

# GIS for the Beginner on a Budget

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This presentation, **GIS for Beginners on a Budget**, will briefly cover some very basic Geographic Information Systems (GIS) concepts. It will look at how you can educate yourself on Geographic Information Systems and show you the process used to set up the GIS for Harris County Engineering.

# What is GIS?



A Geographic Information System (GIS) links locational (spatial) and Database (tabular) information and enables a person to visualize patterns, relationships and trends. The process gives an entirely new perspective to data analysis that cannot be seen in a table or list format.

In its most basic format a GIS or Geographic Information System combines or joins database information to features on a map. The data can come from a spread sheet, or a table from a text file or even a complex database. The Map features are simply points or lines or polygons which are drawn on a map to represent specific Objects, like schools, hospitals, parks, roads or rivers.

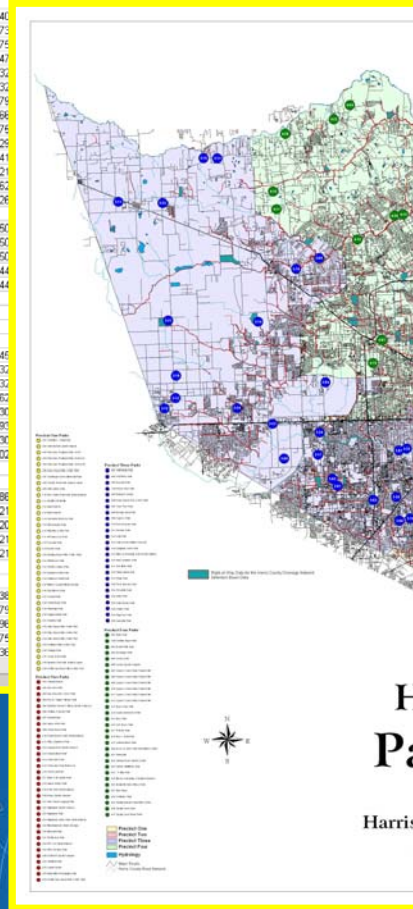
# DataBase Linkages

Microsoft Access - [PK-MAST4 : Table]

PARK_NAME	ADDRESS	CITY	ZIP_CODE	PREC	CIN	CENSUS_TRK	KEY_MAP	TOT_AC	DEV_AC	UNDEV_AC	DATE
Spring Branch Community Center	1721 Pech Road	Houston	77055				451W	0	0	0	
Cypresswood Golf Club	21602 Cypresswood Drive	Spring	77373	4	113		334G	852	852	0	
Faulkney Gully Hike/Bike Trail				4	54		329W	0	0	0	
Lansdale Park	8201 Roos	Houston									
Bane Park	9600 W. Little York	Houston	77048								
Arthur Bayer Park	24811 W. Hardy Road	Spring	77373								
Roy Campbell Burroughs Park	9738 Hufsmith	Tomball	77375								
Tom Bass Section II	3930 Fellows Rd.		77047								
Crosby Park	419 Hare Road	Crosby	77531								
Crosby Sports Complex	6800 Miller-Wilson Road	Crosby	77531								
Don Collins	6727 Cypresswood	Spring	77375								
Doss Park	2500 Frick Road	Houston	77068								
A. D. Dyess Park	16522 Kitzman	Tomball	77375								
Fritsche Park	15603 Fritsche Cemetery Road	Cypress	77425								
Independence Park	5515 Clara Road	Houston	77041								
Cedar Bayou Park	FM 1942@Cedar Bayou		77521								
Allison Pierce Wetlands Sanctuary	506 Highlands Shore		77562								
Hutcherson	540 Lockwood	Houston	77026								
Barbara Jordan	6400 Windfield Road	Houston									
Sheldon Sports Park	8815 Pineland	Houston	77050								
Bill Crowley	5100 Lauder	Houston	77050								
Celber	4735 Gaston	Houston	77050								
Alexander Dousen	12303 Sossier	Houston	77044								
Eisenhower	13400 Aqueduct Road	Houston	77044								
Norman Way											
Swingle Road	3600 Swingle										
Dixie Farm Road	Dixie Farm Rd. @ Clear Creek										
Choate Road	Dixie Farm Rd. @ Clear Creek										
Alameda Road	14100 Alameda Rd		77540								
Cedar Grove Park	13425 Maudeas	Cedar Grove	77531								
Ray Chambers Park	808 1/2 Magnolia	Crosby	77531								
Highlands Sports Complex	1000 Wallisville Rd	Highlands	77592								
Channelwood Park	525 Ovebluff		77531								
Halls Bayou Jogging Trail	Little York @ Halls Bayou		77089								
Channelview Sports Complex	16434 Wood Dr		77531								
James Bute Park	512 McKee		77002								
Moncrief	16000 Bear Bayou										
Syran Beach	400 Bayshore Dr.	LaPorte									
Clear Lake Park South	Nasa Road 1	Pasadena	77586								
Grays Sports Complex	5200 East Road	Baytown	77521								
Burnett Park	1700 Hillcrest	Baytown	77520								
East Harris County Soccer Complex	FM 1942 @ N. Main	Baytown	77521								
Rio Villa	Wallisville Rd		77521								
Bay Area Hike & Bike Trail											
Armand Bayou	8600 Bay Area Blvd.										
Jesse H Jones Park and Nature Center	20634 Kensington Drive	Humble	77338								
Klein park	4531 Spring Cypress	Spring	77379								
Lindsay Lyons Sports Center	2310 Alascocita Road	Humble	77396								
Samuel Matthews Park	1728 Hufsmith	Tomball	77375								
I. T. May Park	2100 Wolf Road	Huffman	77338								

