THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

Knowledge that will change your world

Using GIS to Visualize & Compare Crime Incidence With Perception

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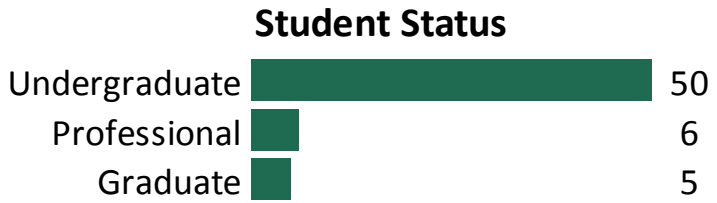
Overview

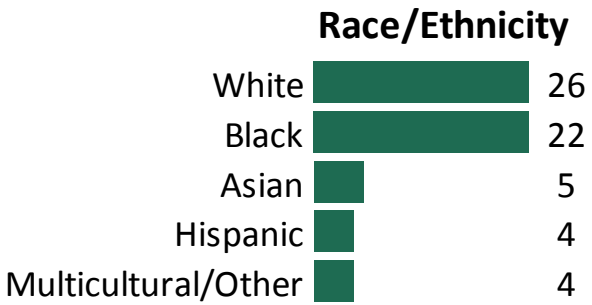
- Phase I: Perceptions of Risk on Campus
- Phase II: Crime Incidents on Campus
- Phase III: Integrative Analysis of Phases I & II
- GIS Data Visualization Lessons Learned
- Next Steps

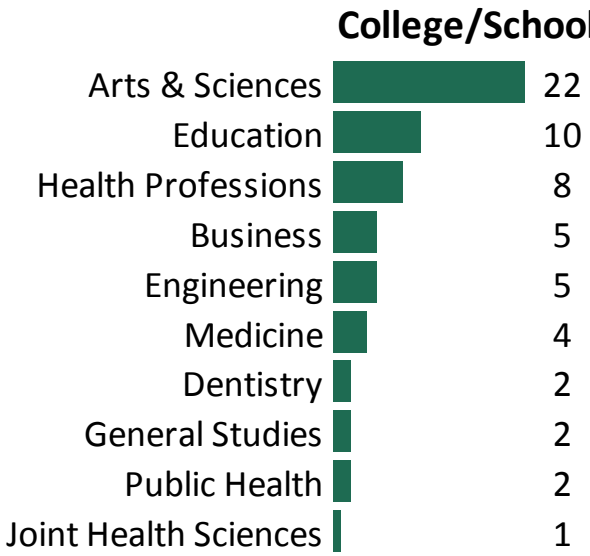
Phase I: Perception of Risk on Campus

- Focus Group Mapping Activity
- Hot Spot Analysis

Focus Groups (n=61)



