PUTTING THE HORSE BEFORE THE CART: 
HOW PLANNING AND IMPLEMENTATION 
AFFECT THE SUCCESS OF TRANSIT SYSTEM REDESIGN 

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ABSTRACT

Many transit agencies neglect to make regular, data-driven adjustments to system maps and service plans to reflect changes in development patterns and rider preferences. However, agencies that make these adjustments often achieve significant gains in productivity, either through increases in ridership or through a newfound ability to serve the same number of riders with fewer units of service. This paper looks at four properties that engaged in system redesigns or comprehensive operational analyses and attempts to illuminate the factors that may lead to greater levels of success. The agencies examined had not fundamentally changed their system maps in 15 to 20 years, but a mix of political crises, financial crises, or changes in leadership led them to pursue a system redesign. They achieved varying levels of success, with one agency increasing productivity by 63 percent and another becoming 16 percent less productive. Their efforts to substantively engage key stakeholders and the broader public seem to be a key factor in determining the relative success of the projects.
INTRODUCTION

In theory, private-sector companies have a clear and immediate incentive to critically examine and optimize their processes. The drive for profits and, among publicly traded companies, fiduciary duties to shareholders should force the most successful companies to take a critical look at core business practices. These examinations should use the most up-to-date data possible, and any changes should reflect the needs of consumers and have buy-in from those who will be executing a strategy shift. In real life, this does not happen perfectly in many private-sector companies, but the incentive system is quite clear and simple.

The incentives are often quite different for public entities like transit agencies. Such organizations do have a fiduciary duty to their shareholders – the tax-paying public – that should push them to be as fiscally efficient as possible, but factors like political pressure to offer service in as many areas as possible make transit agencies’ central priorities less clear. This multi-pronged incentive system could be one reason few transit systems regularly take a step that might be a logical way to ensure financial resources are being spent as efficiently as possible and passenger desires are being taken into account: critically examining system maps and service plans to ensure they truly reflect current development and travel dynamics. The four agencies examined for this paper each let 15 to 20 years elapse before taking critical looks at system design, but three of the four became more efficient and achieved striking gains in productivity by redesigning their systems to reflect current demand patterns. Given the ongoing fiscal constraints that have been imposed on transit agencies for the better part of three decades, agencies might be wise to pursue similar redesigns more regularly. The federal government believes local conditions change quickly enough to warrant a Title VI analysis every three years (1). While agencies, particularly those in slow-growing regions, may not need to take a comprehensive look at their systems quite that frequently, changes in the built environment surely demand fundamental transit-system adjustments more often than once a generation.

This paper uses case studies generated through key informant interviews to reveal the reasons agencies typically pursue system redesigns or comprehensive operational analyses and the factors that contribute to their relative success. Three factors seem to create the impetus for a system redesign: A political crisis, a financial crisis, and/or new leadership. The strength of stakeholder outreach efforts seems to be an important factor in determining how successful and politically sturdy a redesign will be. Other factors including the demographic profile of a system’s riders may also be influential, and a future study with a larger set of cases is warranted to explore just how other factors are mediate the success of system redesigns.

LITERATURE REVIEW

There have been only a limited number of academic analyses of comprehensive operations analyses (COAs) or system redesigns over the last several decades. This could be in part because such projects have grown in use only in the last two decades. Many transit agencies first came under public control in the middle of the century, and the 1960s and early 1970s were marked by significant growth in state and federal funding for transit. This made it much less necessary for planning staffs to engage in politically contentious, fiscally-constrained planning exercises like COAs and allowed them to instead focus on system expansions. By the late 1970s and early 1980s, transit funding shrank, and the effects of decentralized development patterns began to make previously productive routes significantly less so. Still, only a few transit agencies took comprehensive looks at their systems because, as Wilson et al. report, staff capacity was tied up in the need to focus on fighting daily fires, timely high quality data was hard to come by, and planners were uncomfortable or already frustrated with the highly political nature of planning processes that produce both winners and losers (2).
However, the late 1990s and early 2000s saw slightly increased attention on system redesigns, though these analyses either did not make significant efforts to understand the reasons for varying results or tried to explain results based on network design, rather than other potential contributing factors.

A 1998 Transit Cooperative Research Project report highlighted several agencies that had achieved significant ridership increases in the mid-1990s because of, among other factors, system redesigns (3). Specifically, the report noted that a redesign from a timed-transfer to a grid orientation in Vancouver, Wash. was among the factors potentially explaining a 48% increase in ridership between 1994 and 1996. The report did not parse out for just how much of the growth the network-design change was responsible, noting that the region also had strong regional growth and the agency, C-TRAN, introduced new services during the same period.