Records: 111 of 101

Datasheet View



Harris County Parks

Precinct One Parks

- Alexander Deuss
- Almeda Park (Ur
- Barbara Jordan P
- Bill Crowley Park
- Brays Bayou Hik
- Challenger Seve
- Choate Road Pa
- Christia V. Adair
- DOME STADIUM
- Dixie Farm Road
- Dow Park #1
- Dow Park #2
- Eisenhower Pa
- El Franco Lee Park
- Ella Hike & Bike Trail
- Finnigan Park
- Gerber Park
- Hunting Bayou Hike & Bike
- Hutcheson Park
- Kirkwood South Park
- Mickey LeLand Memorial P
- Norman Way Park (Undev
- Oxnard Park
- Pep Mueller Park
- Quebedeaux Park
- Randolph Park
- Sage meadow Park
- Sheldon Park
- Sims Bayou Hike & Bike Tr
- South Bay Hike & Bike Trail

Identify Results

T: Precinct One Parks - 1-31

Park_numbe	1-31
Park_name	Sheldon Park
Acreage	15
CIN	106
PARK_NAME	Sheldon Park
ADDRESS	8815 Pineland
CITY	Houston
ZIP_CODE	77050
PRECINCT	1
CENSUS_TRK	
KEY_MAP	457B
TOT_AC	15.100000
DEV_AC	15.100000
UNDEV_AC	
DATE_ACQ	
HOW_ACQ	
GRANT_ASST	

Clear Clear All

Here is an example of a Database which started out as an Excel Spread Sheet, listing the Harris County Parks and their attributes, and a Map showing the location of the Harris County Parks. Each Park is a point (or feature) on the map. When the “data” is combined with the “map feature” using GIS Software a point can be “queried” and the information associated to that point will be displayed.

Now more complex questions like “Locate all the Harris County Parks with soccer fields?” can be asked. Using population data you can compare existing parks with soccer fields to the demand for soccer fields. Compare that information with a map indicating available land and you can determine where the new soccer fields should be built.

# What are the components of GIS?

A Geographic Information System (GIS) links locational (spatial) and database (tabular) information and enables a person to visualize patterns, relationships, and trends. This process gives an entirely new perspective to data analysis that cannot be seen in a table or list format. The five components of a GIS are listed below.

## HARDWARE

The hardware is the computer and peripherals on which the GIS operates. Today, this could be a centralized computer server running the UNIX or Windows NT operating systems, a desktop PC, or an Apple Macintosh. The computer may operate in isolation or in a networked configuration.

- Computers
- Networks
- Peripheral Devices
- Printers
- Plotters
- Digitizers



## SOFTWARE

GIS software provides the functions and tools users need to store, analyze, and display geographical information. The key software components are

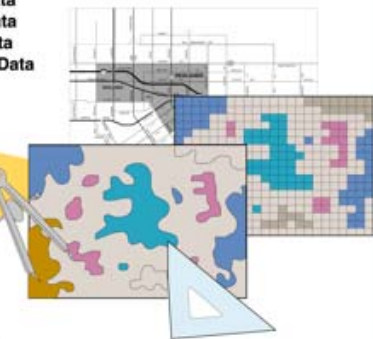
- GIS Software
- Database Software
- OS Software
- Network Software



## DATA

One of the most important component of GIS is the data. It is absolutely essential that data be accurate. The following are different data types:

- Vector Data
- Raster Data
- Image Data
- Attribute Data



# GIS

## PEOPLE

GIS technology is clearly of limited value without people to manage the system and to develop plans for applying it. Users of GIS range from highly qualified technical specialists to planners, foresters, and market analysts who use GIS to help with their everyday work.

