Facilitating Transit Oriented Development in the Purple Line Corridor: The Plans and Regulations Information Tool

Gerrit-Jan Knaap, Cyrus Chimento, Lewis Hopkins, Nicholas Finio

(Professor Gerrit-Jan Knaap, University of Maryland, College Park, MD, gknaap@umd.edu)
(Cyrus Chimento, University of Maryland, College Park, MD, cchiment@terpmail.umd.edu)
(Professor Emeritus Lewis D. Hopkins, University of Illinois, Urbana, IL, ldh@globalnet.com)
(Assistant Director Nicholas Finio, University of Maryland, College Park, MD, nfinio@umd.edu)

1 ABSTRACT

The Plans and Regulations Information Tool (PaRIT) is a computing interface that enables spatial queries to identify and access the many plans and regulations that apply to a given place. These plans and regulations are created by various government, intergovernmental, and non-governmental organizations and are created at different times with different functional, spatial, and temporal scopes. As argued elsewhere (Hopkins & Knaap, 2016), we should neither expect these plans to be consistent nor try to make them consistent. PaRIT accesses multiple plans and regulations to give decision-makers emergent information in support of several plan-using tasks: plan commission staff report, affordable housing location opportunities, developer location opportunities, aggregating ideas across plans for advocacy such as bikeways or affordable housing (National Center for Smart Growth, 2019), neighborhood group advocacy/opposition, looking for consistency or contradictions related to particular goals such as hazards or climate change mitigation (Berke, Malecha, Yu, Lee, & Masterson, 2019).

We demonstrate the capabilities of PaRIT in applications to the Purple Line light rail transit project in Montgomery and Prince George's Counties, Maryland, north of Washington, DC. This tool operationalizes concepts for creating Information Systems of Plans (Finn, Hopkins, & Wempe, 2007; Kaza & Hopkins, 2012), structured databases for collecting, indexing, and querying the many plans that typically apply and relating these plans to regulations. The tool relies on an extensive database of geo-spatially defined plans that express intentions or visions of important organizations in both Counties. These plans range from traditional neighborhood level land-use plans to county-wide general plans but also include educational facility master plans and bicycle and pedestrian plans. Regulations included in the tool include legally binding rights, incentives or constraints on land development in the corridor such as zoning, impact fees, and economic development incentive zones.

Funded by the Federal Transit Administration, the tool is designed to facilitate transit-oriented development across the Purple Line Corridor. Spatial queries can be defined in several ways: by street address; by drawing a point, line, or polygon; by uploading shapefiles; and a buffer can be added to any of these queries. Queries can use filters to focus on particular types of plans or regulations. Query results present important attributes of each plan or regulation that applies to that location and include links to PDFs and websites for the complete documents. A summary report can be formatted in printable format.

Keywords: plans, transit oriented development, Information system, regulations, web tool

2 THE PURPLE LINE CORRIDOR

2.1 Background

As part of a larger effort to spur equitable transit-oriented development (TOD) around Maryland's forthcoming Purple Line light rail, researchers at the University of Maryland's National Center for Smart Growth Research and Education (NCSG) have built a tool to provide access to land use planning information in the Purple Line corridor.

Upon completion, Maryland's Purple Line project will span Montgomery and Prince George's counties from New Carrollton to Bethesda and connect to the existing Metro transit system. It's a massive infrastructure investment that is already bringing further investment to the area. This economic development presents massive benefits to locals such as increasing transportation access, decreasing pollution, and creating jobs.

ISBN 978-3-9504945-0-1. Editors: M. SCHRENK, V. V: POPOVICH, P. ZEILE, P. ELISEI, C.BEYER, J. RYSER, G. STÖGLEHNER

The value of commercial and residential real estate in the area is increasing, as well; but it's not great for everyone. Increasing cost burdens may displace residents and businesses from the corridor, and they won't share in the project's benefits.

2.2 The community development agreement.

To combat this potential outcome, the Purple Line Corridor Coalition (PLCC) formed a community development agreement among businesses, nonprofits, government agencies, and community groups to make sure the Purple Line benefits are shared equitably among all residents and workers in the area. NCSG is the administrative home of the Purple Line Corridor Coalition. The PLCC coalesced around four major goals:

- Housing choices for all
- Support and grow local business
- Build a thriving labor market
- Support vibrant communities

2.3 The complex regulatory environment

PLCC's key strategies to fight displacement of residents include increasing the supply and diversity of housing and preserving existing affordable housing in the corridor. But there's a barrier to doing so: the complex regulatory environment that governs land use in the two counties. Overlapping, interdependent, and conflicting factors regarding land use are difficult to pull together for any given place in the corridor. For example, which areas are being considered for upzoning?

