**Preview Questions**

1. Looking at the different ways in which Newark benefitted from NEWGIN, which stands out to you as being the biggest benefit? Include an explanation of why it seems like this is the largest value added.
2. For both the Newark, NJ example as well as the snowplowing case study, can you brainstorm additional applications of these maps and techniques? What other civic functions would benefit from these types of systems?
3. Why is decision support needed for budget and finance?
4. How do the departments of Newark, New Jersey benefit from Enterprise GIS?
5. For what do the departments of Newark, New Jersey use Enterprise GIS?
6. How does GIS technology help Newark, New Jersey deal with budget shortfalls?

**Summary Notes**

Introduction

* Governments are responsible for establishing sound, defensible revenue-generating and expenditure polices.
* Factoring geography into government budgeting and finance provided government officials with new insights into old problems and fostered sustainable financial planning.
* Applications of GIS:
  + Developing infrastructure cost accounting
  + Calculating revenue streams based on geographic elements
  + Providing acceptable accounting methodologies to meet federal standards
  + Performing financial audits to capture lost revenue
  + Defending property assessments
  + Communicate the allocation of funds
  + Track project schedules and materials costs
  + Indicate locations of economic stimulus
  + Evaluate investment potential

Enterprise GIS Benefits Newark’s Many Departments

* Goal was to provide city employees and the public safety community within the state with easy and quick access to geospatial data and application services.
* Newark Geographic Information Network (NEWGIN) is designed for use by all city agencies in day-to-day decision making.
* Cost savings achieved through better analysis and strategic planning for the use of resources.
* Can provide emergency responders with accurate up-to-the-minute information about a location before they arrive on the scene.
* Traffic Advisory Network used in conjunction with NEWGIN to avoid city traffic congestion.
* Traffic Advisory Network provides real-time access to traffic patterns on the main corridors.
* Future applications of GIS include facilitating current and future development projects and promoting economic growth by identifying brownfields, abandoned lots, and lot ownership and overlaying with other data such as transportation systems, businesses, food and beverage establishments, etc.
* Nearly every city department has realized benefits from NEWGIN.
* The Economic and Housing Development Department used the system to identify properties that could be sold to business owners and entrepreneurs to help increase the city’s tax base.
* The City Assessor’s Office used the system to increase productivity and efficiency and free up more than 20 staff-hours per week that can be applied to other activities.
* NEWGIN has enabled to city to provide fee-based services at sufficient enough volume to make it worthwhile.

Not Letting City Services Get Snowed Under

* GIS technology can be used to avoid cutting programs or reducing service levels because of shortfalls driven by forces beyond the control of the government.
* Using GIS to optimize routes for fleets and individuals provided savings in time and fuel costs.
* Constraints that effect routing include:
  + Commercial and residential development
  + Designated time windows
  + Workload increases
  + Vacations and illnesses
* Other applications of the same technology include:
  + Street sweeping
  + Solid-waste pickup
  + Recycling pickup
  + Meter reading
  + Street maintenance
  + Graffiti abatement

**GISc and Public Policy Discussion**

* In terms of overall impact, I believe the biggest benefit is the ability of government officials to provide constituents with data-driven explanations of their actions regarding the use of resources and demonstrating both how and why the actions taken were the best use of government resources. Justification of resource use is a significant point of friction in government. The use of GIS technology can improve the process and make it less art and more science. Moreover, this provides citizens with the means to review and evaluate how government officials are using the city's resources so that they can hold those officials accountable for their decisions and actions. Increase scrutiny of government decisions through "citizen audits" could help increase government responsiveness and minimize fraud.
* Other civic functions that might benefit from these systems and techniques include property inspections, tree trimming, and planning public transportation.

**Additional Questions of Interest**

1. What types of actions does staff take to alleviate traffic congestion based on the information provided by Traffic Advisory Network?

**Preview Questions**

1. What is at least one way that the use of GIS technology changed how the Board of County Commissioners (BOCC) went about the New Market Region Plan Reconsideration?
2. The use of GIS technology on Houston's water infrastructure solutions seems to have accomplished what the city of Houston needed which was to fix waterlines classified as critical for replacement while keeping costs affordable. Can you think of how their use of GIS towards water infrastructure solutions may pose challenges for other future infrastructure replacements, if any?

