Interim Report – FGDC CAP Grant Category 7

(Demonstration of Geospatial Data Partnerships across Local, State, Tribal, and Federal Government)

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Agreement Number: G10AC00235

Project Title: Taking It to the Next Level: NCStreetMap 2.0
                      Local to State Transformational Data Exchange

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Project Narrative

This project is a collaborative effort between the Working Group for Roads and Transportation (WGRT) and the Working Group for Seamless Parcels (WGSP) to develop a spatial data translator. Both working groups are tasked with creating the necessary standards and tools to assist with the development of statewide centerline and parcel datasets. The WGRT has developed a new centerline exchange standard and a secure web application (www.ncstreetmap.com) to assist the NC Dept of Transportation in their efforts to develop and maintain a statewide centerline file. The WGSP is in the process of developing an exchange standard for cadastral and land use data.

In April 2010 the co-chairs for both working groups established an Integrated Project Leadership Team (IPLT) to manage the joint effort. The first task of the IPLT was to draft the core functionality of the translator. The IPLT met weekly through conference calls and web meetings (gotomeeting.com) and utilized an online workspace (sosius.com). Seven tasks were identified:

1. Set up a new data transformation template.

2. Apply existing transformation to fresh copy of county data.

3. Make simple edits/changes to an existing transformation template.

4. Data validation: error reporting and visualizing transformed data.

5. Create mini-metadata (or ingest full metadata) for a transformed dataset.

6. Upload transformed data and associated artifacts to central repository.

7. Convert transformed data to a different format (other than the standard state schema).

The IPLT developed a PowerPoint presentation (Attachment A) that storybooks the workflow of the translator and further explains the purpose and context of the project. This presentation was given to both working groups as well as other groups within the state GIS coordination structure. The presentation was instrumental in explaining the translation process to local government members and resolved several concerns.

In mid-May 2010 the Integrated Project Technical Team (IPTT) was formed and consists of approximately fifteen members from both working groups. The IPTT is tasked with defining the technical and functional requirements of the translator, beta testing, and training and implementation. The IPTT met biweekly through June via conference calls and web meetings to draft business rules. These business rules were created in a database within the online workspace that ensured consistency regarding their format. This consistency should prove valuable to the developer. The business rules are shown in the attached spreadsheet (Attachment B).

Following the development of the business rules the IPTT began drafting user case stories. These were developed in a separate database within the online workspace. The user case stories are shown in the attached spreadsheet (Attachment C).

Upon completion of the business rules and user case stories, the IPLT drafted a scope of work (Attachment D) and presented it to the proposed developer. Currently the IPLT is awaiting a detailed line item-based cost estimate from the proposed developer. Once the cost estimate is received, the IPLT will either revise the scope of work or begin developing their respective contracts with the developer. Since this is a collaborative effort between the two working groups with separate funding sources, the IPLT will determine which functionality will be covered by each grant. Separate contracts will be developed between the developer and each working group. Once the contracts are in place it is expected that the development process will take approximately six to eight months.

Next Steps

Product Development: Once the contracts are in place the developer will begin work on the translator using agile development methodologies. Throughout this process the developer will provide regular update presentations to the IPTT through conference calls and web meetings. The IPTT will be responsible for providing regular feedback to the developer, beta testing, and development of training materials.

Training & Implementation: Upon successful delivery of the translator, the IPTT will conduct a pilot project to train and transform the street centerline data for all participants. Each team member along with several Councils of Governments (COGs) will use the translator to process their local datasets. The COGs will provide training and assistance to their counties and in cases where the counties are unable to process their data the COG will complete the process on their behalf. It is anticipated that the initial training phase will result in successful implementation in approximately 30 counties or roughly one third of the state. Each participating data provider will provide quarterly updates of their centerline data to the www.ncstreetmap.com repository.

Timeline

Currently the project is approximately 3 months behind schedule due to administrative issues with the other working group's grant. At this point it is assumed that a no-cost extension will be necessary but we are currently unable to estimate the extent of these delays. It is expected that these administrative issues will be resolved by the end of calendar year. We anticipate that it will be possible to determine a revised schedule by January 2011.

SPAЯT-NC

**An Open Source
SPAtial data TRansformation
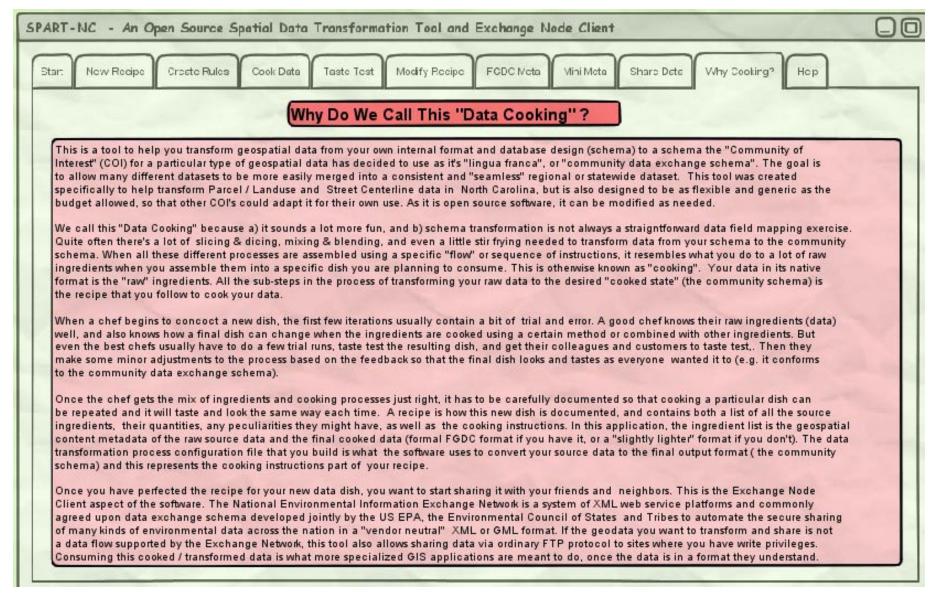tool and Exchange Node Client**

Created by the NC Working Group for
Seamless Parcels and the NC Working Group
for Roads and Transportation

Funded By the US EPA and the US FGDC

What Is SPART-NC & What Will It Do For Me?

- A free and open source desktop application that uses the GDAL and FDO data translation libraries, and is built on top of the OpenNode2 Exchange Node Client and potentially the FDO ToolBox application.

- It's purpose is to help make creating & sharing seamless statewide geo-data easier.

- It will allow a data steward to transform their Parcel or Street Centerline data into a new GML Simple Features (L-0 or L-1) file, or an ESRI Shapefile - using a known community data exchange schema.

- It will allow a data steward to save their data transformation "recipe" for re-use, or share it with other agencies.

- It will allow a data steward to validate their transformed data for conformance with the community data exchange schema.

- It will allow a data steward to create a "slightly lighter" metadata record for it.

