Priority Area Six: Open Transit Data Portal

Vision: A publicly available data source where local government staff, research partners, and engaged community members can easily find transit data.

Objective: Identify recommended steps that enable Triangle region transit agencies and partner jurisdictions to collaboratively develop and sustain an open transit data portal that provides public access to standardized, high-value transit data—supporting transparency, innovation, and regional coordination.

Intended Audiences and Benefits

- *Government Entities:* Benefit from improved inter-agency coordination, data-driven planning and policy development, optimization and reduced redundancy in data requests. Open transit data can help improve multimodal transportation systems. Access to regional transit metrics supports transportation planning, smart mobility solutions, emergency management, grant applications, and equity assessments.
- *Universities and Nonprofits:* Gain reliable access to transit data for research, academic instruction, and program evaluation. Supports partnerships and innovation across the research ecosystem.
- *General Public:* Enhances trip planning experience, reduces frictional points for seamless transfers, and can help reduce wait times. Improved access to transit information fosters civic engagement and trust. Open dashboards and data tools support transparency and empower riders with better service awareness.

Priority Data Types and Reporting Standards

A standardized specification is essential for ensuring consistency, interoperability, and ease of integration across systems, making it the foundation of a reliable open transit data portal. An example of a standardized specification is the General Transit Feed Specification (GTFS), which along with its extensions like GTFS-Realtime and GTFS-Ride, provides a common data format for publishing static and real-time transit information. These standards enable agencies, developers, researchers, and the public to access, share, and analyze consistent transit data across platforms, supporting a wide range of applications from trip planning to performance evaluation.

To maximize utility across audiences, the following transit data types in Table 6-1 are recommended for inclusion within an open transit data portal, each playing a critical role in supporting transparency, accessibility, and system planning:

Each dataset needs to follow open data best practices such as machine-readable formats (Comma-Separated Value (CSV), Javascript Object Notation (JSON)), metadata descriptions, update frequency tags, and version control where possible.

Table 6-1. Recommended Transit Data Types and Formats for Open Transit Data Portal

Data Type	Standard/Format to Use	Primary Applications
Schedules, Routes, Stops	GTFS-Static	Trip planning, integration with apps (e.g., Google Maps, Transit App), schedule analysis
Real-Time Vehicle Locations	GTFS-Realtime (GTFS-RT)	Real-time vehicle tracking
Ridership Statistics	GTFS-Ride, National Transit Database (NTD)-compatible CSV file	Equity analysis, demand modeling, service adjustments, funding justification
Stop and Route Amenities	GIS shapefiles, GeoJSON	Infrastructure planning, ADA compliance, rider information systems
Microtransit zones	GIS shapefiles	Review of where current and proposed microtransit zones are in region

Initial Findings & Opportunities

Summary of Current Conditions

Across the Triangle region, transit data is managed separately by local transit agencies including GoTriangle, GoRaleigh, GoDurham, GoCary, Chapel Hill Transit, and Duke[1]. Each agency collects and maintains its own data on schedules, routes, vehicle locations, and performance metrics, often through their individual Computer Aided Dispatch / Automated Vehicle Locator (CAD/AVL) systems and Geographic Information Systems (GIS) platforms. However, these datasets are not consistently published or centrally accessible in a standardized, open format.

Each of these agencies publish GTFS and GTFS-Realtime feeds as part of the developer resources pages on their respective websites. While this provides a foundation for open data access, the scope, quality, and update frequency of these datasets vary by agency. The fixed route schedules from GTFS-Static feeds from all regions are published on GoTriangle's Map Schedules website[2]. Beyond this, there is no unified, region-wide open transit data portal that integrates these feeds or standardizes access for broader public use.

Stakeholders across government, academia, and the private sector have expressed interest in a centralized, reliable source for transit data to support planning, innovation, and public transparency.

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[1] https://godurhamtransit.org/developer-resources
[2] https://gotriangle.org/maps-schedules/

Noted Challenges

The development of a regional open transit data portal presents several implementation challenges that must be addressed to ensure long-term success, data integrity, and stakeholder alignment. These challenges stem from variations in technical capacity, coordination gaps, and concerns about data security and maintenance.

- **Asynchronous Progress:** Transit agencies in the region are at varying stages of readiness when it comes to open data publishing. While some have established GTFS and GIS-based datasets available through their websites or municipal platforms, others are still developing basic data infrastructure or relying on manual processes. This disparity creates barriers to uniform data sharing and slows regional alignment.
- **Unaligned Priorities for Data Types:** Agencies differ in their views on which data types should be prioritized for inclusion in a regional portal. While some emphasize real-time feeds like GTFS-RT, others may lack the infrastructure to support them. Without a shared understanding of high-impact data types, it is challenging to build a portal that meets the expectations of all intended audiences.
- **Lack of Standardized Data Collection Processes:** Agencies currently use a variety of tools and internal procedures to collect and manage transit data. This inconsistency makes it difficult to integrate datasets across jurisdictions, introduces quality control issues, and limits the potential for automation and regional performance benchmarking.
- **Cybersecurity Risks:** Transit agencies expressed concern about the potential vulnerabilities introduced by publishing operational data online, especially without appropriate access controls or safeguards. Risks include unauthorized data manipulation, exposure of sensitive infrastructure details, or misuse of system Application Programming Interfaces (APIs).
- **Data Maintenance:** Maintaining current and reliable datasets is a resource-intensive process. Agencies noted challenges in keeping data updated, particularly when services change frequently or staff capacity is limited. Without automated tools or shared update protocols, data in the portal risks becoming outdated, undermining trust and usability.

