IN SYNC: Analyzing integrated and independent transit systems in college towns and their effects on mode share and mobility

Prepared by Andrew Dunham

Abstract

American college towns, especially mid-sized cities, typically approach transit in one of two ways: the first being accommodating the transit needs of the university within the existing municipal or regional system via an *integrated system* and the other being coexisting transit systems, one exclusively for university staff, students, and faculty, and the other geared more towards community residents not affiliated with the institution in *independent systems.* Common planning thought would suggest that integrated systems, with more support from large, well-endowed institutions would be more successful in attracting riders, influencing travel patterns, encompassing a wider service area and creating an overall denser urban form and university campus.

To test this hypothesis, I will analyze mid-sized college towns that are not part of a larger metropolitan area and that boast a large public institution, as public institutions are more likely to collaborate with municipal governments on transportation issues and an institution in a large urban area, like Rutgers in the New York metro area, for example, may have more confounding variables (like the availability of transit due to its location in the Tri-State area and not through campus and municipal initiative per se) that could hinder a meaningful overall assessment. The factors studied will include the ridership figures of each transit system provided by university and/or transit agency, transit history, fare structures, urban form, density and economic data provided by the US Census Bureau, and AllTransit transit score. Together, I will attempt to determine whether these factors play a role in the overall quality and usage of the system, if any difference in these factors can be attributed to town-gown cooperation on transit issues, and which system is likely to create stronger *regional* transit.

The areas studied with integrated systems are Madison, Wisconsin; Champaign-Urbana, Illinois; and Pullman, Washington-Moscow, Idaho; these regions host the flagship institutions of University of Wisconsin, University of Illinois, and the nearby institutions Washington State University and University of Idaho, respectively. **The areas with independent systems locally- and university-operated are Tuscaloosa, Alabama; Columbia, Missouri; and Athens, Georgia;** home to the University of Alabama, University of Missouri, and University of Georgia, respectively.

It is also important to consider that, although systems may not be integrated into one single transit entity, there will likely be overlap; some students, faculty, and staff will likely use the municipal system and the university-sponsored transit system may occasionally serve people not affiliated with the institution, particularly during large events like a sports game. It should also be noted that this

report assesses fixed-route service, not paratransit or on-demand transit; while these are crucial links and services that a transit agency provides, they speak more to a case-by-case basis rather than the overall quality and comprehensiveness of the system for the everyday user.

Introduction and ridership trends

Based on prior knowledge of these systems, I infer that integrated systems provide a more comprehensive transit service to the overall region than independent systems. Streamlining of services, financial support from universities, and increased transit demand from the student population are factors that I believe will support my hypothesis. Better transit should translate into better social mobility, high ridership, lower car ownership, and overall denser urban forms.

At first glance, one can see a clear correlation between transit mode share and connected systems, even the twin cities of Pullman and Moscow--by far the smallest cities and metropolitan area on this list--have a high transit mode share when compared to the mode shares in cities with independent systems. Athens, Georgia, which boasts the fourth most transit trips per capita of any US metro (in between the transit behemoths of Washington, DC, and Boston), still doesn't have a sizable transit mode share. Columbia and Tuscaloosa, the other two areas with independent transit systems have very low ridership on their municipal transit systems and slightly higher ridership on their university-run systems. Tuscaloosa's entire bus system averages less than 1,000 riders per day; by comparison, Pullman Transit in Pullman, Washington sees more than five times Tuscaloosa's ridership, despite being only 1/6th of Tuscaloosa's size. Though there is sizeable ridership on the University of Alabama's Crimson Ride bus system, it does not show a significant impact on transit mode share. Columbia's municipal system, Como Connect only sees half as many annual riders as Pullman's system. The integrated systems of Madison and Champaign-Urbana comprise the two most frequented transit systems and afford their respective communities the highest transit mode share percentages among this dataset, at 8.6% and 7.8%, respectively.

Population, transit ridership, and transit mode share

Area	Metro Population	Univ. Enrollment (principal institution only)	Students as percent of population	Municipal Transit Ridership (annual)	University Transit Ridership (annual)	Overall transit mode share
Athens, GA	166,079	36,130	21.75%	1,600,094[1]	11,000,000[2]	5.0%
Champaign-Urbana, IL	231,891	47,826	20.62%	12,770,520[3]	-	7.8%
Columbia, MO	223,676	30,870	13.80%	705,697[4]	857,912[5]	1.1%
Madison, WI	568,593	43,338	7.62%	14,400,000[6]	-	8.6%
Pullman-Moscow, WA-ID	86,955	30,517*	35.10%	1,698,136^ [7][8]	-	6.2%
Tuscaloosa, AL	219,461	38,563	17.57%	301,699[9]	1,851,348	0.6%

**includes the combined enrollment of University of Idaho (10,414) and Washington State University's flagship Pullman campus (20,043)*

^*includes the combined ridership of Pullman Transit (1,529,380) and Moscow's SMART (168,756)*

These preliminary data suggest that integrated transit systems stand to increase transit mode share and ridership both on- and off-campus. However, finding the underlying causes of transit success and failures throughout the country is slightly more complicated; a wide variety of factors influence the travel patterns of a community at large. To determine what other, if any, factors have played a role in travel choices, other variables among these focus cities must be examined.

