

# Smarter Agriculture - Data Analytics and Information Literacy

Dr. Karen Plaut – Senior Associate  
Dean of Research and Faculty  
Affairs in the College of Agriculture  
& Professor of Animal Sciences

# What is the research case for Big Data?

- Turn information into insights
- Connects and empowers people
- Evidence based decision making
- Can develop integrated solutions to complex problems
- Federal mandate from the OSTP (Office of Science, Technology and Policy)
  - All federal agencies that award grants must make data available
  - Ability to access data can help develop informed policy
  - Data security for research done on farm will need to be addressed

# What is the business case for Big Data?

- Organizations that apply data analytics are 4 times more likely to outperform others(IBM UIDP Conference).
- Survey of 900 businesses: 66% of companies that invested in data analytics saw a return on investment with one year.
- “By 2020, the wider adoption of big-data analytics could increase annual GDP in retailing and manufacturing by up to \$325 billion and save as much as \$285 billion in the cost of health care and government services.”

[http://www.mckinsey.com/insights/americas/us\\_game\\_changers](http://www.mckinsey.com/insights/americas/us_game_changers)

<http://www.ibmbigdatahub.com/video/nine-levers-enable-organizations-create-value-big-data>



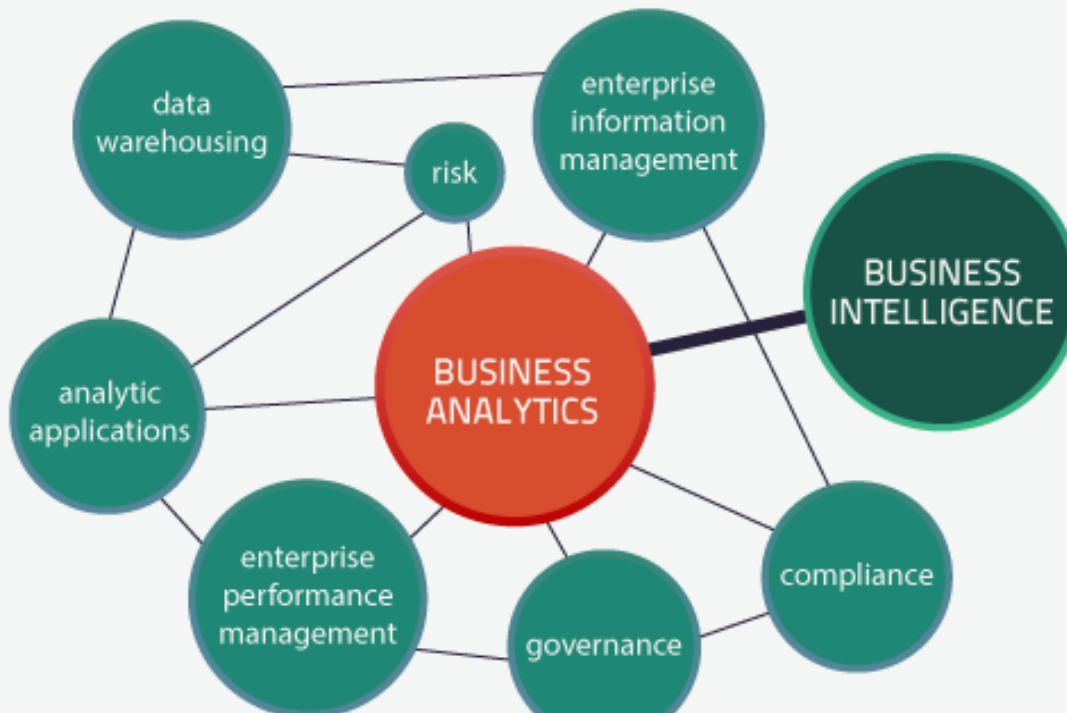
## Business Intelligence and Analytics <sup>[3]</sup>

**Business intelligence**

has come a long way over the years as technological advances paved the way for greater ventures.