Opportunities for Innovation & Collaboration

- **Streamline Internal Processes:** Agencies like Durham County and Orange County identified the need to automate manual data processes and improve feed generation capabilities (e.g., GTFS and GTFS-RT). These technical upgrades reduce administrative burden, improve data quality, and support more frequent updates to a regional portal.
- **Leverage Existing Infrastructure**: Raleigh[3], Durham[4], Cary[5], and Chapel Hill[6] already operate open government data portals with limited transit data. These can serve as initial models or components of a broader regional portal.

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[3] https://data.raleighnc.gov/
[4] https://live-durhamnc.opendata.arcgis.com/
[5] https://experience.arcgis.com/experience/3f2d586f8edc46b291a0aa50b0e01e6e/page/Page?q=gocarydashboard
[6] https://opendata-townofchapelhill.hub.arcgis.com/

- **Collaborative Governance**: The Town of Apex highlighted the importance of working with partners like GoCary and Via to ensure data sharing across service models. A centralized or co-led governance structure, anchored by willing lead agencies, can streamline data aggregation, clarify responsibilities, and foster stronger coordination between public agencies and private providers.
- **Standardize Metrics and Methods:** Capital Area Metropolitan Planning Organization (CAMPO) and Orange County called for shared data standards and performance metrics to support comparability and collaboration. Developing these regionally will help align reporting, evaluation, and service planning practices.
- **Empower Stakeholders Through Open Access:** A well-designed open transit data portal can engage universities, nonprofits, developers, and community members. Transparent and reliable data access fosters innovation, public trust, and stronger civic participation in transit planning.

Survey Responses & Interview Summary

Triangle region transit agencies were surveyed in January 2025 on the types of transit information that is currently available to the general public through web-based interfaces. Table 6-2 lists the agencies surveyed and types of information provided.

Table 6-2 - Summary of Information Available to Public by Regional Transit Agencies

Transit Agency	Routes	Ridership	OTP*	Stops / Stations	GIS Data	Other Data Types
GoCary				X	X	
GoRaleigh	X	X		X	X	Mobility Infrastructure
GoDurham	X			X	X	
GoTriangle						
Chapel Hill Transit	X			X	X	GTFS, GTFS-RT
Town of Apex	X			X		Future / Conceptual Plans
NCSU Wolfline	X	X		X		Ridership per hour
UNC-Chapel Hill	X			X		
Wake Forest	X					
Wake County	X	X	X		X	Mobility Infrastructure, Ridership per Hour, Route Productivity
Town of Morrisville				X		
Durham County	X	X	X	X	X	Mobility Infrastructure, Future / Conceptual Plans
Orange County	X	X		X	X	Mobility Infrastructure, Route Productivity, Future / Conceptual Plans

* OTP = On-Time Performance

Transit agencies expressed interest in expanding the types of data available through an open transit data portal. Comprehensive datasets, including ridership, on-time performance, bus stops, route productivity, GIS data, and future conceptual plans, are priorities for agencies like GoDurham, GoRaleigh, CAMPO, and Orange County. Others, such as NCSU Wolfline and Chapel Hill Transit, focus more specifically on on-time performance or basic ridership data. GoRaleigh also emphasized the need to highlight transit-accessible points of interest to improve regional network visibility.

To make transit data available through a regional data portal, agencies identified key updates and challenges through their survey responses. Durham County noted the need to streamline internal processes, such as automating manual data uploads or fully developing tools like the Durham County Transit Tracker. Town of Apex highlighted the importance of collaboration with transit partners like GoCary and Via to ensure data integration and sharing. CAMPO and Orange County stressed the need for regional standards, metrics, and methods to facilitate collaboration. Technical improvements are also necessary, as Orange County requires solutions to generate GTFS-RT feeds, and GoRaleigh stressed that regional portals should be capable of automatically pulling data to avoid adding administrative burdens. These updates and collaborative efforts aim to create a more accessible, standardized, and user-friendly regional transit data ecosystem.

Case Study: Sound Transit Open Transit Data (Seattle, Washington)

To inform regional planning efforts and illustrate best practices, the following case studies highlight how Sound Transit and CapMetro have successfully implemented open transit data initiatives. These examples demonstrate a range of approaches from centralized data portals to performance dashboards, and offer valuable lessons in governance, technical implementation, and cross-agency collaboration.

To improve transparency, customer information, and regional coordination, Sound Transit launched the Open Transit Data (OTD) program to serve as a centralized hub for transit data across the Puget Sound region. The goal of the program is to make transit data from multiple agencies available in standardized formats to support both public-facing apps and internal planning efforts. The OTD program supports developers, researchers, civic technology groups, and regional planners by offering downloadable datasets and API access in a "one-stop shop" format.

