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A Unique Collaborative Process for Developing a DRU

John Buechler
The Polis Center

Laura Danielson
The Polis Center

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The Polis Center

We brings things into perspective.™

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

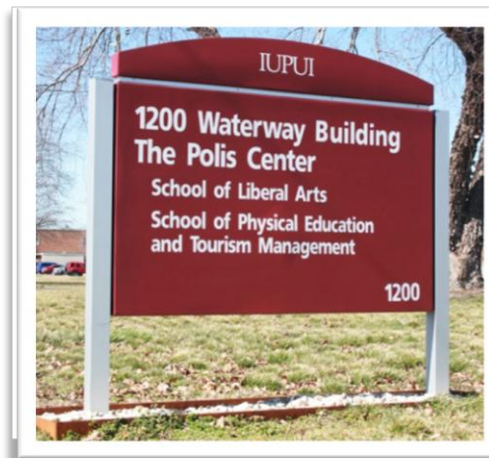
2008 – Southern Indiana

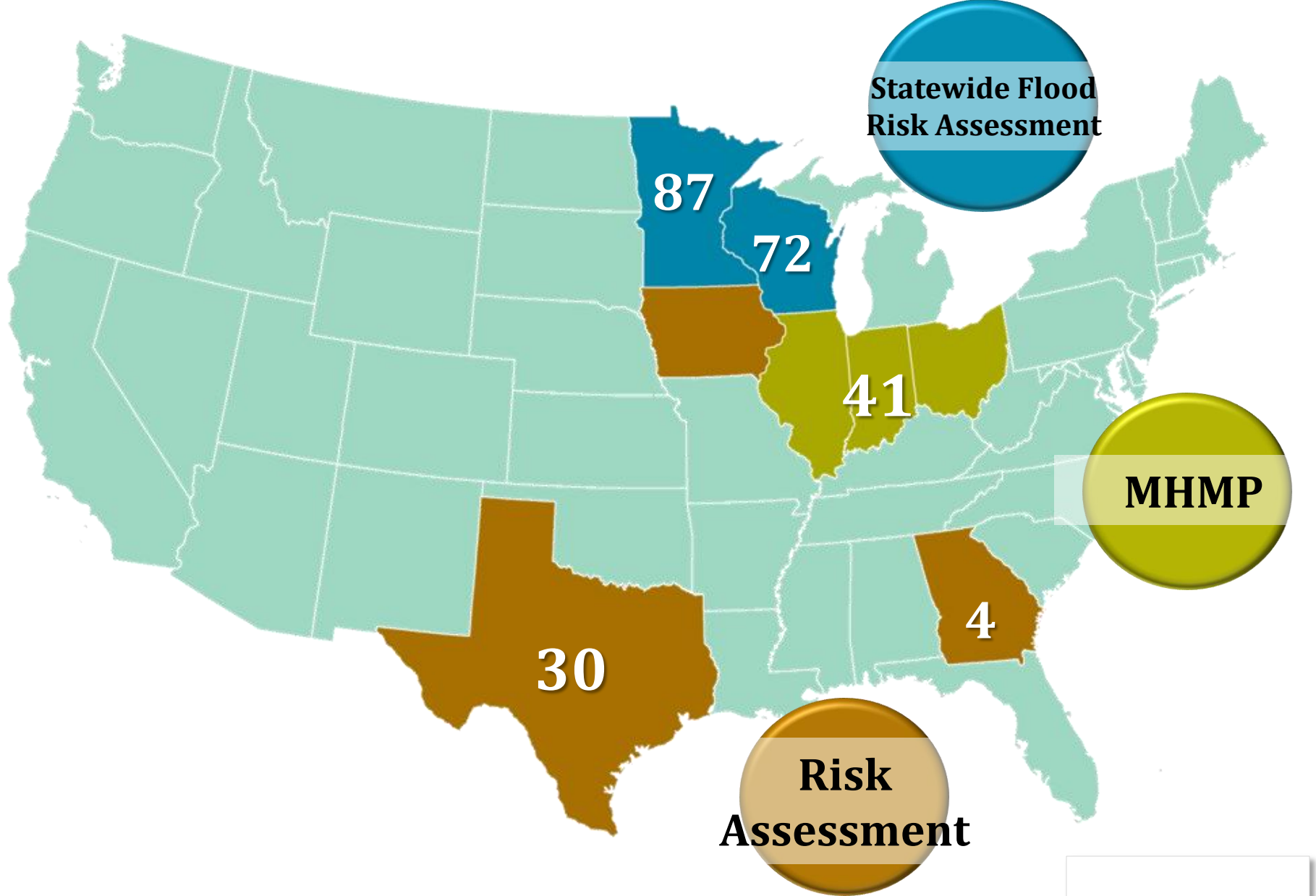




ABOUT US

- 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

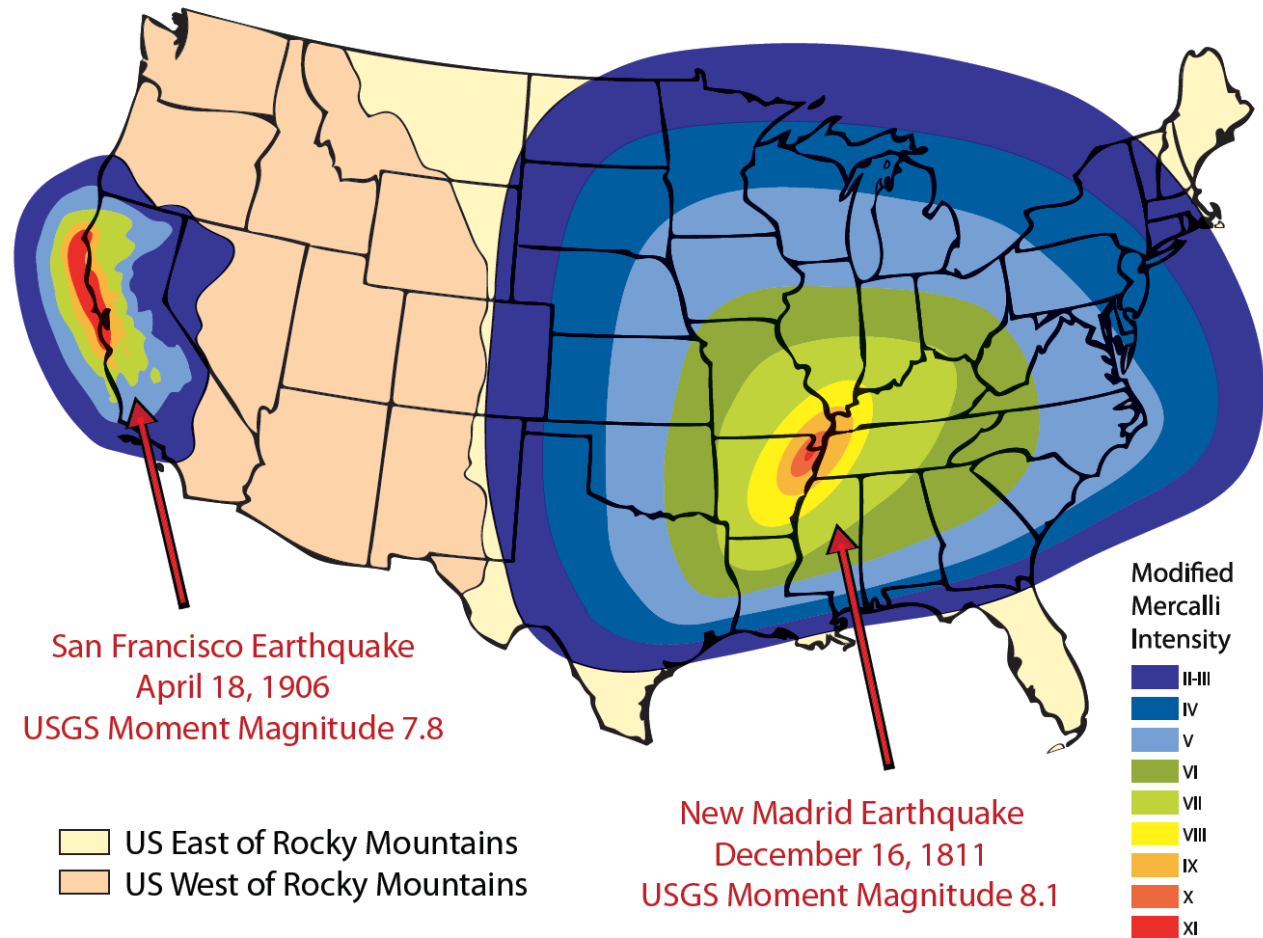


Engagement

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



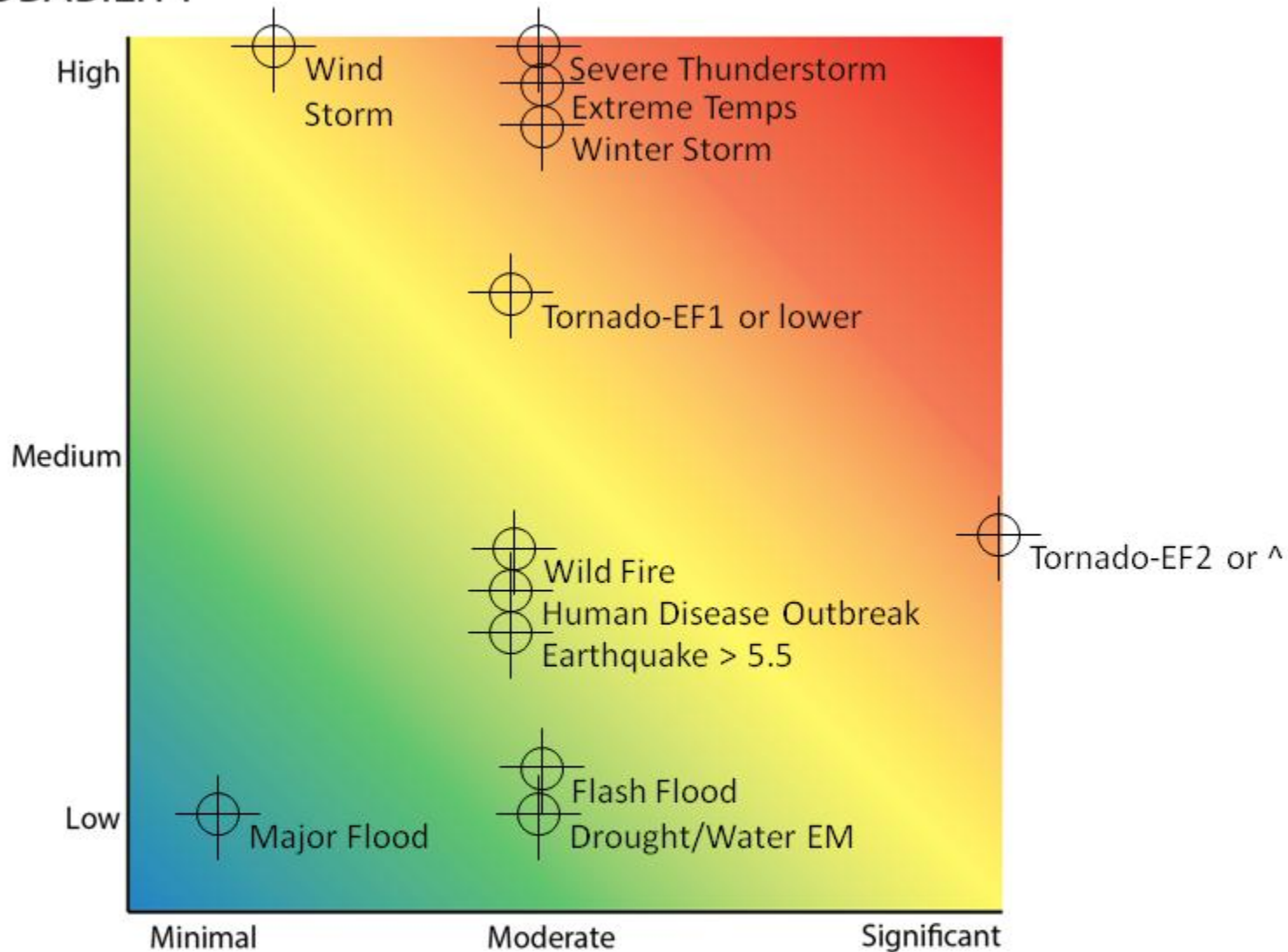
Communication

Less Math + More Visual = Stronger Consensus

Rank hazards objectively AND subjectively