**Business analytics**

however, has encompassed the ideals of BI into a much more integral landscape which includes:



<http://c.fsdn.com/sv/topic/wp-content/uploads/2012/09/biqdatainfoq.png>

<http://slashdot.org/topic/bi/making-the-case-for-business-analytics-and-intelligence/>





Expand capacity  
in plant biology

Transform plants  
to improve crops

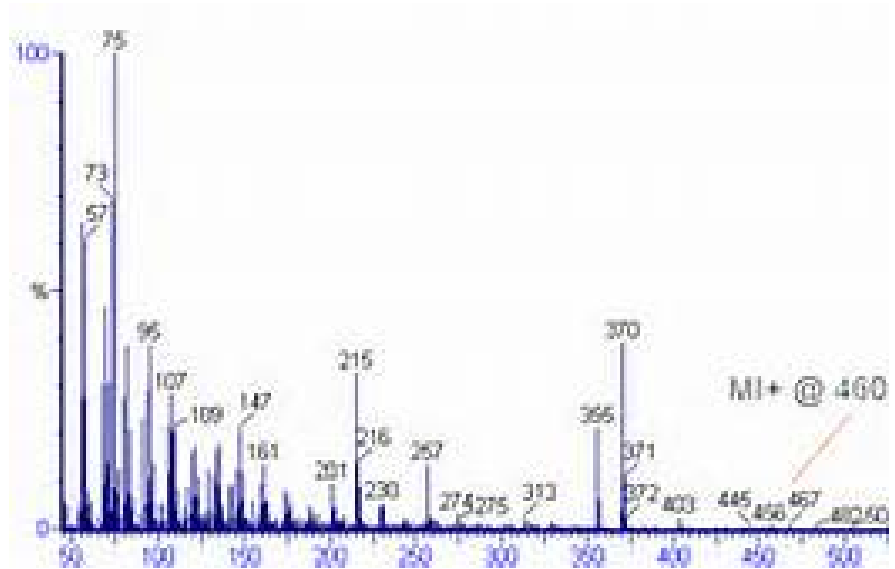
Automate large-scale  
plant analysis

Commercialize products  
and graduate leaders



# P L A N T S C I E N C E S

P U R D U E A G R I C U L T U R E