**Summary Notes**

Introduction

* Effective compromise between parties with different world views is necessary for sound public policy making.
* Public policy generated through consensus strives to solve problems and avoid conflicts.
* Decision making through compromise aims to enable parties with different worldviews to move forward feeling that they’ve fulfilled their objective, which is not the same as seeking win-win solutions.
* Government officials use consensus decision making to achieve satisfactory solutions, promote community growth, and foster trust among the parties.
* GIS can support consensus-driven public policy making:
  + Visualize alternatives
  + Form consensus proposals
  + Diffuse emotions
  + Present facts without emotional overtones
  + Enable qualitative analysis rather than just quantitative analysis

Mulling controversial development in Frederick County

* Frederick County in Maryland is transforming from a farming community to a more urbanized landscape.
* The New Market planning region is slated for a large portion of the county’s growth and has been subject to a lot of controversy.
* The update process took 5 years.
* The plan was not supported by the public.
* The new Board of County Commissioners (BOCC) initiated a review; there were no well-defined processes for this kind of atypical review.
* BOCC needed to justify their decision to review the 2006 plan.
* GIS technology provided commissioners with:
  + Understanding of the physical landscape
  + Current land-use designations
  + Development potential
  + Impacts within the New Market Region
  + Instantaneous visualization of changes and their overall effects
* Previously, GIS was not used for planning region updates other than creating hard copy maps for public hearings and documentation.
* Previous process for plan revisions was very manual, labor intensive, slow, and subject to errors and omissions.
* BOCC New Market Region Plan Reconsideration
  + Reviewed previous plans
  + Deliberated about the reconsideration process
  + Decided on a starting point
  + Produced new, accurate land-use planning and zoning maps within days
  + Held public workshops using the technology to show different scenarios and their effects
* Return on investment in using GIS in the planning process:
  + Minimized the time spent in the planning process
  + Enable the public to better participate in the process

What to fix first in the twenty-first century

* There is a looming crisis of crumbling infrastructure.
* Estimated cost of fixing the nation’s aging water infrastructure is over $250 billion over the next 30 years.
* System components will reach the end of their life all around the same time despite the fact that they were constructed in spurts.
* Not economically feasible to replace all components at the same time.
* Many capital improvement project decisions are politically motivated.
* Houston implemented an approach that prioritized based on need and not political motivation.
* Houston was able to reduce the estimated $180 million replacement cost to $59 million over five years.
* Replaced the chaotic nature of project selection with an orderly set of manageable investments.
* Fact-based justification for projects.
* Return on investment realized within the first year.
* Recommendations accepted with confidence.

Additional Questions

1. Why wasn’t every highly ranked grid on the chart for Houston not recommended as a priority for a replacement project for capital improvement plan (CIP) consideration? How was the final determination made?

**Preview Questions**

1. Is the method that the Boston Harbor Islands National Recreational Area (BHINRA) obtains scientific input for policy makers adequate or would BHINRA be better-served by having scientists on their advisory committee?
2. In the Oneida tribe case and the Alto Dinero case, was the use of GIS to defend or justify policy decisions a fair use of GIS technology? Could you envision a situation (in either cases or in other scenarios) where GIS could be used to misrepresent data and misinform policy makers?

**Reading Summary**

Assessing environmental vulnerability of Boston Harbor

* The Boston Harbor Islands National Recreational Area (BHINRA) was created in 1996 by congressional act as a unit of the National Park Service (NPS).
* BHINRA has a unique governance structure.
* BHINRA is a public-private partnership operating under the sponsorship of the U.S. Department of Interior.
* NPS has responsibility but not the authority to make decisions related to the congressional mandate for BHINRA to achieve ecological, educational, recreational, and economic goals.
* Policymaking and decision authority for BHINRA rests with a 13-member body of representatives from public, private, and nongovernmental organizations.
* BHINRA comprises 34 islands that are owned by a variety of federal, state, nonprofit, and private entities.
* The National Recreation Area (NRA) designation provides legal and administrative framework to make decisions to protect the islands.
* The federal government provides operating funds to the NRA on a matching basis with local community entities.
* The design of strategies to protect and preserve scarce natural resources often involves:
  + Mixed ownership
  + Public-private partnerships
  + Diverse sources of funding
* BHINRA planning has been fragmented and there was no comprehensive program to establish sustainable-use patterns.
* BHINRA developed a decision-support tool to assess environmental vulnerability to boating using a modified with of evidence method to solicit information from scientific experts.
* BHINRA conducted a workshop which produced ecological endpoint goals (EEGs) and measures of effects (MOEs).
* GIS permitted the visualization of complex ecological data and EEGs.
* Maps enabled decision makers to visualize and prioritize impacts of potential increased boating activities.
* The BHINRA advisory council does not have a scientific committee; it brings in scientific expertise on an “as needed” basis of its own accord.
* The central question is how can the public capitalize on scientific knowledge and expertise to better achieve public goals and objectives?
* The interface between science and policy is a major challenge for BHINRA.
  + Policy makers must ask the proper questions of the scientific community.
  + The scientific community must provide policy makers with answers to operational research questions.
* The water and islands are interdependent and must be considered in the development of an integrated management plan.
* The weight-of-evidence approach provides a transparent means of incorporating expert opinion into the decision making process.
* Weight-of-evidence analysis considers all available evidence and reaches a conclusion based on the amount an quality of evidence supporting alternative outcomes.
* EEGs are explicit expressions of the environmental value to be protected.
* MOEs are measureable ecological characteristics of an agent that is used to quantify exposure of the ecological endpoint.
* BHINRA used GIS to evaluate boating activity as a stressor on a chosen set of goals and measures for the whole island system.
* BHINRA policy makers used GIS to inform their decisions about acceptable boat routes and “no go” areas for boats.
* GIS enabled policy makers to consider scientific opinion when they evaluated options.

