DSS IN THE WICKED& WILD WORLD

Recent lessons from data- and model-driven decision support in participatory settings

TEXAS
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Making Texas resilient is our grand challenge.

Today, Texas' population is nearly 28 million. By 2050, that number is expected to double.

Climate change will bring more floods, more droughts, and more heat.

Are we prepared for our future?

Many Parts make a Cyberecosystem

People – Not (just) CS but people with different backgrounds

Systems and Services
(That's often the easier part)

Capacity & Services

- Large scale modeling, data storage, visualization, networks, cloud computing, code optimization
- Consulting, Curation and analysis, Portals and Gateways, Web service APIs, Training and Outreach

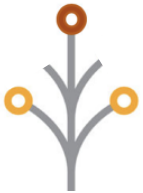
PT2050: Cyberecosystem

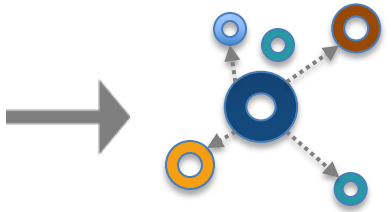
Adaptive Sensing

DataX Science Gateway

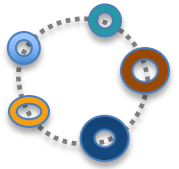
Model Integration

Digital Objects of Research





Participatory Interfaces

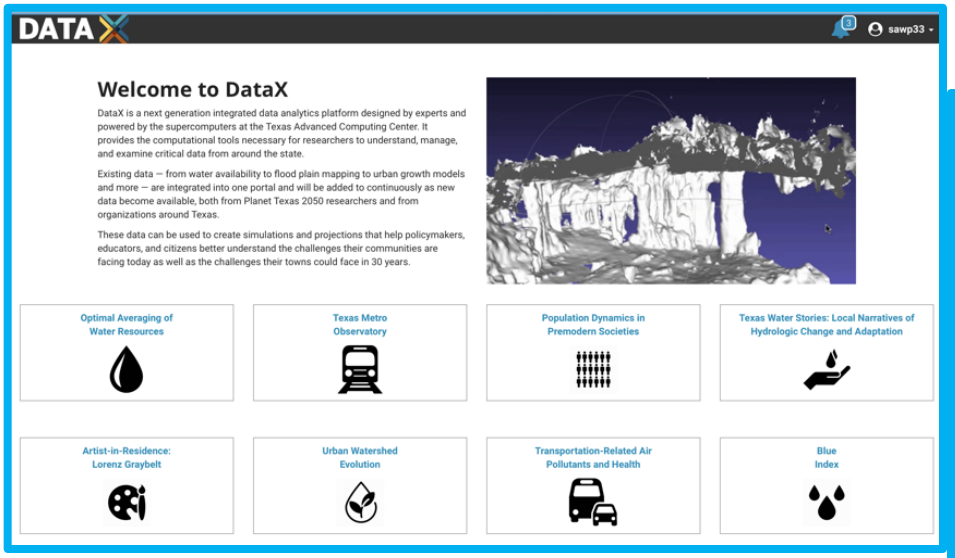


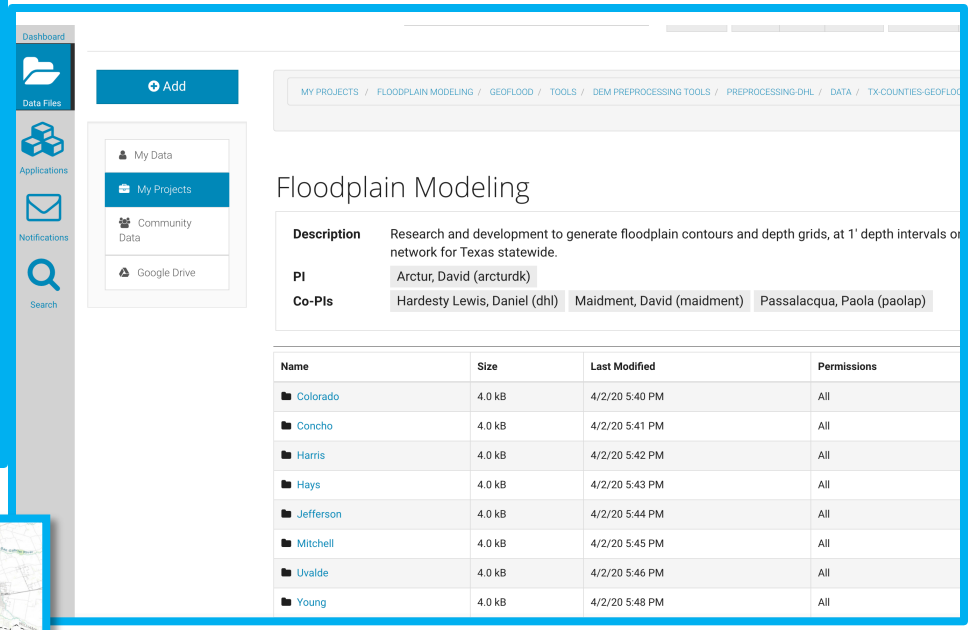
PT2050: Cyberecosystem

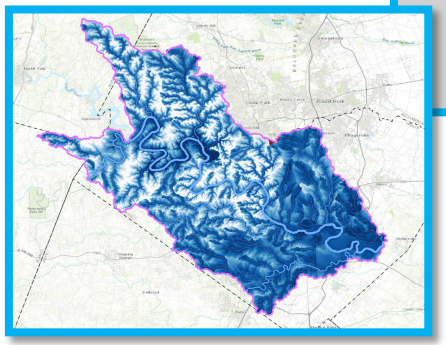
DataX Science Gateway

Model Integration

Data and Models are the building blocks for Knowledge







Data Workbench

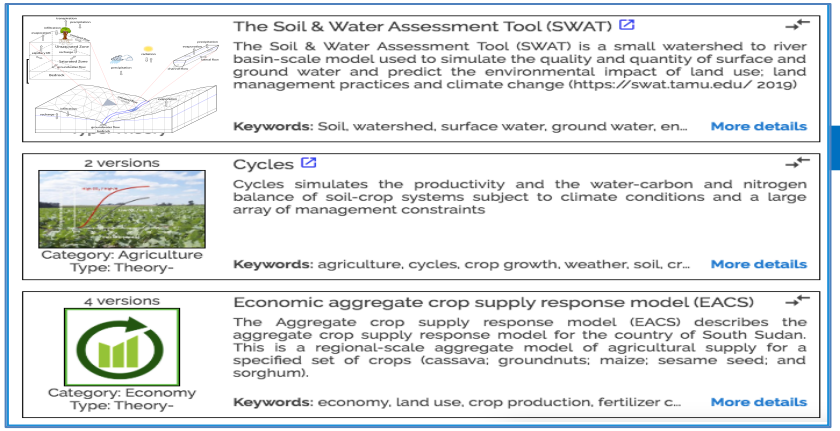
Work with TACC,
Jeaime Powell, Anna Dabrowski, Daniel Hardesty Lewis, Lissa Pearson, Joon Yeh Chuah, Vera Belcher, Nathan Franklin, Sarah Gray, Tracy Brown, Smruti Padhy, Anagha Jamthe, Joe Stubbs, (and many others)

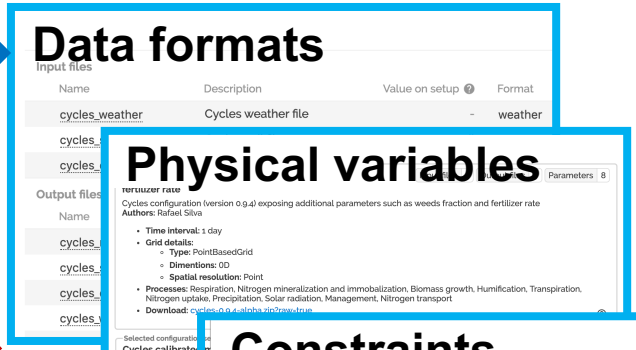
A platform for using artificial intelligence to accelerate:

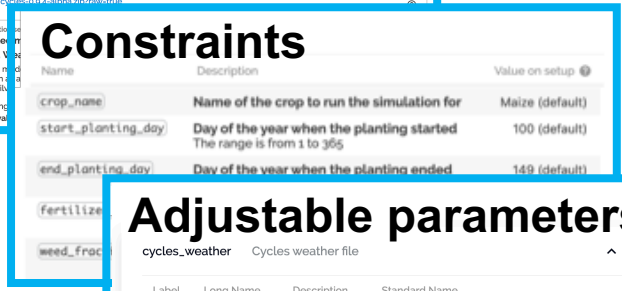
- Connecting data to models
- Composing sophisticated high-fidelity models
- Guiding analysts through easy to follow phases and steps via a user interface that simplifies the complexity.