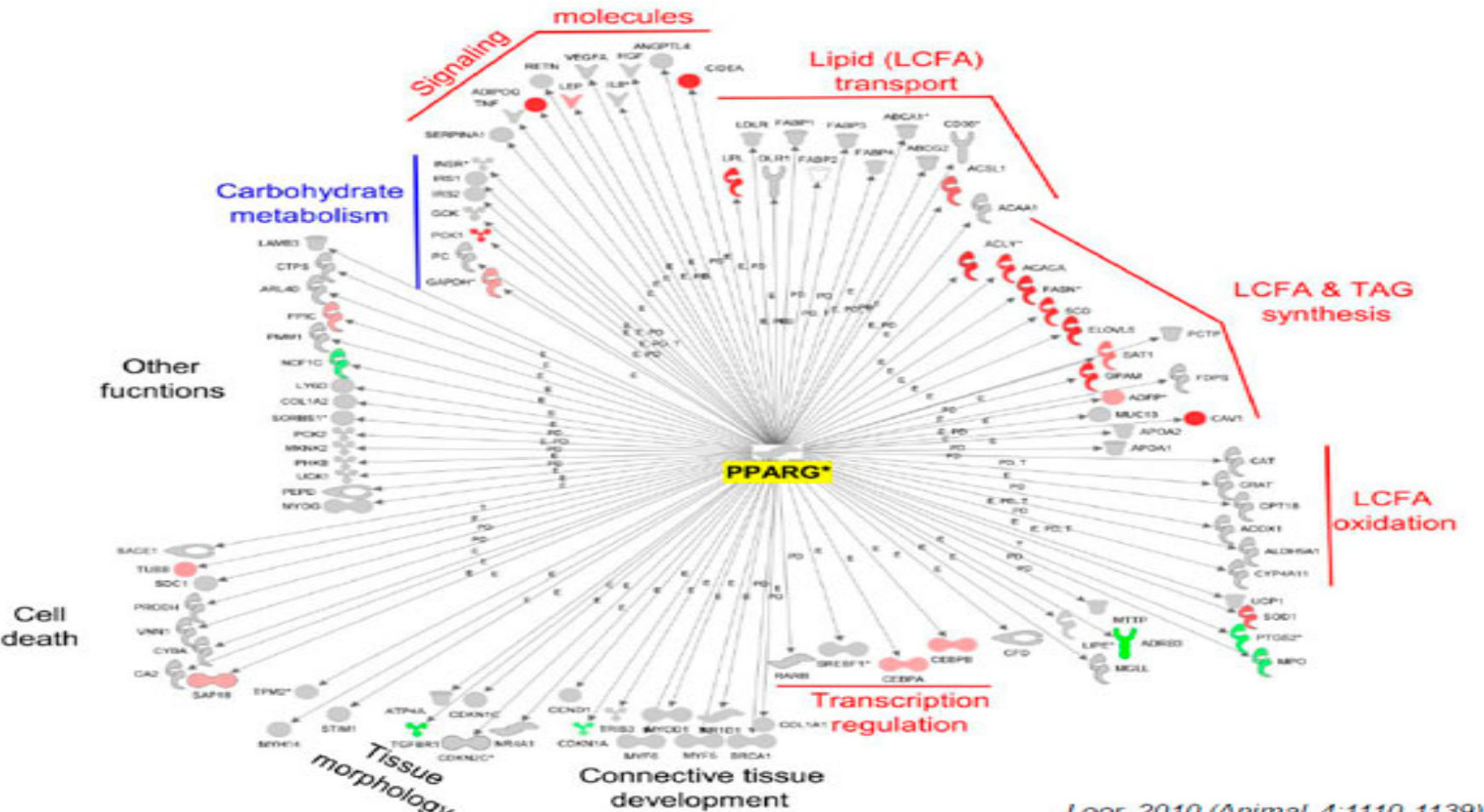
# Resource Management

- Climate
- Weather





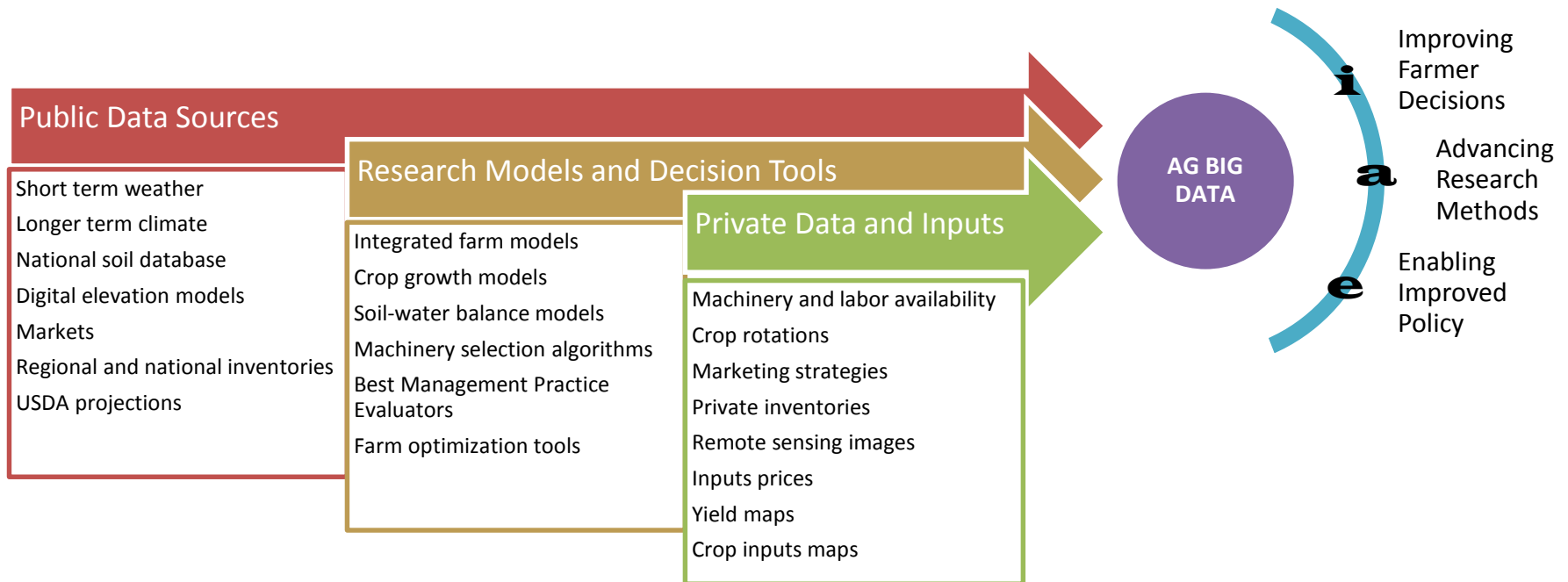
# Animal Production



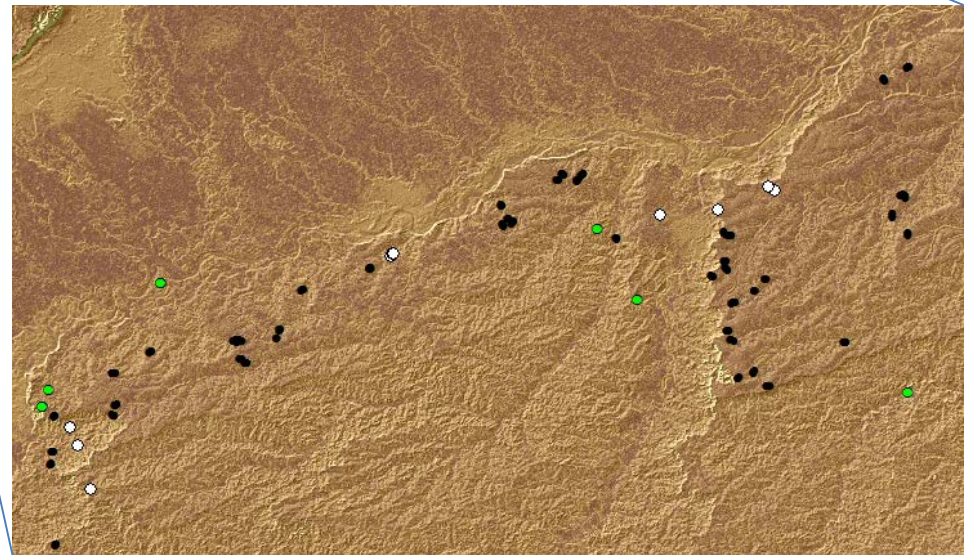
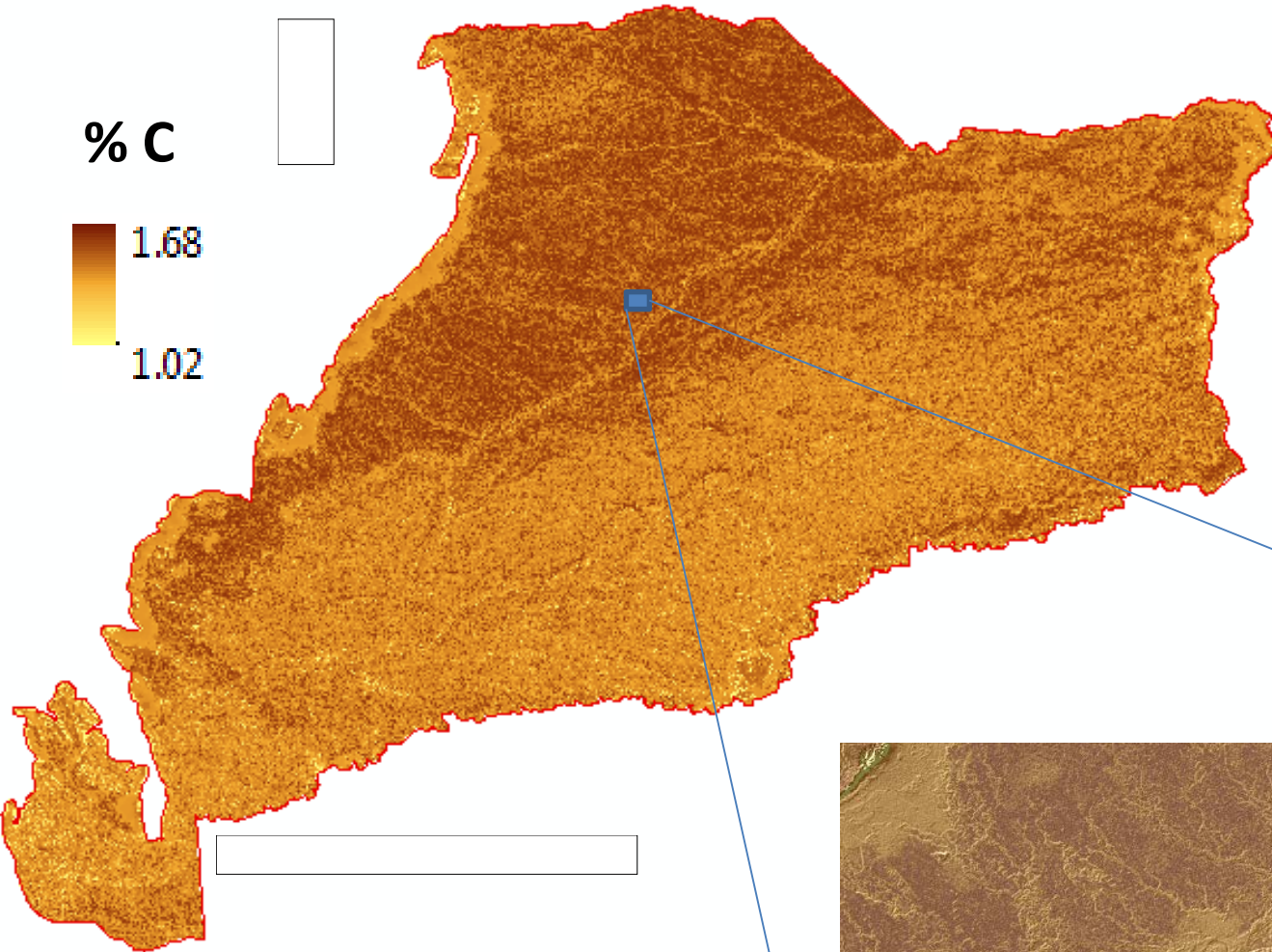
Loor 2010 (Animal 4:1110-1139)