Sound Transit serves as the lead agency and data steward for this effort, aggregating and publishing data from over nine collaborating transit providers. These include King County Metro, Pierce Transit, Community Transit, Intercity Transit, Everett Transit, Seattle Streetcar, Seattle Center Monorail, and Washington State Ferries. The program integrates static GTFS data, real-time GTFS-RT feeds, and spatial GIS datasets, providing coverage of local bus, light rail, commuter rail, ferry, and streetcar services.

The initiative originated in response to a regional call for better coordination of transit data tools and builds on the foundation of existing academic and open-source partnerships, most notably the OneBusAway real-time platform developed by the University of Washington. Sound Transit continues to use this API to serve real-time data to developers and applications across the region.

The Sound Transit OTD effort was phased to allow incremental progress:

- Phase 1 prioritized aggregation of GTFS schedule data and basic real-time bus tracking.

- Phase 2 added rail services and regional schedule reconciliation (e.g., resolving duplicate stop IDs).
- Phase 3 expanded GIS datasets and began integrating newer data types like GTFS-Flex for on-demand service.

While the OTD site itself focuses on downloadable data and developer APIs, Sound Transit also launched a System Performance Tracker[7] to provide public-facing dashboards on ridership, on-time performance, and customer satisfaction. This dual strategy allows OTD to serve as an open infrastructure layer, while the performance site supports public accountability and strategic communication.

The following are lessons learned from the project:

- **A centralized data platform can streamline regional collaboration.** By assuming the role of lead data steward, Sound Transit removed the need for developers and planners to integrate multiple agency feeds individually and made them accessible at a single centralized platform. This significantly improved access and usability.

- **Open-source tools accelerated implementation and reduced costs.** The adoption of OneBusAway allowed the agency to build on an existing, well-supported real-time system, avoiding the need for costly proprietary solutions.

- **Standardization requires early investment.** Sound Transit invested in cleaning and reconciling GTFS data across agencies—such as using prefixed stop IDs to avoid duplication—which was essential to build a consolidated regional dataset.

- **Open data supports both external innovation and internal efficiency.** The same APIs and GTFS datasets powering third-party apps are also used for internal tools such as station signage and trip planning, providing operational benefits beyond transparency.

- **Ongoing maintenance and community engagement are critical.** Sound Transit established a developer feedback loop and update notifications to ensure data quality remains high and API users stay informed.

Case Study: CapMetro Performance Dashboards for Strategic Transparency (Austin, Texas)

To improve transparency, track strategic goals, and support internal decision-making, Capital Metropolitan Transportation Authority (CapMetro) in Austin, Texas, developed and launched a comprehensive Performance Dashboard system.[8] This initiative aligns with CapMetro's Strategic Plan and provides a public-facing platform to communicate progress in key operational and organizational areas.

The goal of the dashboard was to build a centralized, interactive reporting tool that reflects agency performance in real time and enables both staff and the public to evaluate how CapMetro is

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[7] https://www.soundtransit.org/ride-with-us/system-performance-tracker
[8] https://www.capmetro.org/about/performance-dashboard

meeting its objectives. The dashboard framework is organized around six core strategic themes: Customer Experience, Ridership, Safety, Workforce Investment, Financial Health, and Sustainability & Innovation.

CapMetro collaborated with Foursquare ITP for strategic planning and dashboard design. Operational data quality and real-time integrity were supported through integration with the Swiftly platform, which aggregates Automatic Vehicle Location (AVL) and schedule adherence data. The public dashboard itself was built using Microsoft Power BI, providing an interactive interface for internal and public users alike.

The dashboard development process included:

- Identifying key performance indicators (KPIs) aligned with the agency's strategic goals

- Integrating real-time and historical data sources, including operational and customer feedback systems

Figure 6-1 – CapMetro Dashboard

- Developing internal dashboards for staff and executive oversight

- Publishing public-facing dashboards to enhance community transparency

Performance metrics are updated on a regular cadence and include customer satisfaction trends, Net Promoter Scores, mode-specific ridership, budget adherence, incident tracking, and workforce engagement indicators. Dashboards for each theme are accessible via CapMetro's website, providing a consistent, transparent view into agency performance.

The following are lessons learned from the project:

- **Aligning dashboards with strategic goals ensures relevance.** CapMetro's dashboard content is directly tied to its Board-adopted Strategic Plan, ensuring consistency and focus across departments and leadership priorities.