The most comprehensive synthesis of the results of system redesigns appears in another TCRP report, from 2004 (4). Table 1 summarizes the results found in the report. All but three projects included in the report saw gains in ridership, though results were not consistent. The report categorized the redesigns by the resulting network type and found no statistically significant patterns in results based on network design.

<table>
<thead>
<tr>
<th>City/Region (Year)</th>
<th>Redesign Type</th>
<th>Results Reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boston (late 1970s)</td>
<td>Radial Downtown Penetration</td>
<td>+26-30% on relevant lines</td>
</tr>
<tr>
<td>Southeast Portland, Ore. (1977)</td>
<td>Grid</td>
<td>Elasticity of +.29</td>
</tr>
<tr>
<td>Vancouver, Wash. (1994-96)</td>
<td>Grid</td>
<td>+48%, attributed to variety of factors</td>
</tr>
<tr>
<td>Albuquerque, N.M. (1995)</td>
<td>Grid</td>
<td>+4%, same bus hours/miles</td>
</tr>
<tr>
<td>Phoenix, Ariz. (mid-1990s)</td>
<td>Variation on Hub/Spoke</td>
<td>No change</td>
</tr>
<tr>
<td>Boise, Id. (1996)</td>
<td>Variation on Hub/Spoke</td>
<td>-10%</td>
</tr>
<tr>
<td>Sacramento, Calif. (1994)</td>
<td>Variation on Hub/Spoke</td>
<td>+12% on restructured routes, 1.3% increase in ridership/service hour</td>
</tr>
<tr>
<td>Orange County, Calif. (1995)</td>
<td>Variation on Hub/Spoke</td>
<td>+10-15% ridership, -5% operating costs</td>
</tr>
<tr>
<td>King County, Wash. (1996)</td>
<td>Variation on Hub/Spoke</td>
<td>+23% (two years)</td>
</tr>
<tr>
<td>New Castle, Penn. (1960s)</td>
<td>Other</td>
<td>No change</td>
</tr>
<tr>
<td>Putnam County, N.Y. (1997)</td>
<td>Other</td>
<td>No change in ridership, -5% operating costs</td>
</tr>
<tr>
<td>Snohomish County, Wash. (1993)</td>
<td>Other</td>
<td>+5%</td>
</tr>
<tr>
<td>Tampa, Fla. (1992)</td>
<td>Other</td>
<td>+32%</td>
</tr>
<tr>
<td>Riverside, Calif. (1995)</td>
<td>Other</td>
<td>+20.4%, +4% service hours</td>
</tr>
</tbody>
</table>

While additional North American agencies have likely engaged in system redesigns over the last 10 years, there has been little in-depth investigation of such projects since the early 2000s. However, Brown, et al. completed the most in-depth analysis of a system redesign, on a project in Tallahassee, during this time period (5). In 2011, Tallahassee’s transit agency, StarMetro, reoriented its radial bus system, which was organized around timed transfers at its main transit center downtown, into a grid system to “better serve the dispersed local pattern of population and employment.” The new system saw faster travel times across the system but increased customers’ walking time to bus stops by an average of two minutes, based on the combined effects of focusing service on arterials instead of in residential neighborhoods and reducing the overall number of bus stops from 1,055 to 910. It resulted in monthly year-over-year reductions in ridership averaging 12% over the 10 months after the changes were implemented, despite service increases of 35% to 40% during the same months. Authors suspected that the disappointing results
were in part because the new system did not increase headways enough to make for reasonable wait times at the dispersed transfer points and in part because the public was still getting used to the new system. The authors also noted that ridership and productivity were especially low in suburban areas with few attractions that received new cross-town service that was aimed at connecting major activity centers. While the authors summarized the history and planning process, they focused on network-design factors in explaining the results.

Currie et al. looked at system redesigns in Australia and New Zealand and concluded that “route simplification,” which is often a major part of system redesigns, “was the most effective value-for-money bus improvement, covering almost 3.5 times the financial return compared with costs” (6). The authors cited examples from Christchurch, which saw 16% growth in weekday ridership, Wellington, which saw growth of 4 to 7% within the first two years, Perth, which saw 20 to 30% ridership growth in two different areas, and from the National Bus Company, which saw ridership increases of 10 to 20%. Given that the authors were comparing a number of transit ridership-enhancement strategies, they did not deeply examine the factors that contributed to the ridership growth seen in those cases.

This research aims to add to the existing body of work by helping to explain why some projects might be more successful than others, based on deeper examinations of the planning and implementation processes employed in several redesign efforts.

