Towards Better Communication in Planning: An Interactive Data Portal

Executive Summary

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1. Abstract

As a capstone project for Master’s in Urban Planning degree, this project consists of two phases. The first phase aims to develop an interactive data portal (CUUATS Open Data http://data.cuuats.org/) that promotes better communication between a client planning agency, the public, and other government agencies based upon data collection and organization. As a showcase of utilizing information on the data portal, the second phase of the projects aims to develop a report card (LRTP 2015 Report Card http://reportcard.cuuats.org/) of the transportation system in the region based on the data collected, organized for, and downloaded from the data portal.

2. Project client

The Champaign County Regional Planning Commission (CCRPC) is an intergovernmental membership organization that provides and administers a variety of planning, community and economic development, early childhood education, and community services for Champaign and surrounding counties.¹ The Champaign Urbana Urbanized Area Transportation Study (CUUATS) is the transportation entity of the Regional Planning Commission, which is the Metropolitan Planning Organization (MPO) responsible for administering the federally mandated transportation planning process for the Champaign-Urbana urbanized area.²

3. Phase 1: Open data portal

3.1. Background

More and more government agencies and planning institutions have recently launched open data initiatives to provide information to the public. These open data initiatives increase transparency, and allow citizens to use data as a raw material and to create new content. These

² Champaign Urbana Urbanized Area Transportation Study (CUUATS). About Us. http://www.ccrpc.org/about-us
new content can further provide access to services, and help to solve problems including transportation, environment, and public safety. More importantly, opening data encourages community participation and reduces exclusion in planning processes.

Every year, a range of projects are delivered by CUUATS staff to the public and various member agencies and clients addressing transportation policy analysis, planning processes, demographic, economic, environmental and geo-spatial information, and technical analysis. With the many projects and programs, CUUATS has collected a massive amount of data from different agencies, clients and the public.

An open data portal is a new way to make the data more accessible to the public and its member agencies in addition to traditional report-based approaches, to promote better communication between CUUATS, the general public, and member agencies. A web-based user-friendly data portal can create new channels for effective communication with the public, provide active feedback to the public, and further promote public interests in participating in planning processes. Moreover, a data portal can be an innovative, interactive, and efficient way to share data, maps, study results, and analysis reports within agencies in a more organized manner.

3.2. End product Overview

CUUATS Open Data can be reached at: http://data.cuuats.org Functionalities of the open data portal include:

1) Discover data

Users can find data within the data portal by typing text into the search box on the upper left corner of the home page, as shown in Figure 1 below. Once user finished an initial search and found a dataset she/he is interested in, the user can find similar dataset by using the Related Data section of the profile page.

Four dataset categories are summarized on the homepage, including transportation related datasets (transit, sidewalks, trails, bicycle facilities, car share, and alternative fuel station data), land use related datasets (housing permits, affordable housing), project related datasets (point, line and polygon transportation improvement projects data), and demographic statistics (population trend, age, race, households size, income, employment status, poverty status, etc.)

There are another two sections highlight featured datasets, and recently added datasets to provide users with easier access. The map section on the homepage presents the geographic boundary of Champaign County indicating that datasets on this portal are designed for Champaign Urbana region.

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Welcome to CUUATS Open Data Portal

**Transportation**
- Transportation data including transit, sidewalks, trails, bike facilities, or shared alternative fuel stations locations.

**Land Use**
- Land use data including open space, housing permits issued by localities, and affordable housing location.

**Projects**
- Founded and completed transportation improvement projects in the urbanized area based on construction maps.

**Demographics**
- General population characteristics including age, race, households, population trends, and employment.

**Featured dataset**
- Transit Commute Time

**Recently added**
- Residential Building Permits

**CUUATS**
- 1776 E Washington St, Pod 100, Urbana, IL 61802
- Phone: (217) 328-3313
- Fax: (217) 329-2436
- Email: See staff listing
- Visit our [website](#)

**CCRPC**
- CUUATS is the transportation entity of the Champaign County Regional Planning Commission, the Metropolitan Planning Organization (MPO) for the Champaign Urbana Urbanized Area.

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**Figure 1 CUUATS Open Data homepage**

2) **View details and download**

CUUATS Open Data portal provides summary information about each dataset in the search results, and also detailed information about the dataset in the Details page. In addition, Download button is provided to make the dataset downloadable and shareable.

