3-2013

A Unique Collaborative Process for Developing a DRU

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A Collaborative Process for Developing a DRU

Using Hazus and other Tools

Indiana University

- 110,000 students
- 2nd largest medical school
- $1.5B+ endowment

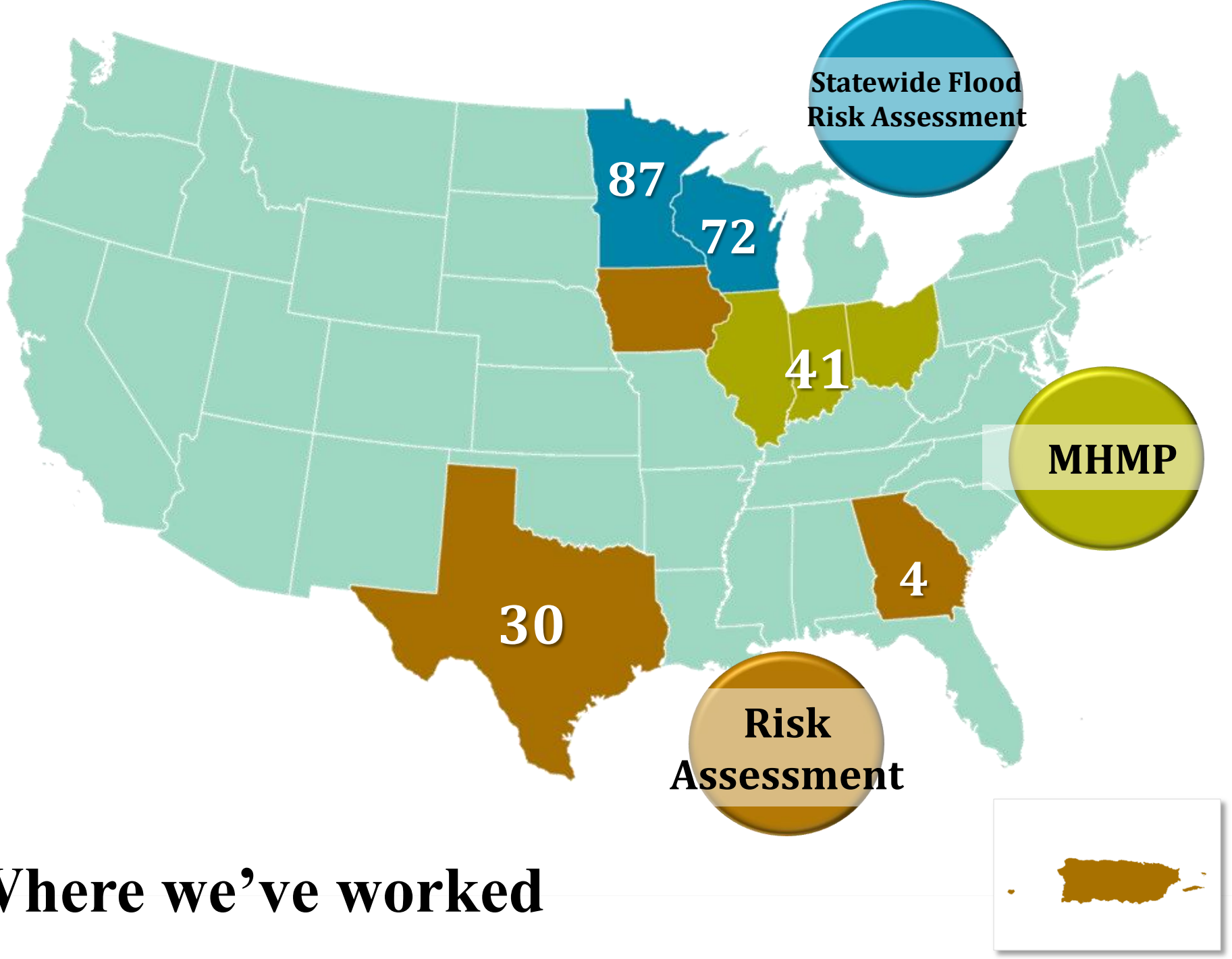
2008 – Northern Indiana

2008 – Central Indiana

2008 – Southern Indiana

ABOUT US

- Research center at IU
- Hazard mitigation experience
- 30 years experience in GIS training
- 10+ years managing Hazus-MH curriculum