METHODOLOGY AND TOP-LINE RESULTS

This study uses a case-study and key-informant-interview approach to reveal common themes in what determines the level of success of system redesign projects. The study team interviewed general managers/chief executive officers at transit agencies, with a focus on the system-redesign process, including both outreach and analysis components, implementation, and more general reflections on system redesigns.

The analysis focused on four cases from among the comprehensive operational analyses and system redesigns completed by Nelson\Nygard in the last 10 years. The four were chosen to represent diversity in size, process and outcomes. Table 2 shows the cases selected and basic information about each transit agency. As the table shows, the agencies’ service areas represent a wide range of sizes and demographic profiles. Mankato showed the most significant ridership gains in the year after the project. Pittsburgh showed slightly lower ridership but saw a significant increase in productivity. Bakersfield saw a drop in productivity.
TABLE 2 Summary of Service-Area Characteristics and Results

<table>
<thead>
<tr>
<th>Agency</th>
<th>Interview Subject</th>
<th>Service-Area Population</th>
<th>Poverty: 12% 0 Vehicle HH: 11%</th>
<th>Metro Area Demo Profile</th>
<th>Annual Unlinked Passenger Trips</th>
<th>Annual Revenue Vehicle Hours</th>
<th>Productivity (trips/hr) Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port Authority of Allegheny County (Pittsburgh)</td>
<td>Stephen Bland, former CEO</td>
<td>1,415,244</td>
<td>Before: 64,782,093 After: 62,452,592 -4%</td>
<td>Before: 1,852,654 After: 1,619,266 -13%</td>
<td>Before: 34.97 After: 38.57 +10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>City of Huntsville Public Transportation Division (Ala.)</td>
<td>Kim Smith, Program Fiscal Officer, Huntsville Department of Parking and Public Transit (COA project manager)</td>
<td>127,000</td>
<td>Before: 334,330 After: 449,482 +34%</td>
<td>Before: 37,093 After: 39,018 +5%</td>
<td>Before: 9.01 After: 11.52 +28%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater Mankato Transit System (Mankato, Minn.)</td>
<td>Mark Anderson, Manager</td>
<td>52,703</td>
<td>Before: 354,734 After: 605,740 +71%</td>
<td>Before: 16,836 After: 17,667 +5%</td>
<td>Before: 21.07 After: 34.29 +63%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SYSTEM-REDESIGN APPROACH

The projects detailed in this paper were conducted using the same general approach to route design, service planning, outreach, and implementation. This section gives a general overview of this approach as context for the discussions below. The case studies build on this context by highlighting the similarities and differences.
differences in how this general approach played out on the ground with transit systems of various sizes, in hopes of shedding light on why the results noted in Table 2 were different in each case.

Route Design

In each case, the project team considered a combination of existing and future land-use patterns, rider preferences, and overall system simplicity and legibility in redesigning routes.

To analyze density and development patterns, considered national experience with density and transit demand to assess ridership potential and gauge appropriate service levels. This approach involved translating block-level residential and employment densities to transit demand based on national experience. The results were mapped to reveal nodes and corridors with high levels of potential transit demand, and these nodes and corridors were compared to existing system maps. Project teams also considered demographic characteristics of the population in similar spatial analyses.

To analyze rider preferences, on-board rider surveys were conducted, gathering information on rider origins and destinations, among other items. While cellular-phone-based GPS data, provided through companies like AirSage, is emerging as a more reliable way to gather trip-making data than surveys, all four of the studies used surveys as the most cost-effective, accessible, and accurate way to gather information on existing ridership patterns at the time of the studies. Another strategy used to gauge rider preferences was to pose a series of trade-off questions that asked them to choose between different service designs, such as walking a longer distance to a bus that travels faster or walking a shorter distance to a bus that travels more slowly.

Finally, system legibility and simplicity were considered by identifying major streets and trip-generators around which service might logically be organized. Project teams generally worked to eliminate one-way loop routes, most often identifying the portions of loop routes that were most productive and incorporating these segments in shorter out-and-back routes. Route naming and numbering conventions were simplified as possible.

Elements of two of the case studies illustrate how these design principals came together. In the Pittsburgh case, planners routed all lines numbered in the 60s along the Forbes Avenue/Fifth Avenue corridor, in the Oakland neighborhood. This corridor featured high densities and a large number of trip-generating land uses, and routing a number of lines through the corridor created both high frequencies for riders with destinations along the corridor and a highly visible backbone for service to and from the rest of the region. In the Bakersfield case, service was organized around four major trip generators: a downtown transit center, a large mall in the southwestern part of the city, a community college, and a state college.