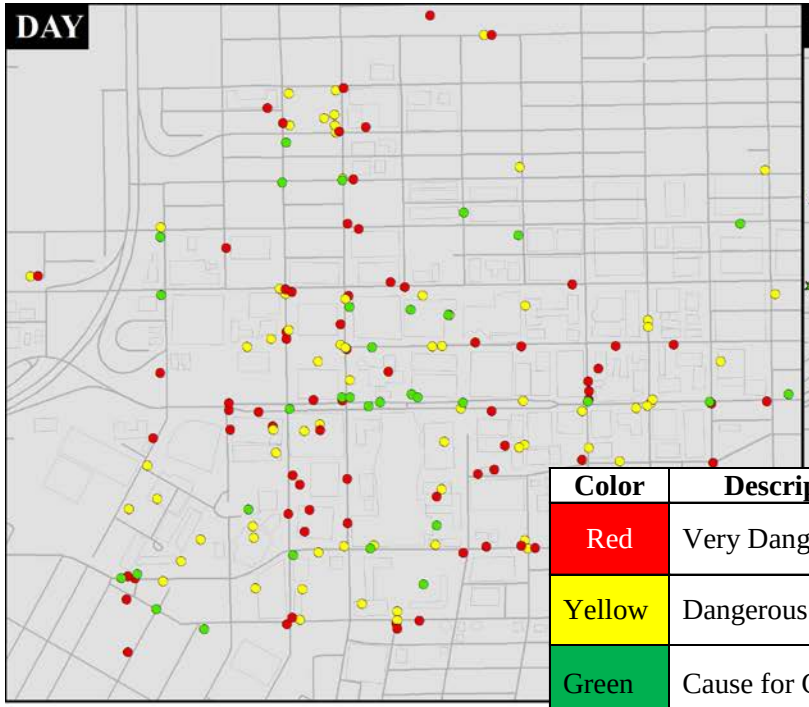


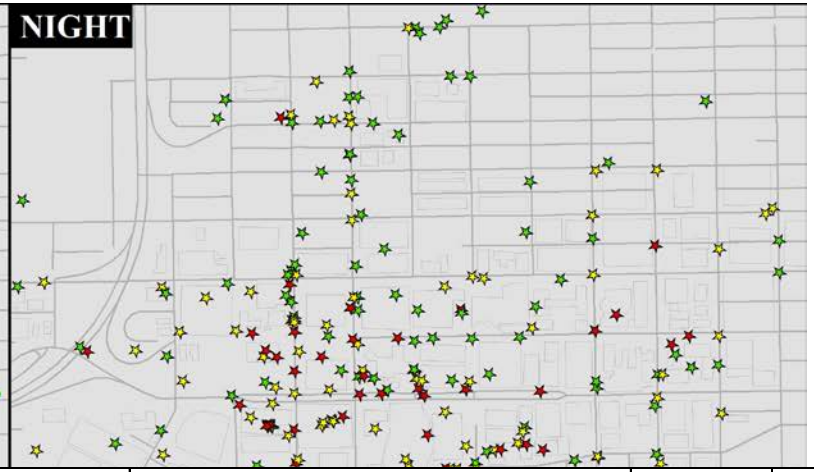


Interview Protocol

- How safe do you feel walking around (institution)?
- How does this perception differ at various times throughout the day (e.g., morning, afternoon, evening)?
- In general, what would help you feel more safe?
- Take your colored dots and indicate “hotspots” on the map related to your concerns about campus safety (Day & Night spots)
- Looking at the identified spots, what can we do to help you feel more secure at each location?
- Do you have other observations or comments?
- What is the best way to communicate with you regarding campus safety?

Focus Group Mapping Exercise





Color	Description	Connotation	Day	Night
Red	Very Dangerous	“I try to avoid this place”		
Yellow	Dangerous	“I am very cautious if I have to go here”		
Green	Cause for Concern	“This place makes me nervous”		

Phase II: Crime Incidents on Campus

- Data collection & specifications

- Hot Spot Analysis

Crime Incident Data

- Crime data from June 2009 to December 2011 was provided by campus police

YEAR	CRIME INCIDENTS
June -Dec 2009	264
Jan – Dec 2010	489
Jan - Dec 2011	468
TOTAL	1,221

Crime Incident Data

Uniform Crime Reports (UCR) Categories	Crime Type	Day Crime Incidents	Night Crime Incidents	TOTAL
Part I: Violent Crimes	Murder/Non-Negligent Murder	0	1	1
	Forcible Sexual Offenses	2	3	5
	Robbery	6	6	12
Part I: Property Crimes	Arson	0	4	4
	Burglary	30	13	43
	Misdemeanor Larceny	398	170	568
	Felony Larceny	264	100	364
	Motor Vehicle Thefts	14	10	24
Part II: All Other Crimes	Non-Forcible Sexual Offenses	3	2	5
	Pedestrian/Vehicle Accidents	4	10	14
	Unlawful Breaking/Entering of a Vehicle	105	76	181
	Total	**826**	**395**	**1,221**