Using GIS in tribal negotiations

* The Oneida tribe negotiates its gaming compacts annually.
* The tribal council uses GIS to prepare for these sessions and to respond to unanticipated opposition.
* The Oneida Nation had to defend its tax-exempt status.
* The Oneida Nation contracts for services from surrounding governments.
* Taxation status serves as the basis for determining what the tribe pays for services.
* Counties and townships claimed that the Oneida tribe held vast amounts of lands in trust that are tax-exempt which unfairly lowers its tax base.
* The Oneida tribe was able to produce an analysis within 8 hours that disproved this claim.

Where to build a new fire station

* Government decisions are often polticized and issues are often decided for reasons other than merit.
* GIS technology can be used to diffuse tensions and provide a defensible basis for merit-based decisions.
* In the scenarios, policymaker had to decide between two potential locations for a new fire station.
* Council members wanted to locate the fire station in Alto Dinero, which is the affluent section of the city where many council members lived.
* The fire chief had to adhere to National Fire Protection Association standards when he decided where to locate the new fire station.
* Using GIS, policymakers determined that locating the new fire station in Alto Dinero would leave a significant portion of the city center without adequate coverage.
* Using GIS enabled policymakers to make a decision based on facts rather than emotions or political influence.

**Preview Questions**

1. Why do governments encourage public participation?
2. What mechanisms do governments use to encourage public participation?
3. How does the GIS Resident Workforce Program enable public participation in Cleveland, Ohio?
4. How does GIS enable public participation in locating sunken vessels?
5. Can you think of a real world example of this GIS public participation and describe it briefly (past) or come up with your own novel way that GIS could be crowd sourced and applied for public good/public use (future)?
6. If you were in charge of a program like this, what is one feature that you would implement in order to ensure the program's success or safeguard it against potential critics?

**Reading Summary**

Introduction

* Government desire public participation as a way to obtain citizen input before finalizing public policy decisions.
* Traditional methods include:
  + public hearings
  + public comment periods
  + town hall meetings
  + sponsored citizen committees
  + focus groups
  + neighborhood meetings
  + published newsletters
  + mail campaigns
  + internet communications
* Traditional methods often produced limited feedback and stoked government mistrust.
* GIS technology enables true public collaboration.
* Early GIS use was for notifications to citizens and producing exhibits.
* Applications of GIS expanded to include real-time, or near real-time, feedback.
* GIS has become a tool for modeling “what if” scenarios and enabling citizens to provide input into the process.

Cleveland advances into the high-technology sector with GIS

* City leaders have wanted to diversity Cleveland’s economy and cultivate the technology sector.
* The Department of Public Utilities, Division of Water developed an enterprise GIS to support major business processes such as engineering and permitting.
* The city hired and trained city residents to perform GIS data-conversion tasks as a way to encourage public participation and expand the workforce for the technology sector.
* The program hired and trained 35 to 50 city residents.
* The cost of the conversion was on par with services from “off-shore” data-conversion companies.
* Cleveland deployed several GIS applications:
  + Hydraulic modeling
  + Crime analysis
  + Waste collection routing
  + Snow plow routing
  + Capital improvement project management
  + Geoaccounting