Where we've worked

Lessons learned from multi-hazard mitigation planning

FROM MHMP TO DRU

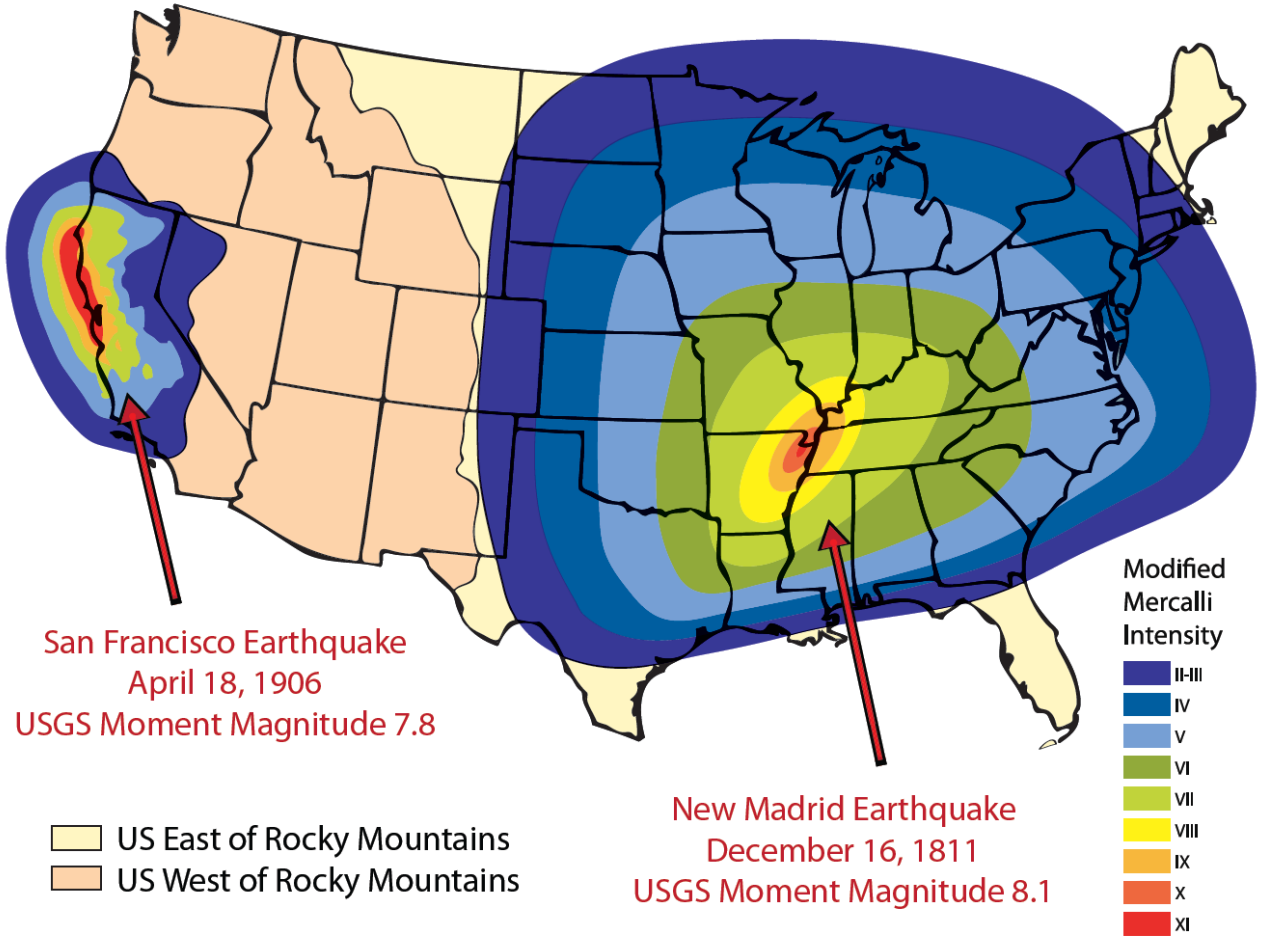
MHMP Process

Engagement

Campus	Student Population	Concern
Bloomington	42,100	Tornado
Indianapolis	30,500	IT failure
Southeast	6,900	Hazmat transport
East	4,200	Cyber attack
Northwest	6,200	Flooding
South Bend	8,500	Public utility failure
Columbus	2,000	Hazmat transport
Kokomo	3,700	Severe storms

Collaboration

Engaged Indiana Geological Survey as Midwest earthquake experts



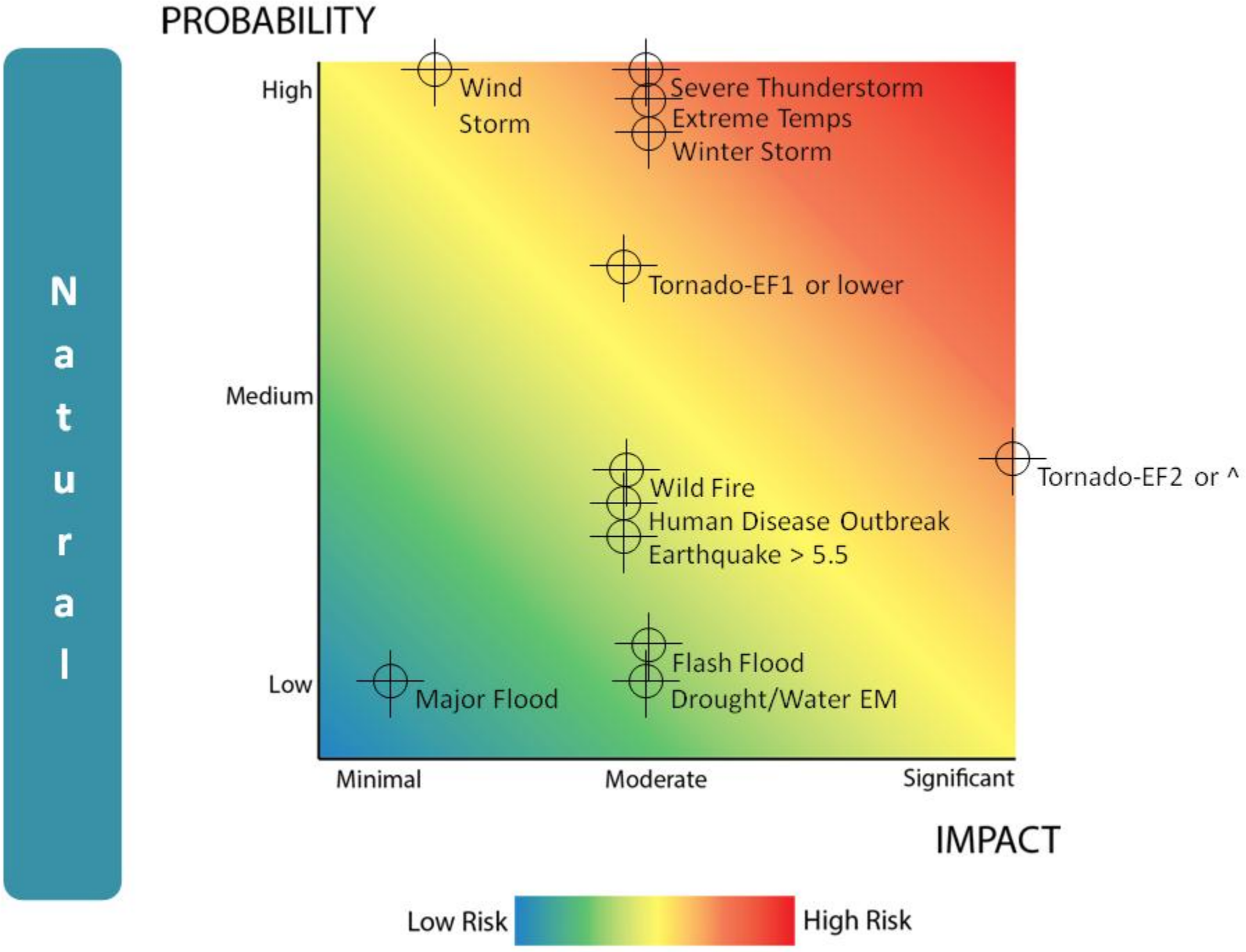
Communication

Less Math + More Visual = Stronger Consensus

Rank hazards objectively AND subjectively

Calculated Priority Risk Index

Hazard	Probability		Magnitude		Warning		Duration		CPRI Score	
Cyber Attack	4	1.8	2	0.6	4	0.6	4	0.4	3.40	
Public Utility Infrastructure Failure	4	1.8	2	0.6	4	0.6	3	0.3	3.30	
Radio Communications System Failure	4	1.8	2	0.6	4	0.6	2	0.2	3.20	N
Severe Thunderstorm	4	1.8	2	0.6	4	0.6	1	0.1	3.10	A
Structural Fire	3	1.35	3	0.9	4	0.6	1	0.1	2.95	T
Extreme Temperatures	4	1.8	2	0.6	1	0.15	3	0.3	2.85	U
Tornado - Strong (EF2 and Above)	2	0.9	4	1.2	4	0.6	1	0.1	2.80	R
HazMat Fixed Facility	3	1.35	2	0.6	4	0.6	2	0.2	2.75	A
Winter Storm	4	1.8	2	0.6	1	0.15	2	0.2	2.75	L
Tornado - Weak (EF1 and Below)	3	1.35	2	0.6	4	0.6	1	0.1	2.65	
Terrorism - Nuclear / Radiological	1	0.45	4	1.2	4	0.6	4	0.4	2.65	
HazMat Transportation	2	0.9	3	0.9	4	0.6	2	0.2	2.60	T
Terrorism - Bombing	2	0.9	3	0.9	4	0.6	1	0.1	2.50	E
Sabotage	2	0.9	2	0.6	4	0.6	3	0.3	2.40	C
Active Shooter / Multiple Assailants	1	0.45	4	1.2	4	0.6	1	0.1	2.35	H
Aircraft Accident	1	0.45	4	1.2	4	0.6	1	0.1	2.35	N
Telecommunications / IT Outage	4	1.8	1	0.3	4	0	2	0.2	2.30	I
Hostage / Barricade Situation	2	0.9	2	0.6	4	0.6	2	0.2	2.30	C
Wildland Fire	2	0.9	2	0.6	4	0.6	1	0.1	2.20	A
Arson	2	0.9	2	0.6	4	0.6	1	0.1	2.20	L
Earthquake (> 5.5 on the Richter Scale)	2	0.9	2	0.6	4	0.6	1	0.1	2.20	
Human Disease Outbreak	2	0.9	2	0.6	1	0.15	4	0.4	2.05	
Structural Collapse	1	0.45	3	0.9	4	0.6	1	0.1	2.05	H
Riot / Civil Unrest	1	0.45	2	0.6	4	0.6	1	0.1	1.75	U
Flash Flood	1	0.45	2	0.6	4	0.6	1	0.1	1.75	M
Drought / Water Supply Emergency	1	0.45	2	0.6	1	0.15	4	0.4	1.60	A
Major Flood	1	0.45	1	0.3	1	0.15	3	0.3	1.20	N
Dam Failure	0	0	0	0	0	0	0	0	0.00	
Levee Failure	0	0	0	0	0	0	0	0	0.00	