The Effects of Density and Land Use

Most of the cities/metropolitan areas that boast the most successful transit systems in the world (Shanghai, New York, London, Tokyo) are extremely dense, and leagues denser than any of the

---

[1] Ballard, D. D. (2010). ARCHIVED COPY: Athens Transit Ridership. Retrieved December 16, 2017, from https://web.archive.org/web/20080821200610/http://www.athenstransit.com/ridership.html

[2] Transit. (2015). Retrieved December 16, 2017, from https://sustainability.uga.edu/operations/transportation/transit/

[3] T. (2015). *Economic Impact of the Champaign-Urbana Mass Transit District*(pp. 8-10, Rep.). Urbana, IL: MTD.

[4] Mai, H. (2017, April 20). Fewer riders drives reboot of CoMO Connect. Retrieved December 16, 2017, from https://www.columbiamissourian.com/news/local/fewer-riders-drives-reboot-of-como-connect/article_9c88ef12-2426-11e7-8e33-8fa46a711196.html

[5] Ruess, B. (2017, July 24). City bus route cuts would save $500,000. Retrieved December 16, 2017, from http://www.columbiatribune.com/news/20170724/city-bus-route-cuts-would-save-500000

[6] *Metro Transit: 2016 Year in Review*(pp. 2-4, Rep.). (2017). Madison, WI: Madison Metro.

[7] *Pullman Transit 2016 Report*(Rep.). (2016). Pullman, WA: Pullman Transit.

[8] *Moscow Multi-Modal Transportation Plan*(Rep.). (2014, July). Retrieved December 16, 2017, from City of Moscow, Alta Planning & Design website: https://www.ci.moscow.id.us/records/Publications/MotM-Final%20Moscow%20on%20the%20Move.pdf

[9] *U.S. Department of Transportation National Transit Database; Monthly Module Adjusted Data Release*(Rep.). (2017). Washington, DC: US DOT. Retrieved December 16, 2017, from http://www.governing.com/gov-data/transportation-infrastructure/public-transportation-agency-ridership-statistics-cities-metro-areas.html

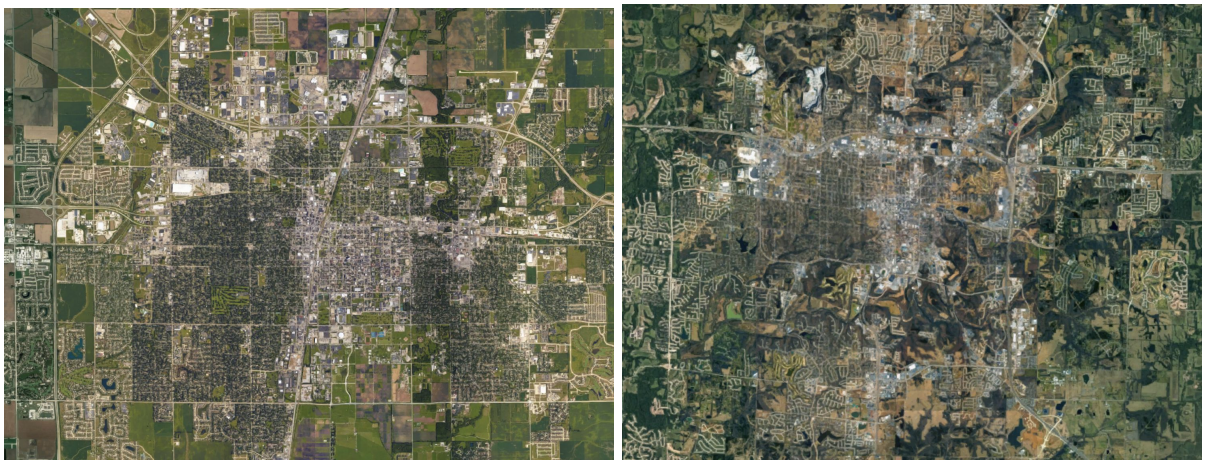
metropolitan (or micropolitan) areas being assessed here. Still, variations in density at any level can have a significant impact on transit usage; studies by the University of California, Berkeley have drawn correlation between urban density and transit ridership and mode share[10]. If this correlation holds true, then it is possible that the areas with integated systems will also be the denser metro areas.