- It will allow a data steward to securely share their transformed data with other Agencies using either the EPA Exchange Network (for Parcel Data) or a specified FTP site (for Street Centerline Data).
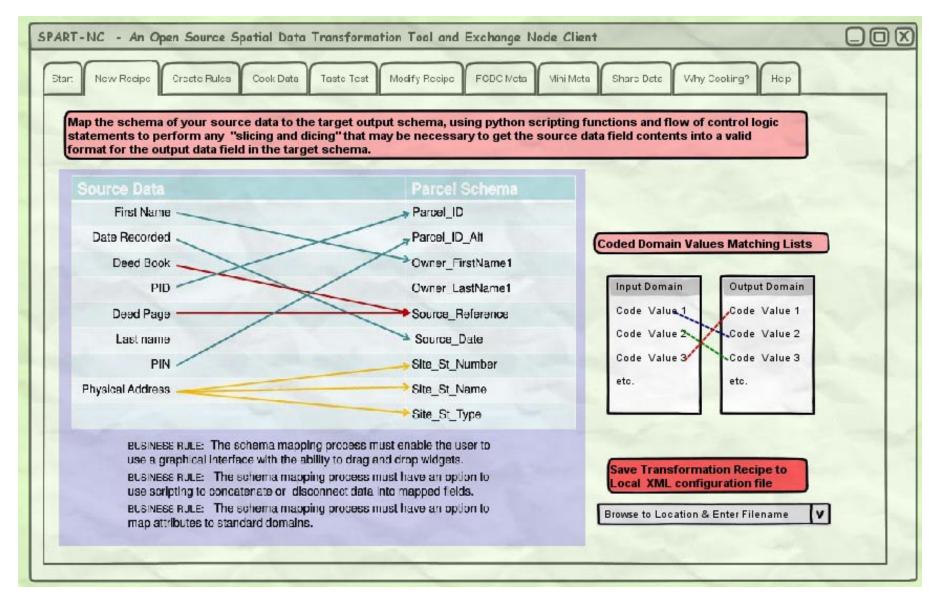
What Could It Look Like?

SPART-NC - An Open Source Spatial Data Transformation Tool and Exchange Node Client

| Start | New Recipe | Create Rules | Cook Data | Taste Test | Modify Recipe | FGDC Meta | Mini Meta | Share Data | Why Cooking? | Hep |

Why Do We Call This "Data Cooking"?

This is a tool to help you transform geospatial data from your own internal format and database design (schema) to a schema the "Community of Interest" (COI) for a particular type of geospatial data has decided to use as it's "lingua franca", or "community data exchange schema". The goal is to allow many different datasets to be more easily merged into a consistent and "seamless" regional or statewide dataset. This tool was created specifically to help transform Parcel / Landuse and Street Centerline data in North Carolina, but is also designed to be as flexible and generic as the budget allowed, so that other COI's could adapt it for their own use. As it is open source software, it can be modified as needed.

We call this "Data Cooking" because a) it sounds a lot more fun, and b) schema transformation is not always a straightforward data field mapping exercise. Quite often there's a lot of slicing & dicing, mixing & blending, and even a little stir frying needed to transform data from your schema to the community schema. When all these different processes are assembled using a specific "flow" or sequence of instructions, it resembles what you do to a lot of raw ingredients when you assemble them into a specific dish you are planning to consume. This is otherwise known as "cooking". Your data in its native format is the "raw" ingredients. All the sub-steps in the process of transforming your raw data to the desired "cooked state" (the community schema) is the recipe that you follow to cook your data.

When a chef begins to concoct a new dish, the first few iterations usually contain a bit of trial and error. A good chef knows their raw ingredients (data) well, and also knows how a final dish can change when the ingredients are cooked using a certain method or combined with other ingredients. But even the best chefs usually have to do a few trial runs, taste test the resulting dish, and get their colleagues and customers to taste test,. Then they make some minor adjustments to the process based on the feedback so that the final dish looks and tastes as everyone wanted it to (e.g. it conforms to the community data exchange schema).

Once the chef gets the mix of ingredients and cooking processes just right, it has to be carefully documented so that cooking a particular dish can be repeated and it will taste and look the same way each time. A recipe is how this new dish is documented, and contains both a list of all the source ingredients, their quantities, any peculiarities they might have, as well as the cooking instructions. In this application, the ingredient list is the geospatial content metadata of the raw source data and the final cooked data (formal FGDC format if you have it, or a "slightly lighter" format if you don't). The data transformation process configuration file that you build is what the software uses to convert your source data to the final output format (the community schema) and this represents the cooking instructions part of your recipe.

Once you have perfected the recipe for your new data dish, you want to start sharing it with your friends and neighbors. This is the Exchange Node Client aspect of the software. The National Environmental Information Exchange Network is a system of XML web service platforms and commonly agreed upon data exchange schema developed jointly by the US EPA, the Environmental Council of States and Tribes to automate the secure sharing of many kinds of environmental data across the nation in a "vendor neutral" XML or GML format. If the geodata you want to transform and share is not a data flow supported by the Exchange Network, this tool also allows sharing data via ordinary FTP protocol to sites where you have write privileges. Consuming this cooked / transformed data is what more specialized GIS applications are meant to do, once the data is in a format they understand.
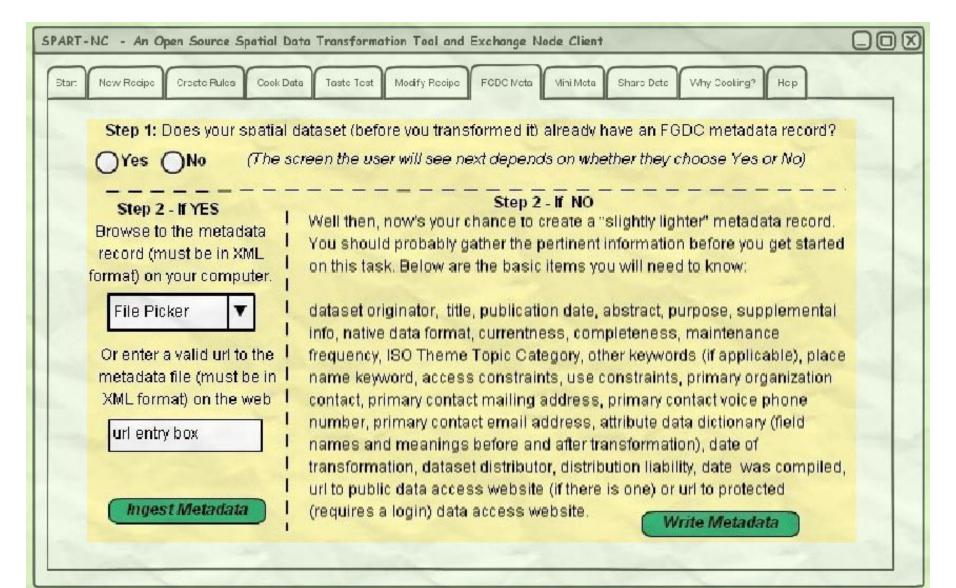
What Could It Look Like?

Creating a New Transformation "Recipe"

SPART-NC - An Open Source Spatial Data Transformation Tool and Exchange Node Client

Start | New Recipe | Create Rules | Cook Data | Taste Test | Modify Recipe | FGDC Meta | Mini Meta | Share Data | Why Cooking? | Help

Step 1 : Select the general category of source geodata you want to create a transformation recipe for:

A "file based" spatial data format ▼

Step 2 : Identify the specific format of your source geospatial data

Supported "file based" geospatial data formats

ESRI Shapefile

ESRI Shapefile + related table(s) DBF/CSV.

ESRI ArcINFO Coverage

ESRI ArcINFO Coverage + related table(s) INFO/DBF/CSV .