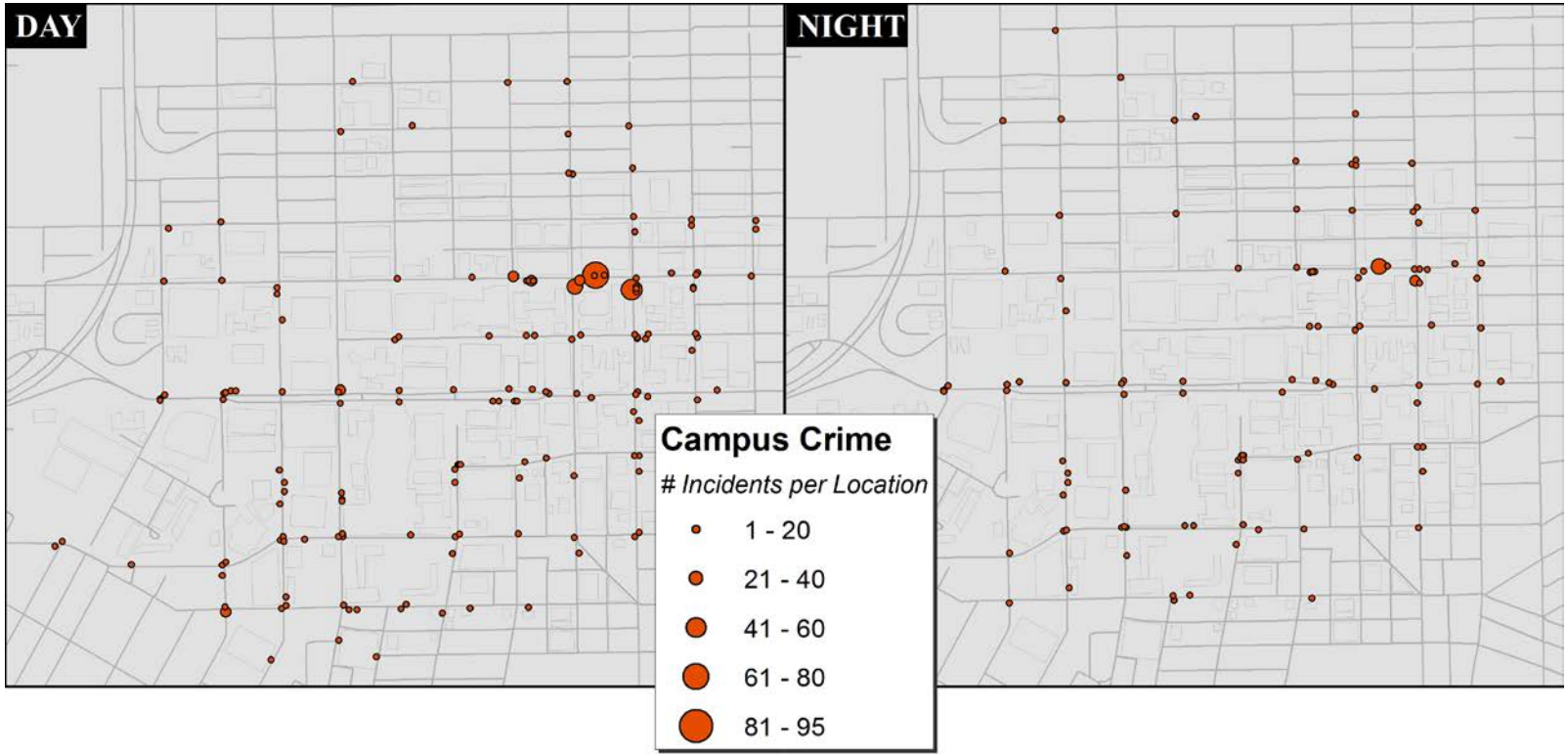
Crime Type Severity Survey

- Students were asked to rate how various types of crimes would make them feel
- Response options were spread across an 9-point Likert-type scale

Crime Type Severity Survey Results

CRIME TYPE	M	Z Score	Z Score (recentered at 3)
Arson	8.42	1.38	4.38
Burglary	8.13	1.13	4.13
Felony Larceny	7.63	0.69	3.69
Misdemeanor Larceny	7.46	0.54	3.54
Robbery	7.29	0.4	3.4
Non-Forcible Sexual Offenses	7.08	0.21	3.21
Forcible Sexual Offenses	6.63	-0.18	2.82
Murder/Non-Negligent Murder	6.21	-0.54	2.46
Motor Vehicle Thefts	6.21	-0.54	2.46
Unlawful Breaking and Entering of a Vehicle (UBEV)	5.63	-1.05	1.95
Pedestrian/Vehicle Accidents	4.50	-2.03	0.97

Campus Crime Incident Data



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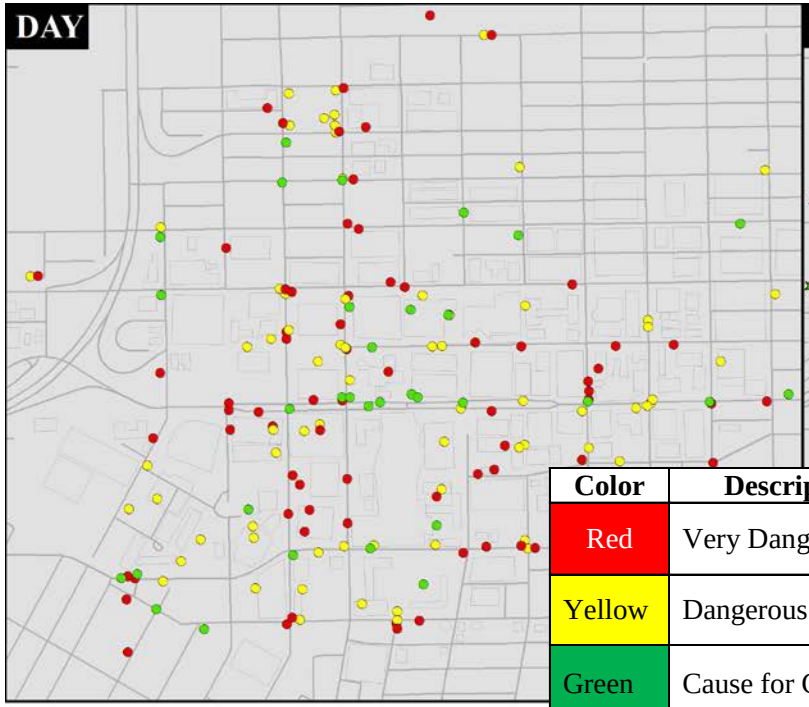