Population density of selected college towns (city proper) from densest to least dense

3,718.24: Champaign-Urbana (integrated system, avg. of both cities)
3,472.99: Pullman-Moscow (integrated system, avg. of both cities)
3,037: Madison (integrated system)
1,700: Columbia (independent systems)
851.5: Athens* (independent systems)
623.71: Tuscaloosa (independent systems)

**Athens, GA is a consolidated city-county, which contributes to a lower population density*

Within these selected college towns, cities with integrated systems appear to be much denser than those with independent transit systems. The difference is striking, the least dense city with an integrated system is almost twice as dense as the densest city with independent systems.

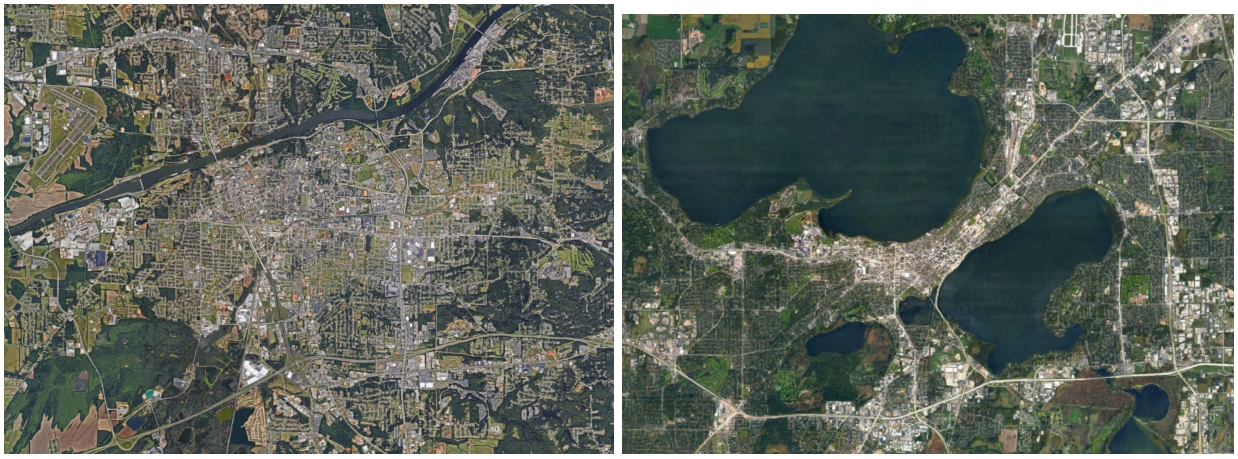


The urban form of Champaign-Urbana (left) shows a much denser urban fabric and more defined urban core than the low-density Columbia (right). (Source: Google Maps)

Upon examination of satellite imagery from Google Maps, regions with integrated systems seem to have more clustered, dense, and mixed-use development. Corridors of dense, mixed use development are apparent in Madison and Champaign-Urbana, encompassing university housing,

[10] Landis, J., & Reilly, M. (1996). *The Influence of Built-Form and Land Use on Mode Share*(Rep.). Berkeley, CA: University of California, Urban and Regional Institute.

campus-centric mixed use development, and dense, established urban cores. Suburban land use in the form of tract housing and automobile-centric retail is present on the outskirts, but these cities exhibit high level of mixed-use development nonetheless. Pullman and Moscow, though small, still have definitive downtowns near their university campuses, furthermore, a lot of student housing appears to be consolidated in dense townhome developments near campus; both Pullman and Moscow have some auto-centric retail uses at their peripheries, but these districts do not hold a candle to the cores that are Downtown Moscow and Pullman.



Though both Tuscaloosa (left) and Madison (right) appear from above to have large districts of density, Madison's established core features much denser development, whereas Tuscaloosa's core is low-rise and features prevalent parking lots. (Source: Google Maps)

On the other hand, the urban form of cities with independent systems do not indicate strong cores. Tuscaloosa has noticeably higher density near the University of Alabama in the form of student apartments and Greek housing, but its downtown is comprised mostly of government buildings and low density commercial buildings with large parking lots and setbacks more akin to a suburb than the core of an old city; a lot of its economic engines and retail hubs are decentralized and sprawled along state highways and interstates. Similarly, much of Columbia, Missouri falls into a disjointed urban form; though it has a discernible, traditional downtown, a lot of development, particularly student housing, offices, and retail centers are concentrated around major highways at the northern and eastern edges of the city. Athens, Georgia, is a notable exception, its historic core appears vibrant, well-used, and in high demand (one can note ongoing construction of new housing); Athens has other pockets of commerce along its Broad Street corridor and ring road, but downtown appears to be the regional hub. Despite this, Athens is not very dense overall, as its form is interrupted by topography and undeveloped stretches of land.