- **Internal and external tools can be built from a common data foundation.** The use of Swiftly and Power BI allows CapMetro to generate dashboards for both internal planning and external transparency from the same underlying datasets. Power BI can be used to create a dashboard layout with graphs and charts, with data from Swiftly serving as the input that can be updated over time.
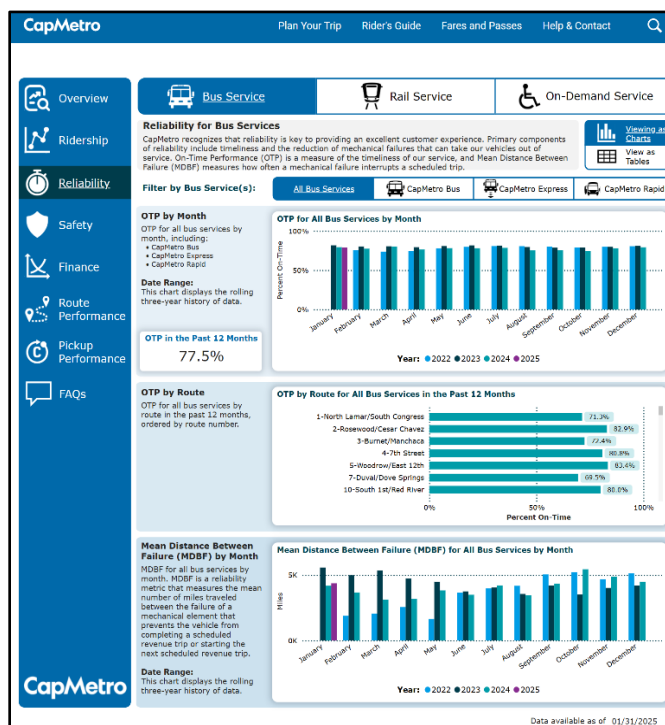
- **Public dashboards increase accountability and community trust.** By presenting live metrics to the public, CapMetro strengthens its relationship with riders, advocates, and funding partners.

- **Cross-departmental collaboration is essential.** Dashboard success required coordination between planning, operations, Information Technology (IT), communications, and executive leadership to define KPIs, curate data, and establish update processes.

- **Ongoing maintenance and storytelling matter.** CapMetro pairs raw metrics with narrative context to help users interpret trends and understand agency decisions, improving the impact and usability of performance data.

Recommendations for Establishing an Open Transit Data Portal in the Triangle Region

Given the presence of multiple transit agencies across the Triangle region—each with different levels of technical readiness and existing open data practices—it is recommended that regional partners pursue two complementary approaches to establish a comprehensive Open Transit Data Portal:

Approach #1: Leverage Existing Data Feeds to Build a Centralized Open Data Portal for all Regional Transit Feeds

Several agencies in the region already publish GTFS and real-time (GTFS-RT) feeds (e.g., GoDurham, GoTriangle, Chapel Hill Transit, GoRaleigh). This approach recommends building a centralized portal that integrates these feeds for unified access and visibility.

Key steps include:

1. Establish a lead agency or regional data steward (e.g., GoTriangle, CAMPO, Central Pines, Triangle West) to manage the data portal, coordinate updates, and support governance.

2. Create a dedicated landing page or portal managed by the lead agency with links to individual agency feeds, APIs, and standardized metadata.

3. Publish a regional developer resource page that includes GTFS documentation, real-time API endpoints, and example use cases for developers and researchers.

4. Encourage all agencies to provide a public GTFS-RT feed, even if initially limited to core routes, using formats aligned with industry standards.

This approach can be implemented quickly using existing infrastructure and requires minimal new investment. Note that this approach could include the modification of an existing dashboard known as the Wake Transit Performance Tracker shown in Figure 6-2. The dashboard can present regional data over time from a static database that allows a user to view specific projects throughout the region. Updates could be made to allow for other data to be updated on an automated basis from transit agencies that could report the data from their CAD / AVL systems.
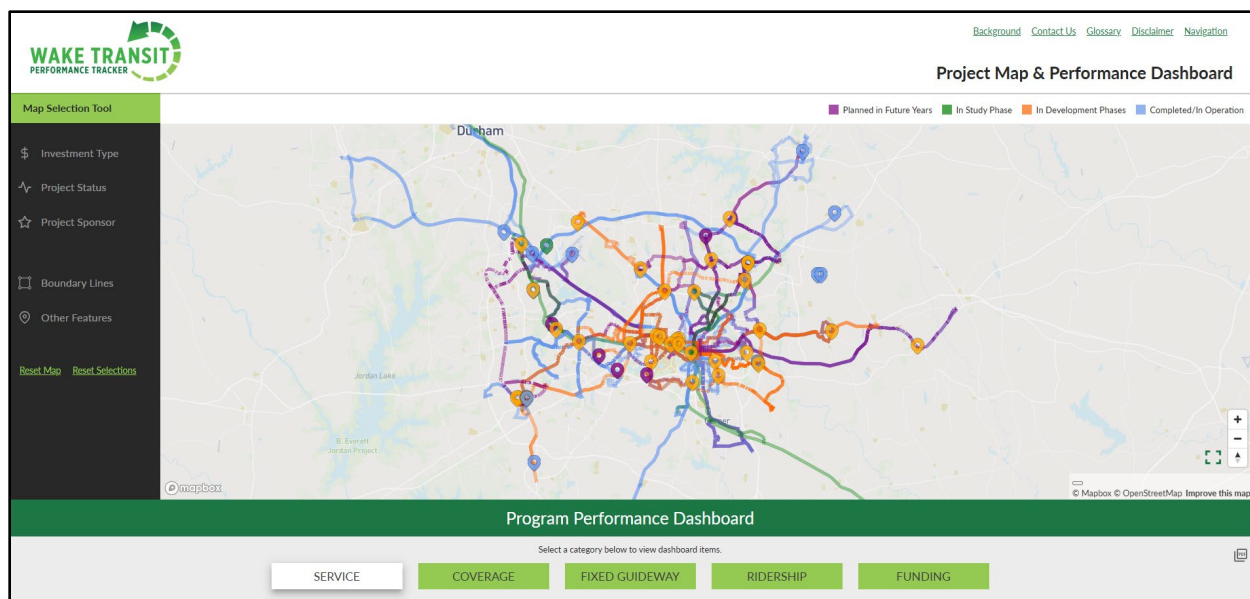
Figure 6-2 – Wake Transit Performance Tracker

Approach #2: Develop a Regional Open Data Portal with Dashboards, Analytics, and Public Engagement Tools

Building upon Approach #1, regional partners may pursue the development of a more advanced open data portal that incorporates searchable datasets, interactive dashboards, GIS-based tools, and performance metrics, modeled from leading examples such as Sound Transit's Open Transit Data system and CapMetro's performance dashboard suite.