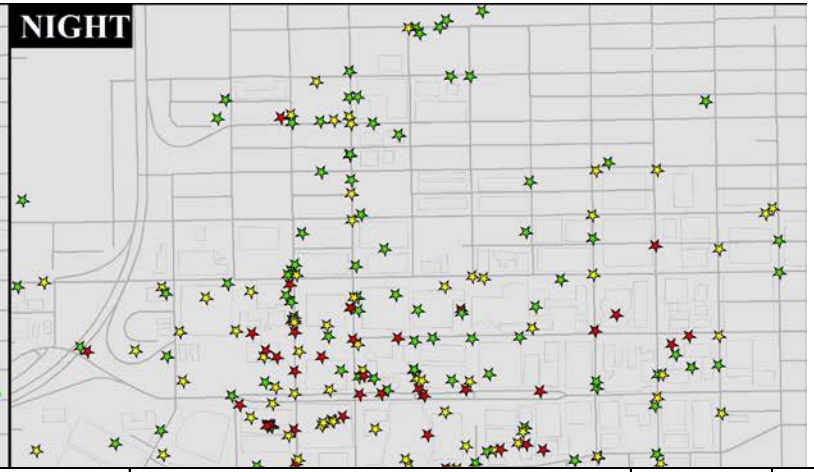

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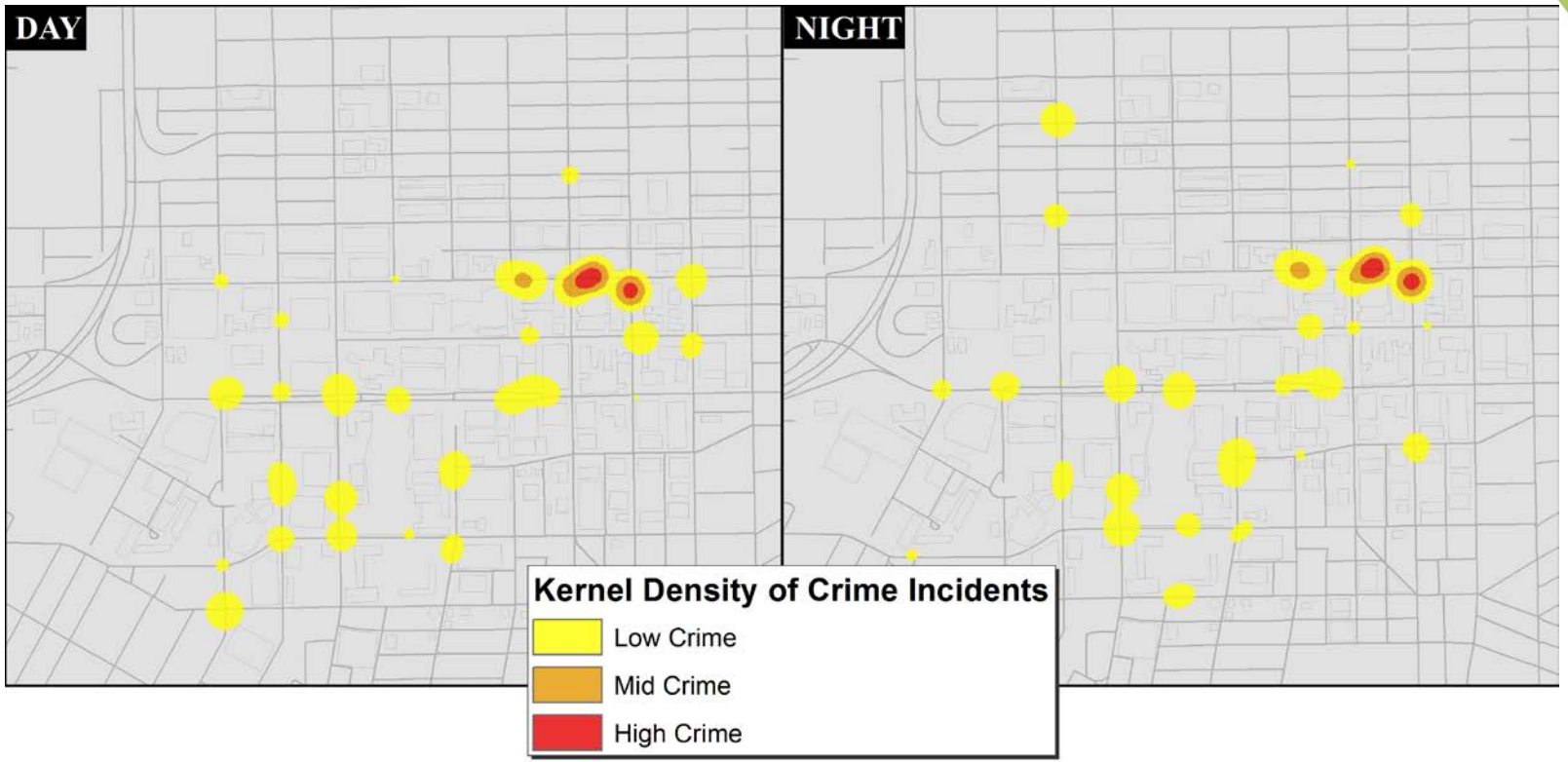
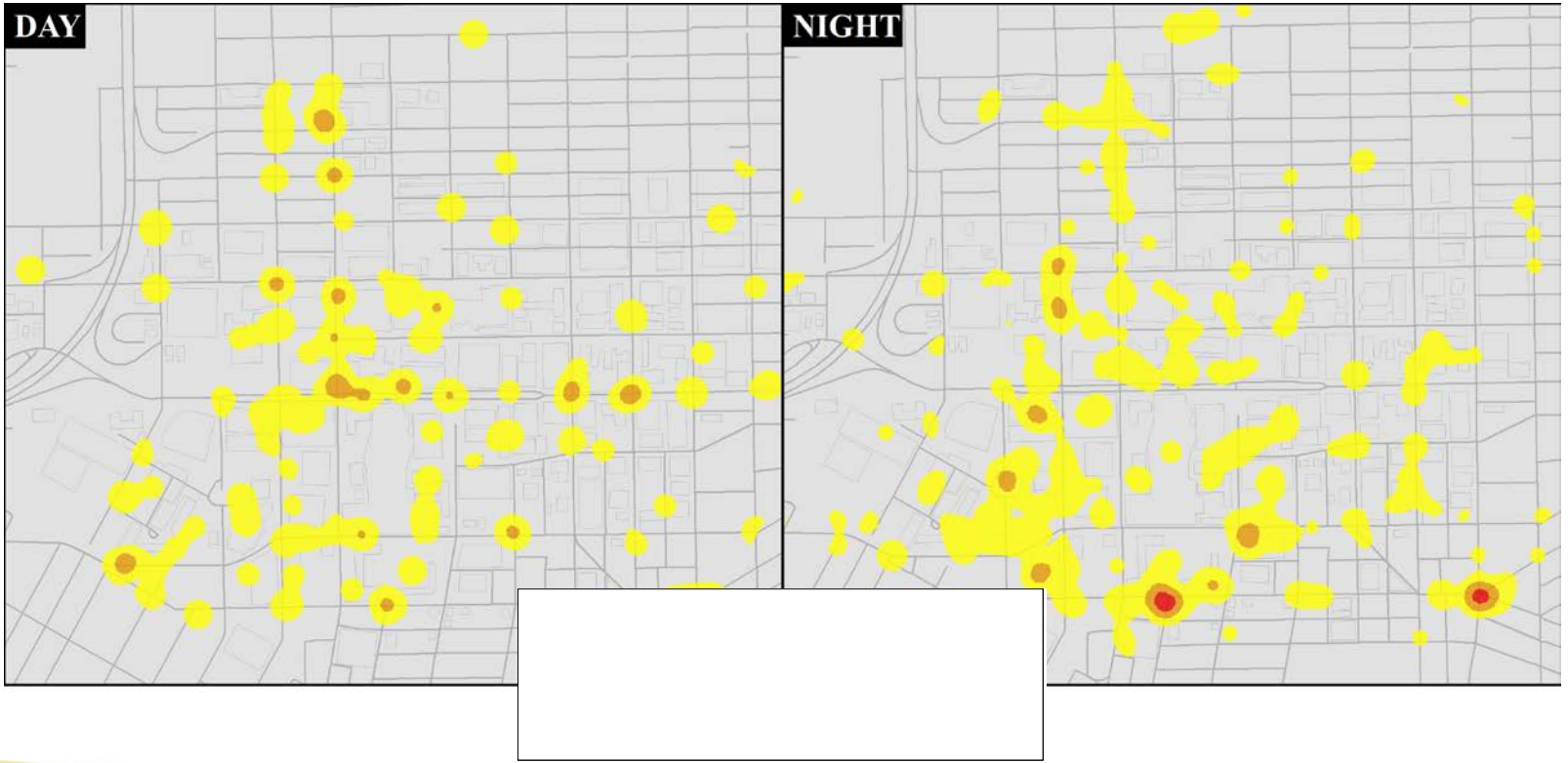
Hot Spot Analysis of Crime Incidents