N
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PROBABILITY



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



Includes building contents data

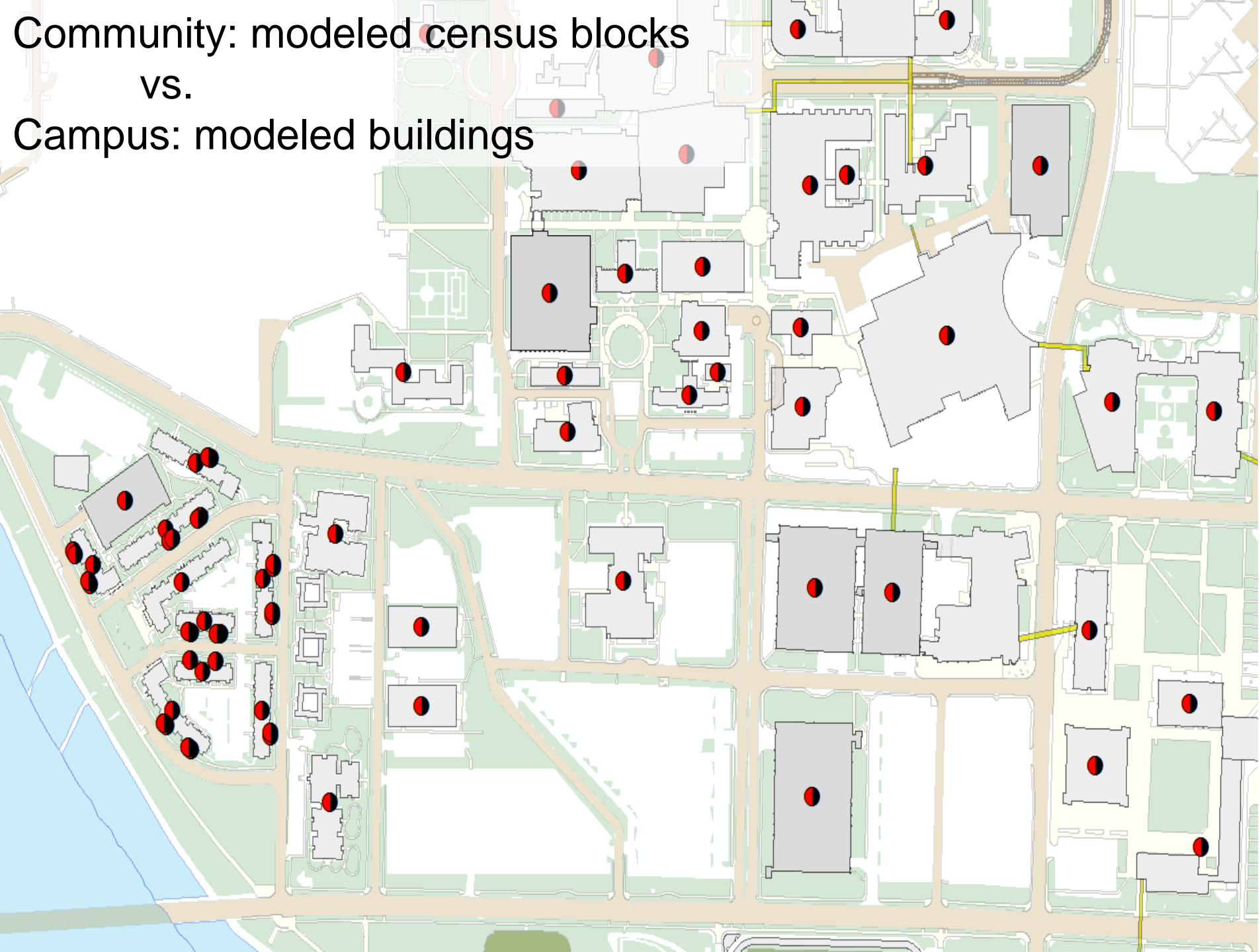


Identifies structural makeup of buildings



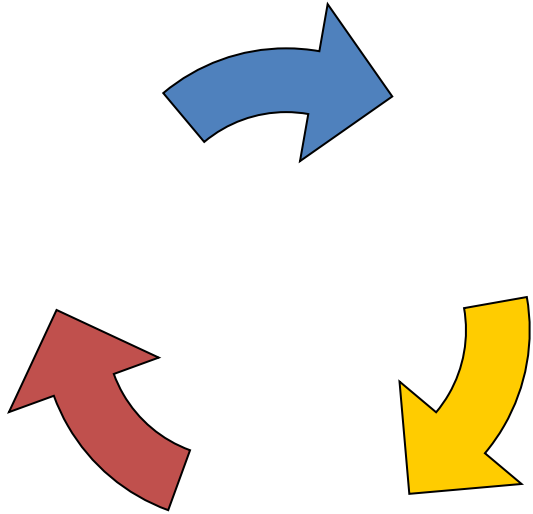
Identifies student population

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)