- Administrators
- Managers
- GIS Technicians
- Application Experts
- End Users
- Consumers



## METHODS

Methods are well designed plans and application-specific business rules describing how technology is applied. This includes the following:

- Guidelines
- Specifications
- Standards
- Procedures



# Where to go from here?

Some logical steps to take.

( \* Do a Needs Assessment and Implementation Plan. )

- Determine what you have, hardware and software inventory.
- Check with all local agencies to find out what's available.
- Check the Internet.

\* In an ideal world a knowledgeable consultant would be hired to do a Needs Assessment and Implementation Plan. This can be costly and time consuming but will eventually need to be done.

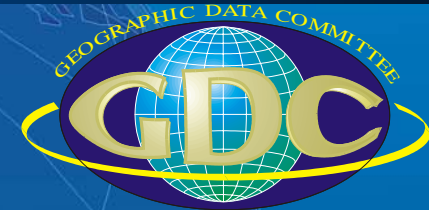
An inventory of current assets, hardware, software, and data is essential.  
Look for any kind of support staff that may be available.

Check ALL the agencies in your region and determine what kinds of GIS already exist. See what software is being used and what data is available and in what formats.

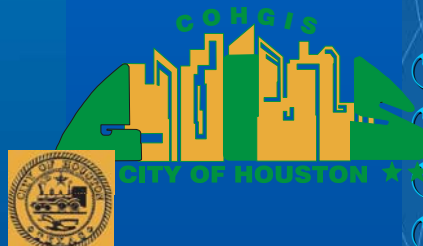
Something to keep in mind: "Map Projection/datum" Using a standard datum common to the local area can facilitate data exchange, which is an integral part of any GIS.

# Where does all the Data Come From?

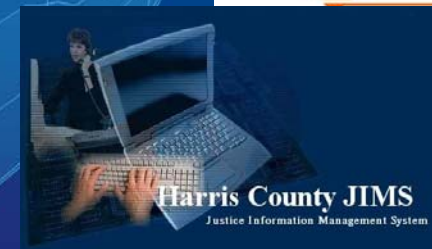
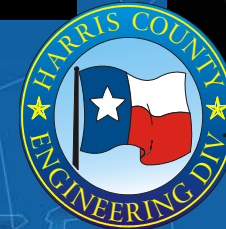
- These are some of our local agencies that have a GIS.
  - The Houston-Galveston Area Council's (H-GAC) Geographic Data Committee's (GDC) Star\*Map Project



Some of the agencies contributing to a regional data sharing effort:



- The Texas Department of Transportation
- The City of Houston
- Metro
- Reliant Energy
- Harris County Public Infrastructure
- Harris County Central Technology
- Harris County Flood Control District
- Harris County JIMS
- Harris County Tax Office and Voters Registration



This Slide shows just a few resources available to GIS users in Harris County. A student will find that just about all these agencies are willing to help you. In Harris County it is common practice for local agencies to freely exchange data. A consultant or private business that uses the data for profit, and requires this data may be charged for the cost of media or staff time.

# Some Internet Resources for our Region.



[www.tnr.is.state.tx.us/index.htm](http://www.tnr.is.state.tx.us/index.htm)

 [NATIONALGEOGRAPHIC.COM](http://NATIONALGEOGRAPHIC.COM)

[www.geographynetwork.com](http://www.geographynetwork.com)



<http://wetlands.fws.gov/>



<http://fema.gov/>

Public Infrastructure Department  
Engineering Division,  
Harris County, Texas

[www.eng.hctx.net/gis.htm](http://www.eng.hctx.net/gis.htm)



Houston-Galveston Area Council

Serving the 13-county Gulf Coast Planning Region

[www.hgac.cog.tx.us](http://www.hgac.cog.tx.us)



**GIMS**

City of Houston  
Geographic Information & Management System  
*Public Works & Engineering GIS*

[pwegis.pwe.ci.houston.tx.us/](http://pwegis.pwe.ci.houston.tx.us/)

[www.esri.com](http://www.esri.com)

**ESRI**  
GIS & Mapping Software

 **USGS**  
science for a changing world

[www.usgs.gov](http://www.usgs.gov)

A word to the wise - be sure to check the data source to be sure you get the most current data!!

