GEO242 (Geographic Information Systems II)

Winter Quarter 2011-2012 |Department of Geography | DePaul University

When: Mon/Wed 2:40-4:10 pm Where: SAC 224 (GIS Lab), LPC

1. Course description

GEO242 is an intermediate-level GIS course. Students will work together as a group to conduct GIS project for community-based organizations (CBO) in Chicagoland following best practices of project management. GEO242 focuses on understanding how GIS is used in organizations, and developing geographic database. Major topics include GIS needs assessment, spatial database design, data collection, geospatial data quality, and spatial analysis. The class is conducted through lectures, group discussion on project, and hands-on lab activities using ArcInfo 10. Prerequisite is GEO241 or instructor's consent.

2. Potential GIS Project—see Appendix A in p. 9-10 for more detail

- Access to emergency food in Little Village and Pilsen (proposed by Enlace Chicago)
- Community-based green initiatives in Chicago (Institute of Cultural Affairs in the USA: ICA-USA)
- Community asset mapping in Bronzeville (Bronzeville Visitor Information Center: BVIC)
- Community gardens in Little Village, Humboldt Park, and Rogers Park (DePaul's Steans Center)
- Animal vaccination (and rabies control) in IL Cook County (Cook County Animal and Rabies Control)
- Safe Haven mapping in Little Village (Enlace Chicago)*(:to be confirmed later)
- Youth program and green space in Chicago or community garden in Bronzeville (Camp Butterfly)*

3. Learning Goals

- Discern the interplay between GIS and organization by observing how geographic information needs arise in organizational contexts, and helping community organization to meet geographic information needs using GIS tools
- Get versed in constructs of database design for GIS, including entity-relationship modeling, relational schema, and geodatabase
- Grasp GIS data collection processes from primary data capture (e.g., GPS), and secondary data capture (e.g., digitizing, rubber-sheeting) to data transfer (e.g., attribute data import, geocoding) by developing GIS database on your own
- Understand elements related to data quality, including resolution, accuracy, completeness, and consistency
- Comprehend how basic methods of spatial analysis—including query, measurement, buffering, vector overlay, and raster overlay—work, and when to use them

4. Learning Outcomes—After completing all requirements of GEO242, you should be able to

- Assess geographic information needs, and design information products related to GIS given an organizational context
- Design database using entity-relationship modeling techniques, and present the database design in entity relationship diagram (ERD) linked to relational model
- Develop geodatabase by applying data collection techniques, including GPS data import, heads-up digitizing, coordinate transformation, geocoding, and topology validation
- Assess the fitness for use of data by checking components of spatial data quality, including calculating measures of accuracy
- Conduct basic spatial analyses appropriate for a given problem, including query, spatial join, buffering, and overlay in both vector and raster environments

5. Course Outlines and Tentative Schedules

Date	Topic	In-class activities	Project milestone
1.04	Course overview	Meet with CBO representatives	
1.09	1. Project management	1. Project management techniques	
1.11	2. Managing GIS	2. Explore data classification methods	P0
1.16	3. Needs assessment	3. Work with attribute table	
1.18	4. Database design	4. Draw ERD in MS Visio, and import a flat file in MS Access	
1.23	5. Geodatabase	5. Explore geodatabase	
1.25	6. Data collection	6. Import GPS data in DNR Garmin	
1.30	7. Coordinate transformation	7. Heads-up digitizing, rubber-sheeting, and topology validation	P1 (needs assessment)
2.01	Meet with CBO reps. 8. Geocoding	8. Geocoding, merging, and adding extended capabilities to geodatabase	
2.06	9. Data quality	9. Calculate Root Mean Square Error	
2.08	10. Basic spatial analyses	10. Conduct spatial join	
2.13		11. Conduct suitability analysis in a vector environment	P2 (system requirements)
2.15		12. Conduct suitability analysis in a raster environment (Spatial Analyst)	
2.20	Project		
2.22	Project		P3 (data acquisition)
2.27	Project		
2.29	Project		P4 (data analysis)
3.05	Project	Map contest (submit a map for review)	
3.07	Project		
3.12	Presentation before CBO reps.		P5 (presentation) P6 (final report)
3.19	Final exam 2:45-5:00 pm		