Hot Spot Analysis of Perceived Risk



Phase III: Integrative Analysis

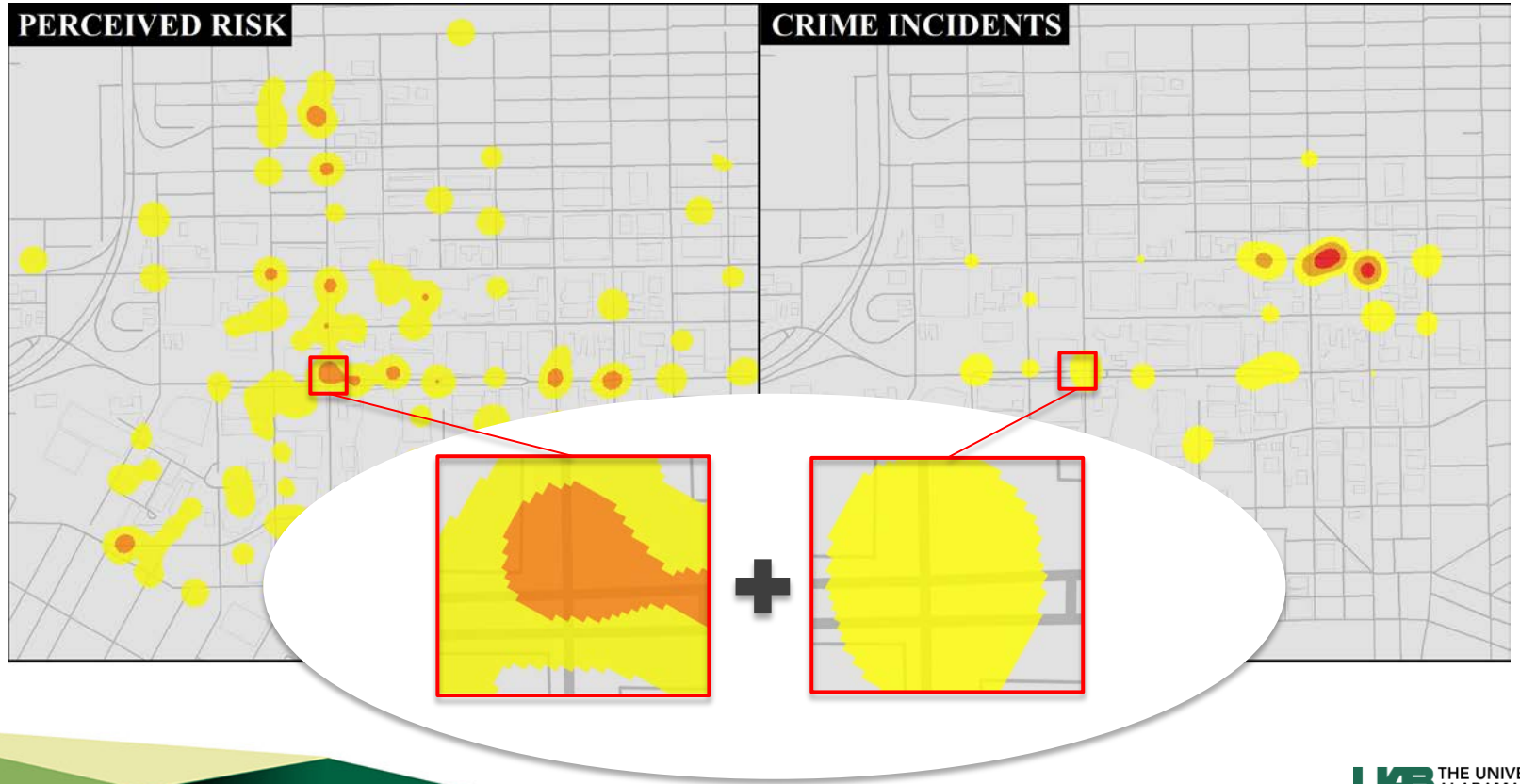
- Where do students' perceptions of unsafe areas align with actual unsafe areas on campus?

