



SOCIETAL BENEFITS OF FOOD / WATER / ENERGY PROJECTS

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OIA/EPSCoR

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Questions...

- Are there common features in the societal benefits that we are seeing in EPSCoR (DOE, NASA, NIH, NSF, USDA) projects with a Food, Energy, Water theme?
- Is there an opportunity here for synergy among jurisdictions?
- Is there an opportunity here for partnerships among agencies?

2012 Strategic Plan for USGCRP (p.32)

THE NATIONAL GLOBAL CHANGE RESEARCH PLAN 2012-2021

A STRATEGIC PLAN FOR THE U.S. GLOBAL CHANGE RESEARCH PROGRAM



- Food, energy, and water are closely interconnected and their production both influences and is influenced by global change.
- Changing climatic conditions, including more frequent and intense storms and droughts, stress food production systems.
- As more energy is being used to produce food, more of the agricultural production is being used to produce energy in the form of biofuels.
- While enhancing energy security and climate mitigation, biofuels from corn and soybeans compete directly with food crops.

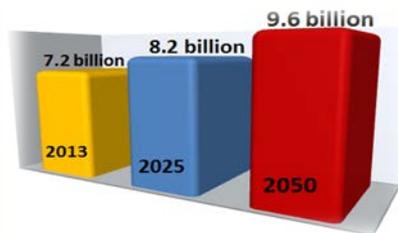
INFEWS: Innovations at the Nexus of Food, Energy and Water Systems



THE 2050 PICTURE

WORLD'S POPULATION BOOMS

↑ >9 BILLION by 2050



Larger, more urban and richer population

Food production will need to **increase**

~60%



2010



2050

FOOD

Water demand will **increase**

~30%



2010



2050

WATER

Energy production will need to **increase**

~50%



2010



2050

ENERGY



Image credit: <http://www.aquate.com>



INFEWS

- NSF will invest \$75M to study interconnected forces by designing and modeling solutions to the natural, social, and human-built factors involved.
- Responds to:
 - Growing global populations
 - Extensive changes in land use
 - Variability in precipitation patterns