Natural
PROBABILITY
High
Medium
Low
Wind
Storm
Severe Thunderstorm
Extreme Temps
Winter Storm
Tornado-EF1 or lower
Tornado-EF2 or ^
Wild Fire
Human Disease Outbreak
Earthquake > 5.5
Flash Flood
Drought/Water EM
Major Flood
Minimal
Moderate
Significant
IMPACT
Low Risk
High Risk

Hazard Analysis

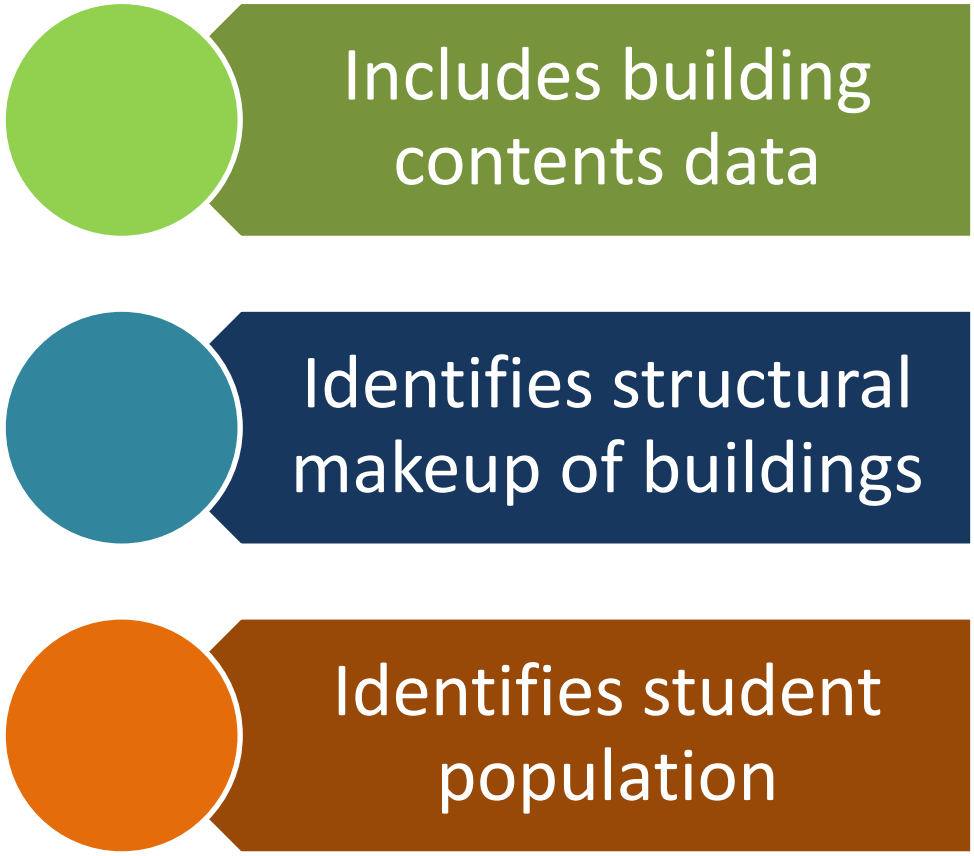
- Qualitative and quantitative
- GIS and Hazus-MH modeling
- Guides campuses in developing measurable mitigation strategies

It all starts here.