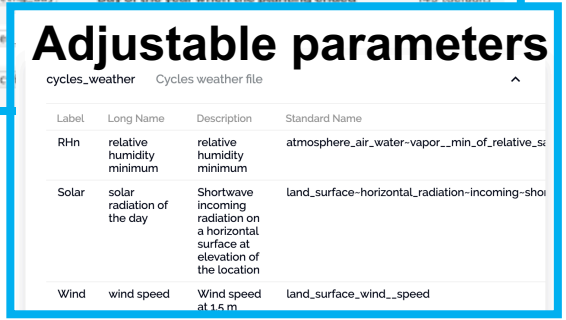
Model-engine for decision support

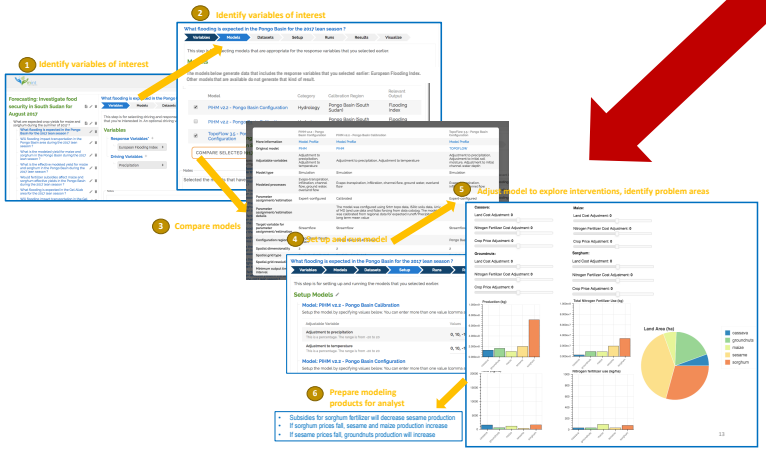
From Models to Solutions







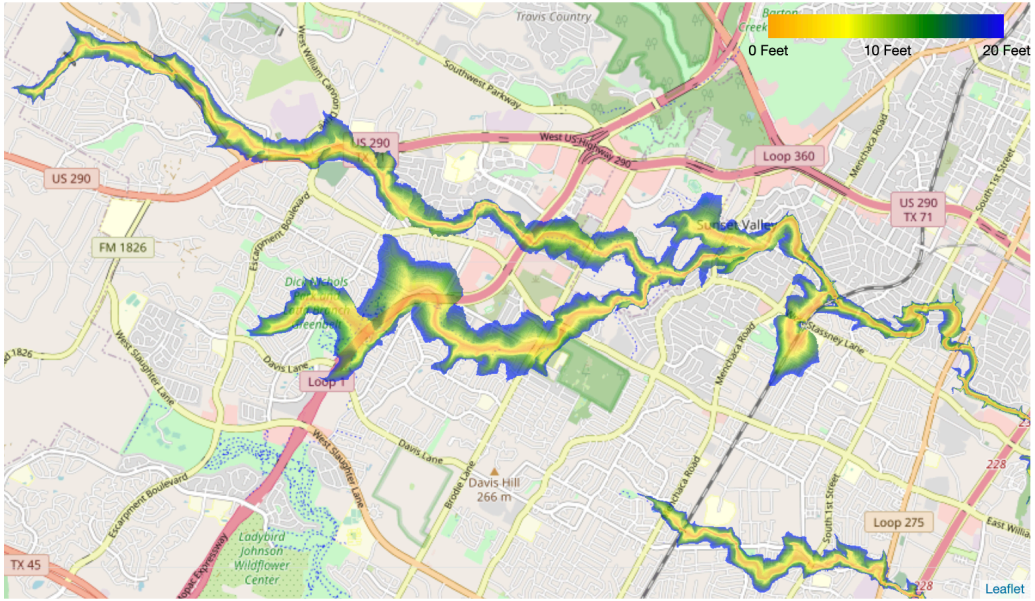




mint
model integration

Work with Yolanda Gil, Daniel Garijo, Maximiliano Osorio, Hernan Vargas, Deborah Khider (USC), Anna Dabrowski and Lissa Pearson(UT)

Visualization of Indicator
HAND Model Results ready <10 minutes



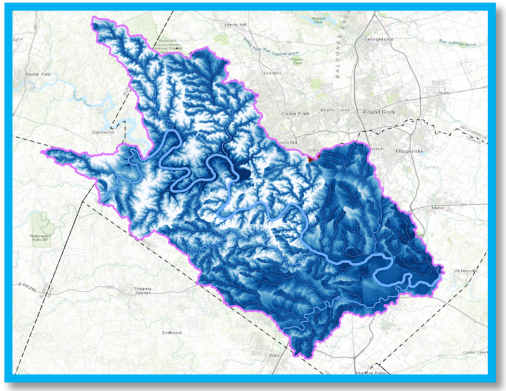
Data and Models are
The best tools we have to understand our critical Earth resources

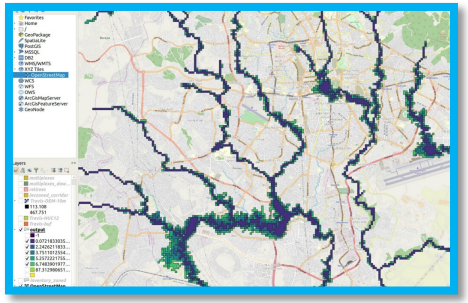
However, information contained within data and models is often misunderstood or misinterpreted by people who need to use it to make group decisions.