Key steps include:

1. Convene a regional working group of transit IT/data managers to define shared standards for open data publishing and priority datasets (e.g., ridership, headways, stop amenities, speed data, Automated Passenger Counter (APC) counts).

2. Develop a regional data schema or adopt an existing one (e.g., GTFS-ride, GTFS-flex, or NTD-compatible formats).

3. Use open data platforms such as ArcGIS Hub, Comprehensive Knowledge Archive Network (CKAN), or Socrata to host the portal, allowing for easy download, visualization, and API access.

4. Coordinate with regional universities and nonprofits to identify public research and planning needs that the portal should support.

5. Include guardrails for cybersecurity, data accuracy, and appropriate usage, modeled after Sound Transit's API and data terms of use.

Budgetary Planning Recommendations for Transit Agency Consideration

Approach #1: Leverage Existing Data Feeds to Build a Centralized Open Data Portal for all Regional Transit Feeds

This approach builds on existing datasets and focuses on integration, hosting, and documentation, thereby minimizing new system development. Table 6-3 presents an estimated budget for implementing this approach. The total initial year investment is estimated to range from approximately $90,000 to $155,000, with annual ongoing costs projected between $50,000 and $75,000 [9][10][11]. The estimated budget is influenced by the current status of GTFS and GTFS-RT feeds among participating agencies and the level of harmonization required. If feeds are already published and well-maintained, initial setup costs can remain low, especially when leveraging open-source tools for integration and validation.

A key factor that can significantly reduce both startup and ongoing expenses is the assignment of an in-house staff member to serve as a regional data coordinator or steward. This internal coordination role can reduce the need for external consultants and streamline update processes. For most agencies, the bulk of ongoing costs, often 60% to 75%, are tied to staffing for data quality assurance, feed maintenance, and communication across jurisdictions. Portal hosting and maintenance costs are comparatively modest. Future discussion with regional entities is needed to identify the most appropriate agency to serve as a transit data steward for the region. This could include Central Pines, which serves as the regional Council of Governments (COG), Triangle West, which serves as the Metropolitan Planning Organization (MPO) for Durham and Orange Counties, CAMPO, which serves as the MPO for Wake County, or GoTriangle as the regional transit agency providing transit service throughout the region.

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[9] City of Fort Collins. (n.d.). *Open data portal software as a service: RFP documents.* Retrieved from https://records.fcgov.com/WebLink/DocView.aspx?dbid=0&id=8604650&repo=FortCollins

[10] City of Chicago. (2023). *Application infrastructure hosting and cloud computing services: Tyler Technologies Inc. (AIS)* [Procurement document]. Retrieved from https://www.chicago.gov/content/dam/city/depts/dps/SoleSource/NCRB2023/Tyler%20Technologies%20Inc%20%28AIS%29%20-%20Application%20Infrastructure%20Hosting%20and%20Cloud%20Computing%20Services.pdf

[11] Bloomberg Cities Network. (n.d.). *Open data: How much does it cost?* Retrieved from https://bloombergcities.jhu.edu/sites/default/files/bch-media/files/resources/civic_impact_open-data-how-much-does-it-cost.pdf

Table 6-3 Estimated budget for Approach#1 implementation

Budget Item	Estimated Cost	Notes
Project coordination & regional data steward (0.5 Full-Time Equivalent (FTE))	$20,000–$40,000/year	Can be hosted by a regional entity, such as Central Pines, Triangle West, GoTriangle or CAMPO; covers coordination & governance. Future discussion with regional entities is needed to identify the most appropriate transit data steward for the region.
Integration software/scripts	$10,000–$15,000 (Year 1)	Open-source tools exist; customization and integration may be needed.
Metadata development and feed documentation	$5,000–$10,000 (Year 1)	One-time cost for feed standards, dataset description, and metadata.
Portal landing page (basic website or Content Management Systems (CMS)	$5,000–$15,000 (Year 1)	Lightweight approach using WordPress, CKAN, or similar tools.
GTFS and GTFS-RT feed validation tools	$5,000–$15,000 (Year 1)	Tools like Transitland Feed Registry or Google Transit Validator.
Staffing: Part-time data coordinator (0.5 FTE)	$40,000–$60,000/year	For data Quality Assurance (QA), updates, support, and communication with agencies. Can include staff time for data automation work on dashboard for region.
Ongoing hosting & maintenance	$10,000–$15,000/year	For server space, cloud backups, and domain registration.