THE HOLY GRAIL

Building Inventory

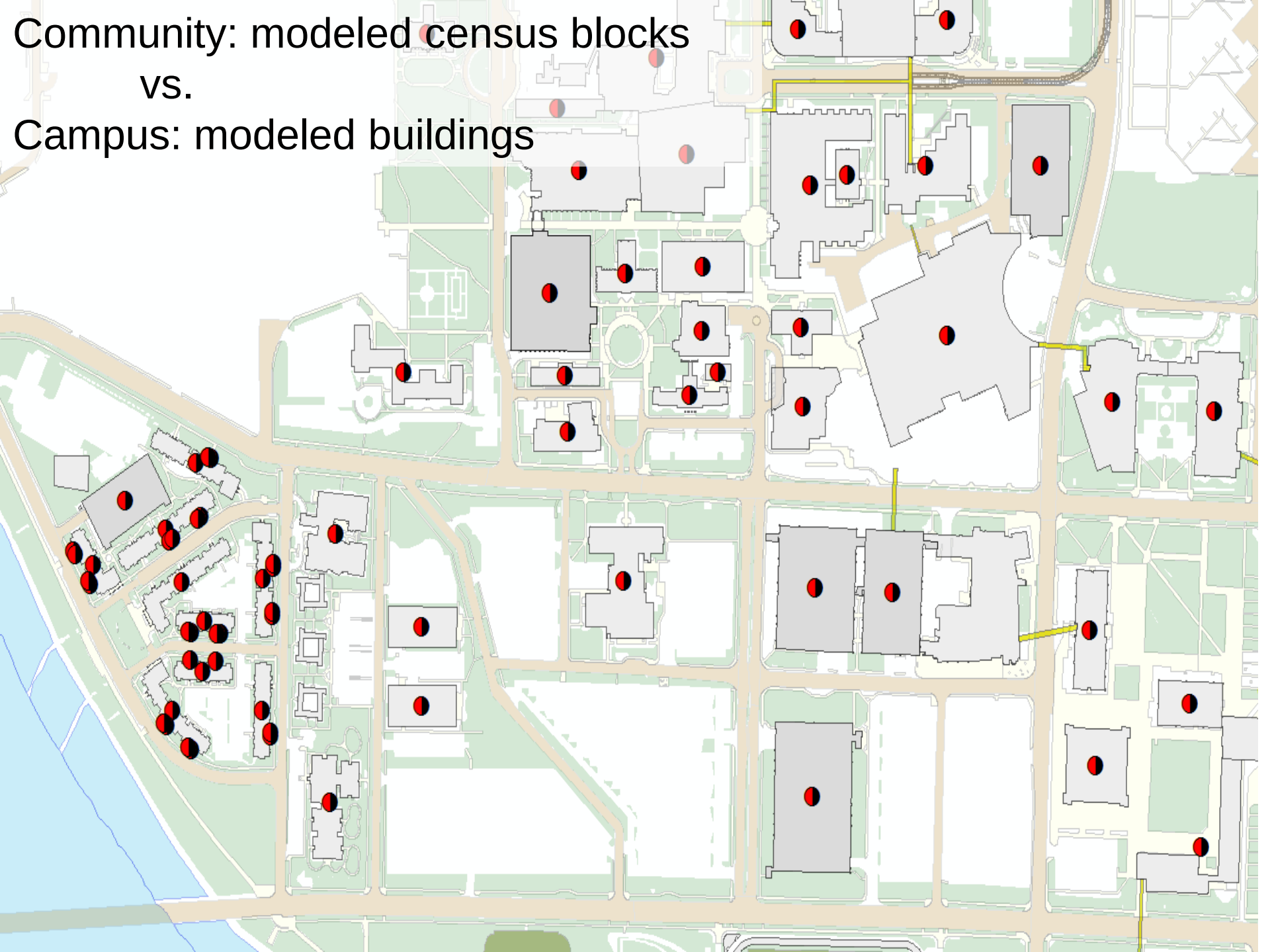
Foundation for all GIS analyses



Community: modeled census blocks

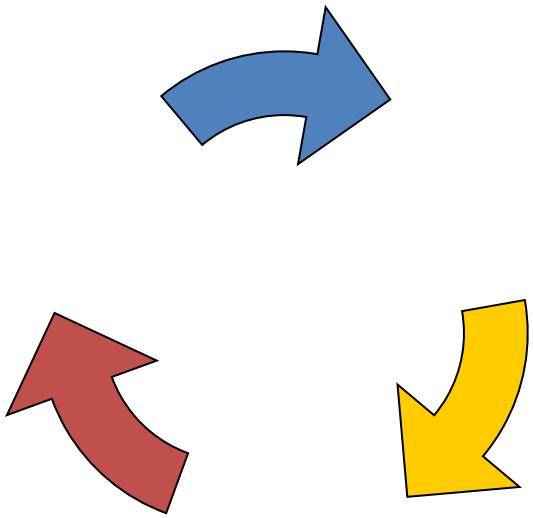
vs.

Campus: modeled buildings



It’s not hard to get!

Available through facilities management, insurance and risk management, and/or GIS offices