In the Details page, in addition to dataset description, charts created from datasets’ attributes, tables showing a spreadsheet of information about the data, and Download options for different dataset formats including spreadsheet (CSV), shapefile, KML are available for users, as shown in Figure 2.
3) Visualize data

There are several options to visualize datasets on CUUATS Open data portal. Charts section on dataset details page allow users to create a graphical representation of data as charts, providing options for different styles and attributes, as shown in the lower section of Figure 3. Using the preview window on the website, users can also create visualization with both integer and text attributes of the datasets using smart mapping functionality, as shown in the upper section of Figure 3.
Figure 3 CUUATS Open Data Dataset Visualization

3.3. Platform

ArcGIS Open Data is the platform used in building CUUATS Open Data Portal. Unlike regular tabular/spreadsheet based datasets, geospatial datasets are often not easy and convenient for sharing and collaborating. Esri provides the most widely used geospatial dataset management and analysis platforms including ArcGIS Desktop, ArcGIS Online. ArcGIS Open Data uses the ArcGIS Online to identify, publish, and remove data a provider wants to share. The datasets on the Open Data automatically sync with the latest version of the data source provider saved on ArcGIS Online or ArcGIS Server.

It enables data provider to share map, feature and image services, in addition to non-spatial data like spreadsheet, and web maps, apps, documents, weblink, etc.
3.4. Procedure

1) Data collection and organization

For CUUATS Open Data Portal, as of May 2, 2016, a total number of 28 datasets were published. Most of the datasets were CUUATS’ internal datasets generated from on-field data collection efforts made every year. External datasets including datasets obtained from Champaign County Housing Authority, Public Works department of City of Champaign and City of Urbana, and private service provider, as well as U.S. Census Bureau are also available on the website.

During the project process, a lot of time and effort are spent in collecting, cleaning, and formatting datasets to make user experience on the portal is reasonable and enjoyable. Datasets were formatted with accessible title, description, attribute aliases, license, and tags.

2) Register and publish datasets

Register services to ArcGIS Online to be added to Open Data. Both feature services and map services can be registered to be shared on Open Data. Considering the amount of space, CUUATS Open Data uses mostly map services. In order to register service to ArcGIS Online, map documents should be registered on the organization’s ArcGIS for Server.

3) Configure and design website layout

After finish preparing datasets, enable Open Data capabilities within the organization’s ArcGIS Online page. Configure Open Data site with custom URL and tailor the layout of the site to meet the requirement of the agency.

3.5. Thoughts and reflections

Opening information has become an important component in increasing transparency for government agencies. However, understanding why opening data is necessary and important is not enough for building a successful open data portal. What data to open, open in what format, and to whom the data are open are all crucial questions. Opening data in planning context is therefore a complicated dilemma that requires collaboration from different parties, but more importantly careful design and management.

Opening what information in what format to the public is a difficult but important question. Some datasets with personal information or with security concern should not be opened without careful consideration. Collaborating between different government agencies in obtaining and maintaining datasets are also important in making the data portal up to date with high data quality. When the data involves government organizations of different levels and different fields, when to open data also becomes another dilemma. “Some actors will be able to act more effectively on better information when data has not been released to the public”, as
argued by Kaza (2009). Planners are also under the risk of information distortion as how we open data would also decide if information is exaggerated or misrepresented, as argued by Forester (1988).

Moreover, while open data websites are enabling highly skilled citizens to take advantage of open data, add value to raw data, and transform data into knowledge, this dynamic may actually increase the gap between highly skilled citizens and less skilled citizens, who have limited access to internet, and reinforce the existing patterns of exclusion, and further lead to another dilemma of open to whom, and who actually has an access to these data.

4. Transportation system report card

As demonstrated above, different entities and individuals can have access to datasets, maps, documents published on the open data portal. In addition, users can download, analyze, study the datasets and even create new content and observation to help the community. As a showcase of one of the possibilities of planning agencies utilizing the datasets published on the data portal, conducting deeper analysis, and influencing future policies, a report card measuring the performance of the regional transportation system using different indexes was developed as the second phase of the project.

4.1. Background

According to the Federal Highway Administration (FHWA), Long Range Transportation Plan (LRTP) is a federally mandated document developed under regional collaboration and consensus, which defines vision for the region’s transportation systems and services. (Grant.et al., 2014) Long Range Transportation Plan has been widely conducted in Metropolitan Planning Organizations (MPOs) across the nation.

Due to its significant influence to the regional transportation system, a performance measure towards “outcomes, outputs, efficiency, or cost effectiveness” of LRTP is extremely important. (Grant.et al., 2014) A well-developed performance measure matrix will enable decision-makers to quickly “observe the effects of a proposed transportation plan, or monitor trends in transportation system performance over time.” (U.S. Environmental Protection Agency, 2004)

CUUATS has been developing and updating LRTP for Champaign Urbana Region. The LRTP Annual Report Cards have been serving as the performance measure documentation for the LRTP. 2015 is the base year for the next round of performance measure for the latest LRTP, Sustainable Choices 2040, approved in December 2014. (CUUATS, 2014)

Sustainable Choices 2040 developed a total number of 74 performance measures to track the goals and objectives formulated based on a combination of “MAP-21 priorities, State of IL
transportation policy factors, local knowledge, current local planning efforts, and input received during Sustainable Choices 2040 public outreach.” (CMAP, 2014)

These goals are grouped according to the six Sustainable Choices 2040 planning pillars including Safety and Security, Resilient Economy, Accessibility and Affordability, Multimodal Connectivity, Healthy Community, and Balanced Development. From the 74 performance measures, 25 candidates were selected by the MPO. The study area includes City of Champaign and Urbana, and Champaign-Urbana Urbanized Area.