# When contacting these agencies what questions should be asked?

## Can I ask you about your GIS?

What GIS Software do you use?

Do you make your data available to the public?

How much does it cost?

Is your data available on the Internet?

What Map Projection do you use?

Do you provide Metadata with your data sets?

## Can I come down and visit with you?

Most of these agencies will be happy to show you around

One of the best ways to gain experience is to volunteer to work on various projects.

Some agencies are very receptive to this, some are not. I started to learn about GIS by working on the HGAC Star\*Map project. If you are a student ask about intern program, most agencies have them.



# Now let's make some Decisions?

What kind of HARDWARE do you have to work with?

Do an inventory of hardware. Determine what do you need.

What GIS Software are we going to use? What is your budget for Software?

Training. Where can I go to learn how to use the Software?

Who is going to use your GIS?

Who is going to maintain your GIS?

Assuming you have the basic research and have become familiar with what's available in your area, now start putting together your GIS.

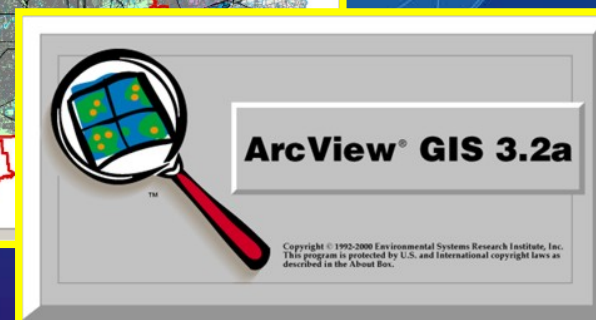
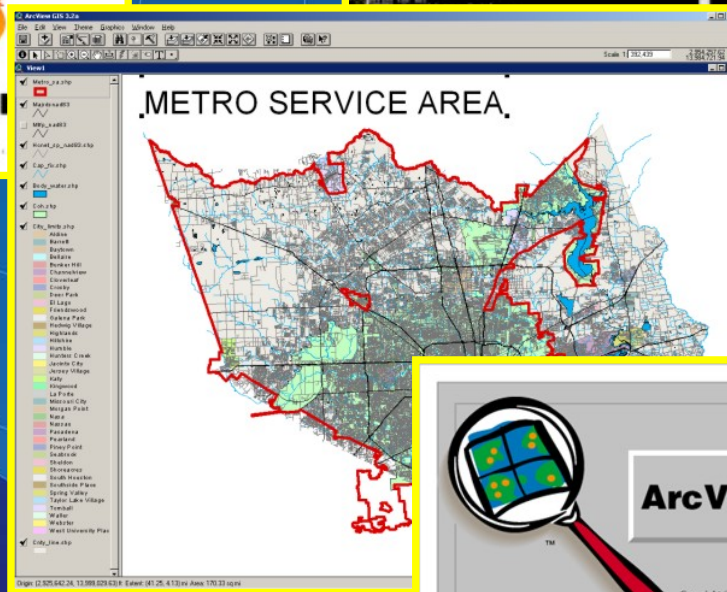
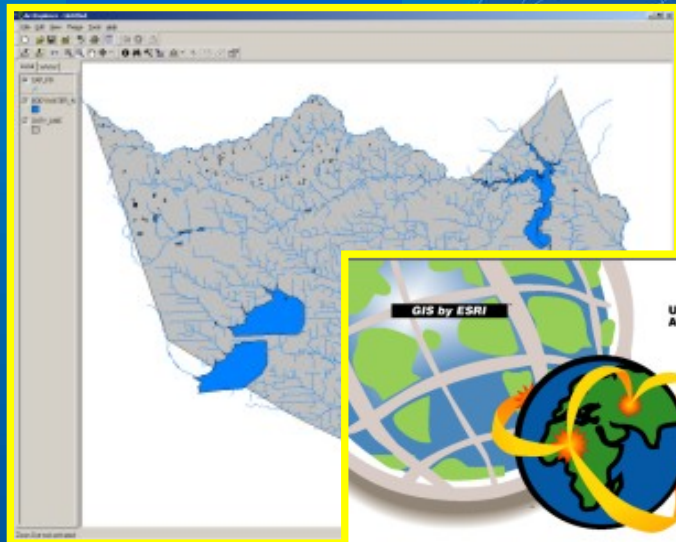
•A quick note about hardware. When it comes to GIS hardware you will learn to always buy to most you can afford. Get the fastest processor, the largest hard drives, the best monitors, and lots of RAM. GIS is very "High End". It requires a lot of horse power to run and Data can take up a lot of disk space on your hard drives and servers.