From building inventory to hazard modeling

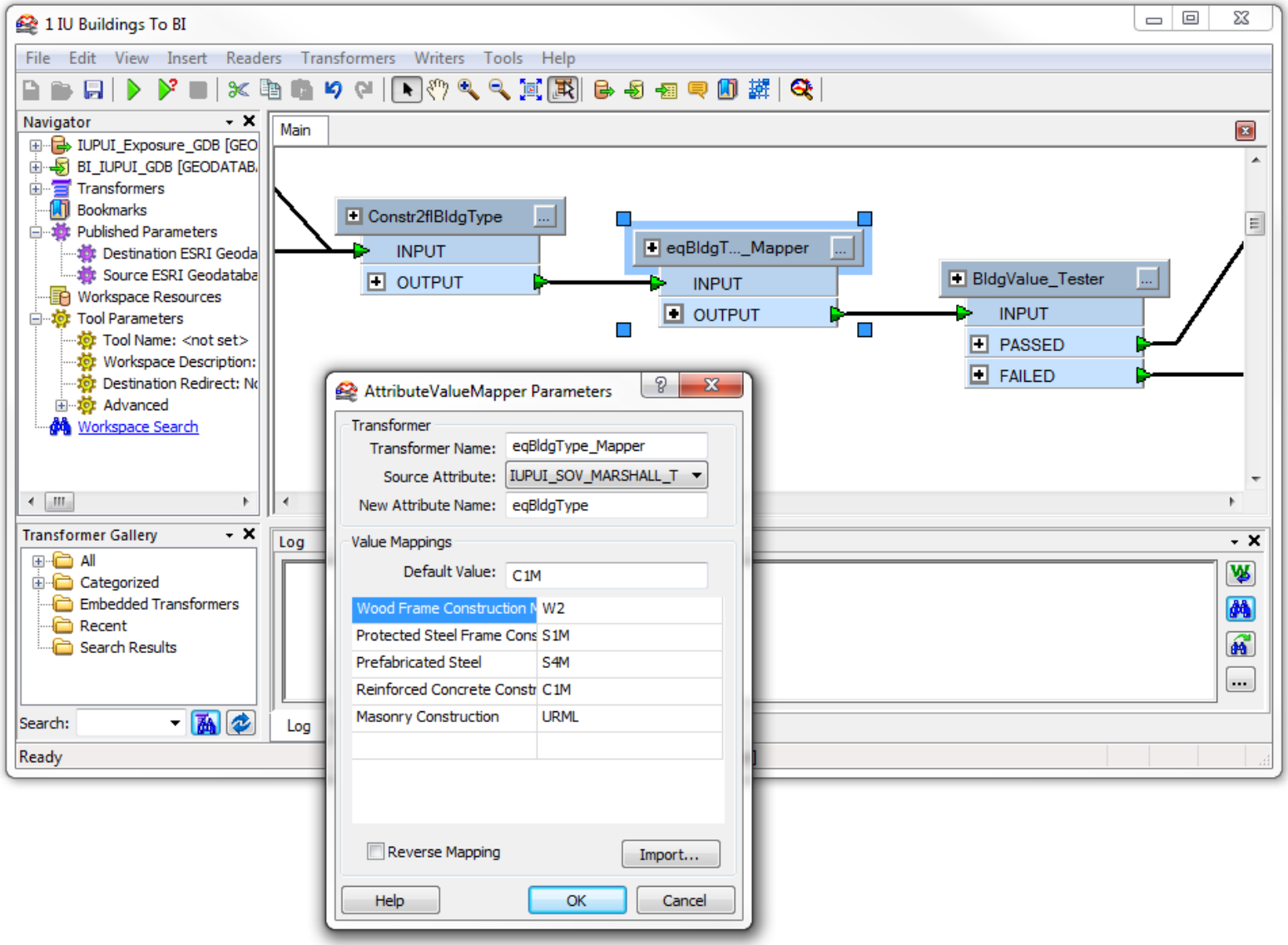
THE PROCESS

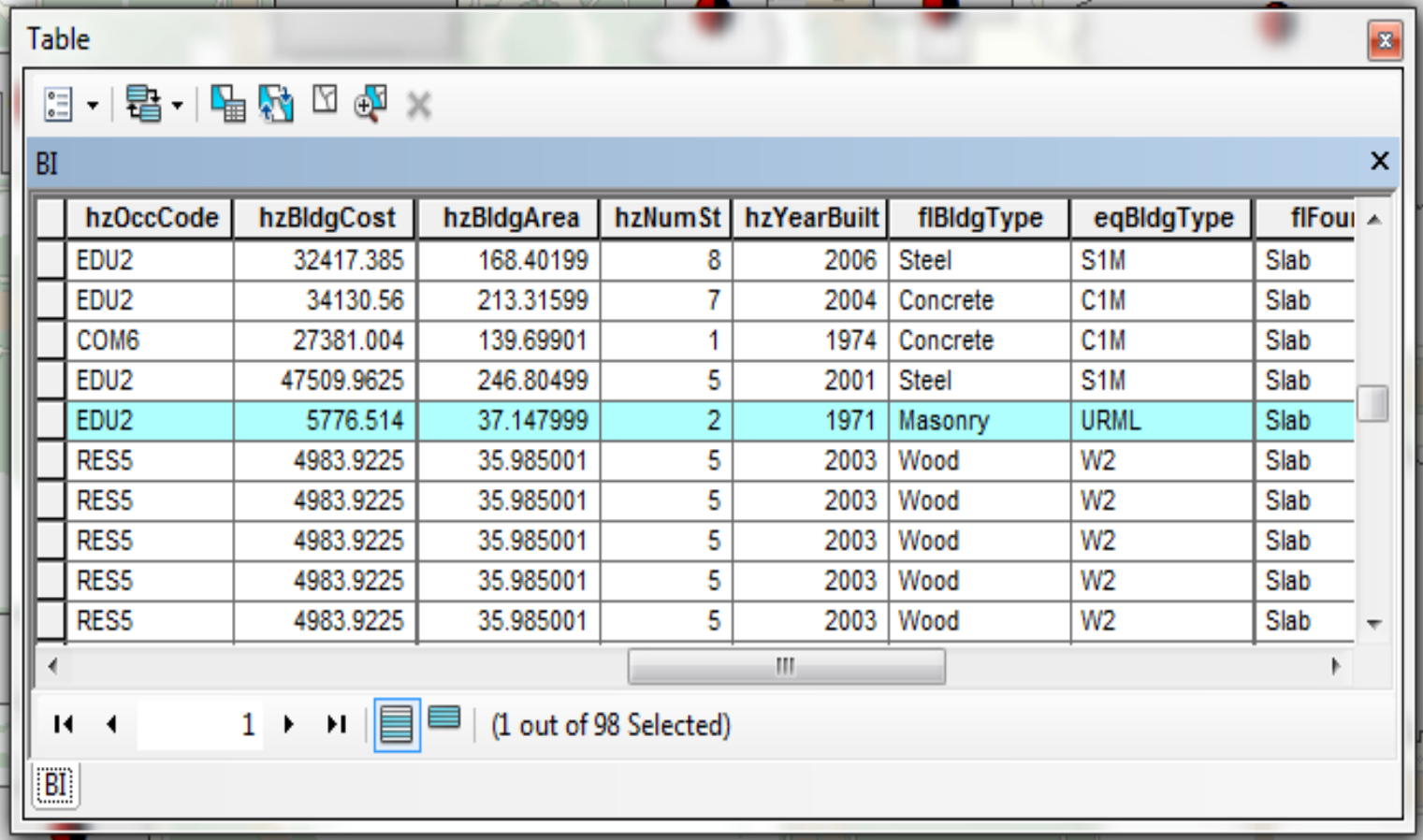
No need to recreate the wheel…

Standard tools can help organize your data

- Esri data interoperability extension (FME)
- Comprehensive Data Management System (FEMA)

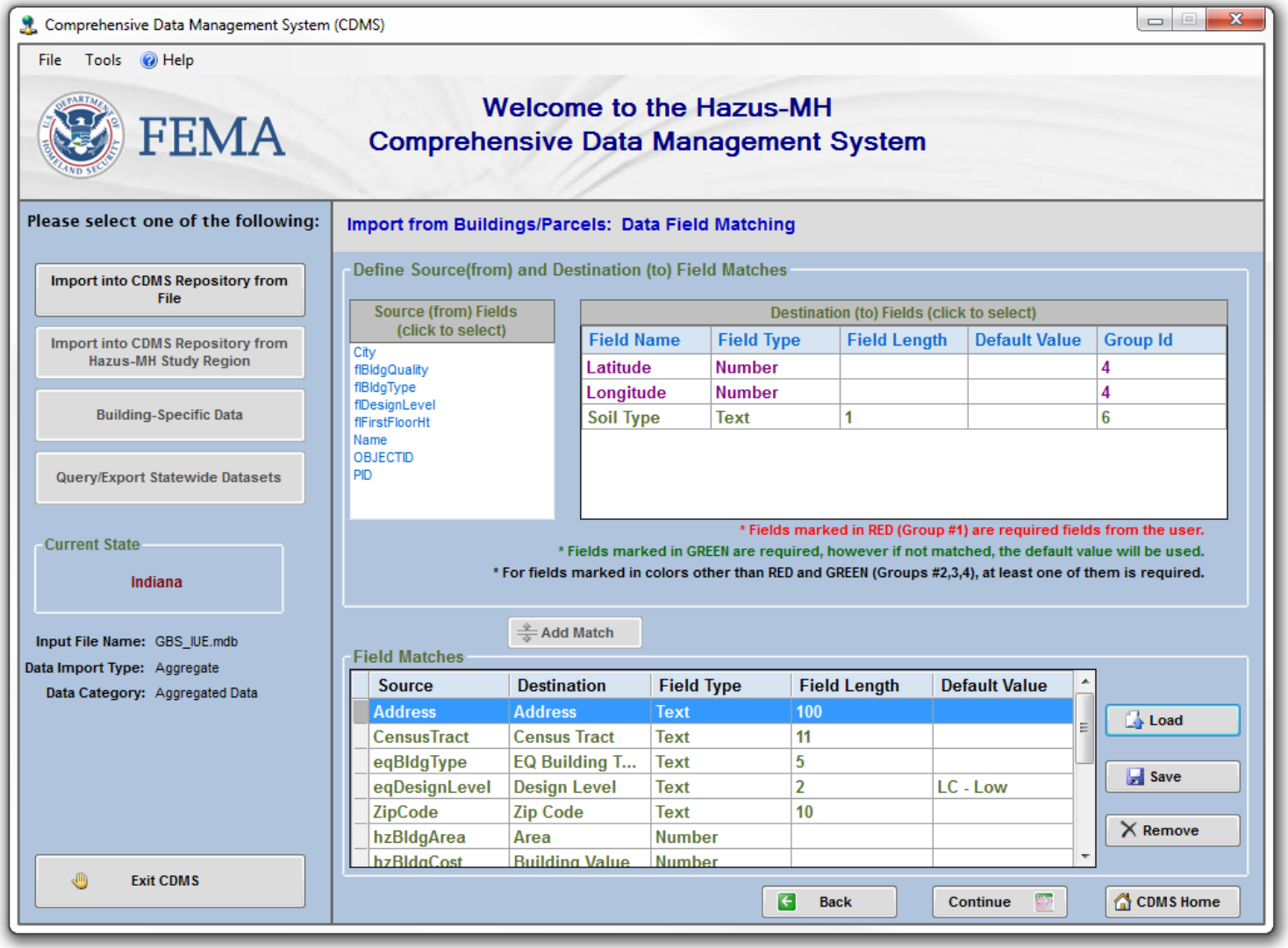
FME converts buildings (facility data) to building inventory (modeling data)