6. Grading scheme

Components	Points (out of 100)	Description
Activities	24	Each is worth 2 points
Exam	20	Written part and practical part during an exam week
Participation	10	Attendance, class participation, and group discussion
Project	40	Consists of six project milestones
Peer review	6	Based on evaluation form filled out by peers in your project group

Activities: Learn how to use ArcGIS (except for activities 1 and 4). All activities are individual work except for activity 1. Activities will be completed in class when instructors are present under most circumstances. If you can't complete activities in class, it is expected that you will complete them on your own after class—go to Richardson Library or work with a lab assistant during lab hours (see Section 8) in GIS lab.

Exam: Only one exam during a final exam week. Final consists of a written part and practical part. The format of a written part is essay (review Section 7 for learning objectives). The practical part tests ArcGIS skills. In the

practical part, you will complete tasks or answer questions using ArcGIS without instruction. Exam is closed-book, but you are allowed to refer to ArcGIS help. You can bring an index card that lists GIS instruction for practical part of the final.

Participation: assigned according to the criteria below

- A (9 - 10) = Student is present in all or nearly class meetings, and prepared, at all times, to respond to questions. Student is an active participant in small group activities, in and out of class, and in class-time activities stays on task.
- B (8 - 9) = Student participates as above, 75% of the time.
- C (6.5 - 8) = Student does not volunteer comments; responses demonstrate vague familiarity with course readings. Student is a passive member of small group activities and/or does not stay on task during class-time activities.
- D (5 – 6.5) = Student never volunteers, cannot respond to direct questions, keeps silent during class discussions and is unable to summarize readings if asked.
- F (0-5) = Student misses many class sessions and/or sits silently in classes when present, or is disruptive and non-participatory in the classroom.

Project: A group of 3-5 persons will work together throughout the quarter in and outside of the classroom to achieve goals that groups set out in conjunction with CBOs that groups work for. Project is broken down to the following milestones:

Milestone	Points	Description
P1 (needs assessment)	4	Assess geographic information needs by defining goal, objectives, and information products
P2 (system requirements)	4	Specify data requirements and processing requirements
P3 (data acquisition)	4	Describe characteristics of data acquired or created, and assess the fitness for use of data
P4 (data analysis)	4	Lay out the plan for data analysis and map design
P5 (presentation)	4	Present results to clients; submit a presentation file
P6 (final report)	20	Final report consists of introduction, P1, P2, P3, P4, results and conclusion. Incorporate any feedback into a final report; Submit a document file and source/output data

Grading scale: A = 93-100%; A- = 90-92.99%; B+ = 87-89.99%; B = 83-86.99%; B- = 80-82.99%; C+ = 77-79.99%; C = 73-76.99%; C- = 70-72.99%; D+ = 60-69.99%; D = 50-59.99%; F = 0-49.99%

Late Work Policy: Late work will be accepted with 25% of the total grade deducted for each day being late. Extensions can be requested if needed, but will be only granted under understandable circumstances (e.g., clients did not provide data in time; you had to be in a funeral). This policy applies to activities and project only.

Makeup Exam/Incomplete Grade Policy: A makeup exam or an incomplete grade can be arranged or granted only when credible dire and documented medical or family situations arise and these circumstances are communicated in a timely fashion.

Attendance/Absentee Policy: Consistent with university's policy, all students are expected to attend class meetings. Unless absence is explained on medical or compassionate grounds (documentation is required), absence from any classes is grounds for a grade adjustment.