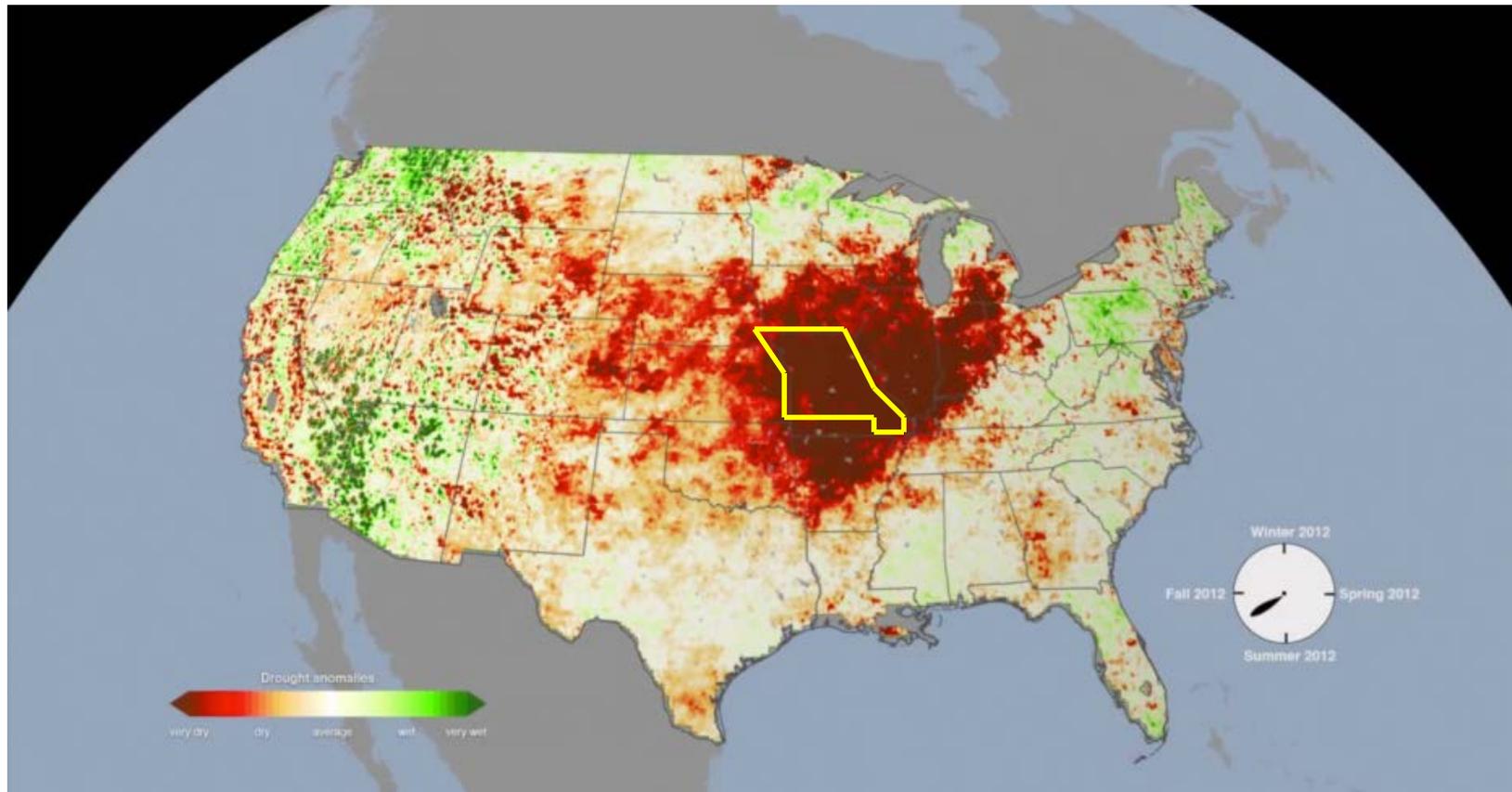


Current RII Track-1 projects

- Over 60% of the RII Track-1 projects have research related to both water and food
- About 70% of the projects include research that relates to either water or energy.
- RII Track-1 education, outreach, cyberinfrastructure, and workforce development activities also support some elements of the clean energy and food security.
- Recent EPSCoR sponsored workshops have also focused on relevant topics such as bioinformatics (AR) and engineered crops (IA).

Evaporative Stress Index

- Thermal infrared imagery to estimate evapotranspiration



- www.nasa.gov/topics/earth/features/plant-stress.html

The Missouri Transect: Climate, Plants, and Community (IIA-1355406)