Building inventory values captured for earthquake and flood modeling in Hazus

CDMS loads the modeling data into Hazus



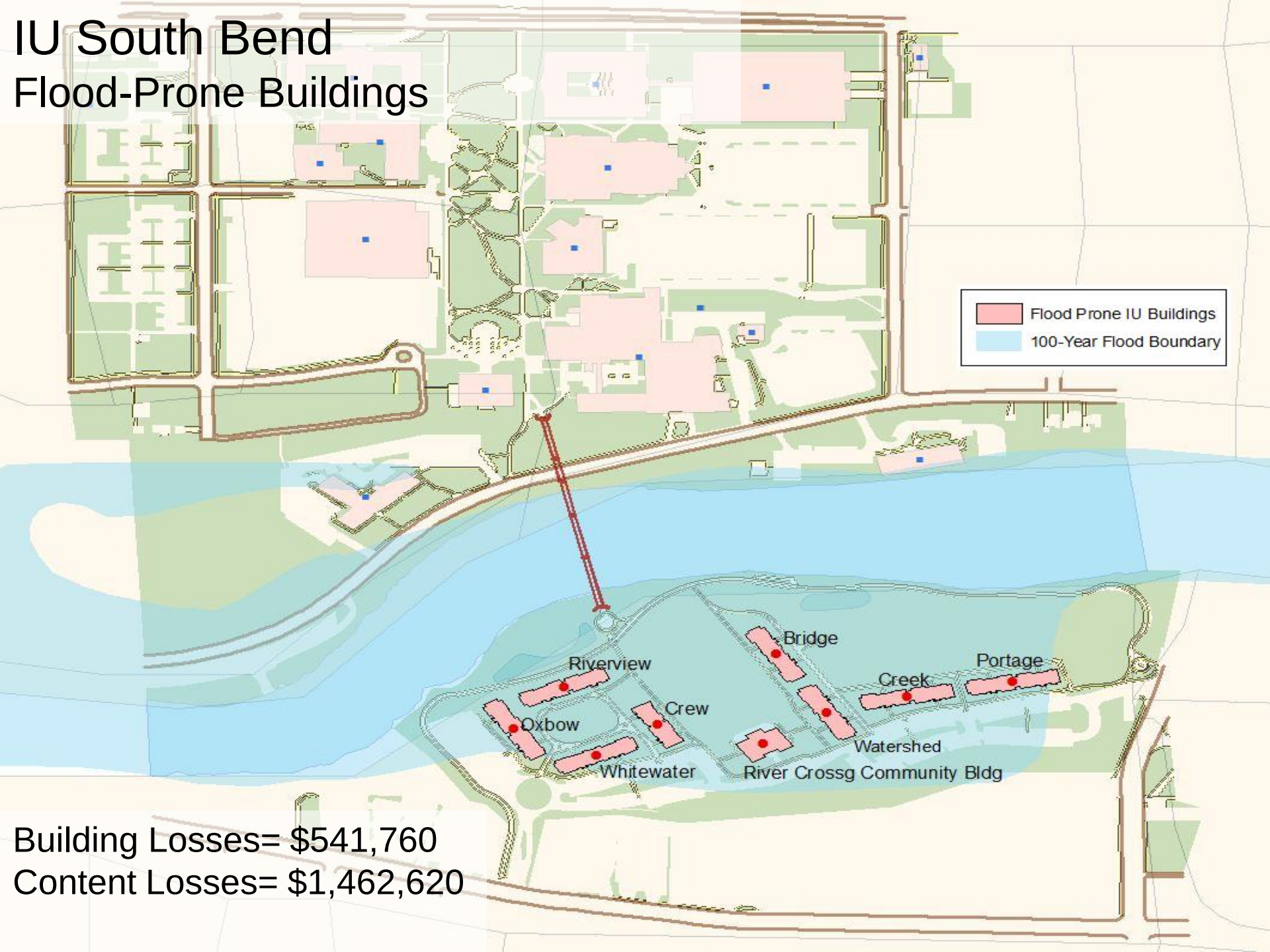
What is it and why do we use it?

USING HAZUS FOR MODELING

The good, the bad, and the ugly

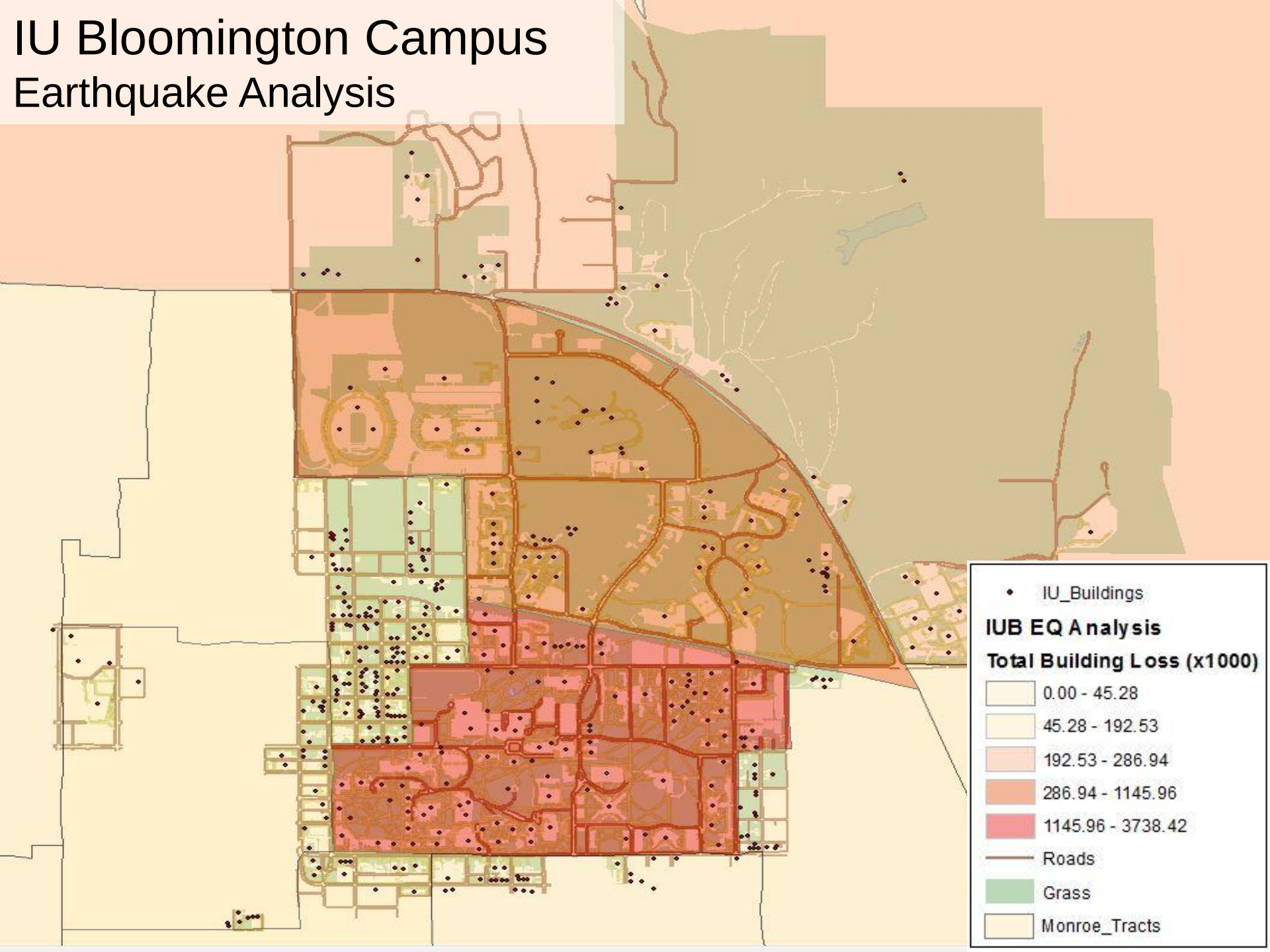
PROS	CONS
Models floods, earthquakes, hurricanes, and coastal surge	Does not model other hazards, e.g. tornadoes, hazmat, etc.
Provides physical, social, and economic damage estimates	Out-of-the-box data does not include good local data
You can import your own data	
Outputs include tables, charts, and maps	
It’s free!	