(maybe) ESRI File GDB "simple" feature class

maybe) ESRI File GDB "simple" feature class + related table(

MapInfo file

MapInfo file + related table(s) in DBF or CSV format

AutoDesk SDF File

GML 3x Simple Features - LEVEL 0 or LEVEL 1

Note: There will be only one "Pick List" for Step 2 - the contents reflecting what was selected in the Step 1 "Pick List"

Step 3 : Browse to File / Specify DB Connection

Browse to File or Enter DB Connection Parameters ▼

Supported "file-based " spatial relational databases

ESRI Personal (MDB) GDB "simple" point/line/polygon feature cla

ESRI Personal (MDB) GDB "simple" feature class + related table(

SQLite 3x / SpatiaLite Spatial Database layer

SQLite 3x / SpatiaLite Spatial Database layer + related table(s)

Supported spatial relational databases

PostgreSQL/PostGIS Spatial layer

PostgreSQL/PostGIS Spatial layer + related table(s)

MySQL Spatial layer

MySQL Spatial layer + related table(s)

Oracle Spatial layer

Oracle Spatial layer+ related table(s)

SQL Server 2008 Spatial layer

SQL Server 2008 Spatial layer + related table(s)

ESRI ArcSDE GDB "simple" feature class (no networks or topologies)

ESRI ArcSDE GDB "simple" feature class + related table(s)

Step 4: GO --> Start Building Transformation Recipe

Doing The Data Mapping

Creating the Business Rules

Start | New Recipe | Create Rules | Cook Data | Taste Test | Modify Recipe | FGDC Meta | Mini Meta | Share Data | Why Cooking? | Help

Define More Involved Business Rules About Data Transformation Process

○ I Want to Create a Schematron Rule Base for an Exchange Network Data Flow

○ I Want to Create Rules for Non-EN GML Data Structure, Content and Geometry Using OpenRules

○ I Want to Create Rules for Shapefile Data Structure, Content and Geometry Using OpenRules

○ I Do Not Need to Create Any Additional Business Rules

Rule ID	Data Element	XML Element	Rule statement	Test Conditions	Error Level	Error Description	Validation Type
An identifier for the rule	The name of the data element	The name of the XML element	Technical description of the rule.	A list of test conditions	Level of error conditions: Warning. Error or Critical	A description of the error and how to fix it	Either schema or Schematron

Rule ID	Data Element	XML Element	Rule statement	Test Conditions	Error Level	Error Description	Validation Type
10	Observation Date	Observation Date	The date must be in YYYYMMDD format and in the range between 1/1/1959 and current date.	Test 1: Format: YYYYMMDD Test 2: Range: Jan. 1. 1957 <= X <= Current date	Error	Use the rule statement.	Schematron

Transforming ("Cooking") the Data

Validating ("Taste Testing") the Transformed ("Cooked") Data

Modifying a Data Transformation "Recipe"

SPART-NC - An Open Source Spatial Data Transformation Tool and Exchange Node Client

| Star | New Recipe | Create Rules | Cook Data | Taste Test | Modify Recipe | FCDC Meta | Mini Meta | Share Data | Why Cooking? | Hep |

Step 1 : Browse to Saved Recipe (Transformation Configuration) File on Your Computer | Saved XML Recipe File Location On Disk ▼

(Opt) Step 2 : Do You Want to Change the Format of the Source GeoData ?   ○ YES   ○ NO   A New Source Data Format Pick List ▼

Step 3 : Browse to Source File / Specify DB Connection   Source File Location On Disk or DB Connection File ▼

(Opt) Step 4 : Do You Want to Change the Format of the Target GeoData ?   ○ YES   ○ NO   A New Target Data Format Pick List ▼

Step 5 : Define New Target File Location & Name On Disk   Target File Location On Disk or DB Connection File ▼

(Opt) Step 6a : Do You Want To Change Target CRS to a Common EPSG Code?   ○ YES   ○ NO   An EPSG Code Pick List w/ Std Code List ▼

(Opt) Step 6b: Do You Want To Specify a More Exotic EPSG Coord Sys Code?   ○ YES   ○ NO   If YES - Type Valid EPSG Code

Step 7: GO --> Start Modifying Transformation Recipe

Modifying a Data Transformation "Recipe"

Ingesting Existing Source Data FGDC Metadata

SPART-NC - An Open Source Spatial Data Transformation Tool and Exchange Node Client

| Start | New Recipe | Create Rules | Cook Data | Taste Test | Modify Recipe | FGDC Meta | Mini Meta | Share Data | Why Cooking? | Help |

Step 1: Does your spatial dataset (before you transformed it) already have an FGDC metadata record?

○ Yes   ○ No   *(The screen the user will see next depends on whether they choose Yes or No)*

- -

Step 2 - If YES

Browse to the metadata record (must be in XML format) on your computer.

| File Picker ▼ |

Or enter a valid url to the metadata file (must be in XML format) on the web

| url entry box |

Ingest Metadata

Step 2 - If NO

Well then, now's your chance to create a "slightly lighter" metadata record. You should probably gather the pertinent information before you get started on this task. Below are the basic items you will need to know:

dataset originator, title, publication date, abstract, purpose, supplemental info, native data format, currentness, completeness, maintenance frequency, ISO Theme Topic Category, other keywords (if applicable), place name keyword, access constraints, use constraints, primary organization contact, primary contact mailing address, primary contact voice phone number, primary contact email address, attribute data dictionary (field names and meanings before and after transformation), date of transformation, dataset distributor, distribution liability, date was compiled, url to public data access website (if there is one) or url to protected (requires a login) data access website.

Write Metadata

Creating New "Slightly Lighter" Metadata if FGDC Metadata is Not Available

Creating New "Slightly Lighter" Metadata if FGDC Metadata is Not Available

Creating New "Slightly Lighter" Metadata if FGDC Metadata is Not Available

Submitting Transformed Data to an Exchange Node

Submitting Transformed Data to an FTP Site

Online Help System

Rule ID	Rule Name	Rule Category	Rule Proposer	Rule Details	This Depends On?	Dependent on This?	Rule Conflicts With?	Rule Priority	Associated File (optional)	IPT Approved?	Other Notes	IPT Questions/ Comments
1	Import Existing FGDC Metadata	Task 5: Import or Create Metadata	31299	If an FDGC-compliant metadata record already exists for the input/source dataset that is to be transformed into the common state schema (whether parcels or streets), the user will import it into the SPART-NC tool and certain metadata elements will be auto	The existence of an FGDC-compliant metadata record for the input/source dataset.	Flow of control for all subsequent operations in the metadata preparation task.	None known	Critical Feature		Yes		
2	Metadata Generator will read Schema Tranformation Recipe	Task 5: Import or Create Metadata	31299	The SPART-NC tool will read the schema transformation configuration/recipe file (as indicated by the user) that was used to transform the data to the Common NC Exchange Format. It will read and use this information to create a simple, human-readable "pro	The ability of the SPARTA-NC tool's metadata module to parse the Schema Transformation Configuration File/Recipe and concatenate a text string containing the data fields and properties as the schema mapping rules define them.	Subsequent steps in the metadata generation module to assemble a final "mini-metadata" record for the transformed dataset.		Medium Priority		Under Consideration	This is listed as Medium Priority only because we do intend that the XML Schema Transformation Recipe/Configuration File will accompany the transformed dataset and its metadata in the binary file attachment package (.zip) that is submitted to the central	
3	Multiple Transformations	Task 3: Edit Rules in Saved Transformation Recipe	31325	An agency should be able to have multiple transformation templates for centerlines. An agency will need a transformation template in order to export their centerline data in the format consistent with the state centerline exchange standard/schema. The	Ability to load additional schema definitions (xsd) into the translator program.		None Known	Medium Priority		Under Consideration	This feature will add value/benefit for local government participation.	
4	Multiple editors/users	Task 3: Edit Rules in Saved Transformation Recipe	31325	The transformation template file will be a standalone xml file that can be stored wherever the use wishes. The xml file can be moved and reused. Installation/configuration: An agency can have multiple users or editors for the translation process.	Ability to store translation templates as separate files (possibly xml) that can be accessed by several users.		None Known	High Priority		Under Consideration		
5	Domain Matching - reclassify	Task 1: Design New Schema Transformation Recipe	31325	User needs to be able to reclassify field values to conform to the schema. Example 1: Craven County has fourteen agriculture values in their Land Use field. Those 14 specific agriculture values need to be reclassified to the general "Agriculture" value	Tools ability to query attribute fields and generate a list of unique values.		None Known	High Priority		Under Consideration		