Mapping derelict and sunken vessels along the coast of Georgia

* Abandoned and derelict vessels have been problems for the Georgia Department of Natural Resources (DNR) for several years.
* Nonhistoric wrecks are vessels that have no significant historical value:
  + Shrimp boats
  + Abandoned recreational vehicles
  + Barges
  + Cranes
* The Coastal Resources Division (CRD) has taken on the main GIS effort is to identify wrecks and derelict vessels.
* ArcIMS website keeps the boating public informed with current information about coastal hazards which reduces the risk of collision and injury.
* Owners of sunken vessels usually cannot be found or ownership cannot be proven.
* Many owners do not have insurance for their vessels.
* Most boat owners escape financial responsibility:
  + Bankruptcy laws
  + Maritime law limits an owner’s liability to the value of the vessel and its contents.
* Wrecked and derelict vessels are made more hazardous by:
  + Winding rivers, creeks, and tributaries
  + High tidal amplitude
* The task was to catalog, evaluate, and prioritize vessels for removal.
* Turners Creek was considered the ideal location to begin collecting information and testing the equipment.
* Staff collected data on vessels using portable computers.
* Side-scan sonar images were included to allow boaters to see water hazards.
* The system can collect additional information:
  + Impact of sunken vessels on marsh vegetation
  + Impact of fuel and oil leaks on marsh vegetation
  + Description, location, and condition of marine debris
* The state of Georgia has recruited local boaters and charter fishermen to help identify additional wrecks or derelict vessels.
* Sunken-vessel removal process is based on:
  + Public interest
  + Navigational impact
  + Relationship to shellfish or fishing
  + Economic impact
* The public will have access via website.

**Preview Questions**

1. Do GIS applications such as BUILD and Decision Maps impact gentrification? Are there ways to use GIS technologies as a check and balances system to prevent the potential negative effects of gentrification?
2. How often do county, or city GIS departments need to update their data? Does the frequency for updates vary by feature (e.g. roads vs. land use)? How can routine updates be implemented as developments continually occur?

**Reading Summary**

Revitalizing Philadelphia’s neighborhoods with GIS

* The most successful state and local government GIS:
  + Version databases
  + Resolution of disorganized spatial data
  + Enhanced data integration
* Potential to use GIS to enhance the way state and local governments provide service.
* In Philadelphia, Pennsylvania the GIS Services Group is part of the mayor’s Office of Information Services
  + Uses GIS for decision support across various departments and business processes.
* Unified Land Records System (ULRS)
* City maintains hundreds of other spatial and non-spatial datasets related to the business practices of various city departments.
* The Neighborhood Transformation Initiative (NTI) was launched in 2001 as a $300 million effort to reverse a history of blight and disinvestment.
* GIS plays a critical role in developing policy for the NTI.
* DecisionMaps is a web-based business siting tool that helps answer critical questions about where to prioritize government efforts in community and economic development.
* Decisions based on geography, proximity, density, and demographics.
* Users can iteratively create site suitability maps.
* Building Uniformity in Land Development (BUILD) is a GIS application that helps those who want to acquire property for development.
* A web service enables the publishing of dynamic information via the Web.
* Web services provide the infrastructure for creating feature-rich GIS applications.
* Geospatial web services have saved Philadelphia hundreds of hours of GIS developer time and helped eliminate redundancy.

Purchasing development rights in Washington County, Wisconsin

* Rapid population growth has created significant development pressures on the rural landscape.
* Purchase of development rights (PDR) is an approach to preserving the remaining large contiguous tracts of prime agricultural lands.
* PDR has been successfully used in the United States since 1970.
* Landowners voluntarily sell their rights to develop parcels of their lands but retain all other rights attached to the land.
  + Development restrictions are transferred to future owners.
  + Generally reduces the market value of the land which makes it more affordable for local farmers.
* GIS was used to identify priority areas.
* PDR taskforce drew on previous efforts when defining prime agricultural areas so that the data would be reputable and defendable.

GIS technology strengthens resident’s case against adding a liquor store

* Most development plans submitted to the city are approved with no changes and no objections from residents and businesses.
* Infill projects are primarily small industrial buildings and strip retail centers.
* Residents mobilized to resists the addition of a carryout liquor store in a recently built strip retail center constructed on a lot that had been vacant for more than 50 years.
* Residents were concerned about the potential for “stop and rob” market and the attraction of “undesirable” clientele.
* Citizen petitions at public hearings are often heartfelt emotional pleas that don’t offer valid justification for overruling existing policies and regulations.
* Community leaders presented a fact-based GIS analysis to demonstrate that allowing the liquor store would violate city policies limiting the number of existing liquor licenses within a census tract.

Determining special-district boundaries

* Determining the boundaries of proposed special districts can be politically sensitive.
* Special districts usually created through legislation of public referendums.
* Limited government services granted to the district may have unexpected impacts on local service-providing departments (e.g., fire, police, etc.) and taxes may unfairly burden low-income groups.
* Local governments use GIS tools to improve special district planning.
* Presenting proposed boundary information on a maps enables stakeholders to review the planned special purposed district within a geographic contexts and investigate potential political entanglements.

