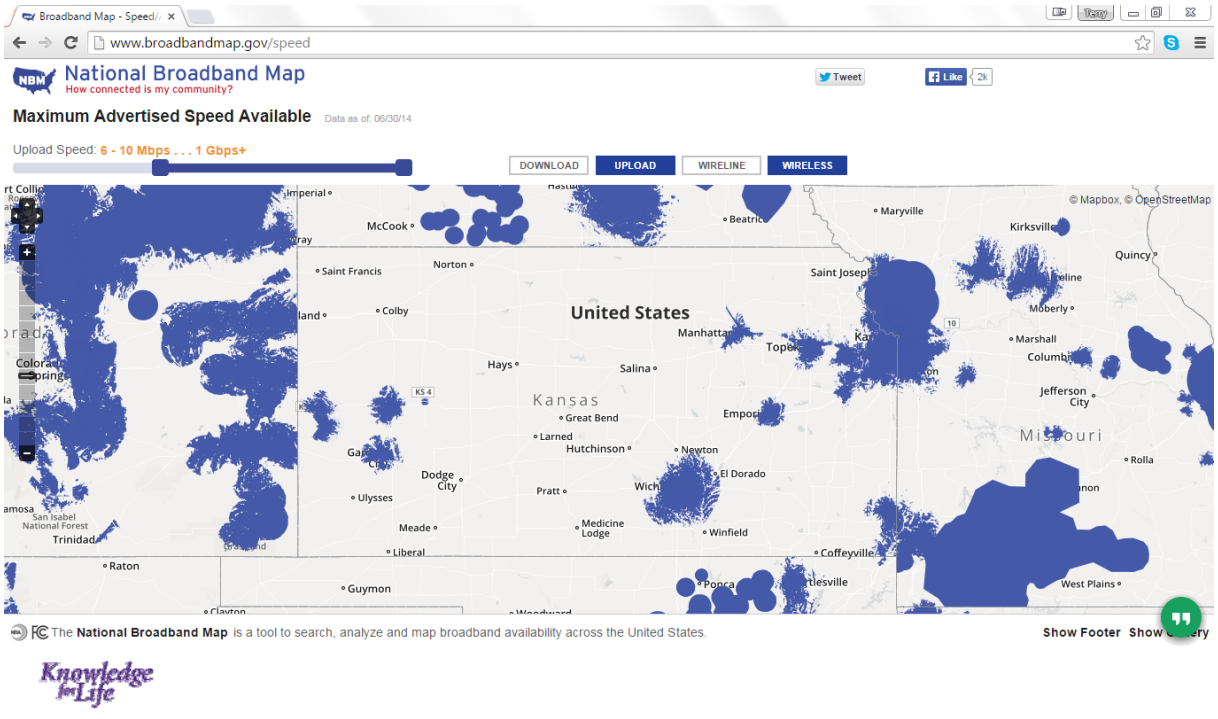

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Big Data in Ag is "Mature" when:

- Farmland values and rents affected by presence of data
- Rural appraisers consider broadband connectivity
- Flow of data controlled by only a few entities
- Secondary uses recognized as valuable
  - If yield monitor malfunctions, will farmer stop harvest to repair
  - Combine operators trained to collect data

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