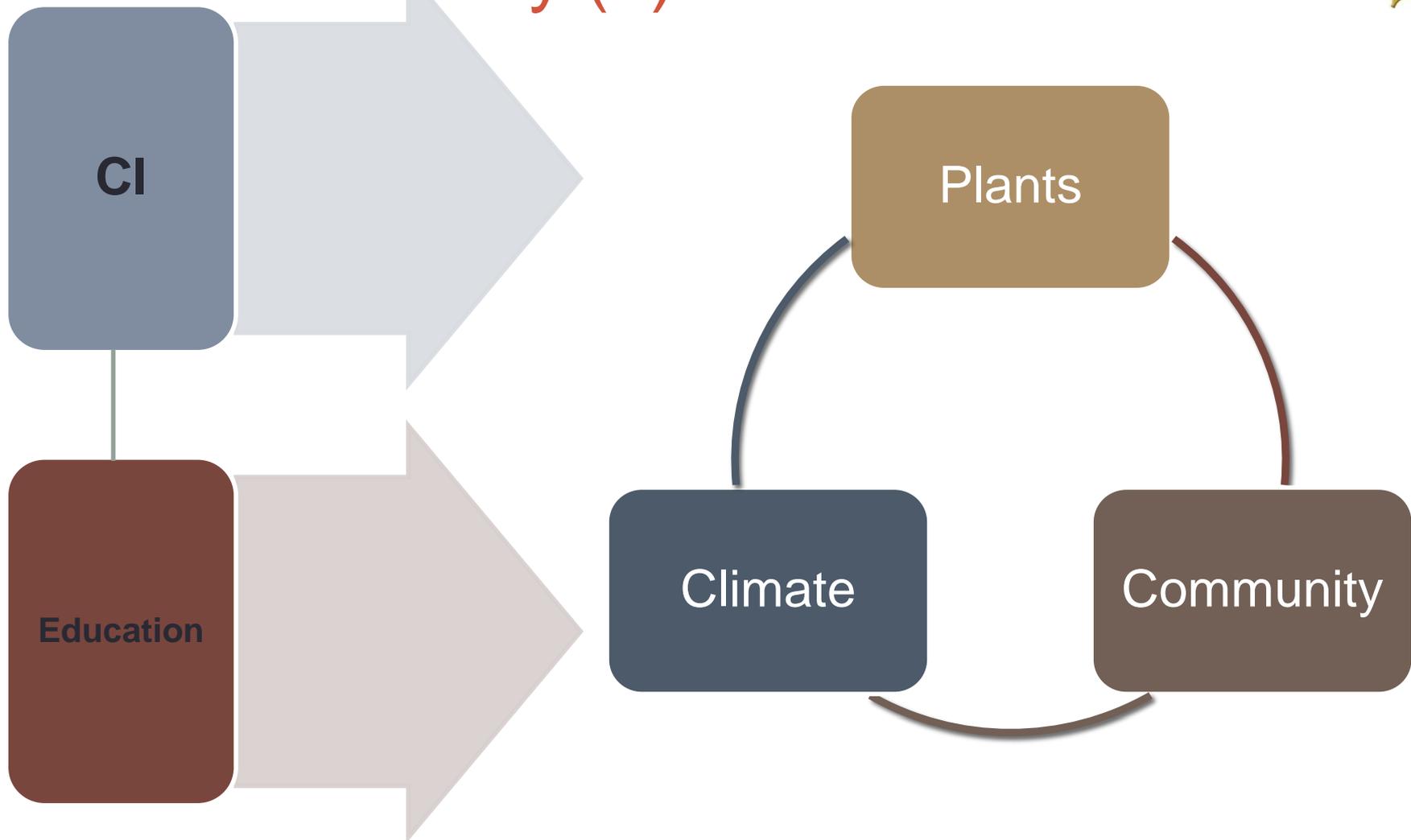




The Missouri Transect: Climate, Plants and Community (IIA-1355406)

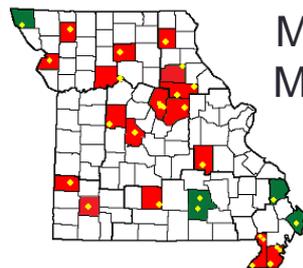
- Climate – research to enable predictions and modeling of climate-scale trends in precipitation and temperature as they impact plant productivity. Q: How do seasonal-scale changes in temperature and precipitation affect the productivity of crops and the natural flora.
- Plants – identify genes important to plant responses to environmental variations, especially water availability, with the view toward enabling the quick and efficient identification of high-yielding, stress-tolerant plants.
- Community – understand how Missouri communities have reacted to environmental catastrophes and how to achieve resilience under changing climate characterized by increased periods of drought, flooding, and prolonged summer heat waves.

The Missouri Transect: Climate, Plants, and Community (+)