Urban form seems to be denser in municipalities and regions with an integrated system. Quality public transit encourages denser development complementary to transit. As new mixed-use development takes root in the cores of cities with independent systems, how the municipal transit agency reacts to and accommodates for new workers and residents is something to watch in the future.

Income and Transit Usage

Throughout much of the United States, riding the bus carries some stigma; the general thinking in most urban areas is that those who can afford to not ride the bus, either by having a personal vehicle or being close enough to the destination to walk or bike, don't[11]. As of 2014, only about 5.10% of Americans utilized transit to get to and from work, of course this also counts rural commuters who are less likely to have access to and choose transit, but public transportation's relatively small slice of the commuting mode pie might explain the associated stigma[12]. Three of the six metro areas examined have a higher transit mode share than the US average, all of which employ integrated systems for their transit services (Champaign-Urbana, 7.8%; Madison, 8.6%; and Pullman-Moscow, 6.2%).

Income, poverty, automobile access, and mode share (2015 ACS)

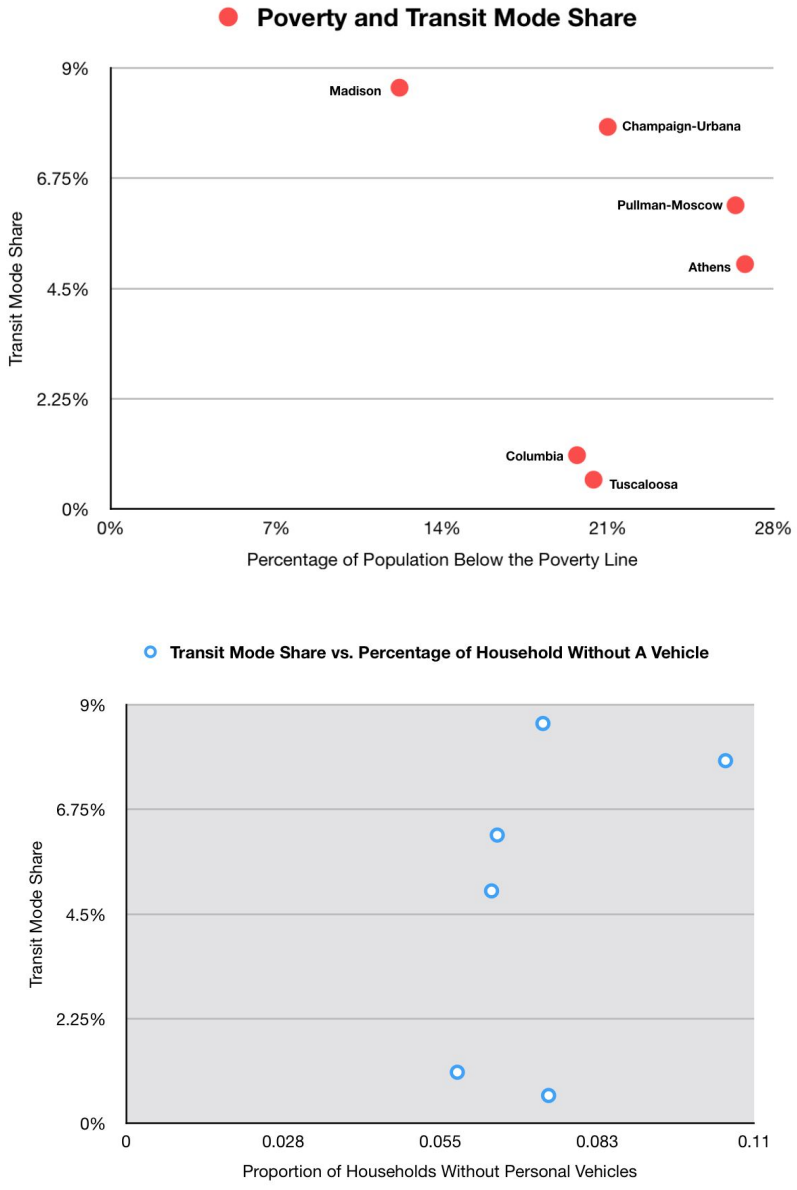
Metro Area	Per capita income	% of population below poverty line	% of households without a vehicle (non-students)	Transit mode share
Athens, GA	$22,165	26.8%	6.4%	5.0%
Champaign-Urbana, IL	$26,538	21.0%	10.5%	7.8%
Columbia, MO	$27,150	19.7%	5.8%	1.1%
Madison, WI	$33,420	12.2%	7.3%	8.6%
Pullman-Moscow, WA-ID	$21,977	26.4%	6.5%	6.2%
Tuscaloosa, AL	$22,414	20.4%	7.4%	0.6%