The screenshot displays the FME Desktop interface with a workflow titled "1 IU Buildings To BI". The workflow consists of three main transformers connected in sequence:

- Constr2fBldgType**: An INPUT transformer that feeds into the next transformer.
- eqBldgT..._Mapper**: A transformer that receives input from the first transformer and outputs to the third.
- BldgValue_Tester**: An INPUT transformer that receives input from the second transformer and has two output ports labeled "PASSED" and "FAILED".

An "AttributeValueMapper Parameters" dialog is open, showing the configuration for the "eqBldgType_Mapper" transformer. The "Source Attribute" is set to "IUPUI_SOV_MARSHALL_T" and the "New Attribute Name" is "eqBldgType". The "Default Value" is "C1M". The "Value Mappings" table is as follows:

Source Value	Target Value
Wood Frame Construction M	W2
Protected Steel Frame Cons	S1M
Prefabricated Steel	S4M
Reinforced Concrete Constr	C1M
Masonry Construction	URML

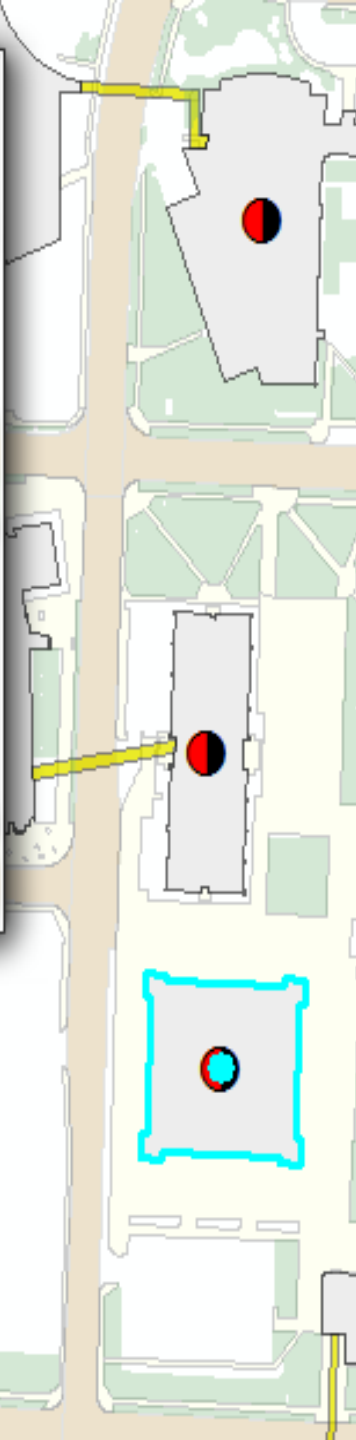
The dialog also includes a "Reverse Mapping" checkbox (unchecked) and an "Import..." button. The "OK" button is highlighted.

Table

BI

hzOccCode	hzBldgCost	hzBldgArea	hzNumSt	hzYearBuilt	fiBldgType	eqBldgType	fiFour
EDU2	32417.385	168.40199	8	2006	Steel	S1M	Slab
EDU2	34130.56	213.31599	7	2004	Concrete	C1M	Slab
COM6	27381.004	139.69901	1	1974	Concrete	C1M	Slab
EDU2	47509.9625	246.80499	5	2001	Steel	S1M	Slab
EDU2	5776.514	37.147999	2	1971	Masonry	URML	Slab
RES5	4983.9225	35.985001	5	2003	Wood	W2	Slab
RES5	4983.9225	35.985001	5	2003	Wood	W2	Slab
RES5	4983.9225	35.985001	5	2003	Wood	W2	Slab
RES5	4983.9225	35.985001	5	2003	Wood	W2	Slab
RES5	4983.9225	35.985001	5	2003	Wood	W2	Slab

1 (1 out of 98 Selected)




Building inventory values captured for earthquake and flood modeling in Hazus

CDMS loads the modeling data into Hazus

Comprehensive Data Management System (CDMS)

File Tools Help



Welcome to the Hazus-MH Comprehensive Data Management System

Please select one of the following:

- Import into CDMS Repository from File
- Import into CDMS Repository from Hazus-MH Study Region
- Building-Specific Data
- Query/Export Statewide Datasets

Current State: **Indiana**

Input File Name: GBS_IUE.mdb
 Data Import Type: Aggregate
 Data Category: Aggregated Data

Exit CDMS

Import from Buildings/Parcels: Data Field Matching

Define Source(from) and Destination (to) Field Matches

Source (from) Fields (click to select)	Destination (to) Fields (click to select)				
	Field Name	Field Type	Field Length	Default Value	Group Id
City	Latitude	Number			4
fiBldgQuality	Longitude	Number			4
fiBldgType	Soil Type	Text	1		6
fiDesignLevel					
fiFirstFloorHt					
Name					
OBJECTID					
PID					

* Fields marked in RED (Group #1) are required fields from the user.
 * Fields marked in GREEN are required, however if not matched, the default value will be used.
 * For fields marked in colors other than RED and GREEN (Groups #2,3,4), at least one of them is required.