#	Name	Task	ID	Description	Col A	Col B	Col C	Priority		Status	Notes
6	Schema Mapping Interface	Task 1: Design New Schema Transformation Recipe	31328	Graphical Interface for the schema mapping should enable user to view the Source Data and Target data together on one screen with the ability to drag and drop mapped connections	resources available to develop the interface	Scripting to concatenate or disconnect data	None Known	High Priority		Under Consideration	Discussion about the feasibility of this was made during the core meeting held 4/28/2010. Some commercial products have a lot of resource invested in screens like this. Overall the consensus was that if we need to develop any graphical interface this on
7	Scripting to Concatenate/Disconnect	Task 1: Design New Schema Transformation Recipe	31328	With the data mapping process, flexibility to run scripting on select data attributes in the Source data to concatenate or disconnect data to populate the target data attributes			None Known	High Priority		Under Consideration	
8	Standarize text based attributes	Task 1: Design New Schema Transformation Recipe	31325	Tool should alllow the user to define critieria and use simple scripting language to manipulate string patterns in the input data to achieve a consistent output format. Example: Craven County has several variations of "US 70 HWY" in the Road Name field	Python scripting ability in tool and user's ability		None Known	High Priority		Under Consideration	
9	Submit transformed parcel data to Exchange Node	Task 6: Publish Transformed Data to Central Rep.	20945	When a fresh set of parcel data has been transformed to the common schema and validated, the user will initiate a process to submit the data to the NC InCLUDE Exchange Node using the Exchange Network web services. A login prompt will appear so that the u	Exchange Network Node supporting the InCLUDE data flow is accessible and the user has a valid NAAS account that allows data submission to the NC InCLUDE Node.	Publishing the transformed parcel data to the secure Exchange Node web publishing portal and potentially to the public NC OneMap site (if the data steward approves public release)	None Known	Critical Feature		Under Consideration	
10	Submit transformed centerline data to NCStreetMap	Task 6: Publish Transformed Data to Central Rep.	31325	When a fresh set of centerline data has been transformed to the common schema and validated, the user will initiate a process to submit the data to the NCStreetMap FTP site. A browser window should open to the NCStreetMap login page. Note - should wor			None Known	High Priority		Under Consideration	
11	validate line geometry	Task 4: Validate Transform, View Data, Error Rpt	31326	Make sure that the data loaded is line data for street centerlines. Don't want polygons or point features loaded into this dataset.	definition of the source file		None Known	High Priority		Under Consideration	

12	validate polygon geometry	Task 4: Validate Transform, View Data, Error Rpt	31326	Make sure that the data loaded is polygon data for parcel data. Don't want line or point features loaded into this dataset.	source dataset being able to tell the transformation tool what geometry type it is.		None Known	High Priority		Under Consideration	
13	identify geometry errors	Task 4: Validate Transform, View Data, Error Rpt	31326	lines: identify multipart lines or lines that are not connected to anything else polygons: identify unclosed polygons or overlapping polygons. produce report for user that indicates a count and the ids of the offending features. The ids should rela	source being a multipart feature.	Proper transformation into simple features	None Known	High Priority		Under Consideration	
14	Schema Mapping Interface-attributes	Task 1: Design New Schema Transformation Recipe	31328	Graphical interface to enable users to view source attributes and map them to a "standard" attribute	available resources		None Known	High Priority		Under Consideration	
15	Re-projection of Data	Task 2: Run a Saved Transformation Recipe on Data	31324	Provide for the re-projection of data including Datum, Projection, and Units			None Known	High Priority		Under Consideration	
16	Capture Datum for Metadata	Task 2: Run a Saved Transformation Recipe on Data	31324	When the transformation is applied to the data it should capture sources and target datum, projection, and units to be applied to the software generated metadata			None Known	High Priority		Under Consideration	
17	Multiple Schemas	Task 2: Run a Saved Transformation Recipe on Data	31324	Performs transformation on multiple schemas, either standard schemas or user defined schemas	Task 1 Step 2C Ability to design your own schema		None Known	High Priority		Under Consideration	
18	File Naming Convention	Task 2: Run a Saved Transformation Recipe on Data	31324	Require output to be named using NC Spatial Data Naming Convention unless user specifically requests a different name			None Known	High Priority		Under Consideration	
19	Schedule Updates	Task 2: Run a Saved Transformation Recipe on Data	31324	Provide a scheduling system that would automatically go to a data source and run a transformation			None Known	High Priority		Under Consideration	
20	Truncate Source Data	Task 2: Run a Saved Transformation Recipe on Data	31324	Truncate source data that is not matched to target data schema			None Known	High Priority		Under Consideration	
21	Null OK	Task 2: Run a Saved Transformation Recipe on Data	31324	If source data field is blank leave target field blank			None Known	High Priority		Under Consideration	
22	Open Source First	Task 8: Other Business Rule	31324	Use existing open source software components whenever possible instead of developing from scratch.			None Known	High Priority		Under Consideration	
23	PIN_PK	Task 2: Run a Saved Transformation Recipe on Data	31324	Use the PIN as the primary key			None Known	High Priority		Under Consideration	
24	Shape Files	Task 2: Run a Saved Transformation Recipe on Data	31324	the tool will transform shape files with attributes to a target schema			None Known	High Priority		Under Consideration	

25	Upload Multiple targets	Task 6: Publish Transformed Data to Central Rep.	31324	Provide an alternate (not Exchange Network web services) upload module that will allow the user to designate one or more FTP upload targets to receive a zipped, transformed data package.			None Known	High Priority		Under Consideration	
26	User defined Directories	Task 2: Run a Saved Transformation Recipe on Data	31324	Software to allow user defined directories for source data and transformed data.			None Known	High Priority		Under Consideration	
27	Creation Information	Task 2: Run a Saved Transformation Recipe on Data	31324	Include basic information such as data custodian, data providing agent, address contact name, phone number, email address etc (info need for metadata)			None Known	High Priority		Under Consideration	
28	Explode Multi-part line features?	Task 4: Validate Transform, View Data, Error Rpt	31326	Request from the user, whether to explode multi part line features, or to stop performing the transformation.	Data source defining linear features as multi part	In order to be transformed, all features have to be simplified to their common-denominator, a single feature	None Known	Critical Feature		Under Consideration	
29	Explode multi part polygon feature?	Task 4: Validate Transform, View Data, Error Rpt	31326	If data source is multi-part polygon feature, ask user if it can be exploded into individual polygons.	Data source being a multi part polygon	In order to properly transform the features, they must be simplified.	None Known	Critical Feature		Under Consideration	
30	Show multi part features	Task 4: Validate Transform, View Data, Error Rpt	31326	Select and display multi part features so that user can see which ones would have to be "exploded" to ensure correct transformation. This would include linear and polygonal features.	Data source containing at least one multipart feature	none known	None Known	Critical Feature		Under Consideration	
31	Change (Add/Delete/Modify) business rules	Task 8: Other Business Rule	31326	Enable the user to add a new template and validation rules, as read from the schema.	Knowledge/experience of the editor	export to other formats	None Known	Low Priority		Under Consideration	If time and $$ allow, this would be a nice to have, and make the tool more versatile.
32	Remove invalid geometry	Task 4: Validate Transform, View Data, Error Rpt	31326	Toggle option set by user to remove geometry that fails tests, from the source data. This is different than skipping over the record in the source data. The output would be the same, but this rule would indicate that the user wants the source data to	ability to edit the source data	output dataset	None Known	High Priority		Under Consideration	
33	Remove non-conforming attribute	Task 4: Validate Transform, View Data, Error Rpt	31326	Remove (set to null) the attribute that is not conforming to proper data type or within expected domain.	proper rules expressed in the xml	correct transformation to expected output	None Known	High Priority		Under Consideration	