Approach #2: Develop a Regional Open Data Portal with Dashboards, Analytics, and Public Engagement Tools

Approach 2 introduces more sophisticated user interfaces, real-time visualizations, and data tools, and as such, has higher upfront and recurring costs. Table 6-4 presents an estimated budget for implementing this approach. The total initial year investment is estimated to range from approximately $130,000 to $205,000, with annual ongoing costs projected between $90,000 and $130,000[12][13][14][15]. Major cost drivers for implementation include platform licensing (e.g., Socrata,

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[12] City of Fort Collins. (n.d.). *Open data portal software as a service: RFP documents.* Retrieved from https://records.fcgov.com/WebLink/DocView.aspx?dbid=0&id=8604650&repo=FortCollins

[13] City of Sacramento. (2023). *Enterprise agreement with Esri for ArcGIS software* [Council report]. Retrieved from https://sacramento.granicus.com/MetaViewer.php?clip_id=5619&meta_id=738436&view_id=22

[14] City of Chicago. (2023). *Application infrastructure hosting and cloud computing services: Tyler Technologies Inc. (AIS)* [Procurement document]. Retrieved from https://www.chicago.gov/content/dam/city/depts/dps/SoleSource/NCRB2023/Tyler%20Technologies%20Inc%20%28AIS%29%20-%20Application%20Infrastructure%20Hosting%20and%20Cloud%20Computing%20Services.pdf

[15] National League of Cities. (2016). *Open data policies report.* Retrieved from https://www.nlc.org/wp-content/uploads/2016/12/CSAR-Open-Data-Report-FINAL.pdf

ArcGIS Hub), dashboard development, and integration of diverse data sources like performance metrics or GIS overlays. The complexity of desired features, such as API endpoints, interactive charts, or accessibility filters, has a direct impact on costs. However, agencies can manage these expenses by leveraging existing enterprise licenses or dedicating internal staff with GIS or data science expertise to manage dashboard content and system upkeep. Over time, as with Approach 1, staffing becomes the largest share of recurring costs, covering data curation, stakeholder support, and continuous improvements to meet public and partner expectations. External development and maintenance contracts add flexibility but also increase costs.

Table 6-4 Estimated budget for Approach#2 implementation

Budget Item	Estimated Cost	Notes
Regional data portal platform (ArcGIS Hub / Socrata)	$30,000–$60,000/year	Pricing varies; consider platform already in use by city/county agencies.
Dashboard & analytics development (e.g., Power BI)	$20,000–$40,000 (Year 2+)	Interactive visualizations for ridership, performance, and equity.
Custom APIs and developer documentation	$10,000–$25,000 (Year 2+)	To allow real-time data access and app development.
GIS data integration and mapping tools	$15,000–$30,000 (Year 2+)	Includes stop locations, routes, amenities, and overlays.
Schema and standardization efforts (GTFS-ride, etc.)	$10,000–$20,000 (Year 1)	Needed for ridership, APC, and performance datasets.
Staffing: Full-time open data coordinator (1 FTE)	$75,000–$100,000/year	Leads data governance, QA, publishing, and stakeholder engagement. Can include staff time for data automation work on dashboard for region.
Regional stakeholder engagement & training	$10,000–$15,000/year	Workshops, technical assistance, and agency coordination.
Cybersecurity & licensing audit	$5,000–$10,000 (Year 1)	Terms of use, access levels, and compliance.

While Approach 1 offers a low-cost and practical starting point by centralizing access to existing transit feeds, Approach 2 provides a more future-ready solution that aligns with long-term regional goals. By incorporating interactive dashboards, performance metrics, and advanced data visualization tools, Approach 2 enables deeper insights for planners, researchers, and the public. It supports more sophisticated use cases such as equity analysis, service optimization, and cross-agency performance comparisons—capabilities that are increasingly essential for modern transit planning and public accountability. Additionally, by investing in a robust platform now, regional partners can reduce technical debt over time and avoid duplicative efforts across agencies, ultimately fostering stronger collaboration and public trust.