Phase III: Integrative Analysis

Potential outcomes from the analysis:

1. Locations of ***high perceived risk***, but ***low crime incidents***.
   a. Students are unnecessarily concerned as no safety risk appears to be present.
   b. Priority area for education/media–public relations intervention to alleviate unnecessary concerns.
2. Locations of ***high crime incidents***, but ***low perceived risk***.
   a. Students are unaware of a potential real threat.
   b. Highest priority for safety intervention.
3. Locations of ***high crime incidents*** and ***high perceived risk***.
   a. Students are justifiably concerned about a location.
   b. High priority for safety intervention.

Integration Methodology

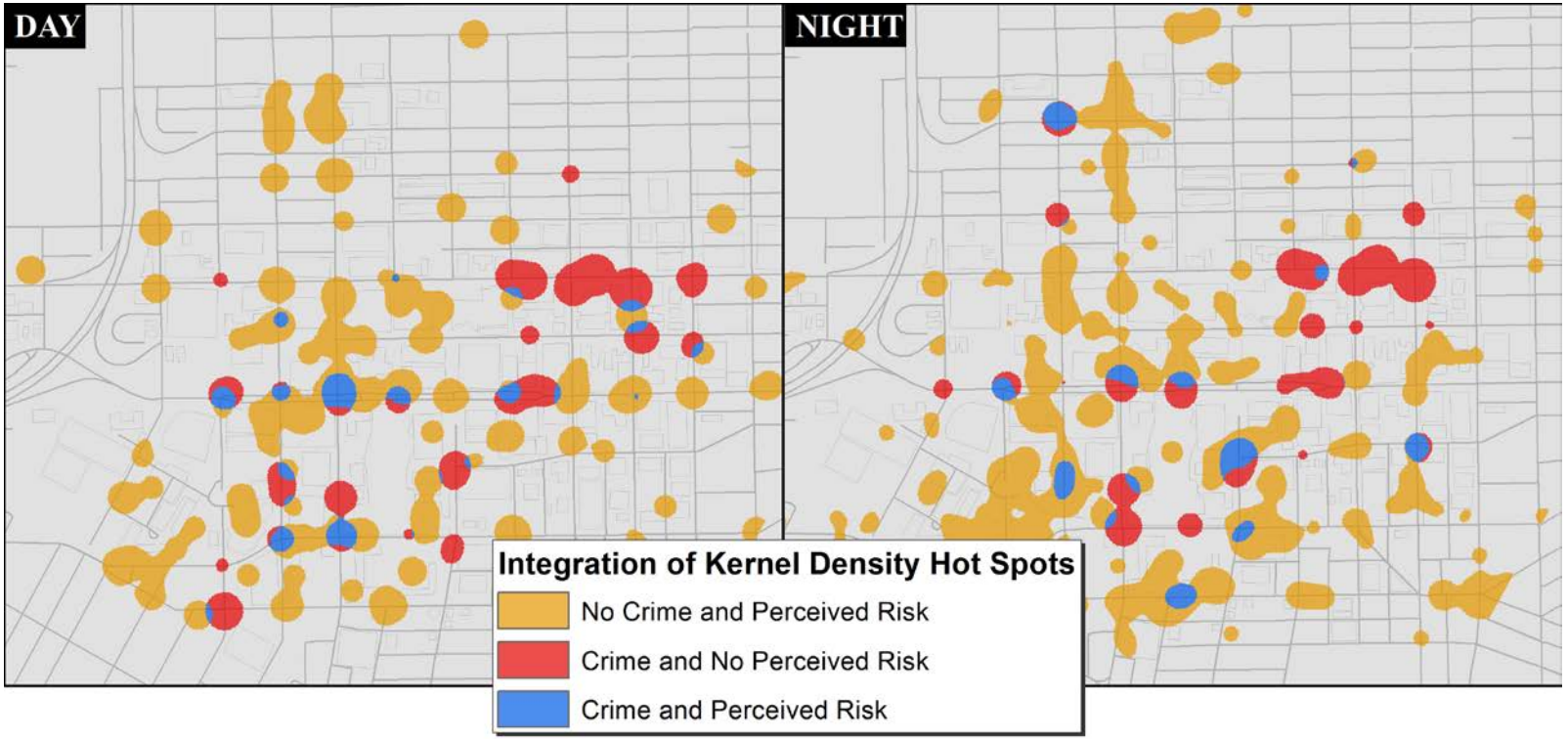


Raster Algebra

- Kernel Density layers were reclassified (cells assigned new values)
- Allows for easy identification and symbolization of integrated area