Add Match

Field Matches

Source	Destination	Field Type	Field Length	Default Value
Address	Address	Text	100	
CensusTract	Census Tract	Text	11	
eqBldgType	EQ Building T...	Text	5	
eqDesignLevel	Design Level	Text	2	LC - Low
ZipCode	Zip Code	Text	10	
hzBldgArea	Area	Number		
hzBldgCost	Building Value	Number		

Load Save Remove

Back Continue CDMS Home



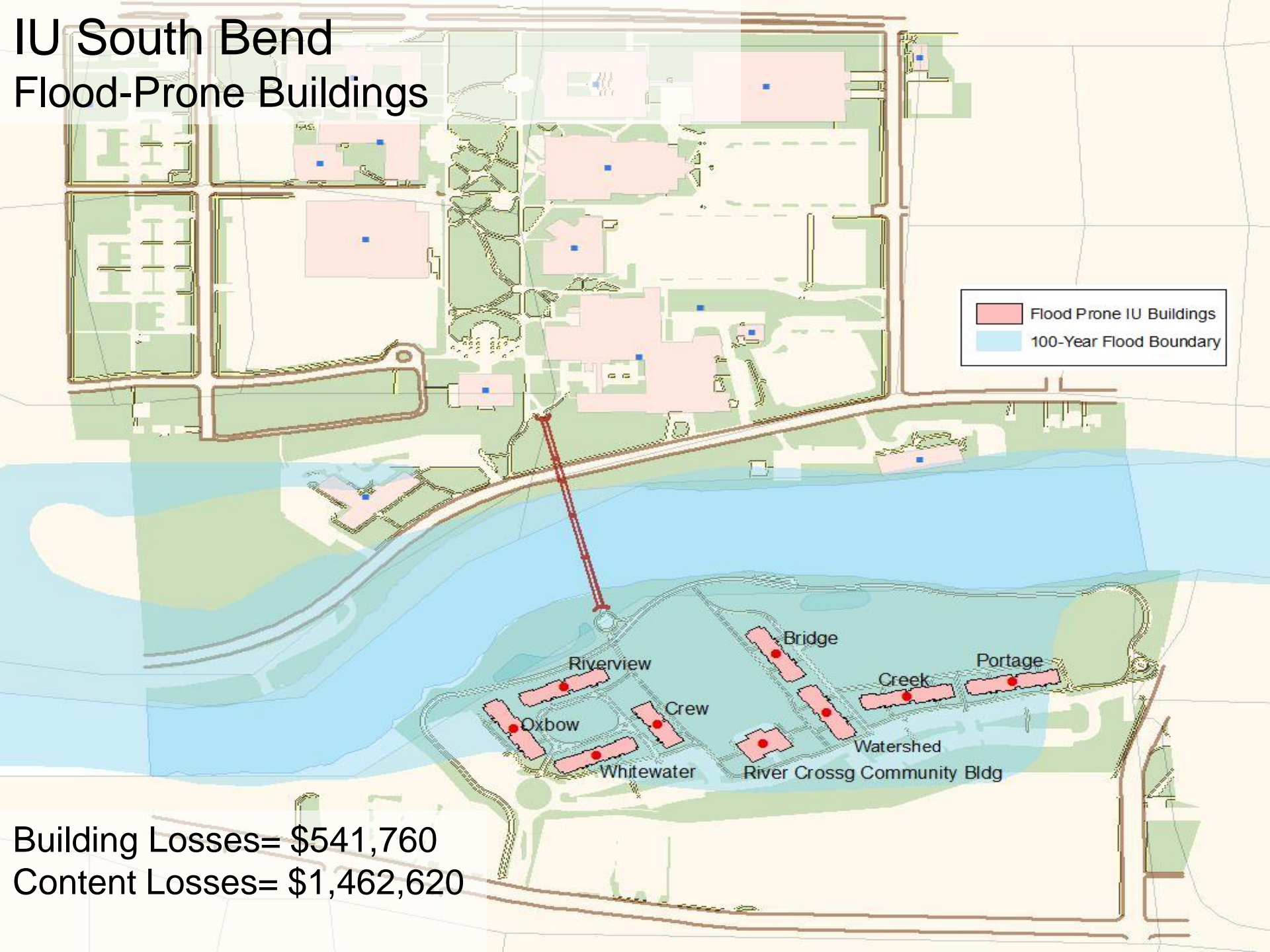
What is it and why do we use it?

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!	