**Preview Questions**

1. What aspects would you add, improve or remove for the implementation in these two cases? Please be critical as possible.
2. The examples highlighted the involvement of an array of actors at different levels (federal, state, local level etc.), and the nature of problems- in terms of their causes and impacts - addressed here have been transcending borders (environmental problems, terrorism etc.) going well beyond national limits. Is there a way to implement GIS beyond national level for international policy making to address these transboundary non-conventional phenomena? How?

**Reading Summary**

Making decisions under pressure

* Making decisions under pressure doesn’t always imply a time-critical emergency situation where lives are at risk.
* Decision pressure can take other forms:
  + Uncertainty
  + Ill-defined problems
  + Multiple players
  + Competing goals
  + Time constraints
  + High stakes
* Decisions are often made with limited public input that might be skewed by a vocal minority.
* GIS can help minimize reactive decision making and encourage fact-based decisions.
* GIS is a visual, statistical, and modeling tool.

GIS helps Fort Bend County update emergency management

* Fort Bend County is in the Houston, Texas metropolitan area.
* Population growth has been driven by quality of life.
* Pressure from intensive scrutiny of ability to protect community from a terrorist attack.
* Office of Emergency Management (OEM) not prepared for a local threat.
* ArcIMS application made GIS available to county departments with Internet access.
* OEM needs included:
  + Digital imagery for fire, police, health services, and emergency –response to facilitate incident assessments and response planning
  + Real-time location of incidents
  + Printed copies of real-time incident maps
  + Information sharing across departments
* OEM conducted practice exercise once system was installed.
  + At what point the county would determine need for federal assistance.
  + Point out deficiencies in system.
  + County acts as central data-exchange point.
* The decision to be made under pressure was when to contact the federal government for assistance during a terrorist threat.
* GIS has grown to be a part of the daily activities of the county.

GIS plays a key role in Miami flood mitigation

* Miami-Dade County is prone to flooding.
* Office of Emergency Management (OEM) began implementing a flood-control program to minimize area flooding.
* The recommended solution (C-4 Basin Initiative) entailed a massive engineering undertaking involving hydrology, hydraulics, and civil engineering.
  + The project was completed in four years.
  + GIS play an important role in the implementation
* The C-4 Basin Initiative took relatively less time to implement than comparable projects partly because of its use of GIS.
* GIS proved valuable as a disaster mitigation tool as well as a disaster response tool.
* Using GIS helps the local leaders prioritize mitigation efforts.

**Preview Questions**

1. What are your impressions of how the GIS data were used in either of these cases?
2. What are your thoughts about the effectiveness of how GIS was used in either of these cases?
3. What possible shortcomings or challenges do you think the map developers encountered in either of these cases?
4. Both of these cases involved developing maps to communicate important information to “expert” users. What would you change about the maps if you were communicating this information to laypeople (i.e., a non-expert audience) to educate them about the situation (in either case)?
5. In the “Rapid mapping analysis…” case, the various units tasked by U.S. Northern Command (NORTHCOM) were able to produce the needed maps “within a matter of hours.” Given that every minute counts in disaster rescue efforts, what changes would you suggest to reduce the time necessary to prepare such maps to less than 60 minutes for future disaster events that might occur elsewhere in the United States?

**Reading Summary**

Rapid mapping analysis helps disaster victims

* The U.S. Northern Command (NORTHCOM) tasked several units at Peterson Air Force Base in Colorado to provide maps showing potential helicopter landing zones (HLZs) that accurately depicted post-hurricane conditions along the Mississippi coast in the aftermath of Hurricane Katrina.
* NORTHCOM disseminated the maps to various recovery teams, including the 82nd Airborne Division and the Mississippi National Guard.
* The intended map readers used the maps to help them locate HLZs during the recovery effort.
* To create the maps, the units integrated advanced spectral analysis from commercial satellite imagery with GIS analysis of supplemental datasets.
* The units used four (4) specific criteria to identify valid potential HLZ zones.
* The units used ArcView from ESRI and Environment for Visualizing Images (ENVI) from Research Systems Inc. to render the analysis.
* The units created the maps within a matter of hours.

Increasing immunization rates

* According to StatePublicHealth.org over 40,000 people die in the United States each year from diseases or complications from diseases that are preventable with vaccinations.
* State and local health departments are using web-based immunization registries to help healthcare providers increase immunization among their patient bases.
* There are specific geographic areas within state and urban jurisdictions that have large numbers of young children who are under-immunized.
* Health officials can use GIS technology to identify hard to reach populations, target outreach efforts, and prioritize program resources.
* Health officials can use ArcGIS to create animation sequences of these pockets-of-need to understand trends over time and inform staff and immunization providers.