Our data show little correlation between income and mode share choices in any way. Having both the highest per capita income and lowest poverty rate, Madison, Wisconsin is the wealthiest metropolitan area by far, but it also has the highest transit mode share figures. This is not to say that low-income individuals in these areas do not ride transit or that those with automobile access are more willing to ride the bus instead, but income-specific ridership data is oftentimes not released by the Census Bureau or transit agency, therefore, we will use vehicle availability to get a better idea of how many people *choose* transit, rather than rely on it for lack of other transportation options. This statistic

[11] Hess, A. (2014, May 15). Race, Class, and the Stigma of Riding the Bus in America. Retrieved December 16, 2017, from https://www.citylab.com/solutions/2012/07/race-class-and-stigma-riding-bus-america/2510/

[12] Freemark, Y. (2016, September 01). Travel mode shares in the U.S. Retrieved December 16, 2017, from https://www.thetransportpolitic.com/databook/travel-mode-shares-in-the-u-s/

gives the percentage of *households* without automobile access; university students are generally not counted, as university housing is a separate Census category[13]. Champaign-Urbana has one of the highest rates of households without private automobiles, however, its high transit mode share and average per capita income suggest that many of these households may be car-free by choice, whereas Tuscaloosa's low transit mode share implies that many are carless for economic reasons.



Champaign-Urbana's low automobile ownership rate makes it a noticeable outlier in the bottom graph, but there is a weak correlation between mode share and households without automobiles

[13] Cohn, D. (2010, March 15). College Students Count in the Census, but Where? Retrieved December 16, 2017, from http://www.pewsocialtrends.org/2010/03/15/college-students-count-in-the-census-but-where/

Hours of Operation and Comprehensiveness of Service

Frequent, comprehensive, and convenient transit has an immense impact on one's willingness to use it. AllTransit is a service provided by the Center for Neighborhood Technology that collects transit data from various agencies across the United States. AllTransit uses transit stop location data (and its location relative to regional housing and jobs), service frequency, transit mode (bus, rail, ferry, etc.), hours of operation, and ridership to a lesser extent to grade the quality of public transport in a metropolitan areas on a 0 (lowest/no transit at all) to 10 (highest)[14]. For reference, New York City and San Francisco rank the highest at 9.6.

Hours of Operation and Transit Score from AllTransit

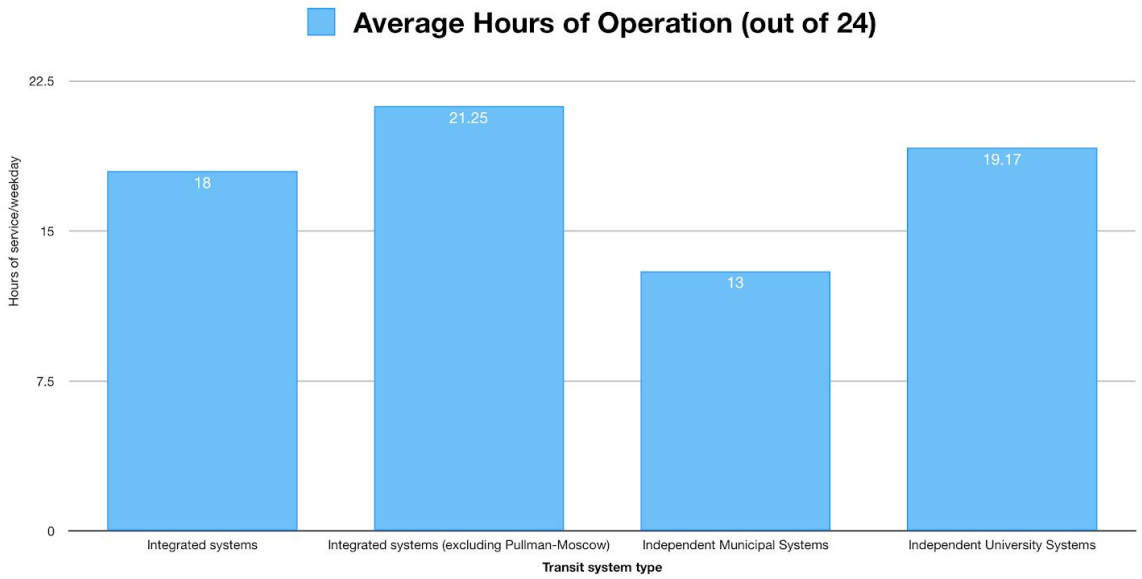
Metro Area/Transit System	AllTransit Score	Hours of Operation (M-F)	Hours of Operation (Sat.)	Hours of Operation (Sun.)	Ridership (annual)
Athens/Athens Transit	4.0	6am-10pm (16 hours)	7am-10pm (15 hours)	7am-10pm (15 hours)	1,600,094
Champaign-Urbana/MTD	7.9	6:30am-4:30am (22 hours)	6am-5am (23 hours)	8:30am-3am (18.5 hours)	12,770,520
Columbia/ COMOconnect	3.5	6:30am-6:30pm (12 hours)	10am-8pm (10 hours)	--	705,697
Madison/Metro	7.3	5:30am-2am (20.5 hours)	7am-3am (20 hours)	7am-3am (20 hours)	14,400,000
Moscow/ SMART	N/A*	6:30am-5:30pm (12 hours)	--	--	168,756
Pullman/ Pullman Transit	N/A*	6:30am-midnight (17.5 hours)	9am-midnight (15 hours)	--	1,529,380
Tuscaloosa/ Tuscaloosa Transit	1.9	5am-6pm (11 hrs)	--	--	301,699