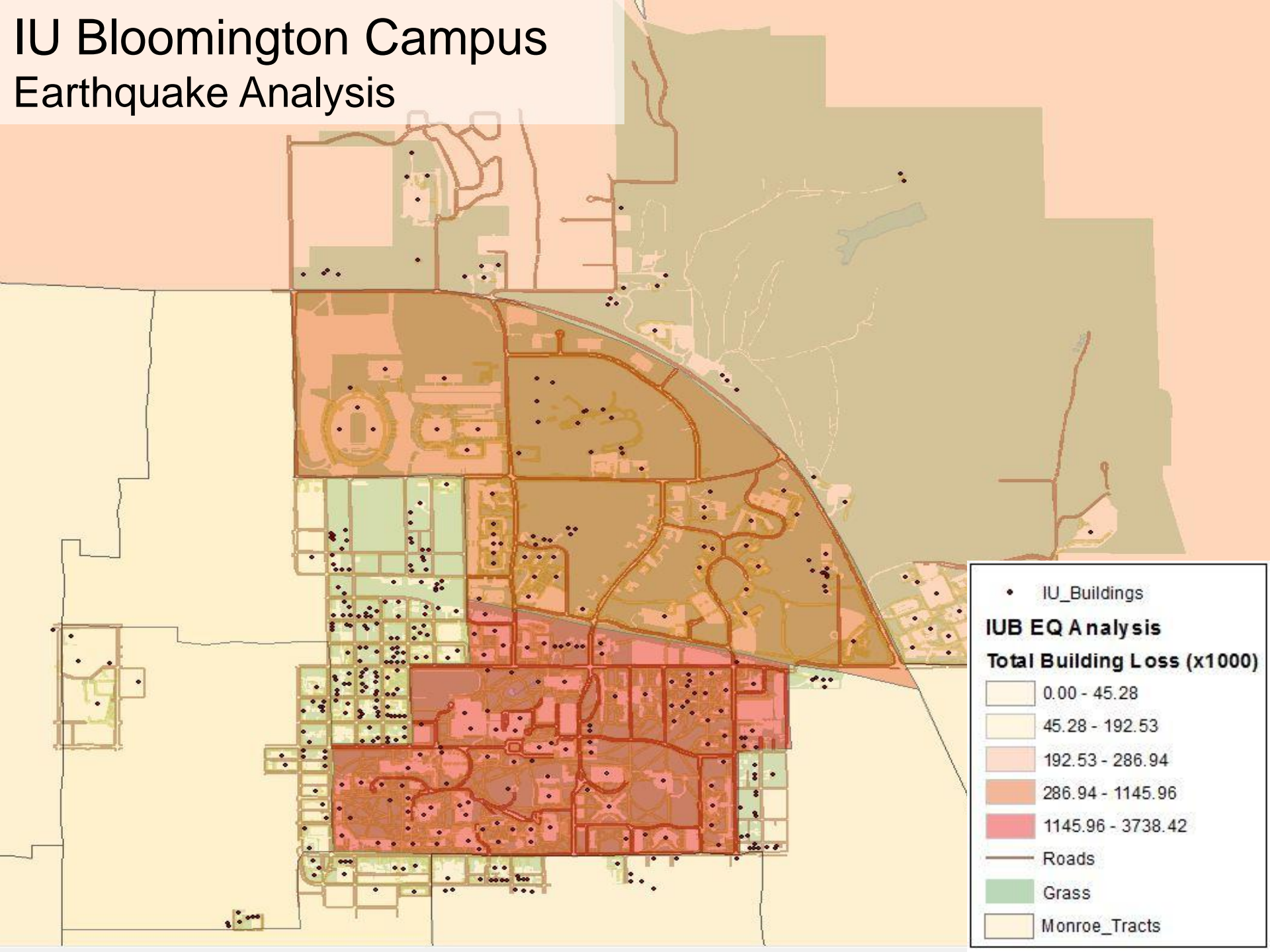
IU South Bend Flood-Prone Buildings



Flood Prone IU Buildings
100-Year Flood Boundary

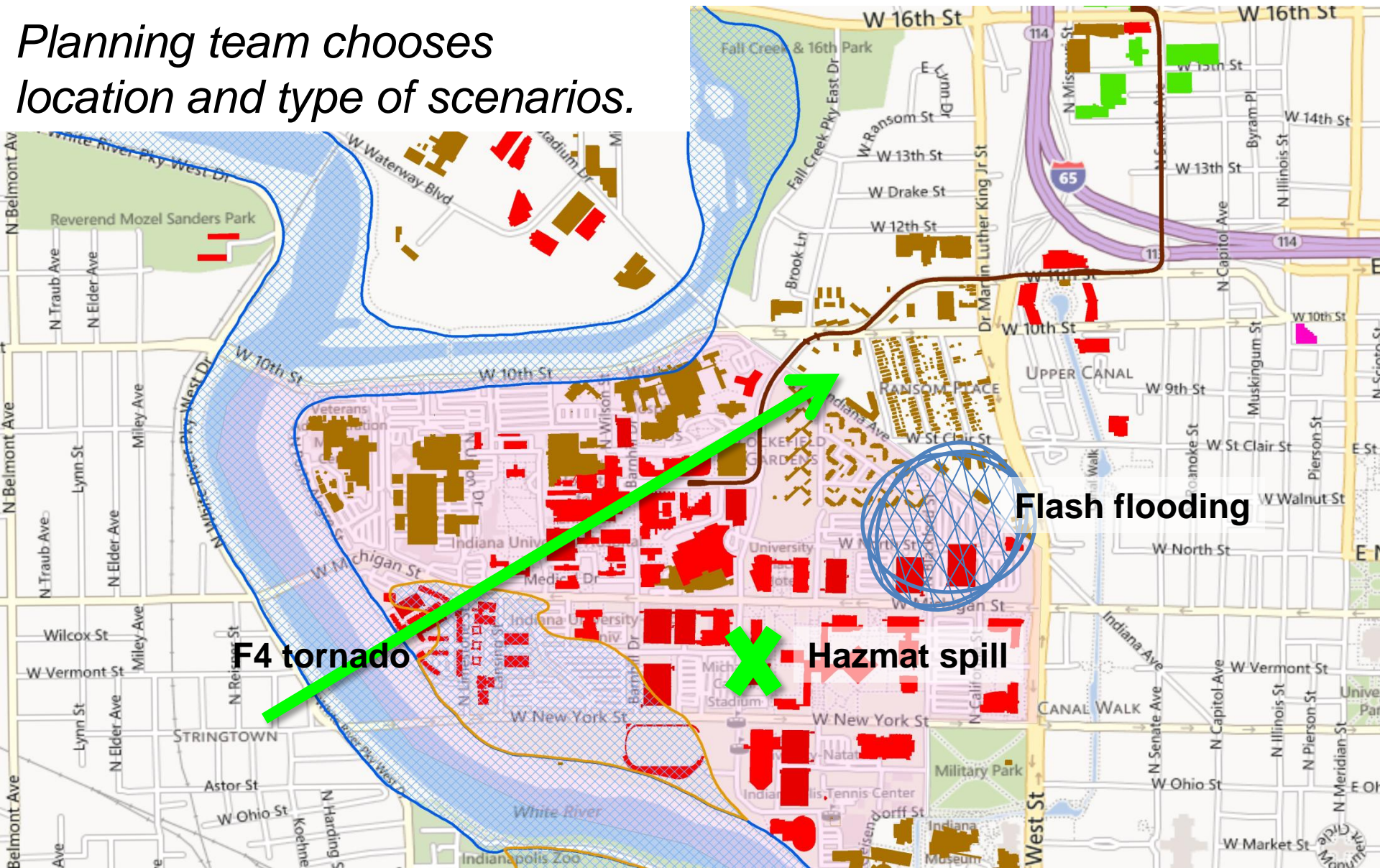
Building Losses= \$541,760
Content Losses= \$1,462,620