# Concept diagram illustrating just a few of the Agricultural Big Data sources and uses



## Soil Carbon of Llanos Orientales, Colombia



- Each 90 m pixel on the map has a predicted value and associated uncertainty for the prediction
- There are about 62,000,000 predicted values for carbon alone
- Ten other soil properties predicted and each property has an uncertainty value.

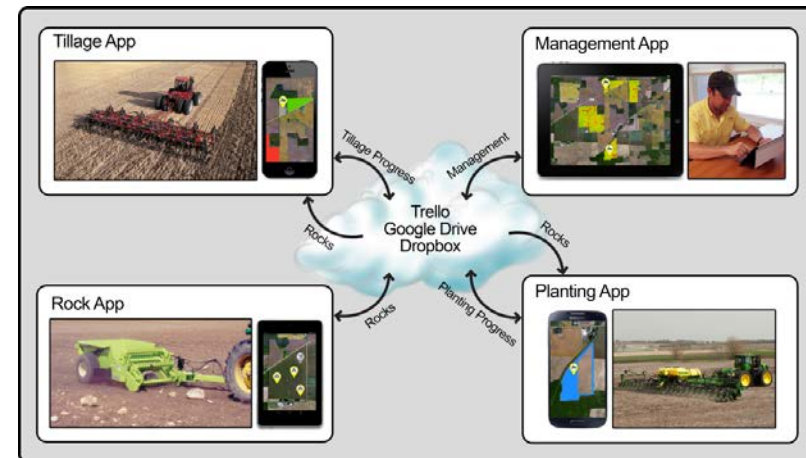
# Purdue ABE & ECE – Farm Management Information Systems

Dennis Buckmaster  
 Jim Krogmeier  
 Aaron Ault  
 Dan Ess  
 Mark Tucker  
 J.T. Welte  
 Andrew Balmos  
 Alex Layton  
 Cyrus Bowman

The OpenATK project covers early stages of the autogenic information system which endeavors to enable data-based field, crop, machinery, and labor management using

- existing cloud storage services,
- human-readable data formats,
- a distributed data model,
- and task-specific, collaborative mobile apps.

The collection of apps allows each farm to put together a highly usable, tailored data management solution to improve production agriculture in the future.