34	Create Error Report (tabular)	Task 4: Validate Transform, View Data, Error Rpt	31326	Create a tabular error report that identifies (by unique id) the features in a data source that do not conform to business rules (geometry or attribute). The report should be broken into sections with the rule broken would be in a header, and then unique	rules expressed in xml format	none known	None Known	Critical Feature		Under Consideration	
35	Create Error Report (visual - geometry)	Task 4: Validate Transform, View Data, Error Rpt	31326	Create an error report that identifies (by unique id) the features in a data source that do not conform to business rules (geometry or attribute). The report format is visual, and should be broken into sections with the rule broken would be in a header,	Having software capable of displaying information spatially.	none known	None Known	Critical Feature		Under Consideration	
36	Report Address range errors (linear features only)	Task 4: Validate Transform, View Data, Error Rpt	31326	Perform general analysis of high-low address ranges and report (using unique id in the data source) which ones have overlapping ranges, or underlapping (gap) ranges.	Address transformation of left/right to high-low and comparison.	GICC requested functionality back to local governments for their use.	None Known	Low Priority		Under Consideration	
37	Identify multiple networks in one dataset (linear features only)	Task 4: Validate Transform, View Data, Error Rpt	31326	For linear features only, indicate that there are more than one linear networks (groups of connected features), and enable the user to inspect that information visually. This is only in case there are more than one network. In some cases, having more	the ability of the tool to check connectivity of features.	data quality of output dataset	None Known	Medium Priority		Under Consideration	
38	Simple Installation	Task 9: Other Technical Rule	33102	Any software that needs to be installed needs to be simple and any dependencies automatically installed. It should be able to be installed by someone with no programming/operating system skills.			None Known	High Priority		Under Consideration	Julie - perhaps it would be helpful if we listed similar tasks that were acceptable. For example, if the user was able to install ArcGIS, Adobe Reader, iTunes, etc... I'm thinking Admin priviledges may still be required. We might also consider that
39	Create Mini-Metadata	Task 5: Import or Create Metadata	31299	The user will indicate whether an FGDC metadata file already exists for their source dataset. If not, the user will be presented a series of data input screens that allow them to enter a subset of the most important metadata items. This subset is known in	The absence of formal FGDC metadata and the user knowing and entering the details of their source dataset.	The metadata file submitted with the transformed data.	None Known	Critical Feature		Yes	

40	Convert data to new format without transformation	Task 7: Convert Un-Transformed Data to New Format	31299	Allow the user to convert existing source data to a select list of spatial data formats without any data content transformation. Example - convert an existing ESRI shapefile to a MapInfo file. This would use the standard functionality of Ogr2Ogr. The only	GDAL/OGR and its built in Proj4 libraries			None Known	Medium Priority		Under Consideration	

Story_ID	Owner_Name	Module_Category	User Story Title	Narrative	Acceptance Criteria - Scenario 1 (required)	Acceptance Criteria - Scenario 2 (optional)	Acceptance Criteria - Scenario 3 (optional)	Any other explanatory notes	IPT Questions/Comments
1	arickard	Module 3 - Edit Existing Transformation	Target Schema Changes	As a county GIS manager I want to update an existing centerline transformation template to account for revisions or amendments to the exchange standard adopted by the SMAC or GICC so that I do not have to manually recreate the entire transformation template. Original text: The SMAC or GICC adopt or revise one of the existing exchange standards and the corresponding transformation templated needs to be revised.	Scenario 1: Given the existing tranformation template performs correctly. When the SMAC or GICC adopts revisions to the centerline exchange standard Then the end user should be able to edit the existing transformation template to account for those revisions. This may include the following types of revisions: - simple addition of new fields in the target schema (add Prefix Direction field) -new format of existing field in target schema that may require editing transformation task or python script Example - existing format for listing highway names in the street name field is "US 70 Highway". SMAC changes standard and the new format is " US Highway 70". End user needs to be able to edit the python scripting associated with this field.				
2	arickard	Module 3 - Edit Existing Transformation	Source Data Changes	As a county GIS manager I want to be able to edit an existing transformation template to account for changes to my source data so that I do not have to manually recreate the entire transformation template.	Given the existing transformation template functions correctly. When the county or city alters the input centerline data by adding or removing fields used in the transformation template Then the end user should be able to edit the transformation template to account for those changes. This could include the following types of modifications to the input data:-county renames existing fields ("name" field becomes "street_name" field) -county changes field type (house number field changes from integer field to text field)-county adds new field that is used in transformation (county adds state route number in centerline data)				
3	arickard	Module 3 - Edit Existing Transformation	Copy Transformation Template	As a county GIS manager I want to create a new transformation template off of an existing template by copying the existing transformation template and renaming it or "Save As" So that I do not have manually recreate the entire template.	Given the existing transformation template functions correctly. If a user wants to create a new transformation template that is very similar to an existing template then the user should be allowed to make a copy of the existing template and save it as a new template then make the necessary revisions to the copy.				
4	arickard	Module 1 - New Transformation	Copy scripting from existing template	As a county GIS manager I want to be able to copy python scripting used in an existing template and paste it into a new transformation template so that I do not have to manually enter the scripting.	Given the scripting works correctly in the original transformation template. When a user wants to create a second transformation template and the transformation template requires python scripting that is currently included in another template Then the user should be allowed to open the first template, copy the required python script, and paste it into the second template.				
5	julia	Module 5 - Metadata	Tool Updates Existing Metadata Entity & Attribute Section With New Transformed Fields	As a local gov data steward, when I ingest an existing FGDC metadata record for my data layer into the SPART-NC transformation tool's metadata module as part of the data transformation process, I want the metadata to have the new field names in the transformed output dataset added to it by the tool.	Given that I have ingested a metadata record that has an entity and attribute section and that each attribute in the source data has a definition, during the data transformation process, the SPART-NC tool will read the XML mapping/transformation configuration file that defines the transformation process from source data to output data, and add the new transformed field names to the entity and attribute section of the FGDC metadata, referencing the original field name in its definition.	If I have no existing FGDC metadata record for the SPART-NC tool to ingest, then after I enter the required "mini metadata" information into the tool that describes the source dataset, the SPART-NC tool will still read the mapping/transformation configuration file that defines the transformation process from source data to output data, and add the new transformed field names to the entity and attribute section of the "mini-metadata", referencing the original field name in its definition.	If, in the mapping/transformation configuration file that defines the transformation process from source data to output data, multiple fields in the source dataset are used to create a single field in the output dataset, whether by simple concatenation, or by a more involved Python scripting process, the SPART-NC tool will still add the new transformed field names to the entity and attribute section of either the ingested FGDC metadata or the user-		
6	Janet Lowe	Module 2 - Apply Existing Transformation	Save Input format in transformation recipe	As the GIS manager, I want to be able to save my input format type in the recipe so that I don't have to re-enter it every month	Scenario 1 - I have the same input format as last month Given the input file is the same format as last month, When I run the transformation Then I don't have to re-define the input format And the transformation proceeds.	Scenario 2 - I have a new input format from last month Given the input file is now different from last month When I run the transformation The tool will indicate that the input file is not the same format And I will be sent to the part of the tool where I can redefine the input format.			
7	Janet Lowe	Module 2 - Apply Existing Transformation	Export my data	As a user of the transformation tool I want to export my data in the same format as last month So that I can provide updated exchange data to my customers.	Scenario 1: I want to export the data in the same format as last time Given I have a transformation already defined and the output format is included in the transformation When I want to exchange data with my customers Then I use the transformation tool to provide them updated data in the same export format as last time.	Scenario 2: I want to export the data in a different format from last time Given I have a transformation already defined And the output format is included in the transformation When I want to exchange data with my customers Then I use the transformation tool to provide them updated data in the new format And will be able to redefine the export dataset format And it will be saved in my transformation template if I want it to And the data will be exported to the new format so I can give it to my customer.			