3 PLANS, USING PLANS, PLANNING SUPPORT TOOLS

Plans communicate intent, aspirations or visions, and possible actions in the face of uncertainty. Plans are thus information about the likelihood of decisions, not full commitments to action. The implications of this definition have been developed extensively, building on Friend and Jessop (1969) and Hopkins (2001). Recent elaborations emphasize the autonomous nature of organizations that plan (Hopkins & Knaap, 2016) and the likelihood that these plans will be inconsistent (Berke, Malecha, Yu, Lee, & Masterson, 2019; Yu, Brand, & Berke, 2020). There is thus an opportunity to create tools that will help planners and stakeholders work with these many plans.

Regulations define rights and incentives that are legally enforceable (Barzel, 1989; Hopkins, 2001). Regulations are thus distinguishable from plans but closely related. Plans may serve as legal backing for the enforceability of regulations, especially of zoning in the United States (Ohm, 2021). Plans with high credibility as commitments by a government agency may yield behaviors similar to responses to regulations. Regulations with low credibility of enforcement may yield behaviors similar to responses to plans (Hopkins, 1984). It makes sense, therefore, to provide access to the information in plans and to the myriad of regulations that apply to a particular place.

3.1 Plans as signals

If we are creating tools to access plans, we must ask how plans can be and are used. At one level we can ask in what ways plans can work. Hopkins (2001) identifies plans working as agendas of things to do, visions as expressions of aspirations, policies as rules of what to do in repeated situations, designs to be implemented, and strategies to act over time in the face of uncertainty. Millard-Ball (2013) emphasizes the causal pathways from plans to decisions and actions. Focusing on plans as information about intents, aspirations, and potential actions, we use the idea of plans as signals (Hopkins & Knaap, 2016) to identify use cases on which to base the capabilities of our plans and regulations information tool. Plans are interpreted as one means of communicating expectations over time in an ongoing conversation among various players in urban development (Boyer & Hopkins, 2016). Rather than viewing plans as done deals or "denials of conflict", plans as signals may be intentionally vague to account for ambiguities of authority and power (Buhler, 2021). Players may use plans to signal their intent to other potential players, to gather evidence of opportunities based on the actions of others, to support advocacy for or opposition to particular proposals, to identify inconsistencies among plans, to highlight conflicts between expressed goals and likely actions, and similar tasks. We make these use cases more concrete in describing the tool below.

3.2 Planning Support Systems

Most planning support systems, computing tools to support planning, focus on the task of making plans (Brail, 2008; Goodspeed, 2020) and thus on the tasks of modeling, forecasting, and evaluating changes in urban development patterns. Building tools to use plans requires thinking about plans as data (Hopkins, 1999; Hopkins, Kaza, & Pallathucheril, 2005; Kaza & Hopkins, 2012). An early framing of a tool to use plans was the Cincinnati, Ohio Planning Guidance System (Kleymeyer & Hartsock, 1973), though its focus was on finding and resolving contradictions among the various plans of agencies of government. Building on earlier practices of compiling a compendium of plans before launching a new planning effort, the concept of an Information System of Plans (Finn, Hopkins et al. 2007) created a simplified database of plan attributes and maps in comparable formats.

Developing computing tools is an iterative, continuous improvement process that often flips between high aspirations and creating "minimum viable products" that can be released to users in order to gain the feedback necessary to continue improving. We first considered the extreme possibility of a learning system that could "scrape" content from plans on the web and organize content in the elaborate data models of earlier work. We immediately recognized that this was beyond the target of two years to a released product for actual use by the members of the Purple Line Corridor Coalition, our primary target audience. After several months developing a purpose-built database to implement one of our data models, we confronted the infeasibility of supporting and sustaining the data encoding that would be required. We then implemented a version of the tool using ESRI's StoryMap application, which successfully demonstrated the kinds of information that could be queried and displayed. Working within StoryMap, however, severely limited the capabilities to make spatial queries: What plan or regulation applies here? Thus, the current version is built using the more customizable ESRI WebApp Builder and other database tools.

4 THE PLANS AND REGULATIONS INFORMATION TOOL

Planning and regulatory complexities take resources to navigate. That's why we created the Plans and Regulations Information Tool, which provides easy access to a curated database of plans and regulations in the corridor. Most of our data comes from outside sources like government open data portals.

The Plans and Regulations Information Tool (PaRIT) is a web-based, graphical computing interface that enables map interaction and spatial and non-spatial queries to identify and access the many plans and regulations that apply to a given place or the places to which plans and regulations apply. The interface can access either plans or regulations data, and there are two important components to each mode: the web application itself and the data accessed by the application.