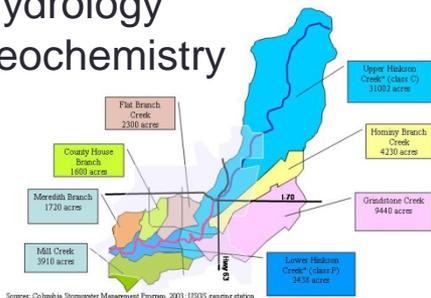


Climate



Missouri Mesonet

Hydrology
Biogeochemistry

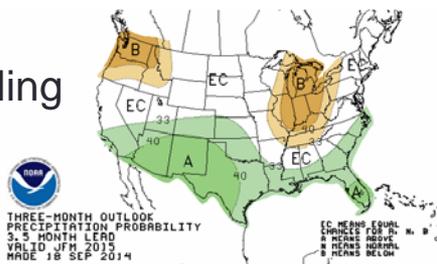


Weather radar and stations



High Resolution Data

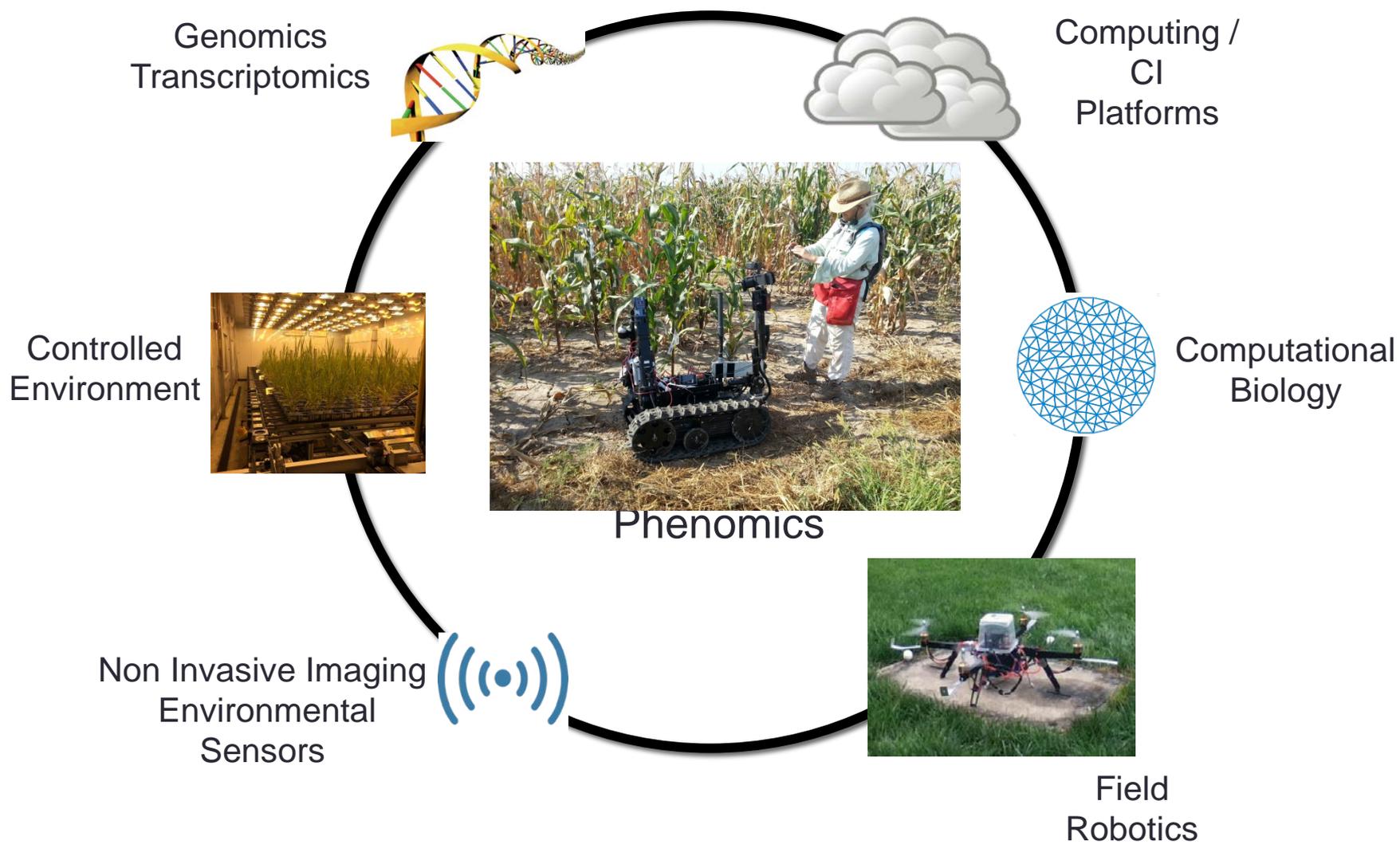
Modeling



Computational Biology



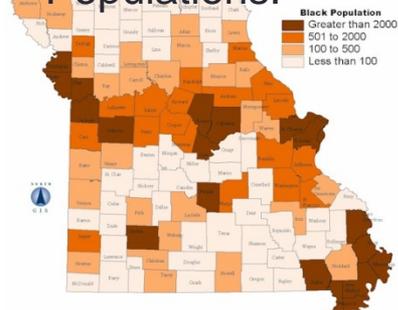
Plants





Community

Landowners,
Land
Managers,
Vulnerable
Populations.