4.2. End product overview

CUUATS LRTP 2040 Report Card can be reached at: http://reportcard.cuuats.org

The website include the following contents:

1) **Overview of the Urbanized Area**

General Population Characteristics includes overview of the region’s age, race and origin, education level, poverty level, income, and population trends, based on American Community Survey 2010-2014 5-year estimate data.

Employment overview summarizes the region’s top employers. Traveling in the Urbanized Area analyzes percentage of population using different modes to work in Champaign-Urbana urbanized area and other comparable university-based urbanized areas, and commute time.

2) **Planning Pillars and Performance Measures**

Planning Pillars section contextualizes goals identified in the LRTP by different categories (pillars), and summarizes performance measures for each pillar.
Table 1 summarizes performance measures for each planning pillar and data source. Note here, the data source refers to original source of the information. Several performance measures directly utilize data obtained from the CUUATS Open Data portal. For each index, analysis comparing the current status with the goals and objectives identified in the LRT can be found on the website in detail.

<table>
<thead>
<tr>
<th>Planning Pillar</th>
<th>Performance Measure</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety and Security</td>
<td>1 Fatalities (5 year rolling average)</td>
<td>IDOT Crash Data, SCIL Report</td>
</tr>
<tr>
<td></td>
<td>2 Total Fatalities per 100M VMT (5 year rolling average)</td>
<td>IDOT Crash Data, SCIL Report</td>
</tr>
<tr>
<td></td>
<td>3 Total Severe Injuries (5 year rolling average)</td>
<td>IDOT Crash Data, SCIL Report</td>
</tr>
<tr>
<td></td>
<td>4 Total Severe Injuries per 100M VMT (5 year rolling average)</td>
<td>IDOT Crash Data, SCIL Report</td>
</tr>
<tr>
<td></td>
<td>5 Total bicycle crashes</td>
<td>IDOT Crash Data, SCIL Report</td>
</tr>
<tr>
<td></td>
<td>6 Total pedestrian crashes</td>
<td>IDOT Crash Data, SCIL Report</td>
</tr>
<tr>
<td></td>
<td>7 Frequency of incidents related to hazmat spills on the regional transportation system</td>
<td>CUUATS staff, Cities and Villages, LEPC, law enforcement, C-U MTD, University of Illinois</td>
</tr>
<tr>
<td>Resilient Economy</td>
<td>1 Number of urbanized area’s funded and completed projects</td>
<td>Economic Model, TIP Database</td>
</tr>
<tr>
<td></td>
<td>2 Transportation and housing costs as percentage of median income</td>
<td>Census data, compare with LAMA data</td>
</tr>
<tr>
<td></td>
<td>3 Distribution of housing permits issued by locality to access job/housing accessibility and balance</td>
<td>Local knowledge, Housing Permit Database</td>
</tr>
<tr>
<td></td>
<td>4 Percent increase in enplanements at Willard Airport</td>
<td>Willard Airport</td>
</tr>
<tr>
<td>Multimodal Connectivity</td>
<td>1 Miles of existing non ADA compliant sidewalks</td>
<td>Champaign, Urbana, and Savoy public works department, University of Illinois Facilities and Services, CUUATS</td>
</tr>
<tr>
<td></td>
<td>2 Miles of trails infrastructure</td>
<td>UTMP, CCGT Plan, Champaign and Urbana, and Savoy public work department</td>
</tr>
<tr>
<td></td>
<td>3 Miles of bike infrastructure</td>
<td>UTMP, CCGT Plan, Champaign and Urbana, and Savoy public work department</td>
</tr>
<tr>
<td></td>
<td>4 CU-MTD service area contained inside urbanized area</td>
<td>CUMTD</td>
</tr>
<tr>
<td></td>
<td>5 Number of flights at Willard</td>
<td>Willard Airport</td>
</tr>
<tr>
<td></td>
<td>6 Number of new education partners identified and number of public events/locations within materials available</td>
<td>CUUATS</td>
</tr>
<tr>
<td></td>
<td>7 Number of new rural transit connections</td>
<td>CU-MTD, CCARTS, CCRPC</td>
</tr>
</tbody>
</table>
Thoughts and reflections

1) Implication on opening data

The LRTP 2040 Report Card study showcases how information provided on the Open Data portal can be beneficial to planning agencies, in this case, tracking the performance of the transportation system in the regional through measuring a matrix of indexes. This further demonstrates the huge potential impact of Open Data portal can have on stimulating producing and sharing new knowledge in the community.