IU South Bend
Flood-Prone Buildings



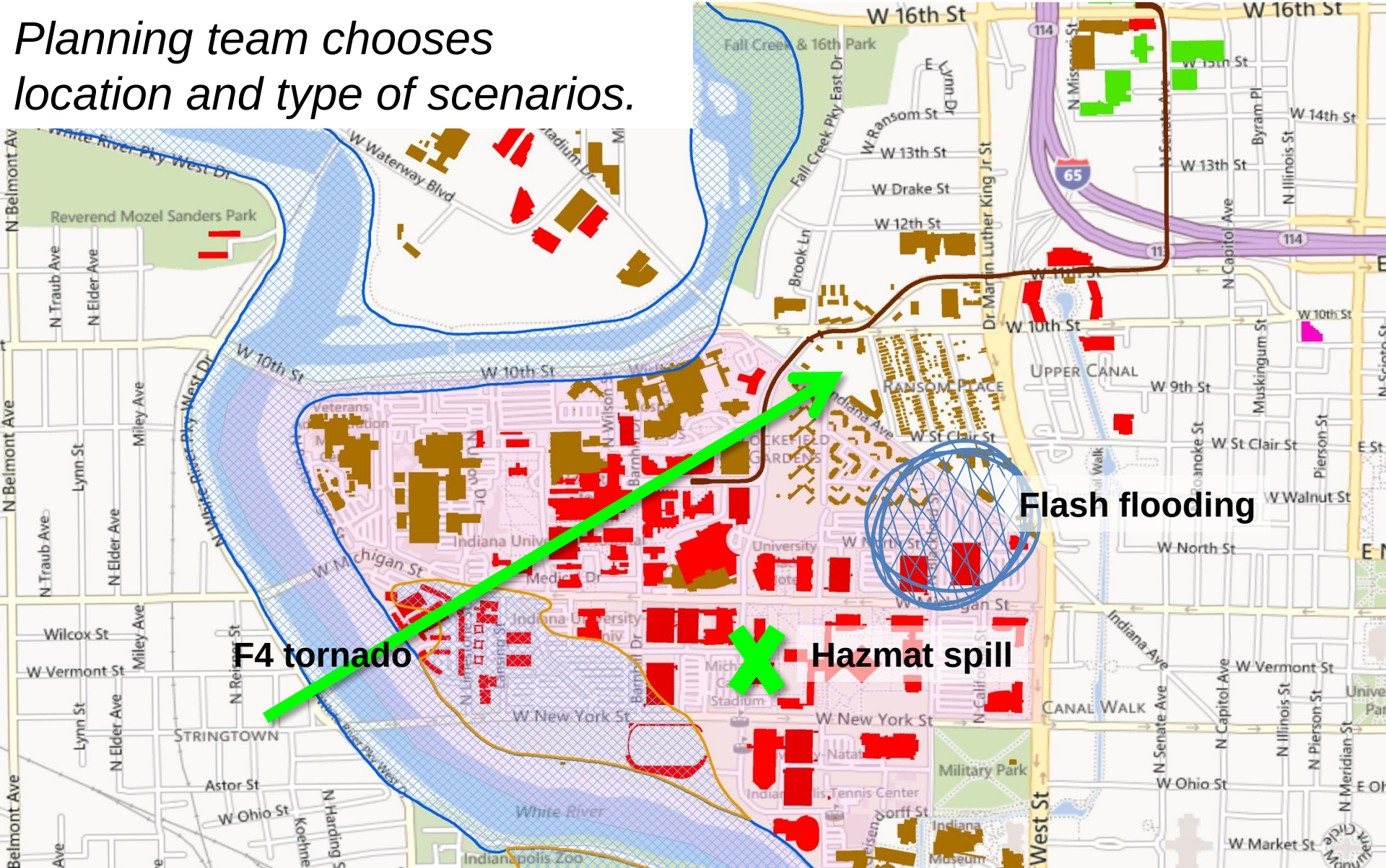
Building Losses= $541,760
Content Losses= $1,462,620