#	Name	Module	Title	User Story	Scenario 1	Scenario 2				
8	Janet Lowe	Module 4 - Validation / Error Reports	Detect Schema Errors as Close to Source as possible	As a user of the transformation tool I want to be made aware of my errors So that I will get a good transformation	Scenario 1: I've incorrectly identified the datum, projection, units Given that I have a known dataset When I indicate the datum/projection/units I'm selecting from known datums/projects/units And not entering my own data by hand (user error) And the tool should indicate to me that there's no such datum/projection/unit (nicely)	Scenario 2: I've specified an output location that doesn't exist Given I have ...				
9	julia	Module 5 - Metadata	SPART-NC can ingest existing FGDC Metadata	As a local government data steward who has already gone to the trouble of writing FGDC compliant metadata for my data layers, I want the SPART-NC tool to be able to ingest my existing XML metadata file rather than me have to type in the information all over again.	Given that my XML metadata file can successfully be validated by the online FGDC metadata validator web service, when I point the SPART-NC tool to it from the metadata module/interface, the XML metadata file should be ingested and stored in the SPART-NC tool's internal processing database for re-use with the standard data transformation task associated with the gis dataset it documents.	Given that my XML metadata file has some kind of errors in it that prevent it from passing the online FGDC metadata validator web service, when I point the SPART-NC tool to it from the metadata module/interface, the elements of it that are valid should be ingested and stored in the tool's internal processing database for re-use with the standard data transformation task associated with the particular gis dataset it documents. For those elements that are not valid, the SPART-NC metadata module/interface will then prompt me to type in the necessary information for those missing elements and will store those values with the rest of the metadata record in the internal processing database, and optionally give me the option to write a valid and complete XML metadata file to my computer's hard drive so that I can replace my old, invalid XML metadata file with a good one.				
10	julia	Module 5 - Metadata	SPART-NC will let me create "mini-metadata" if I do not have an FGDC metadata record for the dataset I plan to transform	As a local government data steward who just has not gotten around to writing formal, FGDC-compliant metadata for my data layer yet, I want the SPART-NC to provide me an easy to understand and use interface for entering the minimal amount of information to create a new metadata record using the DENR "slightly lighter" metadata profile, which will still validate as a compliant FGDC metadata record.	Given that I know all of the other business and processing related information about my dataset and have keyed it in, the SPART-NC metadata collection module will be able to read my input/source gis dataset and determine all of the correct coordinate system, units, datum, spatial extent bounding coordinates values, etc. and populate the metadata elements for these items automagically.	Given that I know all of the other business and processing related information about my dataset and have keyed it in, but I have neglected to create a spatial reference system for my dataset (using whatever method or file artifact is appropriate for my file format - most commonly the .prj file for a shapefile) the SPART-NC metadata collection module will notify me that my file is missing this information and give me an opportunity to point to another dataset in the same coordinate system, datum, and units that DOES have the required spatial referencing system artifacts and the tool will "copy" that information from the other dataset and apply it to my "mini-metadata" record. Once it knows the coordinate reference system, datum and units, the SPART-NC metadata collection module will also know how to generate correct bounding coordinates based on the contents of the target data layer rather than the "copied" data source.				
11	Katie Templeton	Module 6 - Upload Transformed Data	Direct Upload to NCStreetMap	As a City GIS Analyst I would like to have an automated process that directs me to upload transformed data to NC Street Map within the same environment I used to upload and transform the data.	Givens: I have uploaded my county centerline.Events: The transformation is complete and my data matches statewide schema. The template now prompts me to upload directly to NCStreetMap without leaving the template interface. Outcome: My data is uploaded and can be viewed immediately through NC StreetMap as part of a statewide centerline.					
12	Scott Barnwell	Module 6 - Upload Transformed Data	Auto-Notification to upload data	As a county GIS manager, I want to be notified to upload data via my defined transformation template on a defined periodic basis (e.g. monthly, quarterly) so that the data stays current and I can avoid infrequent/inconsistent updates.	Given a defined data update frequency (e.g. monthly, quarterly) and given that my agency has valid contact information and given that my agency has a saved transformation template from an earlier transformation, When the defined update frequency for the data has passed, Then an email is sent to me indicating that it is time to upload current data with a link to the transformation tool and my saved template.	Given that my data has not been updated since the previous transformation, When the email notification is received to upload current data, Then provide an option to indicate that there have been no changes to the data and indicate that the existing transformed data is still current, and update the metadata record to reflect the currency of the data.				