7. Detailed plan of the class: synopsis, readings, and learning objectives

Module 1: Project Management

Project management skills are increasingly valued skills today. A common problem in project management is a poorly *defined* project, and a poorly *planned* project. The *Statement of Work* (SOW), and the *Work Breakdown Structure* (WBS) are suggested as antidotes to these problems. This basically comes down to asking important questions—why, what's included, and what is deliverable—upfront, and breaking down big tasks into manageable tasks (i.e., divide-and-conquer).

Read Verzuh. 2008 The Fast Forward MBA in Project Management. Wiley: 13-14, 21-24, 6-9, 60-68, and 125-142

1) What are distinguishing characteristics of *project* compared to ongoing *operations*? Come up with at least two examples of project—one from your life, and another from your work.
2) You, as a project manager, are likely to conduct tasks related to *defining* project, *planning* project, and *controlling* project. Describe these three project management functions in detail, and discuss why each function is important, and how each function interacts with one another.
3) Why do you think so many projects fail? Name three *project success factors* by reflecting on reading and your experience if any.
4) Define four elements of the *Statement of Work* (SOW)—*purpose*, *scope*, *deliverables*, and *objectives*—and discuss why spelling out these four elements in the early stage of project can be conductive to your project onward.
5) Describe how the *Work Breakdown Structure* (WBS) is constructed (including where to start and where to stop), and discuss at least two advantages of the WBS that may bring to your project.

Activity1 (Project Management): write the SOW, and sketch out project plan by applying the WBS with project group members.

Module 2: Managing GIS

While project management techniques will help you keep on track, it doesn't guarantee the success of project if *organizational contexts* are not taken into consideration. In this regard, it is important to ask "is this project worthwhile?" before project begins, and "is this project success?" after project ends. In this module, we will look into issues related to *rationalizing* GIS project and *assessing* GIS project.

Read a) Longley et al. 2010. Chapter 17 (Managing GIS) of "Geographic Information Systems and Science". The 3rd edition. Wiley: 427-434; b) Obermeyer and Pinto. 2008. Managing Geographic Information Systems. The 2nd edition. Guilford Press: 81-92; c) Slocum et al. 2009. Chapter 4 (Data classification) of "Thematic Cartography and Geovisualization". The 3rd edition. Prentice Hall: 57-75

6) Examine different cases in which GIS is used in government (Longley Table 17.1), and discuss how each case brings the *benefit* to the organization. How will you rationalize your group's project?
7) Discuss different levels in which *implementation success* can be defined by drawing from reading and your experience if any. How will you go about assessing your project after this quarter is over?
8) Describe the following four data classification methods—equal interval, quantile, natural break, and standard deviation, and discuss advantages and disadvantages of each data classification method

Activity 2 (Prism Mapping): make choropleth maps showing % Hispanics in Illinois with different data classification methods, discuss pros and cons of data classification methods, and make a prism (3D) map.

Module 3: Needs Assessment

GIS project with poorly assessed needs would not be worth pursuing. Are there any systematic ways to assess user's needs? Note first that this depends on the *scope of GIS project*. Then, you can start by asking organization's mission (why they exist), *organization's function* (what they do), what *information products* they need, and what *data* and *processing* (operations) are needed to create those information products.

Read a) Tomlinson. 2003. Chapter 1 (GIS: the whole picture) of "Thinking About GIS". ESRI Press: 3-9; b) Huxhold. 1992. Needs Assessment. In Brown and Moyer eds. Multipurpose Land Information Systems: the Guidebook. FGCC: 16-1~16-38

9) Distinguish the *scope of GIS project* (or system), namely *single-purpose*, *departmental*, and *enterprise* GIS project/system. What is the scope of your GIS project?
10) List functional needs of the organization you work for given the scope of your project by writing sample *geographic information needs inventory form* (Huxhold Figure 16-3)
11) List *data needs* and *processing needs* in your project given application needs (Huxhold Figure 16-8).
12) Explain how the *functional needs* of agency (what they do) determine other needs (Figure 16-1) using examples from your project.