In addition, another important factor of being truly inclusive in the process of opening data is to make the content accessible to community members with physical disability. In order to address that, CUUATS staff created tools that enable persons with disability have access to website contents easily. For example, all website information is keyboard accessible. All figures and non-text information have text description.
2) Implication on transportation system performance measure

The process of analyzing transportation system performance itself also taught us new lessons.

Advocacy performance measure

Comparing the performance measure matrix developed by CUUATS with those of other MPOs, it is very obvious that CUUATS is advocating for a more sustainable, accessible, and affordable transportation system.

For example, providing higher accessibility and safer streets are both important objectives of the LRTP. However, the objective of providing higher accessibility in terms of improving mobility level from higher vehicle speed is in conflict with providing safer streets. CUUATS chose safety, and vehicle travel speed is not even included as a performance measure, while it is not the case for many other MPOs.

Strong supporting studies

The purpose of performance measure is to depict a general picture of the functioning the transportation system. For each of the indicators, there are a lot behind the simple numbers.

Take road crashes as an example. Despite its importance in quality of life, road crashes also closely relates to environmental justice. “In many U.S. cities a disproportionate share of pedestrian accident victims includes the elderly, children, and ethnic and racial minorities”, as argued by Harwood. (Harwood, 2003) CUUATS develops Selected Crash Intersection Locations Study every two years to study in depth the spatial pattern of road crashes, including the social, economic, and racial characteristics of the victims. Other supporting studies include Local Accessibility and Mobility Analysis. These combinations of performance measure and in depth studies make CUUATS’ policy recommendation more comprehensive and convincing

Data Requirements

As argued by researcher, major obstacles towards a comprehensive and effective performance measure matrix is the extensive data requirements. (Gudmundsson, 2001) This study also compares the performance measure matrix developed by CUUATS with the guidance provided by FHWA as a way to evaluate the selected indicators. The evaluation focuses on the availability of the data, whether the data can be forecasted, whether the performance can be influenced by transportation policies and planning strategies. The comparison with FHWA guidance shows that developing comprehensive performance measure matrix highly depends on data availability. This then requires fully cooperation of member agencies in providing timely detailed data. Some performance measure cannot be predicted (Number of alternative fuel stations) or hard to influence by transportation policies directly (Number of Zipcar locations). But they are still valuable for us to understand the transportation system.
5. Limitation of the project and areas for improvement

5.1. Open data portal

Since the open data portal is built on Esri ArcGIS Open Data platform, there are a lot of limitations due to limited developer privileges. For instance, the data portal currently cannot host image services, which disables CUUATS to share information stored in raster layers, Landsat images in particular. In addition, when sharing map services with multiple layers, metadata information cannot be displayed differently for each layer, which may cause confusion to users, Transit Commute Time datasets for instance. Moreover, there are limited options when visualizing datasets. Last but not least, the portal has not been made ADA compliant, which makes it difficult for users with disabilities to maneuver and utilize the data shared on the portal. Options in improving these aspects will be explored in the future. However, if CUUATS continues to use ArcGIS Open Data platform, it is unlikely that the above problems will be solved in-house, unless changes made by Esri to the platform.

In terms of portal management and expansion, current dataset will be updated on a yearly basis. New datasets will be added to the portal when they become available.

5.2. Report card

The current performance measure matrix developed by CUUATS missing important indicators of urban form, including density, diversity, and urban design. (Cervero & Kockelman, 1997)

Urban density represents number of people, jobs, or housing units per unit of land. As argued by Cervero and Kockelman, higher urban density means the neighborhood is more likely to meet the demand thresholds within public transit service areas, thus contributes to frequent and better public transit services, and finally leads to a less vehicle dependent transportation system. (Cervero & Kockelman, 1997) On the other hand, higher urban density will also increase the possibility of traffic congestion, which further makes transit become more attractive. Moreover, higher urban density indicates closer distance to destinations, which will lead to less vehicle miles traveled in the region, and make walking and biking more attractive. Urban diversity stands for land use mix. Neighborhoods with diverse land use types improve residents’ proximity to activity destinations, thus reduce travel demands, and further promote non-motorized travels. Urban design mainly refers to connectivity, completeness, and density of street network. (Cervero & Kockelman, 1997)

However, the current performance measure matrix does not include urban form measure of any types. One possible explanation is that the MPO actually has very limited power on changing urban form, especially through land use zoning regulations, or influencing developers’ decisions. Nonetheless, including urban form as part of the performance measure matrix can be
a good indicator of the land use and transportation pattern. The MPO can also make policy recommendations to municipalities advocating a denser and compact land use.

**Reference**