13	Scott Barnwell	Module 6 - Upload Transformed Data	Saving incomplete transformation, particularly with metadata	As a local GIS data manager, I want the SPART-NC transformation tool to save my transformation whether it is partial or complete so that I can return to finish the transformation at a later time. In particular, since entering the "mini-metadata" may require significant time and research, I do not want to have to start from the beginning in the transformation process if I am unable to complete the mini-metadata in a single session. I also would like to re-use my mini-metadata record for future transformations.	Given that the transformation tool requires FGDC metadata and will provide an interface to enter a "mini-metadata" record in situations where a metadata file has not already been created, When I am entering the mini-metadata and need to stop for some reason (e.g. need to research metadata elements or not enough time to complete in a single session), Then the transformation tool will allow me to save my unfinished work to be completed at a later date.	Given that I have previously transformed my data using the SPART-NC tool and given that I previously completed a required mini-metadata record, When I go to transform my data again at a later date, Then the SPART-NC tool will give me the option to use the existing mini-metadata record from the previous transformation so that I do not need to enter it again. (Of course, the preferred workflow would be for me to apply the mini-metadata record to my local data so that the next time I upload data with transformation tool, it already includes FGDC metadata.)				
14	C Klaus	Module 4 - Validation / Error Reports	Domain QC	I'd like to have the group delineate the extent of attribute QC this tool will do for parcels and for centerlines. From Julia's posts it sounds as if spatial extent and projection will be tested. My understanding is that all other attribute domain tests (and verifying positional accuracy) are the responsibility of the end user.....at least for the parcels. My impression from other posts is that the attribute domain QC for the centerlines might be more thorough. Will this tool incorporate existing attribute domains for QC? My understanding from posts to date is...parcels no, and centerlines maybe? Non-domain attribute testing: The end user wants to know that the data submitter understands/agrees with frequency of null/zero length string statistics on each field, that the end user can generate on his/her own. This is to avoid a situation where data submitter thinks (s)he has submitted all data, only to realize later that it did not all come through, and the data user thought all along that the submitter knew there were null values for a bunch of records. So the to	Separate webpage, 'accept' checkbox, the ability to have the tool run a SQL query to count all records where value is null/zero len string, by field, and to record final file size, and create a report of same. The stats, file size and timedate are recorded onto a .txt file that is sent with data transmission.					
15	C Klaus	Other	Terms of follow up contact	Pre Step 1. Data submitters have the option to supply contact information for content-responsible staff. Contact data submitters supply the following to the application according to their contact preference. Name (mandatory), Phone (optional), email (optional), Day(s) of Week to contact (optional), and time of day to contact (optional), and Vendor (sometimes content-responsible folks are a 3rd party vendor). I understand these appear in the CSDGM.....however many counties don't have that filled out. The data submitters need the ability to change their profile whenever they want.	The application incorporates tools as necessary to collect profile information on data submitters.					
16	C Klaus	Module 4 - Validation / Error Reports	User Supplied Error Description	Data Submitter has the option to write a short text describing known problems with the dataset, for the benefit of the user. They can write one narrative for each dataset they submit. For example....township A's parcels are not going to be verified for positional accuracy until next year. Or, we're doing a data conversion later this year, and when we do that, problems A, B and C will be fixed.	A hyperlink entitled 'Please Tell Us about Known Problems with These Data'. Click on the hyperlink, and they get to type a narrative. No doubt some users will use this to type in complaints they have with the virtual server tool. Maybe that's not all bad either....how else would we get that feedback?					
17	Nancy von Meyer	Other	Wildland Fire	see document User_ Stories_ Use_ Cases/2010	see document User_ Stories_ Use_ Cases/2010 LetterToCounty.doc		Nancy, if you have any questions about RAVAR analysis or the data required to do it, please contact me: Andrew.Bailey@ncdenr.gov . I have been trained and may take a few assignments this summer conducting RAVAR analysis.			

18	GISJulie	Other	Installation	As a GIS mapper, I may not have a lot of expertise in operating systems and as a GIS mapper for a small local government, I do not have access to an IT department. I can install my ArcGIS software, Adobe Acrobat and other common programs. I want the installation of any software that I am being asked to use, to be complete in its installation, and not require me to download software from other sites and make any connections between them. The benefit is that I want to be able to do as much of this on my own and not have to have someone more knowledgable come in and mess with my system.	Program is delivered via CD/email/download. I click install. I answer some questions about my hardware/software. The program works.					
19	GISJulie	Module 7 - Convert Transformed Data	Converting data to other transformations	As the data provider to my 911 dispatch center, I need the the ability to transform data from the surrounding counties to match my data schema which is not the state schema. Our dispatch software has been set up with our schema and relies on other fields that they state schema does not use. 911 Dispatch needs the data from surrounding counties for mutual aid and in the cases where the quickest way to an event in our county is through another county.	I have traded data with a neighboring county. I bring in my schema I do the same process matching fields from the other counties data to my data. I transform their data schema to my data schema.					
20	Andrew Bailey	Module 6 - Upload Transformed Data	Auto-Navigate to transformed data	As a local or county GIS data manager, I want the upload tool to "pre-navigate" to my most recent transformation output, So that I do not want to have to hunt throughout my computer or network to find the transformed data that I wish to upload. This should reduce the frequency of "accidental" uploads of older transformations or untransformed datasets.	Scenario 1: There is valid transformed data to send Given that the user has performed a transformation for either centerline or parcel data And the transformation is valid (completed without errors, only warnings) When the user clicks a button to browse for the transformed data The file browse window should open And the window should be open to the location of the last output And the most recent output should be selected (highlighted) by the program And clicking "Ok" or "Submit" should be the only user input required And if the user wishes to upload another output file, they should be free to browse and locate one.	Scenario 2: There is no valid transformed data to send Given that the program has no record of output for the selected output type (centerline or parcel data) When the user clicks a button to browse for the transformed data The file browse window should open And the window should be open to the default output folder And a warning message should appear to the user stating "No valid output found for this transformation type" And the user should be free to browse to select an upload file (for example, it was created on another system).				
21	Andrew Bailey	Module 6 - Upload Transformed Data	Validate outgoing data	As a county or local data manager, I want outgoing data to be checked to make sure that the data submitted is a valid transformed dataset So that a user who manages both parcel and centerline data can't mistake one for the other, or accidentally upload untransformed data.	Scenario 1: A valid, transformed dataset was selected. Given that the user has selected a dataset to upload And the dataset's fields are the same type and size as the target schema When the user clicks "upload" or "sumbit" The program should complete the upload And notify the user of the upload's success.	Scenario 2: An invalid or non-transformed dataset was selected. Given that the user has selected a dataset to uploadAnd the dataset's fields are of different types and sizes than the target schema When the user clicks "upload" or "sumbit" The program should not complete the upload And notify the user of the upload's failure, giving the specific reason "The schema of the selected file does not match the target schema. Did you mean to specify a different, transformed dataset?"				

Functional Requirements

Development Component 1: The "SPART-NC" Desktop Application

The "SPART-NC" application will provide spatial data stewards with a wizard-driven graphical user interface they will use to map / crosswalk selected data elements from their native data formats and transform them to an output format in a specified community GML schema or another commonly used spatial data format. The application will allow the local government data stewards to retain complete control of the data transformation process, which is critical for the long-term success of a data sharing arrangement with State, Tribal and Federal Agencies. After transformation, the data will be securely shared with the Exchange Network using the InCLUDE data flow. "SPART-NC" will also allow users to contact an Exchange Node that supports the InCLUDE data flow and request InCLUDE data for a specific county, or for a user-defined area inside a set of bounding box coordinates (within reasonable extents), provided the user has the appropriate credentials to access data from that Node and the original data steward has set the access security levels on their InCLUDE data to allow this.

The tool will provide data stewards with the ability to edit and save all configuration parameters needed to produce a reusable data transformation "recipe" that can be reapplied to source data at a later date, or shared with others. For the parcel and land use data, the default output format will be the InCLUDE GML schema. For the WGRT-funded functionality, the default output format will be a State of NC road centerline data content standard based largely upon the FGDC's framework transportation data schema. For WGRT users, the ability to submit transformed data to a spatial data repository will use the FTP protocol.

The interface design goal for "SPART-NC" is a simple, uncluttered user interface that adheres to human computer interface design best practices and provides intuitive workflow patterns for the user; while using the minimum specialized software components possible to deliver the required functionality. The application will provide an interactive online help manual with sections for each module and functions that include a discussion of proper usage and relevant examples for both parcel data and road centerline data.