Now GIS Software. When it comes to making a decision on software, ask the following questions:

What will be the final product of the GIS? Maps? Data? Will the GIS be creating new data or just using existing data? What will be the easiest way to obtain and use existing data? How was it created? What software was used? After asking these questions in Harris County it became apparent that the majority of the region's agencies utilize ESRI software, so for ease of data acquisition and exchange the obvious solution was to acquire the same software platform.

# What makes it work?

By checking with the regional data sources in Harris County I found that the majority of them use ESRI GIS Software. Working with a common Software platform allows for seamless data exchange.



# Which GIS Software Package is appropriate for you?

ArcExplorer?

ArcView 3.x?

ArcEditor?

ArcGIS 9.x?

Who is going to use your GIS?

How are going to use your GIS?

Who is going to maintain your GIS?

Are your managers going to want access to the GIS Data? Do you want to give them “rights” to edit your data?

Are you going to maintain updates or will you download Data from the web?

Each level of software allow you to do more and more manipulation of the data.



The Key to a successful  
GIS is Good, Solid  
Communications.

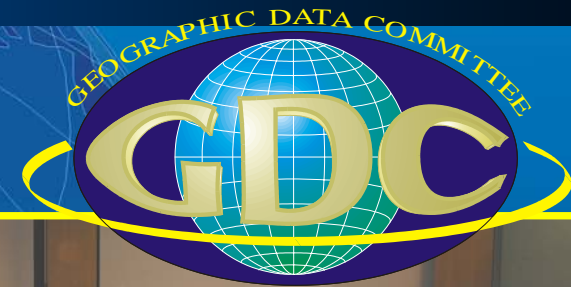
Get Involved!

GIS is all about Communications!. You have to be able to talk to your clients and to your data providers. A GIS doesn't work in a vacuum. As GIS Coordinator it's your responsibility to see that the lines of communication are always open. Constantly look for new data or a way to fulfill a client need. Develop a network of GIS Users as a support group. Get involved with as many local and regional effort as you can.

# H-GAC's

## Geographic Data Committees

- One of the best regional groups.
- Committee meetings are open to the Public.
- A great place to make contacts.
- To become a voting member the Dues are \$1000.00.
- Save Money on Joint acquisitions.



These next slides show GIS organization active in Harris County and some of the advantages to participating with them.



# Involvement with the GDC has

provided the opportunity for cost sharing ventures.

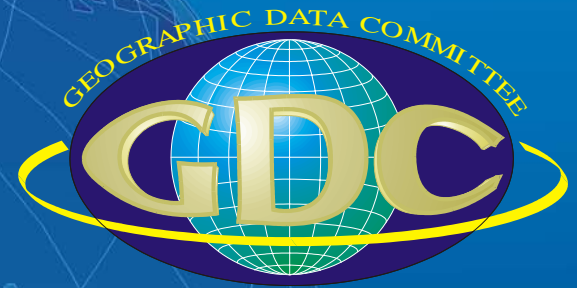


Aerial Photography acquired through a cost sharing effort at a greatly reduced cost.

From approximately \$ 250,000.00 to approximately \$15,000.00

# Join a GDC Sub-committee.

- 🌐 The GDC Sub-Committee for Additions and Corrections to the Star\*Map
- 🌐 The GDC Sub-Committee for GIS DAY



By joining various sub-committees you make new contacts, and have hands on experience and direct input into the various regional efforts.

# Join Inter-Departmental & Inter-Agency Groups

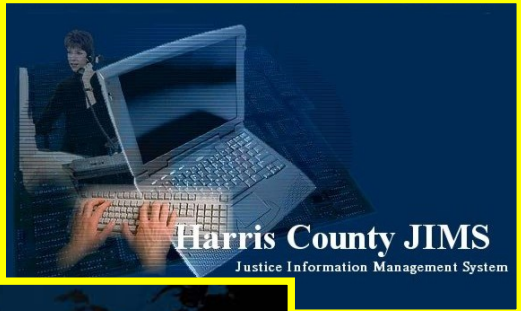
## Harris County Flood Control District's GIS Round Table Meeting



**Monthly meetings enable a positive environment for information and data exchange.**

**Regularly attend GIS meetings to keep informed as to what is going on in the GIS World.**





# Harris County GIS Task Force

Our involvement with Harris County ITC, the Harris County GIS Task Force and Harris County Flood Control has enable us open line of communication between Departments.