IU Bloomington Campus Earthquake Analysis

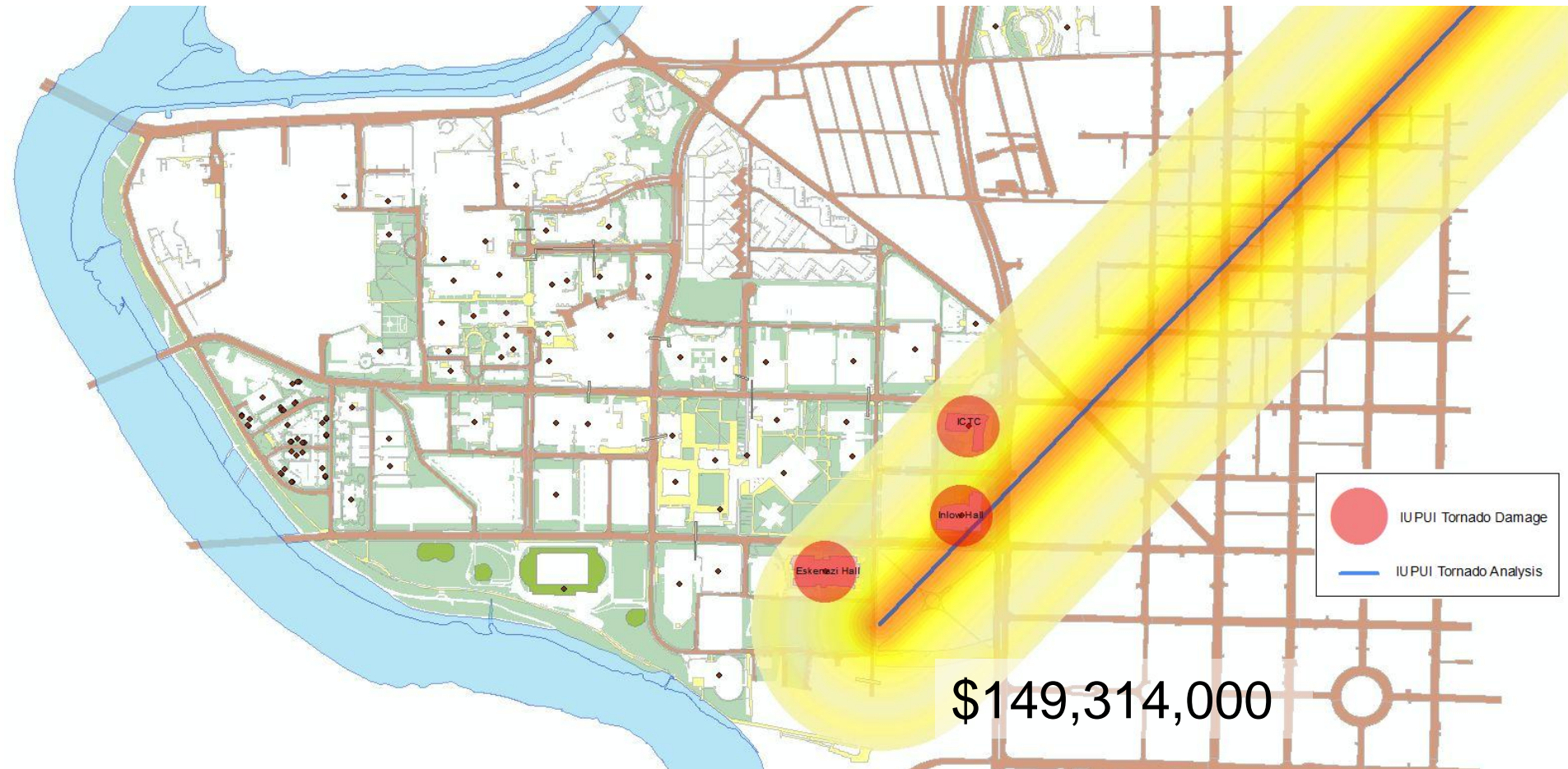


Other GIS analyses

Planning team chooses location and type of scenarios.