For the purposes of this tool, we define "plans" and "regulations" broadly. In this case, regulations are any legally binding rights, incentives, or constraints on land development. Plans are any documents that express intentions or visions of important organizations within the corridor. This loose definition is important because the tool includes non-governmental documents that might have direct or indirect effects on the corridor, like WMATA's strategic plan or the Capital Trails Coalition's network vision.

The real power of the tool is to (very quickly) answer the general question underpinning those mentioned above: "What plans or regulations apply to this place?" And since the Purple Line corridor spans multiple jurisdictions, we bring all the data together in one place.

4.1 Web Application

We built the plans and regulations web applications using ESRI's Web AppBuilder (WAB), a no-code platform for designing and implementing custom web-mapping applications. The application consists of a web map with geographic data (described in the next section) and several "widgets", or interactive functionalities, available to users within the application. The widgets include contextual information and basic map interaction functions. The map interaction functions include a toggle list of geographic plan and regulation data contained in the application (the "Layer List" widget), which allows a user to visualize only the layers of interest, and a data table (the "Attribute Table" widget), which allows a user to view and select individual features within a data layer, and their important attributes, including links to PDFs and websites to access the complete documents. Using these functions to interactively visualize plan and regulation data

ISBN 978-3-9504945-0-1. Editors: M. SCHRENK, V. V: POPOVICH, P. ZEILE, P. ELISEI, C.BEYER, J. RYSER, G. STÖGLEHNER

layers and the geographic extents of individual plans and regulations answers the question "To what places do these plans and regulations apply?".

In addition to these basic map interaction functions, the application includes two customizable query functions. Using the first query function (the "Group Filter" widget) a user can define an SQL query on a limited number of data attributes using a dynamic interface. The plan or regulation data matching the query conditions displays on the map. Using the second query function (the "Screening" widget) a user can define a spatial query on a custom area (or areas) of interest. The user can define an area of interest for the spatial query in several ways: by street address; by property parcel tax ID; by drawing a point, line, or polygon on the map; by uploading geographic data (such as a shapefile); by allowing location access; or, by choosing a feature already visualized on the map. For any of these methods, users can add a custom diameter buffer to the area of interest. A spatial query on the area of interest results in a report of all the plans or regulations that spatially intersect the area of interest, answering the question "What plans and regulations apply to this place?". The report generated by the spatial query displays important attributes of each plan or regulation, including links to PDFs and websites to access the complete documents, and a summary report of the results can be exported in printable format (PDF) or as spreadsheets or geographic data (shapefile or geodatabase).

The various widgets can be used in tandem, for instance, by first defining a query on data attributes, then defining a spatial query on the first query's results.

4.2 Data

Two separate geodatabases underlie PaRIT: plans and regulations. Each geodatabase is structured as a set of geographic data layers. A single regulation data layer contains the geographic extent of a single regulation (such as "Tax Increment Financing Districts") over the study area, which may be a single polygon feature, multiple polygon features, or a single multipolygon feature. A single plans data layer contains the geographic extents of multiple plans of the same type (such as "Sector Plans"), and is made up of multiple polygon features. In addition to the geographic data, non-geographic data attributes are associated with the feature(s) in both databases, including contextual information – like the year a plan was published or a regulation was passed – and links to external sources – such as a plan document or an information page about a regulation. In some cases, data attributes will point to other information systems. In addition to plans and regulations, each database also contains some contextual data layers, such as the extent of the study area (the Purple Line Corridor), the right of way and station locations of the Purple Line, and the property parcels within the study area.

The plans and regulations geodatabases are constructed with data from multiple sources. We accessed a majority of the plans and regulations data through public data portals hosted by federal, state, and local governments. We gathered the remainder of the data through formal data requests, personal communication with staff of agencies and non-governmental organizations whose plans we were seeking, and doing our own data creation by exploring public documents and georeferencing and tracing images of the boundaries of plans or regulations. After data collection, we processed the geographic data to conform to the study area boundary and the non-geographic data attributes to be human-readable.

4.3 User options

Users have many options to define an area of interest in the tool such as inputting an address or property parcel ID; drawing a point, line, or shape on the map; and uploading their own geographic data. From there, users can query which plans or regulations apply in the designated area and export a sharable report of the results.

These capacities allow housing developers to cut through regulatory complexity, thus removing barriers to investment in the Purple Line corridor and reducing the resources required to do so. Instead of spending time and resources repeatedly compiling plans and regulations for a prospective site, they can quickly pull the full list.