	RISK VALUE	CRIME VALUE
None	0	00
Low	1	10
Medium	2	20
High	3	30

Integration of Hot Spots



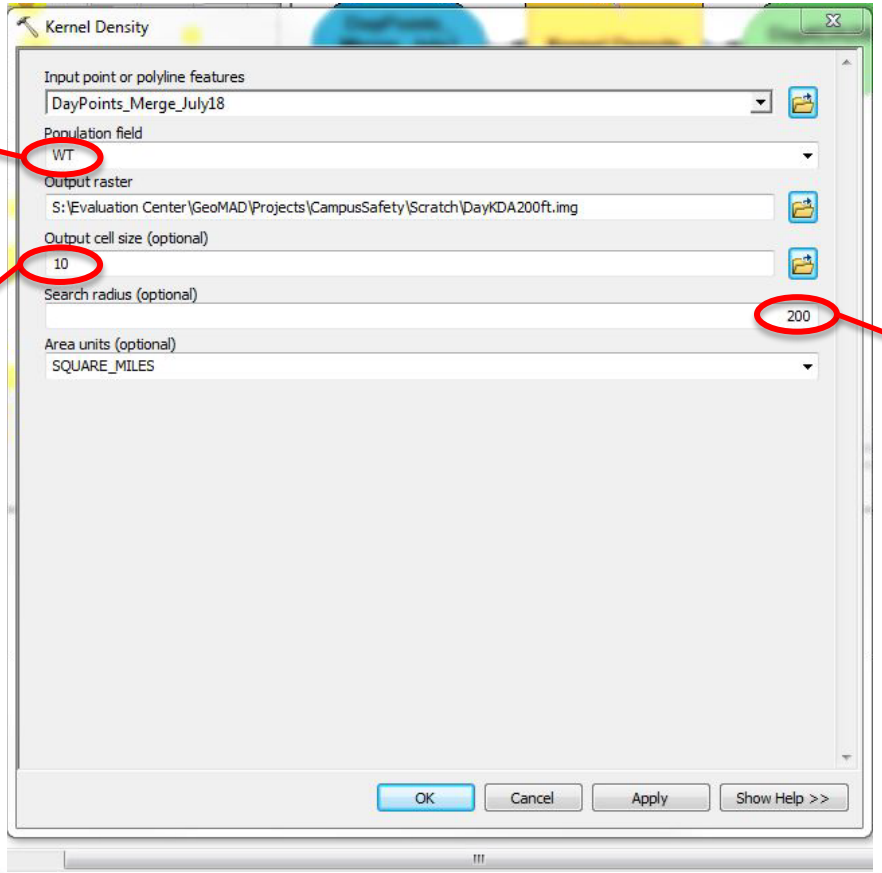
GIS Data Visualization Lessons Learned

- Tool parameters matter
- Symbology classification matters

Tool Parameters Matter

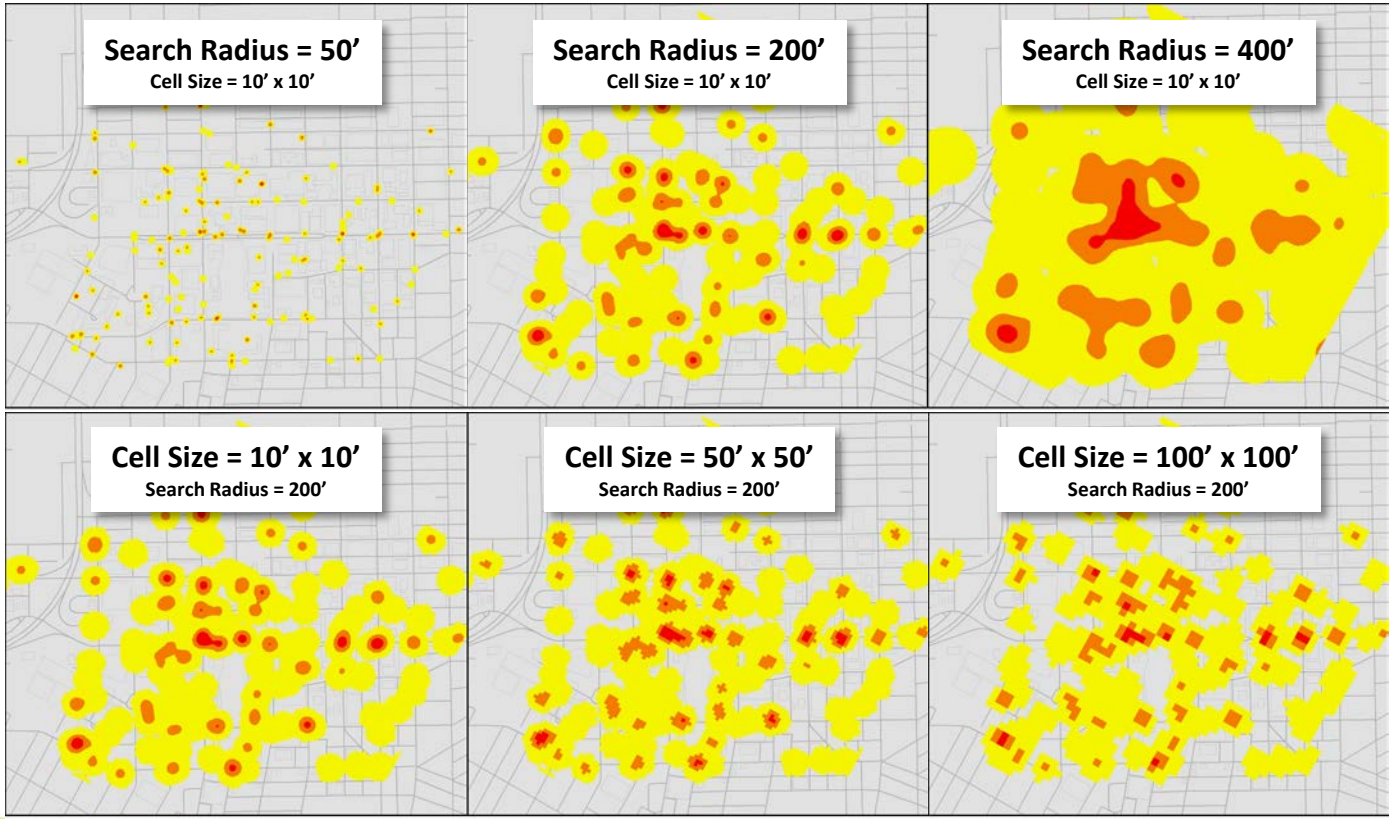
How each data point is weighted in the kernel density layer