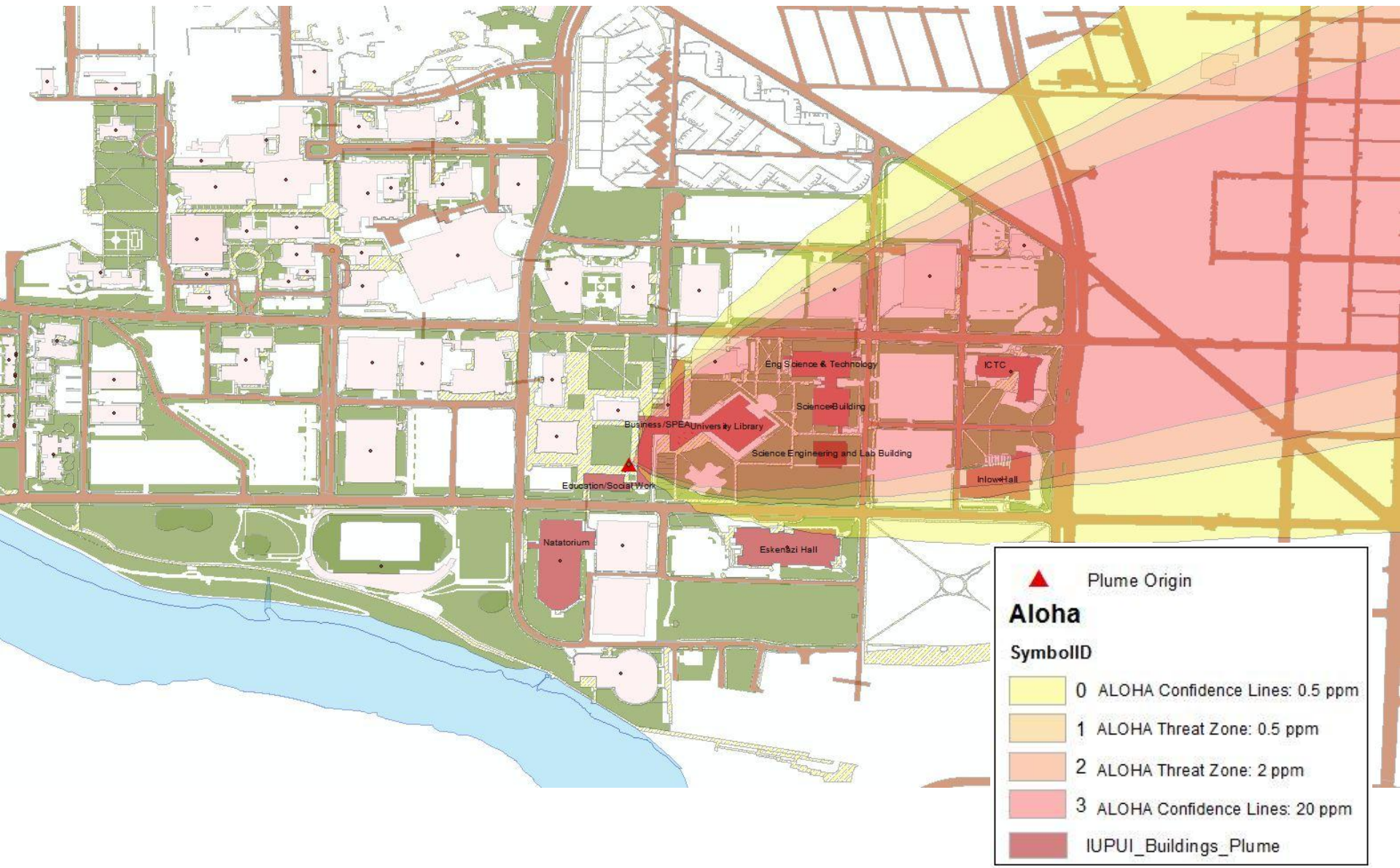


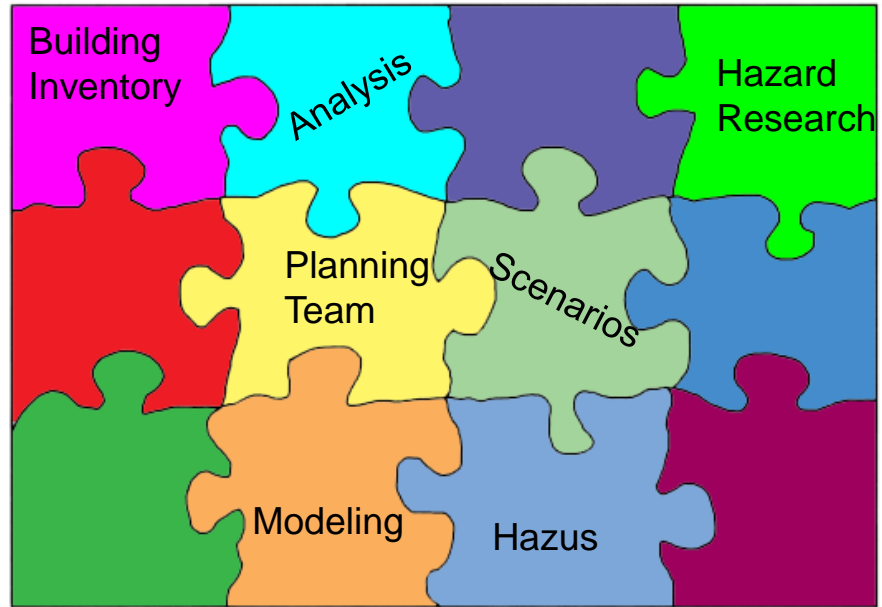
IUPUI Campus Tornado Analysis



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