Service Planning

The planning process typically involved both service area analyses of population, employment, density, and activity centers as well as an evaluations of each transit route in the system. Route-level evaluations allowed planners to understand the strengths and weaknesses of each individual route as well as interactions between routes. The next step typically involved reconstructing the system by building on the opportunities identified on the route level as well as the overall service area characteristics. This information was combined into system improvement scenarios that offered different ways to provide transit service within the same fiscal constraints. Systems can be organized in a variety of ways – around a grid, a network of transit hubs or series of key corridors. In every case, each scenario makes different trade-offs on how the transit agency can serve its communities. Determining which of these scenarios works best for the community in question ultimately reflected local values.

Outreach and Implementation
In most cases, system redesigns are conducted with participation from an oversight committee as well as input provided by stakeholders, riders and members of the public through interviews, focus groups, and/or rider surveys; input is structured to collect ideas and understand existing needs. In a few cases, the case study examples included processes where stakeholders, including agency board members, engaged in a planning game in which participants are given a limited budget and asked to choose between different service and system-design characteristics. In addition to official public meetings, project teams also generally continued public engagement through an additional survey later in the project or “rider drop-ins” at transit centers, to get input as ideas developed.

Consultant teams had varying levels of involvement in the implementation process, with some working closely with the agency through decisions about how a redesign rollout would be phased in and others simply giving a detailed checklist of key things to account for in the implementation process. Service plans and routes were generally subject to minor modifications as agencies moved them into local service-planning software.

**CASE STUDIES**

**Pittsburgh**

The Port Authority of Allegheny County implemented a system redesign over almost two years, starting in 2010 after a two-year planning and public engagement process. The project was initiated because of a combination of three related events. A Pennsylvania statewide commission’s finding that the Port Authority was significantly underperforming relative to other major transit agencies in Pennsylvania created political pressure to make the system more productive. Ongoing fiscal issues and the onset of the 2008 financial crisis created financial pressure. Finally, the agency’s new chief executive officer, Stephen Bland, was interested in taking a critical look at the system based on his observations over his first few months on the job and his positive experiences with comprehensive operations analyses at two agencies at which he had worked previously, in Albany, N.Y. and York, Pa. “I thought that every few years, you should look at your service and make sure it’s still relevant and you’re making the changes that are necessary,” he said (7). The project resulted in a 10% increase in system-wide productivity.

*Overview of Changes*

The system had not seen a major update in approximately 20 years and included large amounts of service to areas that had lost significant steel-industry employment in the interim. The region had also invested in several major capital improvements over the period, including a light-rail line and two busways, but the system as a whole was not fundamentally adjusted when the new services came online.

Today’s system reflects the redesign and an additional 15% service cut that was imposed on the agency after the redesign planning process had been completed. The project merged service that had been on nearby parallel streets to provide increased frequencies, and with the service cut, the number of routes in the system was reduced from 219 to 102. Without the service cuts, the system redesign would have cut the number of routes to 125 but provided the same number of service hours and similar service coverage, with a goal of providing more compelling choices with fewer routes.

The redesign simplified downtown circulation, eliminated route variants on the outskirts of the system, and consolidated stops to speed service. It also simplified route numbering and naming conventions (8). The project also included new performance standards for the system by service type, grouping routes based on their function within the larger system, with the most stringent standards for trunk and rapid services and lower standards for local and dial-a-ride services. The system redesign originally aimed to be
revenue-neutral, but the additional service cut reduced bus service hours by more than 20 percent. On the whole, revenue vehicle hours were reduced by 13% between 2009 and 2013.

Planning Process

An extensive up-front stakeholder outreach process was critical to ultimately gaining political and public support for the recommended changes and ensuring that implementation could proceed smoothly. In fact, according to the CEO, the community trust and good will established in the public engagement process continued to pay dividends well after the project’s completion. The project included a consultant budget of nearly $200,000 for public outreach, or nearly 30% of the total consultant budget (9), and Port Authority staff time spent on outreach added a significant amount to that total. At the outset, the team focused on identifying and holding meetings with key constituencies, including the social service community, the business community, key elected officials at all levels of government, and key members of the media. The project team created “design principles;” the design principles were tested with the community through a series of trade-off exercises that asked riders to choose between different service designs. Having the community “vote” or choose between the options helped change stakeholder and staff perceptions about what would work. The design principles included ideas like consolidating routes to give riders “a few good options” instead of a larger number of subpar ones, and Bland said the principles both informed the redesign effort and allowed the project team to explain the rationale for the proposed changes at public meetings and during the approval process.

Other outreach and stakeholder engagement strategies included a standing advisory committee, comprised of people representing all of the key groups with a stake in the process, and efforts to get in front of the general public at events and gatherings. Figure 1 shows one such effort: The agency wrapped a bus with the statement “Tell us where to go” and used the interior to share information about the proposed changes and solicit input.