Boone, Cole, and
Scott
Counties



Long term
patterns



State Parks and
Historic Sites



Education and Outreach

Interactive
outdoor exhibit



CS training for
the physically
disabled



Citizen Science
MO DIRT



Impact



K-12
classrooms

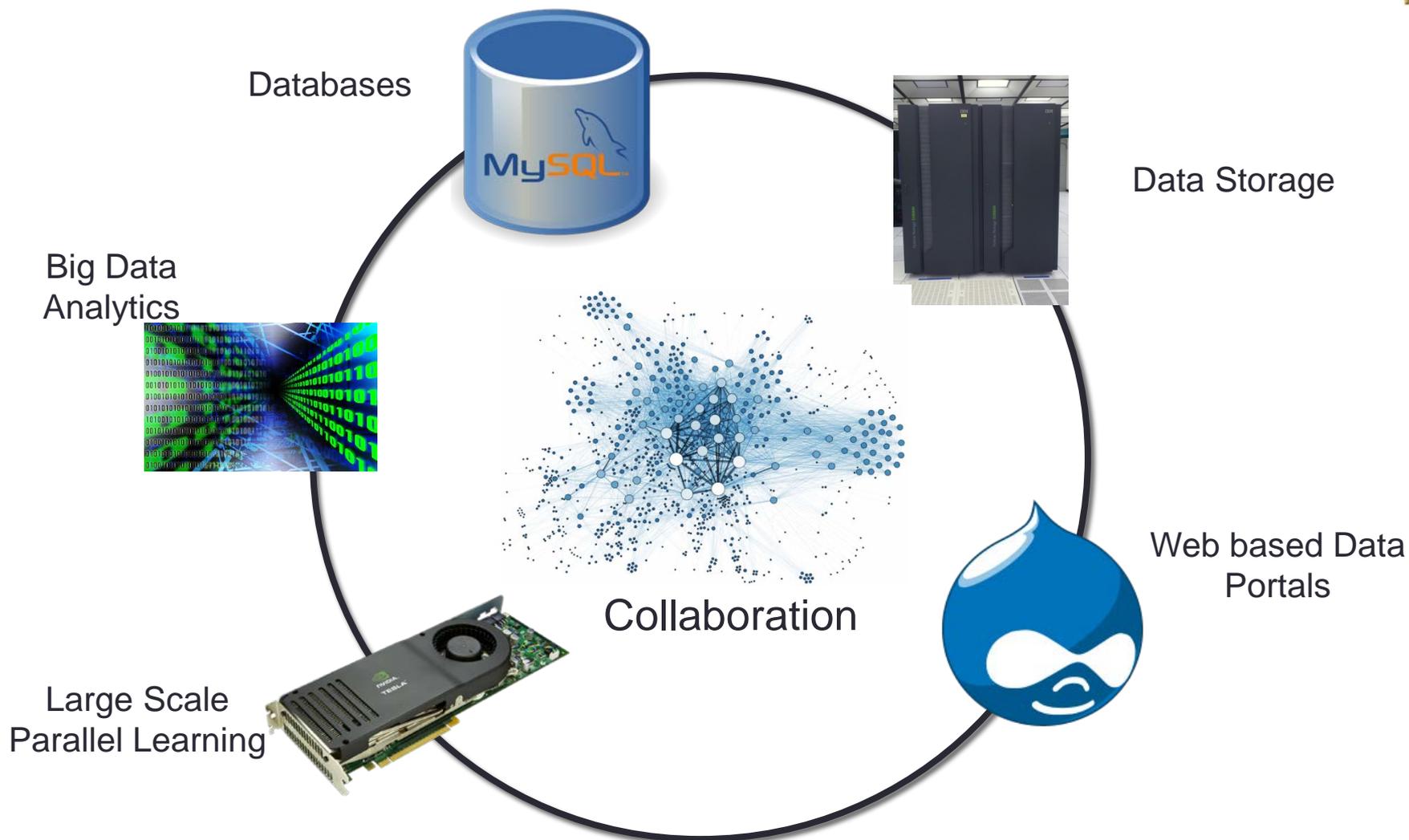
CS training and
internships



CS Institute
For Young
Women



Cyberinfrastructure





Societal Benefits

- Learning tools and opportunities that inform about increased climate variability and predicted effects on agriculture and the natural environment.
- Public education programs for students, teachers, and citizens of how a changing environment affects plants and society, and their ability to adapt to climate change.
- Education programs about how scientists study climate change, search for drought/stress tolerance traits.
- WFD plan focused on undergrad/graduate training, bioinformatics training for individuals with physical disabilities.



Missourians Doing Impact Research Together (MO DIRT)

- Citizen education on soil health and soil-climate interactions.
- Investigation of soil respiration seasonally across the state, and how it may change and contribute to the prediction of the effects of climate change on agricultural productivity and native flora
 - **Soil science curricular elements and enrichment activities** to learn about soil science and to understand that healthy soils are living, breathing entities. Education leaders will be trained in implementing, monitoring, and evaluating the program.
 - **Soil surveys** conducted by individuals/groups, equipped with training, guidelines and soil quality test kits, to collect data on soil properties including soil respiration.
 - **Data management** through a web-based portal for participants to access educational and training material to enter data. Validation and analysis of the scientific data. The public will have open-access to the data.



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Thank you