**As the metro area totalled less than 100,000 inhabitants AllTransit did not provide a score for Moscow, Idaho or Pullman, Washington, but did include both area's transit mode share, which resulted in a weighted average of roughly 6%*

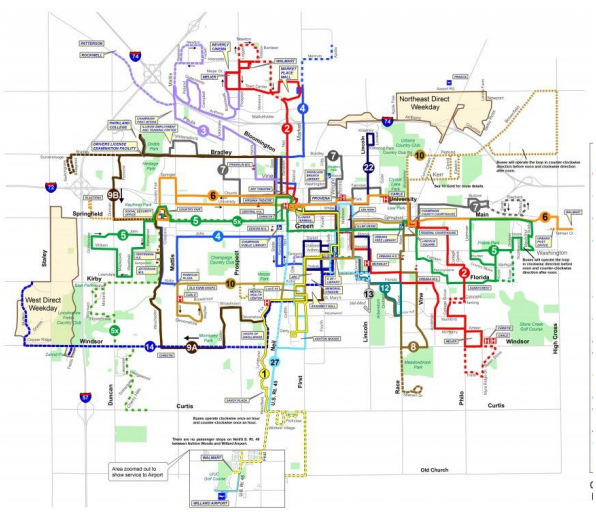
Though the Pullman-Moscow area was not rated, the difference in AllTransit scores between integrated and independent systems is striking. The integrated systems in Champaign-Urbana and Madison both scored in the 7-8 range; by comparison, Denver, Colorado's, score was 7.8--one tenth of

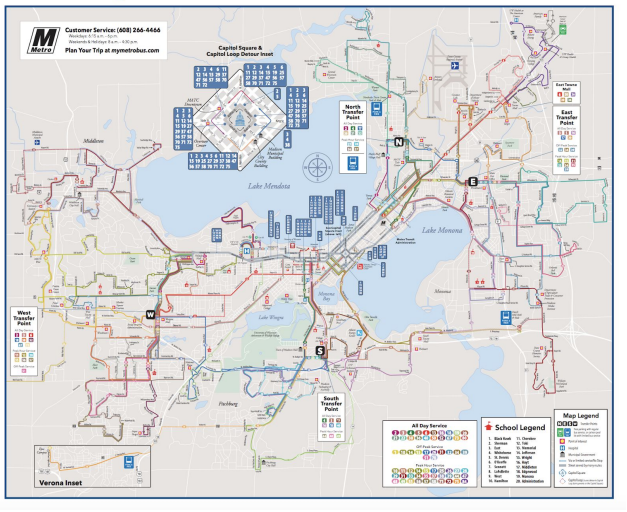
[14] Methods. (2016, November 17). Retrieved December 16, 2017, from http://alltransit.cnt.org/methods/

a point *lower* than Champaign-Urbana. The highest-scoring independent system, Athens, only scored a 4.0. C-U and Madison both have transit service seven days a week and have the only systems with transit operating past midnight with favorable headways all day. Pullman and Moscow have very limited or no weekend service, but this is likely consistent with the transportation demand in these relatively small twin cities (each is only about 3-4 miles in diameter at their longest point). Columbia and Tuscaloosa, which are both larger metro areas, do not have Sunday service, and Tuscaloosa has no Saturday service either, save for event shuttles for Rolling Tide football games. Tuscaloosa's Transit is hourly, meaning that it is oftentimes quicker to walk to a destination than wait for a bus. Madison and C-U, on the other hand, provide reduced, but still robust, fairly frequent, and comprehensive service throughout the weekend. Transit seems to be far better and more convenient in college towns with integrated systems, even glancing at the route maps of these systems, one can notice remarkable differences and disparities in the service hours and geographic scope of these networks.