FIGURE 1 “Tell Us Where to Go” Bus

The consultant team compiled detailed route profiles on 186 existing lines, in addition to a review of population, employment, and demographic dynamics in the Port Authority’s service area. Through the analysis, the project team calculated that a large percentage of the system’s ridership was being generated on just a few routes. The technical analysis was the foundation for the recommendations, but Bland said the findings also helped with outreach and public engagement.

Implementation

The redesign was implemented in seven phases over two years, with most occurring during 2010 and all changes in place by September 2011. The agency decided to roll out the changes in phases, rather than all at once, because of concerns about whether the agency had the organizational capacity to implement all of
the changes at the same time. Agency leaders were also sensitive to the fact that even with the extensive public outreach process, many riders were likely not deeply engaged in the redesign process. “My take was that the changes were really radical, so even though we had thousands of people participating [in defining what the changes were], the overwhelming majority of riders had no idea what was going on,” Bland said. The Port Authority included the changes that would provide the most benefit in the first phase of the implementation and worked down to the changes that would provide smaller benefits. On the days each phase went into effect, the agency “swamped routes with help” to make sure passengers and operators knew where they were supposed to go, assigning staff members to key locations throughout the system to answer questions and respond to complaints.

Bakersfield, Calif.

Golden Empire Transit (GET) in Bakersfield implemented a system redesign in October 2012 also after a two-year planning and implementation process. The project was initiated by a new general manager, Karen King, who was brought in with a political mandate from the agency’s board to redesign the system. The area had seen dramatic land-use changes in the 20 years since the previous system redesign (10). “[Members of the board] were very active at [the American Public Transportation Association], hearing about all the things other transit agencies were doing,” King said. “They wanted to be part of that, bringing the transit system into the 21st century.” King noted that the system had changed incrementally over a quarter century as the Bakersfield area expanded rapidly in land area, and the system had previously “subscribed to a coverage philosophy,” in which the paramount goal was deploy system resources to cover as much territory as possible. This resulted in a significant number of unproductive routes or portions of routes with very low ridership. The project was not triggered by an immediate funding crisis, but King noted that the agency was unable to provide additional service on several lines that were experiencing overcrowding because resources were tied up in a number of underperforming routes. The project was a partnership with the Kern Council of Governments, and as such, it included both a short-term bus system redesign and long-term plans anticipating larger transportation-system changes that would come with the implementation of high-speed rail in California.

The short-term redesign, which dramatically changed the bus system, resulted in an initial drop in riders per revenue service hour. Some of the drop was simply due to the way riders are counted: Trips that previously required a transfer but no longer do would have been counted as two trips and are now counted as one. But the rest reflects riders who began taking fewer trips or finding other ways to get around.

Overview of Changes

GET’s system map included a number of loops before the redesign. Consistent with the coverage principle, these loops were often low-frequency service extensions that had been put in place to serve territory the city of Bakersfield had annexed. Figures 2a and 2b show the Bakersfield system maps before and after the redesign and illustrate clearly how the system was simplified.

The changes decreased the system’s emphasis on timed transfers, increased service to the California State University campus and the local community college, and introduced express or rapid cross-town routes. The new system made most routes more direct and simplified the route numbering system. It also introduced a hierarchy of service, with specific design and performance standards for rapid, cross-town, circulator, and express lines.
FIGURE 2a  Golden Empire Transit System Map Before Redesign
FIGURE 2b Golden Empire Transit System Map After Redesign
Planning Process

One of King’s biggest reflections on the project is that it would have made implementation smoother if there had been more outreach. “I think we made an effort to engage the public, but I in retrospect don’t think it was significant enough,” she said. The portion of the consultant budget dedicated to outreach was approximately $50,000, or about 17% of the total ($1). King noted that the project team held stakeholder meetings, but they were “not necessarily well attended.” The project team also attempted to talk to the general public at several summer festivals and solicit feedback through an online survey, and these efforts also failed to reach a large audience. “While I think the data we received was probably representative of a larger group, one of the criticisms we’ve been under since changes went into effect two years ago is that people didn’t get an opportunity to participate, they didn’t know anything about it, this was done in a vacuum,” she said.

A large share of the criticism has come from nonprofit and social service organizations, a few of which had front-door bus service under the old system. In an effort to straighten out routes, the redesign eliminated diversions to several of the service agencies that were not on main arterials. Pressure from these organizations led the county Board of Supervisors to form a special committee to investigate the situation, and, as a result, in October 2014 the GET re-instituted some of the diverted routes. The agency and local politicians have also heard complaints from the public, mostly about the need to walk further to reach a bus stop because of the line- and stop-consolidation components of the plan, but there are currently no plans to change other components of the system.