Though real estate development in the Purple Line corridor is an obvious use case, we built the tool to equip any stakeholders within the corridor that need to identify the stack of land use plans and regulations in a given area. A number of other use cases already exist (and we envision many more):

- A housing advocacy group working across the corridor uses the tool to identify alignments, gaps, or mismatches in housing plans and policy to help them advocate against displacement.
- A nonprofit developer uses the tool in tandem with their own data to identify and pursue deeply affordable housing opportunities.
- A small business development group uses the tool to identify ongoing plans for wayfinding and signage in certain areas of interest to engage with the planning processes.

The plans and regulations accessed by the tool are intentionally not comprehensive; they are curated by staff at NCSG with input from PLCC members and other stakeholders to reflect information relevant to development in the corridor. (If you think something should be included that is missing, let us know!)

Of course, this tool is not going to single-handedly prevent all negative effects of the Purple Line. However, it can be a piece of the larger effort to make sure the benefits of the Purple Line investment accrue equitably.

5 CONCLUDING COMMENTS

The Purple Line Corridor Coalition is an unusual informal planning and advocacy organization that can only "implement" plans by coercing, conjoling, and coordinating the actions of others. It has no regulatory or planning authority and even less budget. For this reason the Plan and Regulatory Information Tool is one important means for promoting its agenda. How successful it is in that regard, and the extent to which the PaRIT furthers that success remains to be seen. We believe the tool itself, however, represents an important enhancement in conceptualizing, and operationalize a system of plans approarch to urban development.

6 REFERENCES

Barzel, Y. (1989). Economic Analysis of Property Rights. Cambridge, England: Cambridge University Press.

Berke, P. R., Malecha, M. L., Yu, S., Lee, J., & Masterson, J. H. (2019). Plan integration for resilience scorecard: evaluating networks of plans in six US coastal cities. Journal of Environmental Planning and Management, 62(5), 901-920. doi:10.1080/09640568.2018.1453354

Boyer, R. H., & Hopkins, L. D. (2016). Acting under the Influence: Plans as Improvisational Gifts. Planning Theory. doi:10.1177/1473095216654729

Brail, R. K. (Ed.) (2008). Planning Support Systems for Cities and Regions. Cambridge, MA: Lincoln Institute of Land Policy.

Buhler, T. (2021). When vagueness is a strategic resource for planning actors. Planning Theory.

Friend, J. K., & Jessop, W. N. (1969). Local Government and Strategic Choice: An Operational Research Approach to the Processes of Public Planning. London: Tavistock Publications.

Goodspeed, R. (2020). Scenario Planning for Cities and Regions: Managing and Envisioning Uncertain Futures. Cambridge, MA: Lincoln Institute of Land Policy.

Hopkins, L. D. (1984). Comparative Planning: Looking at Ourselves the Way We Look at Others. Planning and Public Policy, 11(3), 5.

Hopkins, L. D. (1999). Structure of a Planning Support System for Urban Development. Environment and Planning B: Planning and Design, 26(3), 333-343.

Hopkins, L. D. (2001). Urban Development: The Logic of Making Plans. Washington, DC: Island Press.

Hopkins, L. D., Kaza, N., & Pallathucheril, V. G. (2005). Representing Urban Development Plans and Regulations as Data: A Planning Data Model. Environment and Planning B: Planning and Design, 32(4), 597-615. doi:10.1068/b31178

Hopkins, L. D., & Knaap, G.-J. (2016). Autonomous Planning: Using Plans as Signals. Planning Theory. doi:10.1177/1473095216669868

Kaza, N., & Hopkins, L. D. (2012). Intentional Action, Urban Plans, and Information Systems. International Journal of Geographcial Information Science, 26(3), 557-576. doi:10.1080/13658816.2011.603337

Kleymeyer, J. E., & Hartsock, P. (1973). Cincinnati's Planning Guidance System (295). Retrieved from Chicago, Illinois:

Millard-Ball, A. (2013). The Limits to Planning: Causal Impacts of City Climate Action Plans. Journal of Planning Education and Research, 33(1), 5-19. doi:10.1177/0739456X12449742

Ohm, B. W. (2021). Analyzing Action/Plan Consistency. Journal of the American Planning Association, 87(1), 11-20. doi:10.1080/01944363.2020.1785926

Yu, S., Brand, A. D., & Berke, P. (2020). Making Room for the River. Journal of the American Planning Association, 86(4), 417-430. doi:10.1080/01944363.2020.1752776

7 APPENDICES

User Documentation:
https://docs.google.com/document/d/1tCeGaPnYsRJ4en4EA_0clnFU_4t6WzBsr6doxBvn1mA/edit#heading=h.es0774b5se9y

Technical Documentation: https://docs.google.com/document/d/1cexRA51Uz-GiEvFhvATmtsEo4Us5eVh9XDaylhsugDo/edit