Activity 3 (Change Mapping): make a map showing population change in Chicago from year 2000 to 2010, and answer questions regarding population change at different geographic scales using table statistics and query.

Module 4: Database Design

As you clarify on data needs by conducting needs assessment, it will become necessary to present 'how data is organized' (or your model of the *miniworld*) concisely and systematically to stakeholders. A popular method is to draw *entity relationship diagram* (ERD). In this module, you will learn popular database design techniques (entity-relationship modeling) linked to *relational* data model, mainly oriented toward attribute (non-spatial) data.

Read Shekhar and Chawla. 2003. Chapter 2 (Spatial concepts and data models) of "Spatial Database: A Tour". Prentice Hall: 34-41

13) Differentiate three steps of database design—*conceptual*, *logical*, and *physical* database design
14) Describe elements of *entity relationship (ER) model*, including entities, attributes, relationships (including cardinality), and draw ER Diagram in Chen model (Figure 2.4) given examples
15) Describe constraints on the relational schema maintained to ensure the logical consistency of the data, that is *key constraint*, *entity integrity constraint*, and *referential integrity*
16) Describe how the ER model is mapped to the *relational model*

Activity 4 (Entity-Relationship Diagram): draw entity-relationship diagram in Crow Feet model with Visio, and import a flat file into MS-Access

Module 5: Geodatabase

Although *shapefile* may be still considered to be a *de facto* standard of geographic data format, *geodatabase* is rapidly replacing shapefile. GIS industry is moving in the direction amenable to *database management* (why do you think it is?). Geodatabase, a native data model of ArcGIS, represents that trend. Geodatabase is distinct from shapefile, is built on *relational* data model, and adds extended capabilities.

Read Zeiler and Murphy. 2010. Chapter 1 (Inside the geodatabase) of "Modeling Our World: The ESRI Guide to Geodatabase Concepts". The 2nd edition. ERSI Press: 2-19

17) What are three fundamental datasets that constitute *geodatabase*?

18) Describe constructs that extend capabilities of fundamental datasets, including *attribute domains*, *relationship classes*, *subtypes*, and *topologies*.
19) How is geodatabase different from shapefile, and *relational* data model (table), and what advantages does geodatabase offer over shapefile and table?

Activity 5 (Geodatabase): create geodatabase by importing from existing data, and add extended capabilities by creating (attribute) domains, relationship classes, subtypes, and topologies.

Module 6: Data Collection

What are options to create geographic data? There are mainly three options: one is to derive geographic data from existing attribute data (e.g., geocoding). The second is to derive it from secondary geographic data (e.g., digitizing). The third is to create data on your own from scratch (e.g., GPS data collection). We will focus on grasping overall process of GIS data collection, and importing GPS data into GIS.

Read Longley et. al. 2010. Chapter 9 (Data collection) of "Geographic Information Systems and Science". 3rd ed. Wiley: 229-243

20) Describe overall GIS data collection processes, by distinguishing and relating *primary data capture*, *secondary data capture*, and *data transfer*
21) Describe distinguishing characteristics of primary data sources such as *GPS*/survey *data* and *remotely sensed image* in terms of data model, resolution, and errors
22) Describe secondary data capture methods, including *scanning* and *digitizing*, and describe types of errors involved in those methods

Activity 6 (Primary data capture): collect geographic features in LPC using a GPS receiver with *track log* (line and area data) as well as *waypoint* (point data) options, and import GPS data into GIS with DNR Garmin

Module 7: Coordinate Transformation

Geometric distortion is common in raw geographic data. Aerial photos (primary data capture) do not represent a stereographic view prior to *photogrammetric* processing. Digitized data (secondary data capture) do not match with real-world coordinate systems if it is digitized in internal units. Any data derived from data of low accuracy (e.g., library archives of maps) contain positional errors. Coordinate transformation is used to rectify these errors, or more broadly defined as operations that transform coordinates in one system to another (better) system.