King thinks the sweeping nature of the changes are part of the reason the agency received so many complaints after the new system was implemented. “I think the biggest problem we had in really implementing this is that it was such a significant change, it really affected everybody, whether positively or negatively,” she said. “It was a change, they didn’t like the change, and they were very vocal about not liking the change.” However, King believes the changes have better positioned the agency for the future because it operates more efficiently, and she said ridership was steadily increasing through the first six months of 2014.

The data collection and analysis components of the planning process also added significant value for the agency, according to King. Combined with an on-board survey, the data were used for detailed route profiles that formed the technical basis for the redesign.

Implementation

The GET system redesign was implemented all at once, approximately 10 months after the final recommendations were approved by the agency’s board. Preparation for the implementation included driver training, additional public outreach to get validation on the proposed new route timing and scheduling as well as refinements to the route map based on finalized bus stop locations. The agency also engaged in a public-information campaign that included sending staff members to all of the transit centers in the weeks leading up to the switch-over to talk to people one-on-one about the redesign and hand out maps and schedules. The biggest shortcoming of the effort was that while drivers had been trained on their routes, they did not know enough about other routes to give suggestions to passengers who had questions about connecting routes.
Huntsville, Ala.

The City of Huntsville Shuttle implemented its first system redesign in 20 years in November 2012. Kim Smith, a program fiscal officer in the city’s Department of Parking and Public Transit, managed the redesign effort, which yielded a 28% increase in productivity. The project was initiated after the Federal Transit Administration recommended in a Transportation Management Area Review that the agency analyze the route structure and service levels. “Usually when the FTA says you need to do something, it behooves you to do it,” Smith said. “So we did it.”

Overview of Changes

Before the redesign, the system employed timed transfers at the city’s main transit center but also had transfer points in other parts of the city. The 12-route system was centered on two core loops that ran at half-hour headways around the city’s urban core and the near-southwest part of the city. The other routes were also long loop designs reaching into some of the city’s residential neighborhoods. The system was organized around serving high need areas and facilities, including low-income housing projects and social service agencies.

While the redesign kept the basic structure of the system, with core loop routes and several neighborhood loops, the redesign made most routes more direct and converted two lines from loop to out-and-back structures. The system became more centered on the downtown transit center, with fewer transfer points outside the downtown area. The redesign also eliminated three routes, with other routes taking on segments these routes had previously covered.

Planning Process

In this smaller metropolitan area, unofficial outreach efforts were seemingly more important than the official meetings held to share ideas and solicit feedback. Smith says partnering with the mayor’s office was particularly important. The mayor’s director of communications, Kelly Schrimsher, helped get several news outlets in the area to put together news stories on the system redesign, which Smith believes helped ensure that riders were aware that the changes would be coming and that they had an opportunity to share their feedback. The project team also briefed key stakeholders in the process of preparing for the official public meetings, which helped ensure that they were directly involved in the process and enabled them to share detailed information on points that the team thought might be of particular interest to certain individuals. As an example, the project recommended rerouting one line so it would no longer serve a recreation center bearing the name of a city council member. The project team briefed the city council member in question, sharing data showing low ridership at the station, and he agreed with the recommendation, according to Smith. The project team conducted briefings with other key stakeholders and personally invited them to the main public meeting on the project. It also made presentations at the board meetings of stakeholder agencies and organizations.

The team held three official public events as part of the process. Two of the events were open-house style events at the system’s main transit center. Smith says this was the best way to reach existing riders, given that many of the system’s riders came through the transit center to transfer to other lines. These events were held toward the beginning and toward the end of the redesign process, the first to share initial design ideas and solicit feedback and the second to share final recommendations, solicit final feedback, and notify riders of the upcoming changes. The project team also held a more traditional public meeting at City Hall, inviting elected officials, key stakeholders, and the general public.

Implementation

Smith says driver training and contingency planning were critical elements of the implementation process. The agency held several sessions to train drivers on the new route structure, but Smith says even with these efforts, several drivers called into the system’s main office to ask for directions at key points in the new routes during the week after the redesign was implemented. More robust driver training might have helped reduce some of this confusion.
The agency heard very few complaints about the route modifications after implementation, but it did have to send a van to pick up passengers who had not heard about the changes during the first several weeks. Smith said ensuring that a van was available to provide this service was something for which the agency planned.

On-time performance improved significantly system-wide, Smith said, but she noted that it is important to keep an eye on performance metrics in the several years after implementing changes. After initial improvements, on-time performance has begun to fall on the system’s two highest frequency and highest ridership lines, and it may be time for another perhaps smaller analysis in the coming year or two.