# Networking

The Key to a successful  
GIS is Good, Solid  
Communications.

- **Harris County PID Engineering is connected directly to both Harris County Flood Control and Harris County Information Technology Center's J.I.M.S. Server.**



 **By networking we have access to many of the regionally available data sets.**

# Data Distribution

## Internet or Web Based Data Distribution



The GIS Office also provides a GIS Data Catalog, which is available on the Internet with easily downloadable GIS Files. The GIS Coordinator responds to Public inquiries to this Web Site on a daily basis.

The Harris County Public Infrastructure Department, Engineering Division - Microsoft Internet Explorer  
Address: <http://www.co.harris.tx.us/hcedweb/>

Engineering Division  
Harris County Administration Building  
1001 Preston Avenue, 7th Flr.  
Houston, Texas 77002  
Telephone (713) 755-5370

Public Infrastructure Department  
Engineering Division,  
Harris County, Texas

Permits Office  
9900 Northwest Freeway,  
Suite 103,  
Houston, Texas 77092  
Telephone (713) 956-3000

[www.eng.hctx.net/gis.htm](http://www.eng.hctx.net/gis.htm)

Quick Link

The Harris County Public Infrastructure Department's **Capital Improvement Plan** is now available on line.

**2000 Specifications**  
Download the complete specifications

Harris County's **Master Plan for Pavement** is now available for viewing on line

**Employment Opportunities**  
A listing of open positions in the Engineering Division

**HCFCD Watershed Department**  
Standard detail sheets in AutoCad

**FEMA Benchmark Information**  
A listing of FEMA Benchmarks, project locations and descriptions

**GIS Data**  
A listing of GIS data sets available

**Traffic Counts**  
A listing of traffic counts for various locations for a 24 hour period on the date shown

Projects Currently **Bidding**  
A link to the Purchasing Department's current bidding

Project **Award Information**  
A listing of projects awarded by Contract

Projects **Previously Awarded**  
An archive of projects awarded from 1995 to the present

Public Infrastructure Department, Engineering Division - Microsoft Internet Explorer  
Address: <http://www.co.harris.tx.us/hcedweb/cip.htm>

Engineering Division  
Harris County Administration Building  
1001 Preston Avenue, 7th Flr.  
Houston, Texas 77002  
Telephone (713) 755-5370

Public Infrastructure Department  
Engineering Division  
Harris County, Texas

**Capital Improvement Plan  
Fiscal Year 2001 - 2005**

The Harris County Public Infrastructure Department's Capital Improvement Plan (CIP) and flood control projects in Harris County over a five year period.

The CIP consists of two sections:  
**(1) Executive Summary Section**  
**(2) Project Information Section**

The report is now available for online viewing and/or download in the "pdf" format. If you are using a web browser reader, it is available free for download at [Adobe's](#) web site.

Once you have established your GIS, it's your turn to contribute back to the local knowledge based. Open your GIS system up for data sharing. There are many secure ways of doing this, the internet is one of the best ways.

# Education

My personnel GIS Philosophy includes a mandate to educate as many people as possible as to the benefits of GIS, how it works and how it serves the community. One of our best forums is the annual GIS Day Event.



## GIS Day

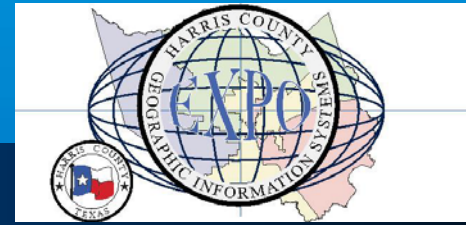
- GIS Day is a grassroots event that formalizes the practice of geographic information systems (GIS) users of opening their doors to schools, businesses, and the general public to showcase real-world applications of this important technology. The event is principally sponsored by the National Geographic Society, the Association of American Geographers, University Consortium for Geographic Information Science, the United States Geological Survey, The Library of Congress, and ESRI.



The LIBRARY of CONGRESS

# GIS Day

1999 - Harris County GIS Expo



2000 - Harris County PID Engineering Division

GIS Section Open House

2001 - GDC GIS Day  
Hosted by The University of Houston-Downtown



hosted by  
UPD University of Houston-Downtown



hosted by  
UPD University of Houston-Downtown



hosted by  
UPD University of Houston-Downtown