Read a) Bolstad. 2008. Chapter 4 (Maps, data entry, editing, and output) of "GIS Fundamentals: A First Text on Geographic Information Systems". The 3rd edition. Elder Press: 146-155; b) ArcGIS Help on "About spatial adjustment transformations"

23) What is *coordinate transformation*, and when is it used?
24) What is *control point*, and how is control point used in coordinate transformation?
25) Describe the difference between *affine* and *similarity* transformation method, and when to use them

Activity 7 (Secondary data capture): digitize buildings in LPC against aerial images (*heads-up digitizing*), edit street center lines using *rubber-sheeting*, and validate *topology* of data collected from GPS (i.e., remove errors such as overshoot or sliver if any)

Module 8: Geocoding

One of the most commonly used operations in GIS II project is *geocoding*, an operation that converts text description of location (e.g., street address) to geographic coordinates. *Address matching* (i.e., operation that

converts street addresses to x, y coordinates) is the most popular type of geocoding; other types include XY geocoding and *linear referencing* (used in transportation field). We will focus on the process of, and errors in address matching.

Read Goldberg, Wilson, and Knoblock. 2007. From texts to geographic coordinates: the current state of geocoding. *URISA Journal* 19(1): 33-46

26) Describe the process of *geocoding* (more specifically address matching) (Figure 2)
27) Describe *geocoding errors*. In other words, what would explain inaccurate position of data geocoded?

Activity 8 (Data transfer): geocode Point of Interest (POI) given street addresses in LPC, merge buildings (captured from GPS and digitizing), and add extended capabilities to geodatabase

Module 9: Data Quality

GIGO: Garbage In Garbage Out. One cannot emphasize the importance of data quality enough. While data quality is largely thought of as something to do with lack of errors, data quality is best defined as 'fitness for use of data'. In other words, how suitable is data for a given problem? Then what aspects of data would ensure the fitness for use? (i.e., components of data quality) How can those aspects be measured so that one can determine how good data is given intended use? (i.e., assessing data quality)

Read Bolstad. 2008. Chapter 14 (Data standards and data quality) of "GIS Fundamentals: A First Text on Geographic Information Systems". The 3rd edition. Elder Press: 511-532

28) Differentiate terms related to data quality, including *accuracy*, *precision*, *resolution*, and *consistency*
29) The FGDC standards define data quality components (Table 1) as follows: *lineage*, *positional accuracy*, *attribute accuracy*, *logical consistency*, and *completeness*. Describe each of them along with examples.
30) Describe what *root mean square error* (RMSE) is, and how it is used to measure positional and attribute accuracy of data
31) Describe how *error table* (aka. error matrix, classification matrix) is constructed for what purpose

Activity 9 (Data quality): assess positional accuracy of POI data by calculating RMSE

Module 10: Basic Spatial Analyses

GIS enabled users to examine spatial relationship (e.g., what schools are vulnerable to toxic emissions from TRI facilities?). Although one can look at this relationship using multivariate maps (e.g., schools overlaid on TRI sites), spatial mapping is rather limited because maps are often interpreted with subjectivity. In addition, spatial mapping wouldn't work very well when the number of variables increases; for instance, multiple criteria should be considered for selecting suitable landfill sites. This module largely focuses on different techniques for examining spatial relationship, namely *spatial query*, *spatial join*, and *overlay*.

Read Bolstad. 2008. Chapter 9 (Basic spatial analyses) of "GIS Fundamentals: A First Text on Geographic Information Systems". The 3rd edition. Elder Press: 342-361

32) When can *buffering* (or proximity analysis) be used? Provide examples of geographic questions that you think buffering can be helpful in addressing. Also describe different options for vector buffering (Figure 9-26, Figure 9-29).
33) When can *overlay* be used? Provide examples of geographic questions that you think overlay can be helpful in addressing.
34) Describe the difference between *vector overlay* (Activity 11) and *raster overlay* (Activity 12).