Mankato, Minn.

The Greater Mankato Transit System implemented a system redesign in September 2012 after a one-year planning process. The project was initiated by the system’s manager, Mark Anderson, shortly after he took on leadership of the agency, which is a division of the city’s Department of Public Works. Unlike Pittsburgh and Bakersfield, there was no clear financial or political impetus for the redesign, but Anderson said that it was clear to many in the community that “it was a broken system” (12). The system had not been substantively adjusted in approximately 15 years. The agency partnered with the Minnesota Department of Transportation (MinnDOT) for the project, which was funded by MinnDOT, the city, and Minnesota State University, Mankato. The project resulted in a 63% increase in productivity.

Overview of Changes

Before the redesign, the system was centered around a downtown loop, and most routes included a number of diversions on the way between major destinations. The new system features more direct service for most riders and improved connections between major activity centers, including Downtown Mankato and MSU, by increasing service between major transit hubs. The redesign also increased service to the university. Students had accounted for half of the system’s ridership before the redesign.

Planning Process

As in Huntsville, informal outreach activities were more important than official activities in Mankato. The project included an official steering committee, which consisted of representatives from interested groups, but Anderson attributes some of the project’s success to the fact that the steering committee met only three or four times over the course of the project, and that the meetings were always rather short. A series of meetings with interested parties early in the process seems to have been more critical. Early meetings with the student leadership at MSU led to the student senate passing a $1 per credit hour fee that would fund the system in exchange for allowing students to simply show their MSU IDs for unlimited access to the system. Anderson said he met with members of the city council, the Blue Earth County Board, the local chamber of commerce (officially called General Growth), members of the local Diversity Council, and a local community center that catered to immigrants.

Like Bakersfield, Mankato pulled some low-performing service out of residential neighborhoods. He said he has heard “no squawking about that until just recently,” when community members began asking for new service in these areas. He suspects the reason for the new requests is that the service is now popular in other parts of the city.

Implementation

The implementation process was mainly focused on communicating the changes with the public, and again, key stakeholders were a central part of the public information campaign. The agency was able to communicate about the changes through the city’s public information team, the chamber of commerce, and...
the university’s marketing team, which directed a social media campaign aimed at MSU students. The
time-over to the new system was timed to the beginning of MSU’s academic year. Anderson also made
presentations at a local community college, the immigrant-focused community center, assisted living
centers, and subsidized housing centers, among others, and had staff members on the street handing out
materials in the weeks leading up to the switch.

**DISCUSSION**

The Port Authority of Allegheny County, Golden Empire Transit, the Huntsville Shuttle, and the Greater
Mankato Transit System each completed their major system redesigns but with dramatically different
results. While the four agencies are of different sizes, have different ridership profiles, and are in different
parts of the country, all four redesigns included some common core elements: They each made service
more direct, consolidated lines and stops, simplified route structures, and increased each system’s focus on
its most productive activity centers. But differences in the planning processes, the implementation
strategies, and the customer bases may have played an important role in the varying outcomes. The success
of system redesigns seems to boil down to three major components: A good planning process, including
significant outreach efforts; a plan that is tailored to local conditions; and well-executed implementation.

**Good Planning Process**

A good planning process requires devoting significant energy to both outreach and a transparent data-
driven analysis. The leaders of the Pittsburgh and Mankato redesign processes each pointed to significant
up-front outreach efforts as critical factors in both shaping the plans and ensuring buy-in at the end of the
process, while the leader of the Bakersfield project noted that the project would have benefited from more
outreach but that there was no additional available budget.

Bland, Pittsburgh’s CEO, emphasized the value of taking the time to align around design
principles, with the full involvement of key stakeholders and the Port Authority Board. The principles
provided guidance for the redesign and documented a rationale that project team members could point to in
explaining the changes. The Mankato system manager also said up-front meetings with stakeholders were
crucial to the success of the project. He pointed to examples of how stakeholder input substantively
influenced specific aspects of the redesign. He also noted that funding from MSU students and outreach
help from the university’s marketing team helped make the implementation as successful as it was. The
Mankato and Pittsburgh project teams both seemed to effectively meet stakeholders and the general public
where they were, instead of focusing most of their outreach energy on official community meetings and
hearings. Pittsburgh’s “Tell Us Where To Go” bus and Mankato’s unofficial meetings and presentations to
all manner of stakeholder groups are both examples of this.

King, the GET general manager, has dealt with criticism from social service organizations since
the implementation, and she said she thinks that could have been avoided with more significant up-front
and ongoing outreach to that group. King also noted that official outreach activities fell short of
expectations. “The invitations went out, but the stakeholder meetings and things we did were not
necessarily well attended,” King said.