IU Bloomington Campus
Earthquake Analysis

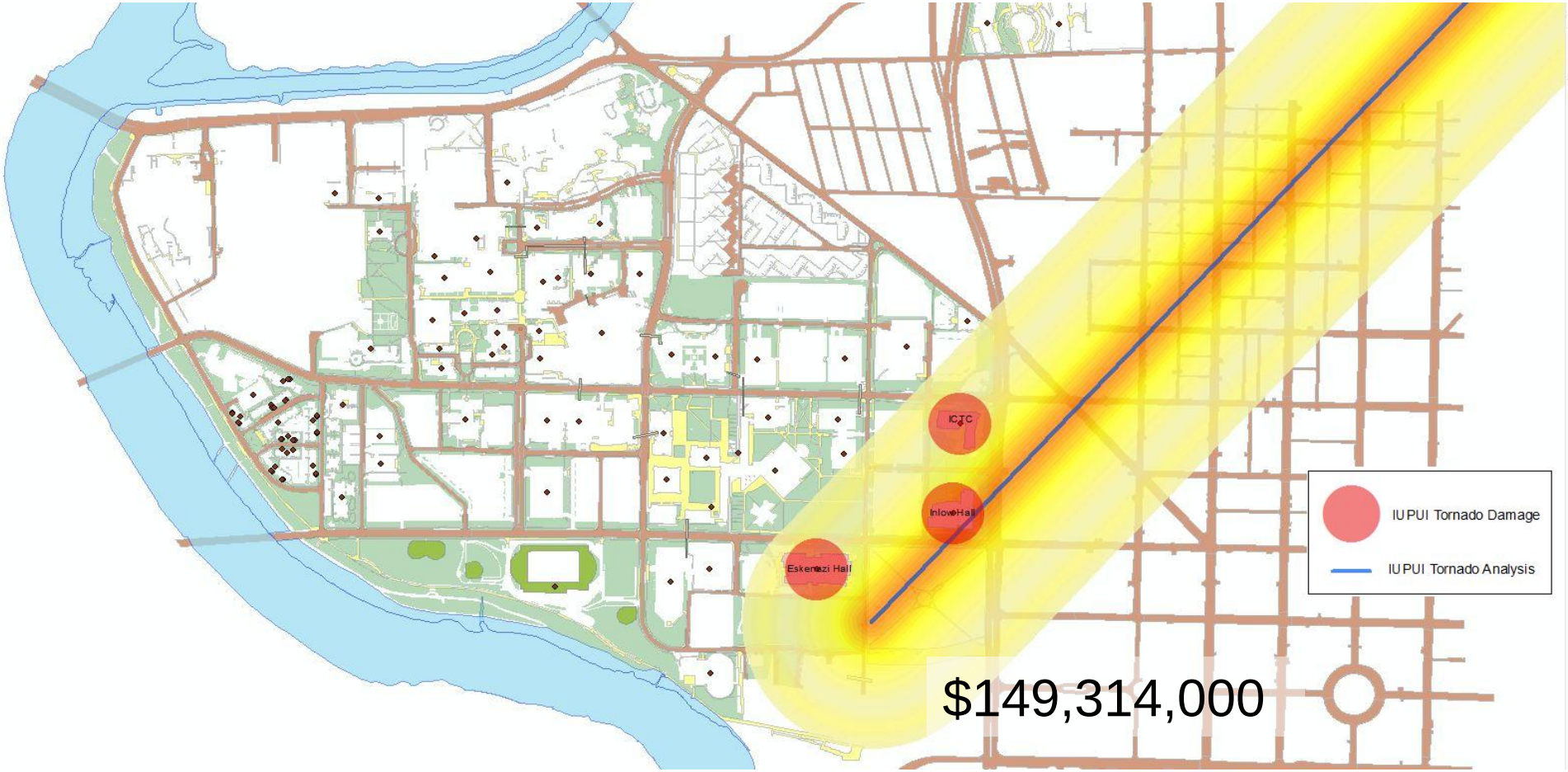


Other GIS analyses

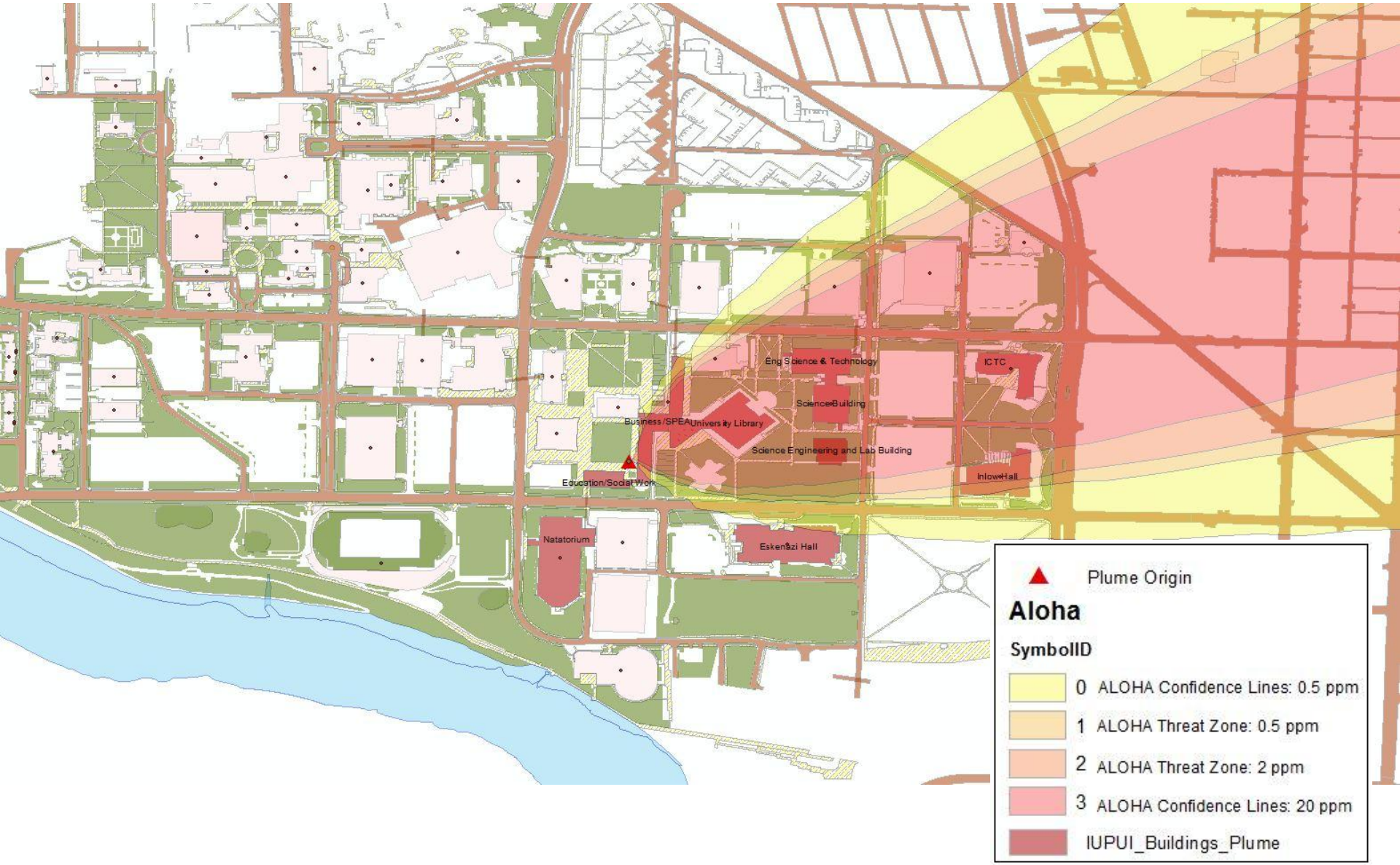
Planning team chooses location and type of scenarios.

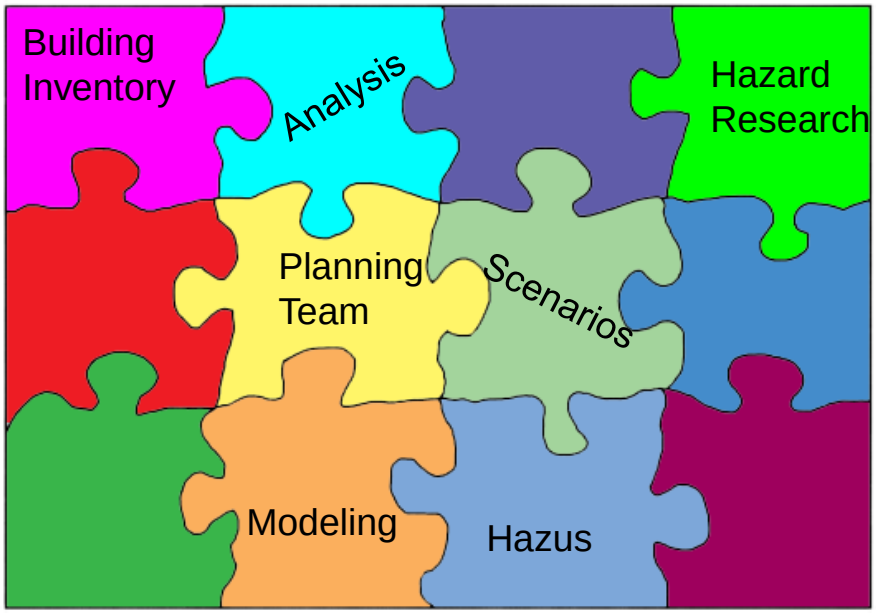


IUPUI Campus
Tornado Analysis



IUPUI Campus
ALOHA Plume Analysis





And in conclusion…

THE OUTCOME

That’s a lot of effort!

- Time-extensive
- Significant research and data collection
- Knowledge and application of various software

It’s worth it!

- Each campus gets a comprehensive modeled scenario for tabletop exercises
- Data-informed mitigation strategies
- University has information necessary to obtain grants


INDIANA UNIVERSITY