Activity 10 (Spatial join): Select by feature, spatial query (select by location) and spatial join will be used to find out the total sum of toxic chemicals released from TRI sites by community area. Spatial join is useful in summarizing attributes by areal units (e.g. what neighborhood has the highest rates of youth violence?).

Activity 11 (Vector suitability analysis): A household with a kid who suffers from respiratory disease is looking for affordable home. The house should be least exposed to toxic emissions, and be within their budget. Where would this home be? You will create buffers with a variable width in proportion to the magnitude of toxic emissions, and then overlay buffers over a census tract layer with median home value to narrow down areas that meet criteria.

Activity 12 (Raster suitability analysis): Spatial analysis for the same scenario above will be conducted in a raster environment using Spatial Analyst tool, including buffering (distance tool) and overlay (map algebra).

8. Instructors' contact and office/lab hours

	Sungsoon (Julie) Hwang	Alex Vasquez (Lab assistant)
Contact	shwang9@depaul.edu or (773) 325-8668	avasquez125@gmail.com
Office	Room# 4513, 990 W Fullerton Ave	
Office/lab hours	Tue/Thurs 2-3 pm or by appointment	Wed 6-9pm in GIS lab

9. Miscellaneous

Academic Honesty and Plagiarism: Academic honesty and integrity are expected at all times. Academic dishonesty, such as cheating or copying during exams, will be punished severely. Plagiarism – using someone else's work without acknowledgment and, therefore, presenting their ideas or quotations as your own work – is strictly forbidden. DePaul University officials will be informed of any instance of academic dishonesty and notification will be placed in your file. Please read the DePaul Academic Integrity Resources page (http://academicintegrity.depaul.edu/Resources/index.html) for definitions and explanations of plagiarism and the University's Academic Integrity expectations for students. Cutting and pasting text taken directly from a web-site without appropriate referencing and quotation marks is plagiarism and is forbidden. Submitting work that has any part cut and pasted directly from the internet is grounds for an automatic grade of zero.

Accommodations: Any student who requires assistance is asked to contact the University's Center for Students with Disabilities (CSD) (Phone 773/325-1677, TTY 773/325-7296, Fax 773/325-7396, http://studentaffairs.depaul.edu/studentswithdisabilities). They will be able to assist both student and faculty. If you have a condition that requires accommodation from the Productive Learning Strategies program (PLuS Program) please contact them at the Student Center room 370 (Phone 773/3251677 or online: http://studentaffairs.depaul.edu/plus/

University Center for Writing-Based Learning: Collaborates with writers from all disciplines, backgrounds, levels of expertise, and roles within the University community. Their goal is to help develop better writers along with better writing and reflection through continual revision. If you need assistance with writing assignments, they can be contacted at: 773.325.4272 (LPC) or wcenter@depaul.edu

10. Department of Geography Learning Goals—GEO242 addresses 1, 5, 6, and 7:

Courses in the Department of Geography teach students:

1) Understand spatial patterns and processes of modification of the Earth's physical and cultural landscapes
    a. As social constructions.
    b. As systems that link the Earth with human society in interdependent, dialectical relationships, and
    c. Through mapping and visualization.
2) Understand the concept of scale as a spatial phenomenon that ties the local, the regional, the national, the transnational, and the global in a system of interaction.
3) Understand the phenomenology of the discipline of Geography—most importantly, "space", "place", "landscape," "region," and "location".
4) Distinguish that spaces, places, and so on, may have both objective and subjective/symbolic dimensions.
5) Develop research and writing competences that would allow you to:
    a. Formulate a cogent research question about the spatial character of a physical, socio-cultural, or environment-societal phenomenon,
    b. Write about it in ways that reflect analytical and critical thinking, and
    c. Ethical concern over social and environmental justice, consistent with the University's social mission.
6) Engage competently in qualitative and quantitative spatial analysis, and with exercises that are concerned with explaining spatial regularities (for example, the spatial calculus behind the location of retail commerce in Chicago, or transnational flows of capital).
7) Learn the basic utility and use competently one or more of the information technologies that are now redefining the logistical limits of spatial analysis: geographic information systems (GIS) and remote sensing.
8) Achieve greater general knowledge of the world, its regions, its physical systems, its cultures, and political-territorial divisions.