Data Fusion to Refine and Build Insight

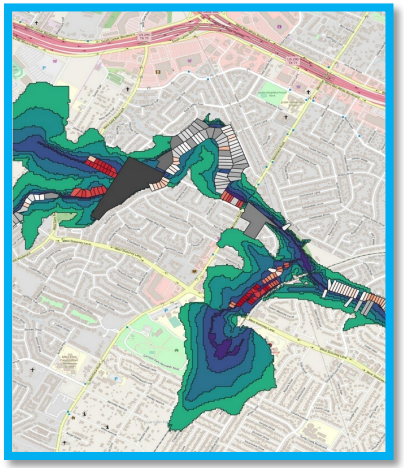
Recombine Models with Data

Automating assessment using portable flood model workflow with higher resolution base data



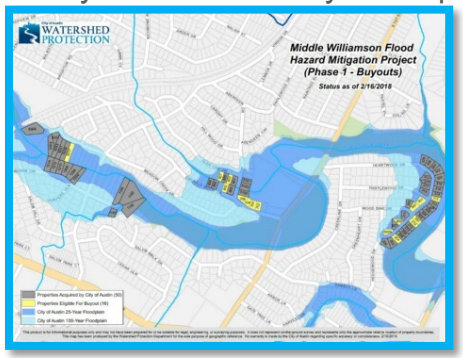


Travis County



Comparison Williamson County

Manually Constructed Buyout Map



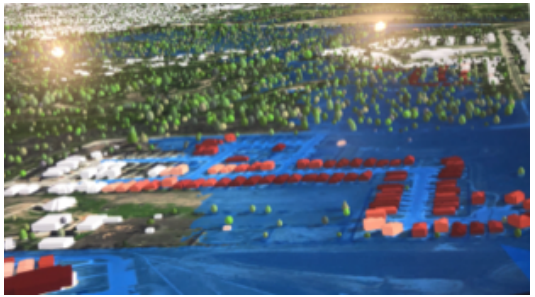
MINT Generated Vulnerability Map

Combining

- Terrain (10 m, 1 meter next)
- Population
- Urban Land Use

Work with Daniel Hardesty Lewis, David Arctur and Paola Passalacgua (UT)

Knowledge comes in many forms



Creating dynamic user interfaces to help understand & share it

Research versus "IRL"

Disaster usually strikes fast and without tolerance for deliberation.
At the very moment response needs to be nimble, frontline communities can be overwhelmed by the complexity of impending impacts and limited in their collective action by the **"speed of trust."**

https://tpwmagazine.com/archive/2017/apr/ed_3_hornsbybend/

"*Austin's Hornsby Bend does double duty as a sewage plant and wildlife mecca.*"
- Camille Wheeler

The Speed of Trust

Success depends on both **access to trustworthy knowledge resources** and **existence of robust relationships** among affected communities.

Aspect	Research	IRL = In Real Life
Combinatorial	Must be capable of fast and powerful computations	Candidate solutions that are “Good Enough” to support insightful dialogue and deliberation
Expertise	Crucial, precise, high caliber science-driven	Frame the problem with people Diagnose to context
Accessibility	Need to be flexible and easy to use	Could be as simple as a conversation drawing on your knowledge or driven by media cycles
Uncertainty (particularly with models)	Carefully delineate the limitations and evaluate performance with best precision, detailed metadata	Modelers need to define the limitations and constraints for other users. Can someone else use your model ‘safely’
Timely	Careers are made and dedicated for years, exploratory analyses	Commit to the pace of the event and focus on the problem structure at hand
Integration	Look for and define frameworks,	Various knowledge areas **will** be combined and used

Thank You!

Social Process is as Important as the Cyberecosystems, Data, and Models

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Planet Texas 2050, Bridging Barriers Initiative, UT Austin
MINT/DARPA, Award W911NF-18-10027
IS-GEO/NSF, EarthCube Award #1632211

NSF

IS-GEO
Intelligent Systems for Geosciences

PLANET TEXAS 2050
A UT Grand Challenge

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