The "SPART-NC" application will have an installation wizard requiring the end user to make a minimal number of decisions for a default installation. The software and installer must run successfully on the following operating systems: Windows XP and Windows 7. Installation complexities and potential conflicts with the user's existing computer configuration must be minimized, as professional software support for this software application will not exist. If the installation requirements are complex and the installer cannot be easily used in a locked-down environment, many local government staff may not be able to use the application. The ultimate design goal for the installer is an application that installs without incident for even the most non-technical users, and does not require Administrator privileges.

"SPART-NC" Module 1 – Create New Transformation "Recipe"

This module will allow the user to design a new schema transformation "recipe" / data mapping to transform their source data to the desired community output schema or format. The transformation "recipe" produced by this module will be persisted on disk in the form of a portable and self-contained instructions file the user can share with others. The user will be able to develop and save a library of reusable transformation "recipes". The "SPART-NC"

application will use the saved files to re-create a specific data transformation process on future versions of the same source data. The two types of transformation "recipes" are:

- Output conforms to a pre-defined GML "community schema", using an existing GML Schema document (XSD). This feature is mandatory.

- Output is an ad-hoc GML defined interactively by the user. The tool will generate an XSD file for the ad-hoc schema at the end of the design process. This feature is mandatory.

The user will have a visual interface to construct the recipe for transformation to the target schema. The user will be able to "map" or "crosswalk" features and attributes in the source file to appropriate features in the destination file by dragging and dropping from the source list of elements to the destination list of elements for simple one-to-one mappings. For data mappings that are not simple one-to-one; or the source data values require a bit of adjustment, the user will have the ability to apply basic data manipulation functions and conditional processing logic to input data elements during the transformation in order to make the data conform to the required form in the output schema. The means to apply the manipulation functions and processing logic should be a built-in, commonly known scripting language. The two most widely known scripting languages in the local government GIS community are VBA and Python. VBA is a proprietary Microsoft scripting language, and Python is open source, so Python is the most logical choice.

The data mapping interface will allow the user to include a related tabular dataset and/or lookup code table with their source spatial data as input, because County Tax Assessor's databases are managed separately from the parcel boundary GIS datasets. The data steward should have the ability add additional user-defined business rules for the transformation "recipe" that are more complex than those which can be validated by using only GML schema. Users will typically not have programming backgrounds and the rule-building process will need to be simple enough that a moderately sophisticated business user can do it. This feature is quite desirable, but not mandatory if the development costs and complexity to implement are very high.

The user should be able to set up specific "topology rules" to test that the geometry features in their source data are valid and adhere to specific user-defined conditions that they deem appropriate for their particular output dataset. Examples of user-defined geometry conditions:

- The boundary of a parcel polygon must not cross itself.

- The ends of line segments forming the intersection of two or more streets must all be snapped to the same point.

"SPART-NC" Module 2 - Edit Existing Transformation "Recipe"

The user will have the ability select an existing schema transformation "recipe" / data mappings configuration file and (optionally) any associated business or topology rules from their library of "recipes" and edit it.

<u>"SPART-NC" Module 3 – Run Transformation "Recipe" on Source Data</u>

The user will be able to apply a newly created or previously saved transformation "recipe" and (optionally) business rules to their source dataset to transform it into the desired output format.

<u>"SPART-NC" Module 4 – Create or Edit Metadata</u>

The user will be able to produce an FGDC XML metadata file for their transformed dataset by two methods:

a) Ingesting an existing FGDC metadata XML file and enhancing it with additional data transformation information elements.

b) Allowing the user to enter required metadata information manually and save it to an abbreviated profile of the FGDC content standard for digital geospatial metadata.

<u>"SPART-NC" Module 5 – Validate Transformed Data</u>

The user will be able to run a validation function on the transformed dataset. Validation will consist of checking for schema conformance, topology of geometry features, and (optionally) other business rules included in the transformation recipe. If errors are encountered during the validation process, the application will generate an error report.

The error report will list what the error for each feature is. If applicable, the error report will include a suggestion for how to fix each error. The user will be able to print the error report or save it as a persistent file on their computer. Each record in the error report will be viewable in the built-in map viewer for detailed inspection.

<u>"SPART-NC" Module 6 – Submit Transformed Data to InCLUDE Node or FTP site</u>

For the InCLUDE data flow, the "SPART-NC" Node Client user will be able to submit validated, transformed data and associated metadata files, transformation templates, and (optionally) business/topology rules as a single package to any Node that implements the InCLUDE data flow, contingent upon possession of the required credentials. The data provider will designate a data access level that should be applied to their transformed data package once it reaches the State InCLUDE Node. The access level will be applied dynamically to the relevant property in the InCLUDE schema, and should match what is in the metadata.

Users of the "SPART-NC" Node Client will be able to contact a State or Tribal InCLUDE Node and request parcel data for any area, using the query types identified in Development Components 3 and 6 below, provided they have appropriate access credentials. Local property and land use data stewards at the county level will have the option to use login credentials other than a NAAS account for submitting InCLUDE data to or requesting InCLUDE data from their State's InCLUDE Node. The State of NC maintains an identity management service called "NCID" and it is desired that local county data providers in North Carolina be able to use their NCID account with the NC InCLUDE Node.

For transformed data not affiliated with the Exchange Network, the user will be able to submit the transformed data and attachments package to any other established spatial data repository via FTP, upon possession of the required credentials to that specific FTP site.

<u>"SPART-NC" Module 7 – Convert Data to another Format without Schema Transformation</u>

The user will be able to convert a source data file to another popular spatial data format without applying any specialized schema transformation to it. The final list of supported file formats will be short and will be determined during project the design phase, as this will depend on which open source format translation libraries are used in the project. The only modification other than file format that will be offered to the user is the ability to re-project the output dataset to a different coordinate reference system.

<u>Interoperability Requirements</u>

The "SPART-NC" tool will not be hard-wired to transform spatial data using only the InCLUDE community schema. It will be open and extensible, conform to Open Geospatial Consortium (OGC) standards where applicable, and will allow spatial data stewards to map and transform virtually any GML Simple Features compatible spatial dataset from its native state (in supported formats) to:

a) OGC GML Simple Features (Level 0 or Level 1) as specified by a valid GML schema document provided by the user and transformation rules the user manually constructs using the tool.

b) Other very common spatial data file formats (ex: ESRI shapefile) based on transformation rules the user manually constructs using the tool.

The SMAC Working Group for Roads and Transportation (WGRT), a sister committee to the WGSP, has additional funding from an FGDC CAP grant. The WGRT proposes to apply this funding to the development of specific features for the "SPART-NC" application that are focused on transforming and sharing linear spatial data (road centerlines) in much the same way as the parcel and land use data will be transformed and shared using the InCLUDE data exchange. The primary difference between the goals of the WGSP and the WGRT is the WGRT does not propose to develop an Exchange Network data flow for the road centerline data.

The WGRT requirement is for the "SPART-NC" desktop tool to be flexible enough for local governments to transform, validate and share their spatial data, primarily transportation data, in a common format without using the Exchange Network. Instead of submitting transformed road centerline data to an Exchange Network Node using a Node Client, "SPART-NC" users will have the ability to submit transformed data packages to any centrally located spatial data repository via FTP, in a number of common spatial data formats that the software supports. The ultimate intent is that this application will be flexible enough to be used in transforming many other types of local government spatial data in the future (fire district boundaries, schools, etc.) to a community agreed-upon schema and shared with State or Federal level spatial data repositories for the purpose of building seamless statewide or national datasets. Exchange Network data flows may be developed for other environmentally related datasets in the future, but use of the Exchange Network to share data transformed by the "SPART-NC" tool will not be required.