Output cell size
=
Raster/Image Resolution

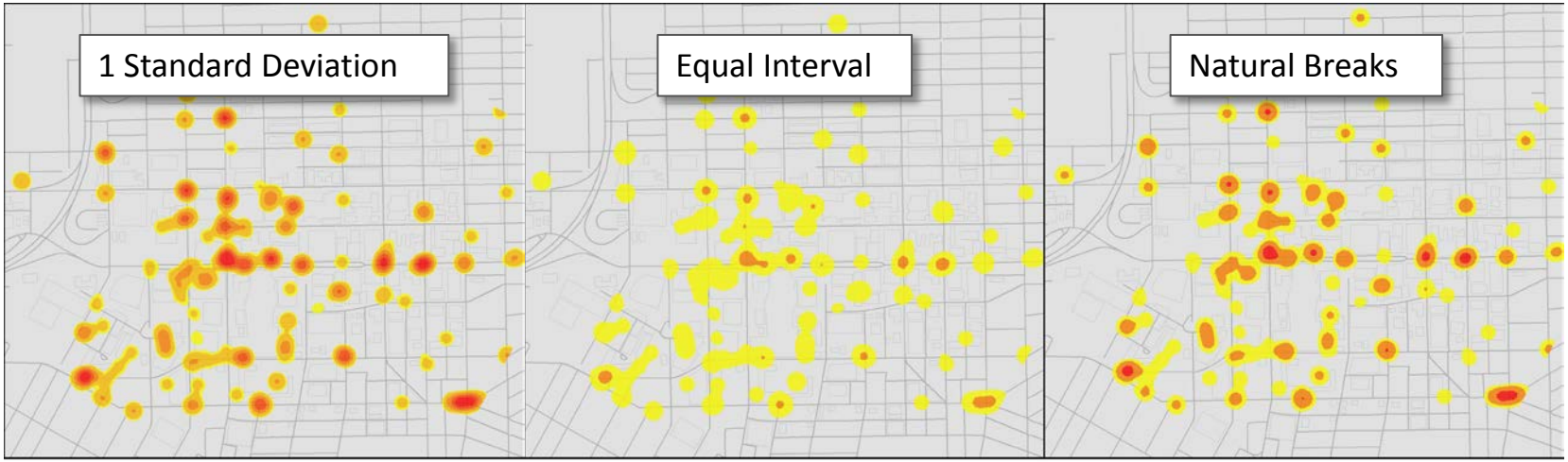


Search radius
=
Bandwidth or kernel

Tool Parameters Matter



Symbology Classification Matters



Next Steps

- Gain access to more comprehensive crime data
- Comparison of other hot spot method results

  (i.e. KDA vs. Getis-Ord Gi* vs. Local Moran's I)

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For copies of this presentation, please go to:
www.soph.edu/csch/evaluation

For Ariann's Eye's Only…

Question: Crime KDA map – why is it not showing there were more crimes during the day (over double) than night in the kernel density map?

Short Answer: We converted our kernel density values standardized z-scores.

Long Answer: We converted the kernel density values to z-scores so that we could work from a standardized scale. However, Wei and I just talked this out…z-scores are not ideal for comparing maps side by side (at least if the data is on a different range and with different means and standard deviations). Hindsight is 20/20…if we were able to do this over, we would have used the bare density values and placed them on the same data range/symbolization in order to show the comparison between day and night more accurately.

- In summary, z-scores are bad for comparison maps – the original values are on different scales…symbolized scales need to be the same for any comparison. Once the values are converted to z-scores, you lose the flexibility of displaying the data on the same scale. We made a mistake in our data visualization… ☹