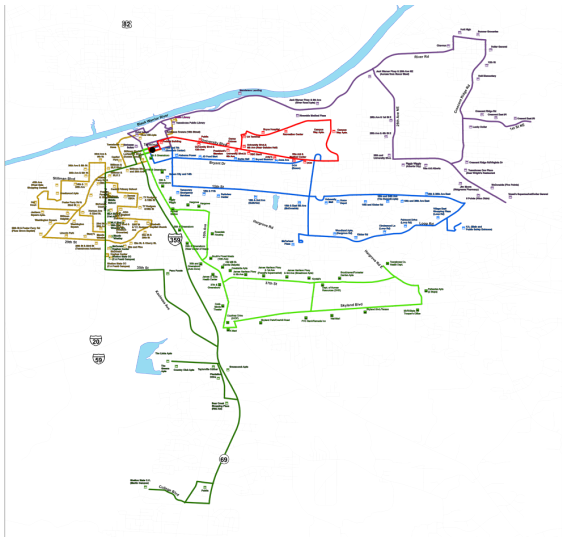


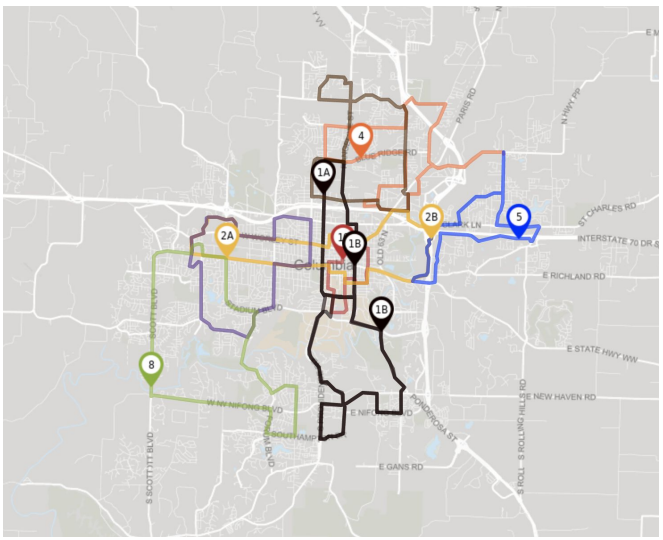
Integrated services provide superior hours of operation. Even when accounting for the limited hours of Pullman Transit and SMART, integrated systems are far more available throughout the day than independent municipal systems and competitive with university-sponsored systems with schedules meant to serve nocturnal students.





Champaign-Urbana (left) and Madison (right) both have comprehensive bus networks, extending to the far reaches of each metropolitan area[15] [16].





On the other hand, the municipal systems of Tuscaloosa (left) and Columbia (right) already appear to be less comprehensive than their integrated counterparts. Many of the urban fringe communities are not serviced and huge gaps exist within the established urbanized area. Headways are also far more infrequent in these cases, making public transportation especially unattractive[17] [18].

---

[15] MTD Route Map [Digital image]. (2016). Retrieved December 16, 2017, from https://www.cumtd.com/the-inside-lane/wp-content/uploads/2011/06/weekday-daytime-2010-1024x733.jpg

[16] Madison Metro Weekday Map [Transit route map]. (2017). Retrieved December 16, 2017, from https://www.cityofmadison.com/metro/schedules/SystemMaps/WeekdayMap.pdf

[17] Tuscaloosa Transit Map [Route map]. (2015). Retrieved December 16, 2017, from http://www.tuscaloosatransit.com/routeInfo.php

Social Mobility

The quality of a region's mass transit also has implications for social mobility. Transportation (especially commute time) is the most crucial factor that determines whether someone will be able to emerge from poverty[19]. Though there are a plethora of other factors which determine the difficulty of climbing the income ladder in a given region, lower average commute times should signify better social mobility in a region. This will also be incorporated into the analysis.