Roadmap and Resiliency Plan for OTD in Future Years

The following roadmap outlines phased steps that regional transit partners can take to establish and sustain an Open Transit Data (OTD) Portal, regardless of whether they pursue a foundational data aggregation model (Approach 1) or a more advanced portal with analytics and dashboards (Approach 2). Phases 1 through 4 represent common actions applicable to both approaches, including data standardization, governance, and centralized public access. Phases 5 and 6 apply when the region elects to pursue the expanded functionality described in Approach 2, such as visualization tools, performance dashboards, and engagement features. This roadmap is supported by resiliency strategies to ensure the portal remains accurate, secure, and adaptable over time.
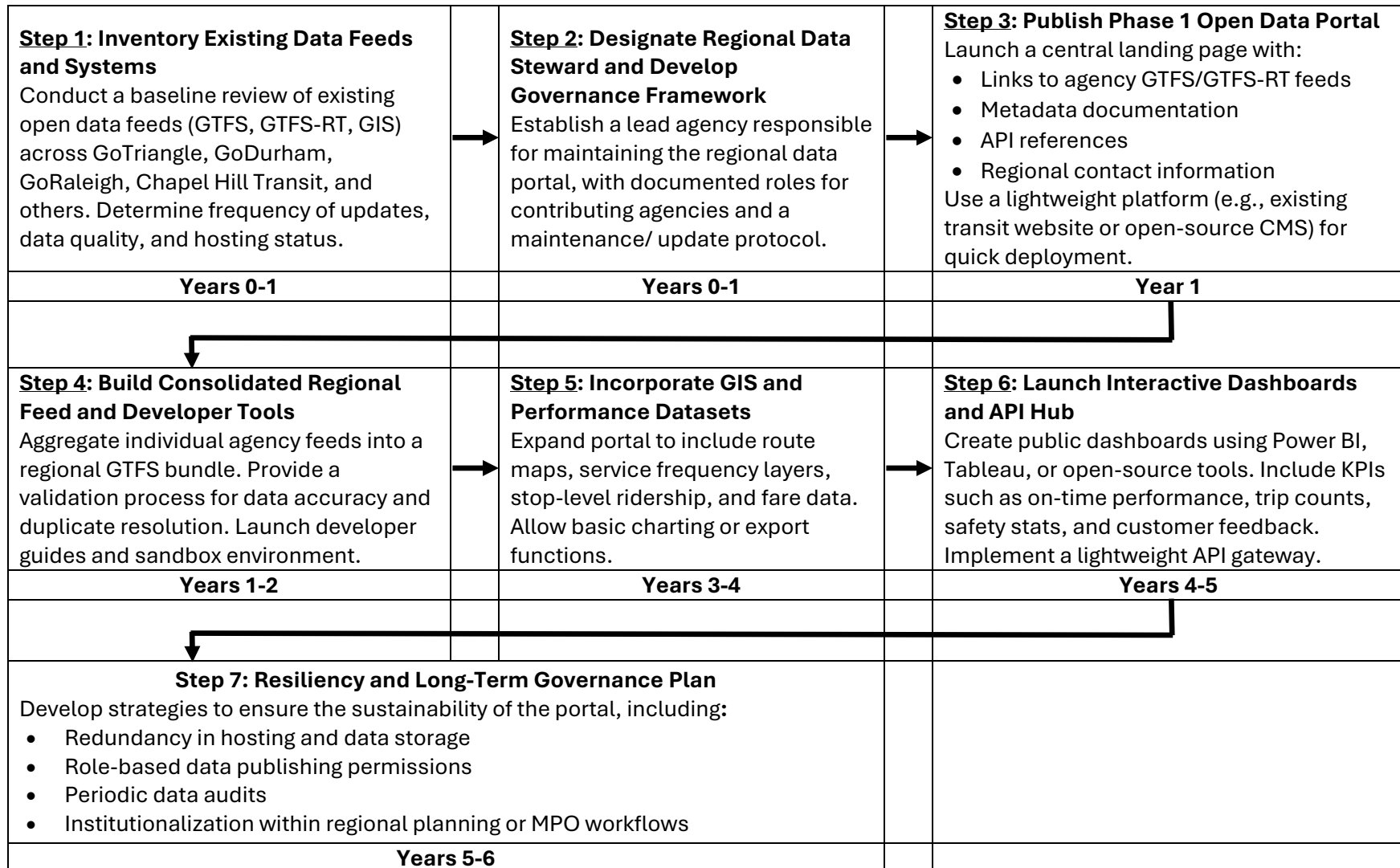
Step 1: Inventory Existing Data Feeds and Systems Conduct a baseline review of existing open data feeds (GTFS, GTFS-RT, GIS) across GoTriangle, GoDurham, GoRaleigh, Chapel Hill Transit, and others. Determine frequency of updates, data quality, and hosting status.		**Step 2: Designate Regional Data Steward and Develop Governance Framework** Establish a lead agency responsible for maintaining the regional data portal, with documented roles for contributing agencies and a maintenance/ update protocol.		**Step 3: Publish Phase 1 Open Data Portal** Launch a central landing page with: • Links to agency GTFS/GTFS-RT feeds • Metadata documentation • API references • Regional contact information Use a lightweight platform (e.g., existing transit website or open-source CMS) for quick deployment.	
Years 0-1		**Years 0-1**		**Year 1**	
Step 4: Build Consolidated Regional Feed and Developer Tools Aggregate individual agency feeds into a regional GTFS bundle. Provide a validation process for data accuracy and duplicate resolution. Launch developer guides and sandbox environment.		**Step 5: Incorporate GIS and Performance Datasets** Expand portal to include route maps, service frequency layers, stop-level ridership, and fare data. Allow basic charting or export functions.		**Step 6: Launch Interactive Dashboards and API Hub** Create public dashboards using Power BI, Tableau, or open-source tools. Include KPIs such as on-time performance, trip counts, safety stats, and customer feedback. Implement a lightweight API gateway.	
Years 1-2		**Years 3-4**		**Years 4-5**	
Step 7: Resiliency and Long-Term Governance Plan Develop strategies to ensure the sustainability of the portal, including**:** • Redundancy in hosting and data storage • Role-based data publishing permissions • Periodic data audits • Institutionalization within regional planning or MPO workflows					
Years 5-6					

Figure 6-2 – Roadmap of Implementation Steps for Transit Agencies for Operations

Implementation Considerations and Cybersecurity Recommendations

To ensure the success, sustainability, and integrity of a regional open transit data portal, the agencies need to consider incorporating the following implementation safeguards and considerations from the outset:

- **Data Accuracy**: The credibility of the portal depends on the reliability of its data. Automated QA checks, detailed update logs, and structured stakeholder review periods prior to publishing will help build public trust and ensure that decisions based on this data are well-informed and defensible.