Of course, good analysis is also critical. All four leaders pointed to the detailed route profiles and
population, employment, and demographic analyses as being helpful to project-team members and agency
staff. This aspect seems particularly critical in small agencies that lack APC and other technologies. In the
case of Bakersfield, King said the analysis done through the project yielded the most comprehensive data
on the GET system in many years.

**Locally Tailored Plan**
Of course, a good plan is another critical aspect of a successful system redesign. That looks a bit different in each of the four case-study cities. While all four redesign plans took similar approaches — making routes more direct, simplifying route structures to increase frequencies and system legibility, consolidating stops to speed service, and, in the cases of the bigger systems with several service types, creating service hierarchies with specific operating and performance standards. All four plans oriented service around activity centers, including universities and major employment hubs like downtowns.

It seems to be important to strike a balance between making routes more direct and continuing to serve smaller trip-generators like the social service organizations that raised significant concerns with the GET system redesign after implementation. All four examples show that redesign plans require significant political support to be successful, and a perception that the system favors one social group or set of organizations over another can leave a project politically vulnerable.

Well-Executed Implementation

Good implementation seems to look very different in different places, and it depends on the size and complexity of the system and organizational capacity. Regardless, public information seems to be a critical driver of how smoothly implementation goes.

According to the Mankato agency’s manager, the implementation process there was pretty simple, with most energy focused on communicating about the changes to key rider groups. His ability to galvanize stakeholders to do much of the communication on the agency’s behalf likely made the process easier than it otherwise would have been. The GET general manager said the agency made a significant effort to communicate about the changes, including having agency representatives on-hand at transit centers throughout the city in the weeks leading up to the change-over. She noted that while operator training was generally smooth, it took a while for them to be able to communicate knowledgeably with riders about the system as a whole. The Huntsville Shuttle project manager also noted that operator training was critical.

Political conditions and organizational capacity may dictate whether an agency implements comprehensive changes in phases or all at once. In the case of Pittsburgh, the complexity of the system and concerns about staff capacity to implement all of the changes at the same time led the agency to make the change-over in seven phases. Those considerations overrode concerns that executing the implementation over a number of months of time could leave the recommendations politically vulnerable if initial changes garnered significant rider criticism. In Mankato and Huntsville, the simplicity of the systems made it easier to implement the changes all at once.

All four agencies have made small adjustments based on experience and rider feedback. This seems to be another important aspect of these projects. A good planning process can only anticipate so much, and it often takes on-the-ground experience to understand exactly how a line should be routed or how realistic a schedule is.

CONCLUSIONS AND FUTURE RESEARCH

It is likely that many transit systems could benefit from a system redesign or comprehensive operational analysis, given the fast pace of development over the last several decades in some parts of the country. In the case of four systems highlighted in this paper, despite significant land-use changes in the 1990s and 2000s, agencies had not substantively adjusted their route maps or service plans during that time period. This led each system to have significant imbalances, with overcrowding on some routes and underperformance on others. In today’s fiscally constrained environment, such inefficiencies can cost agencies the opportunity to effectively serve strong and growing markets, which can in turn perpetuate agency reputations and land-use patterns that can erode transit ridership over time.
This paper has attempted to illuminate the dynamics that might lead an agency to pursue a system redesign or comprehensive operational analysis and the elements of the process that make some redesigns more or less successful. While the particulars of the design are clearly critical, elements of process also seem to be key differentiators between projects that achieve different levels of success.

The case-study approach is limited in some important ways but suggests further research on several key questions:

- What role does the size of the transit-dependent population play in the success of these projects?
- Of the four cases studied in this paper, Bakersfield’s transit-dependent population made up the largest share, and King estimated that 80 percent of the bus system’s ridership could be considered transit-dependent. Perhaps certain transit-dependent riders are less interested in the increased frequencies or travel-time savings system redesigns can offer, instead preferring service that gets them from as close to the door of their origin as possible to as close the door of their destination as possible. Future research could explore the relationship between the amount of transit dependency and community reaction to change.

- If the redesign results in only slightly better service, how does that affect the results? Reducing headways on consolidated routes from 40 minutes to 30 minutes increases options for riders but does not substantively change their basic experience with transit – they must still look at a schedule to figure out when their bus will arrive. More frequent than before but still infrequent service may not justify a bus stop consolidation. Long headways may also make the transition from a timed-transfer system to a grid system less successful, as it is more difficult to ensure short passenger waiting times at transfer locations.

Still, the case studies included in this paper show the range of outcomes possible and give important indications as to why some transit redesigns are more successful than others.

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