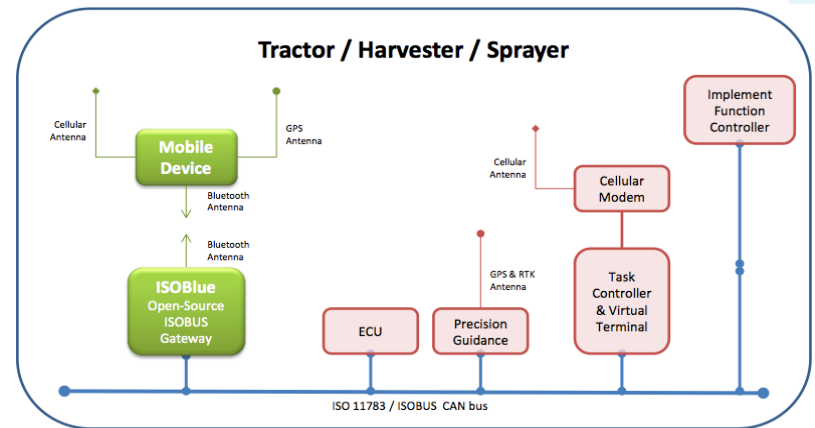
## Acknowledgement

Funding for this effort was provided by USDA National Institute of Food and Agriculture under grant GRANT10867241 Proposal Number: 2011-03666 Accession Number: 228079.





# Autogenic data: the isoblue connection



= Farmer Controlled Data     = Ag Vendor Controlled Data



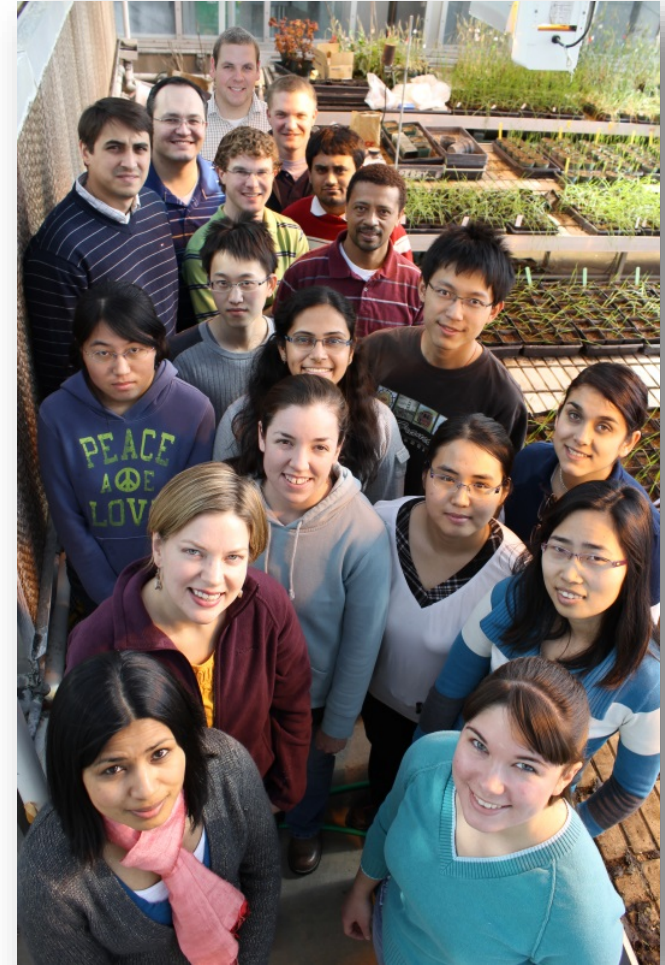
An open source, inexpensive means for getting data from any ISO11783-compliant vehicle to a Bluetooth-equipped mobile device in real-time

Isoblue – toward autogenic



# Big Data is important for Research, Education and Extension

- What are the knowledge and skill sets that students need to compete in the 21<sup>st</sup> century?
- What are the knowledge and skill sets that producers need to compete in the 21<sup>st</sup> century?



# Knowledge and Skills for the 21<sup>st</sup> Century

- Discovery and Acquisition
- Ethics and Attribution
- Metadata and Data Description
- Cultures of Practice
- Data Management and Organization
- Data Curation and Reuse
- Data Quality and Documentation
- Data Processing and Analysis
- Data Visualization and Reuse
- Databases and Data Formats
- Data Conversion and Interoperability
- Data Preservation