- **Open Licensing**: Adopting a permissive license such as Creative Commons BY 4.0 promotes transparency and innovation. It allows developers, researchers, and the public to build tools, conduct analysis, and create value-added services—while still maintaining appropriate attribution to the source agencies and avoiding legal ambiguity.

- **Redundancy and Continuity**: A resilient system requires built-in redundancy. At least two agency staff members should be trained in system administration to avoid single points of failure. Additionally, using cloud backups and dataset versioning ensures operational continuity in the event of outages, personnel changes, or data corruption.

- **Regional Alignment**: To avoid fragmentation and duplication of effort, formal agreements across participating agencies should clearly define responsibilities, update frequencies, data stewardship roles, and priority datasets. This alignment is essential for ensuring long-term collaboration, data interoperability, and consistent public service across jurisdictional boundaries.

- **Cybersecurity Recommendations**: A secure portal must balance openness with protection. Implementing tiered user access for administrative tools, API key controls for developers, and publishing anonymized datasets for public consumption will mitigate risks of data misuse, system breaches, and privacy violations—especially when dealing with sensitive or operational data.

    - Perform risk assessment of the data to be published on the portal.
      (e.g., Identify sensitive data, anonymize or remove personally identifiable information, assess potential risks.

    - Develop a data management plan that provides framework for data collection, organization, processing and getting the data ready for open data portal and/or for decision-making purposes.

    - Considering various transit agencies supporting the management of open data portal, develop a data access management framework to establish role-based access control, logging and monitoring of activities.

    - Assess current practices using cybersecurity evaluation tool such as FTA's Cybersecurity Assessment Tool for Transit (CATT)

- Develop cybersecurity framework in alignment with industry standards. Key resources include:

    - FTA's Cybersecurity Guidelines (Link)

    - National Institute of Standards and Technology (NIST) Cybersecurity Framework (CSF). (Link) The five functions of the NIST CSF are as shown in Figure 1.

- Ensure that systems are up to date and in compliance with the latest cybersecurity standards including but not limited to NIST SP 800-53: Security and Privacy Controls for Information Systems and Organizations (Link)

- Ensure that the data is encrypted and, open data portal and supporting infrastructure is hosted in a secure environment that meets the latest cybersecurity standards. Any third-party service integration must also comply by the IT established protocols and standards.

- Perform periodic security audits and assessments such as penetration testing.
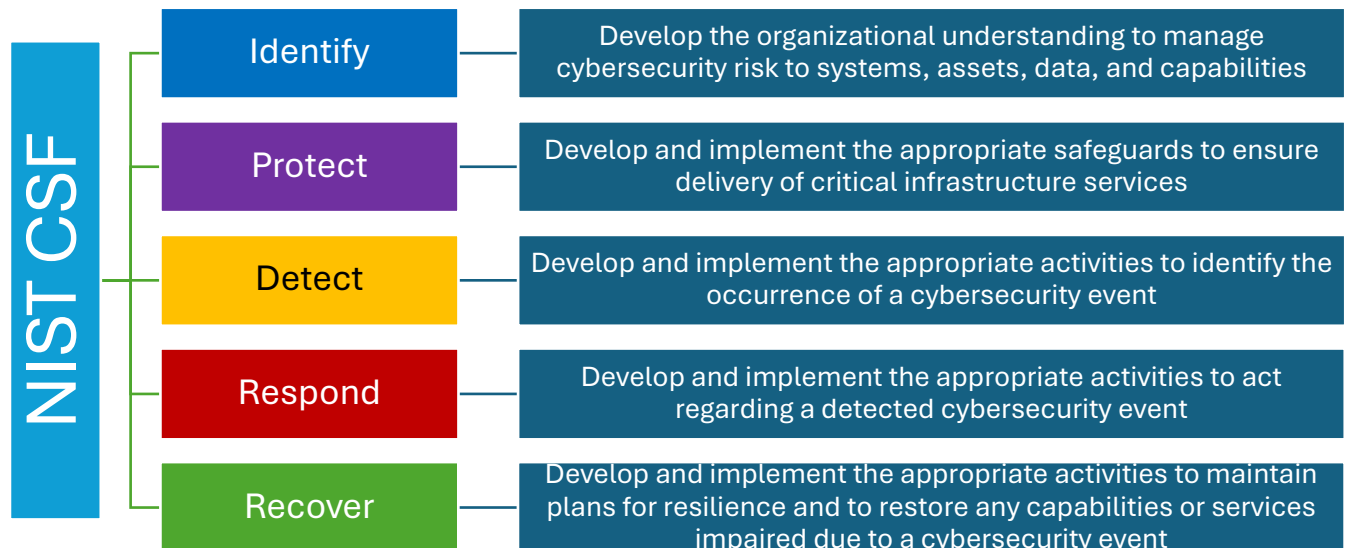

Figure 6-3 – The five functions of National Institute of Standards and Technology Cybersecurity Framework