Appendix A. Further resources on potential GIS project

Project short name	Project description	Organization's name, website, address and contact
Access to emergency food	EC has surveyed food pantry in Little Village and Pilsen. Data has been mapped earlier, and EC wants to make maps reflecting updates. How can GIS be of help in better addressing communities' basic needs?	Enlace Chicago (EC) http://www.enlacechicago.org/ http://www.hoperesponsecoalition.org/ 2756 S. Harding Ave, Chicago IL Simone Alexander: salexander@enlacechicago.org 773-542-9233
Community-based green initiatives	Community-based sustainability initiatives have grown in recent years. ICA is collecting these data in Chicago's 77 neighborhoods to share results through conference in September 2012. Make maps of green initiatives (based on partial data) in Chicago.	Institute of Cultural Affairs (ICA) http://www.ica-usa.org/ Programs > Resilient Communities 4750 N. Sheridan Road, Chicago IL Seva Gandhi: sgandhi@ica-usa.org 773-769-6363

Community asset 	BVIC has collected data regarding community assets. BVIC is interested in mapping community assets from those data, including landmarks, businesses, restaurants, and street arts in the Bronzeville area. Maps will be used to develop tours in the area.	The Bronzeville Visitor Information Center (BVIC) http://www.bviconline.info/ 3501 S. Martin Luther King Dr, Suite One East, Chicago IL Norman Montgomery: nfmontgomery@gmail.com 773-373-2842
Community garden 	Data on community gardens in three community areas—Rogers Park, Humboldt Park, and Little Village—have been collected. Howard Rosing is interested in mapping community gardens in these communities. More to come.	The Irwin W. Steans Center http://steans.depaul.edu/ 2233 N. Kenmore Ave, Chicago IL Howard Rosing: hrosing@depaul.edu 773-325-7457
Animal control  *Due to the nature of data, those who volunteer for this project needs to sign a confidentiality data agreement form.*	CCARC is providing rabies vaccinations to animals for compliances with the law and public health protection. CCARC has archived data on rabies vaccinations, dog bites, and veterinarian facilities. Currently, vaccination data are pulled out for analysis. Are there any areas underserved in terms of rabies vaccinations? How can GIS help devise preventive and control measures?	Cook County Animal and Rabies Control (CCARC) Website (see below) 10220 S. 76th Ave. 2nd Floor, Bridgeview IL Donna Alexander: Donna.Alexander@cookcountyil.gov 708-974-6140
Safe Haven Mapping 	Create a map of Safe Havens in the Little Village area. This can be examined in relation to census and crime data in order to find gaps in resources and services which can be addressed by the Violence Prevention Collaborative.	Enlace Chicago (EC) http://www.enlacechicago.org/ Violence Prevention Collaborative 2300 S. Millard, Chicago IL Luis Carrizales luiscarrizales@enlacechicago.org 773-823-1062
Green space and youth program 	Green space has potential to enrich youth program (e.g, community garden for educational purposes and youth violence prevention). Where are those green spaces and how can these be utilized to benefit youth program? In case youth program data is not ready, this can be switched to community garden mapping project in Bronzeville.	Camp Butterfly (CB) http://campbutterfly.org/ Programs > Green Butterfly Project 2929 S. Wabash Ave, Chicago IL Toni Anderson: toni@campbutterfly.org 312-869-1020

CCARC website: http://www.co.cook.il.us/portal/server.pt/community/animal___rabies_control/247