Improving NCDOT Project Delivery With GIS
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Goals of the presentation

• Share the evolving story of a unique project at NCDOT
• Inform you about how GIS will be used to help expedite project delivery in the future
• Emphasize how web-based GIS applications can improve or enhance the ability to complete tasks at a DOT
• Offer additional lessons learned based on this experience
Overall Transportation Project Process

• Step 1: Planning
  – Comprehensive Transportation Planning (20-25 years)

• Step 2: Programming
  – State Transportation Improvement Program (10 years)

• Step 3: Project Development and Env. Analysis
  – Project is funded and proposed project is evaluated

• Step 4: Design

• Step 5: Property Acquisition

• Step 6: Construction
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Setting the stage

- NCDOT was not meeting expectations for project development timeframes

- Management expects to meet the goal of “3,2,1”
  - 3 years to complete an Environmental Impact Statement
  - 2 years to complete an Environmental Assessment
  - 1 year to complete a Categorical Exclusion

- This goal was communicated effectively to everyone throughout the agency (this will come into play later.....)
Expectations vs Reality
Catalyst
The Kinston Bypass Project
Kinston Bypass

Brownton Road

KINSTON BYPASS
Kinston Bypass
Kinston Bypass

• Screening was successful in reducing project development time for main project
  – Note that this screening was a manual process done on a desktop

• GIS data was able to be used for several uses throughout the project

• GIS data was also used on Brownton Road widening project and assisted in that projects ability to be accelerated
Meanwhile…
Decentralization

Centralization and Decentralization
Manual Statewide Screening Tool

- The Environmental Analysis Unit had created an arcpy tool years ago that screened all STIP projects with about 100 environmental layers.
- Output was a very complicated spreadsheet.
- Used to determine which projects should stay at central and which projects can go to divisions.
- While the screening was automated with a python script, a lot of time and effort was needed to massage the data before running the tool.
Deadline Given

• Upper management tells the Environmental Analysis and Project Management group to find a solution to speed up project delivery and get it into place by October 2018.

• Main focus was on screening projects for environmental impacts and building predictive models for some of those key datasets.
A Confluence

Agency Reorganization

+ 3,2,1 Mandate

+ Deadline

Kinston Bypass Experience

+ Screening Tool
An Unorthodox Approach

• In September, the Environmental Analysis Group reaches to GIS Unit for assistance
• In August, EAU holds an “Industry Day” at headquarters downtown
Gathering the Knowledge Base

• Teams of disciplines were created, comprised of SMEs in different areas of environmental analysis in project development
  – Wetlands
  – Streams
  – Threatened and Endangered Species
  – Transportation modeling (forecasts, congestion, bike/ped, planning, transit etc.)
  – Sweeping Environmental
  – Hydraulics
  – GIS
  – And more would come
Detective Work

What does expediting project delivery really mean?

Isn't "everything" we do related to project delivery?

What have other DOT's done?

Who is involved in project delivery?

Where is the data to support this?
Overall picture takes shape

• Over 80 interviews with business units across the agency by October.

• Understanding emerges that there are deficiencies with all aspects of the project development process—not just environmental data.

• The Project Managers need better information before a project begins... "An informed scoping meeting"
What is project scoping?

**Scoping Objectives:**
- Understand the **Problem** - history and context
- Understand **resources** within the area
- Identify **issues**, constraints
- Discuss **potential ideas** for Solutions
- Plan project **approach & next steps**
Overall picture takes shape

- After many meetings and many whiteboarding sessions between Eric and Ryan, the big picture starts to emerge
Visualizations - A Turning Point

- Process Flow chart showed others, at a high level, where in the business process our project would be making improvements.
- Crystalized for others the type of improvements there would be.
- Power BI examples helped show graphically what a screening could provide.
But Wait…

• Other Business Units received the same “3,2,1” message and had started similar efforts.
  – Feasibility Design
  – Governance Office
  – Traffic Forecasting
  – Transportation Planning Division
  – 14 Divisions
  – Central Office

• The visualizations, graphics and interview results quickly moved our project to the forefront as the best option for success.

• Unification of those efforts was a task unto itself
Project ATLAS

- **Project ATLAS - Advancing Transportation through Linkages Automation and Screening**

- Improve business processes and provide a data access framework to support automated screening of projects in order to reduce project delivery times
Results of Business Analyst Effort

• Tasks were able to be identified
  – Applications
    • Search tool (Data Repository)
    • Screening Tool
    • Project Management Platform
  – Identify Authoritative data and locate it
  – Identify points of possible automation
  – Identify Possible areas where a programmatic agreement can be use

• Schedule for tasks could be developed
Data, Data, Data…

- Disciplines submit all GIS data used in their deliverables.
- Eric builds data repository where our analysts enter data from the discipline’s lists—metadata (location of services, downloads, date of last update, update cycle etc.)
- The repository gets populated with fields for deliverable type, organization, sub-organization etc.
- We link datasets to hard project deliverables and the groups responsible for those datasets to get the whole picture.
- We set out to use this approach for new business process improvements and datasets we’ll be creating through this project.
Realizations and Deliverables

- Realization that consultants and NCDOT folks do not always use the same data for their environmental deliverables and reports from the same source or do not know where the data is located
  - Deliverable #1 = a web-based search tool

- At many points throughout the project delivery process, screening could be introduced to help planners, project managers, and consultants understand impacts to their projects for better planning and implementation
  - Deliverable #2 identified = web-based screening tool
Deliverables

• Project managers and consultants have only one common gateway or interface for coordination during a project and that is a SharePoint repository
  – **Deliverable #3 identified = project management platform** (web interface where PM’s and consultant PM’s can see the status of screenings, which deliverables are needed and which ones have been completed, and project analytics)

• There are many areas where Business Units are developing key datasets on their local PC’s
  – **Deliverable #4= enterprise database**
Moving Forward

• Requirements documents are taking shape
Moving Forward

Potential for Automation
Moving Forward

- Technology selections
  - Trello/Visio
  - Enterprise Architect
    - BPMN 2.0
  - VSTS & CAST
    - C#.Net
    - Python
  - SharePoint
  - SQL Server, SDE, Web services
  - ESRI Screening Tool?
Code Review/Standards

CAST

Achieve Insight. Deliver Excellence.
Team Management
Workflow Modeling
Data Management

Microsoft SQL Server

esri ArcSDE
Screening Prototype

Conclusion

• October is coming quickly...
• Lots to do
• Staff is motivated
• We know what we have to do