In 2013, the Equality of Opportunity Project (EOP) released an interactive map which ranked the social mobility of the metropolitan areas of the United States[20]. These figures are sometimes obscured due to the large areas of analysis selected by the EOP, grouping in more socially mobile metros with slightly more economically depressed ones (for example, Champaign-Urbana is grouped in an overarching region with Decatur, a deindustrialized city with a much different economic outlook); but they still paint the most accurate and comprehensive picture of overall mobility in the metropolitan regions across the United States among currently available resources. Its methodology combines education data, neighborhood income figures, life expectancy statistics, absolute social mobility, and other pertinent factors from a variety of different, regional-level reports that have been released in the last decade[21]. In this analysis, EOP determines into which income bracket someone born to parents who earn within the tenth percentile (very low income bracket, in other words: 90% of people earn more than this income group) an average child will fall when he or she grows up based on the aforementioned factors. Simply put: the higher the number, the more socially mobile a region is.

[18] COMOconnect Interactive Route Map [Digital image]. (2017). Retrieved December 16, 2017, from https://www.gocomotransit.com/schedules/bus-tracker/

[19] Bouchard, M. (2015, May 07). Transportation Emerges as Crucial to Escaping Poverty. Retrieved December 16, 2017, from https://www.nytimes.com/2015/05/07/upshot/transportation-emerges-as-crucial-to-escaping-poverty.html

[20] Leonhardt, D. (2013, July 22). In Climbing Income Ladder, Location Matters. Retrieved December 16, 2017, from http://www.nytimes.com/2013/07/22/business/in-climbing-income-ladder-location-matters.html?pagewanted=all

[21] Equality of Opportunity Project>Data. (2013). Retrieved December 17, 2017, from http://www.equality-of-opportunity.org/data/

Region	Income bracket that a child born in the 10th percentile of highest earners will, on average, will end up	Average commute time (mean travel time to work)
Athens, Georgia	31st (Winder Area)	22.7 minutes
Champaign-Urbana, Illinois	36th (Decatur Area)	18.6 minutes
Columbia, Missouri	38th (Columbia Area)	17.3 minutes
Madison, Wisconsin	40th (Madison Area)	21.4 minutes
Pullman-Moscow, WA-ID	44th (Pullman Area)	11.9 minutes*
Tuscaloosa, Alabama	32nd (Tuscaloosa)	18.7 minutes

**Average of Pullman's 11.2 and Moscow's 12.6 minute average commute times*

Each of these metropolitan areas shares some similarity with each other in that every one hosts at least one major flagship public institution, and each engage in community outreach and are huge employers and economic engines for the regions. Athens and Tuscaloosa, both with independent systems have the lowest social mobility and among the highest average commute times. Columbia, Missouri is the exception in this case, the region is relatively socially mobile and its commute time is relatively short at only 17 minutes despite its relatively weak municipal transit system. It can be reasonably assumed that much of Columbia, even the poor, owns a car, making commuting faster and that regional opportunities like the University of Missouri and the center of state government in Jefferson City (which falls in the region) contribute to heightened social mobility.

The size of the metro area is not accounted for in this analysis, which probably explains Madison's 21-minute commute time; its population is over 500,000, making it by far the most populous of the metropolitan areas studied, so it makes sense that its commute times would be slightly longer given the geographic scope of the metropolitan area. It is assumed that the size of the area affects the commute time, as it still ranks the second-highest in social mobility.

On the other hand, the tiny Pullman-Moscow area ranks very high in social mobility and has by far the shortest average commute time of all areas analyzed. Its short commute time is no surprise, both Moscow and Pullman are less than four miles in diameter and only separated by about 16 miles. The relative ease of climbing the social ladder is what makes Pullman-Moscow truly striking, though it remains a mostly rural micropolitan area, its social mobility (showing an average rise to the 44th percentile from the relative poverty of living in the 10th percentile of highest earners) is in contrast to the relatively bleak outcomes in many declining rural areas.

Areas with integrated systems like Pullman-Moscow, Madison, and Champaign-Urbana show overall lower commute times and higher social mobility. The presence of major institutions in the area

and relatively comprehensive and convenient transit likely play a role in the low commute times of the regions and the difficulty (or lack thereof) in improving one's socioeconomic lot.

Fares

Farebox recovery, which is how much of the transit agency costs are recouped by fares paid by passengers, is extremely low for many transit systems in the United States, no system breaks even except for a few Amtrak routes in the northeast. Many transit agencies rely on government subsidies to continue to provide a public service, but when the funding is not adequate, these overseeing bodies will reduce service frequency, operating hours, raise fares, or some combination of the three[22]. All of these have some impact on ridership; like any consumer good, riders who have choices will not take the bus if they don't believe they are getting what they pay for.

Fare Structures of Municipal Systems (for adult, unsubsidized passengers)

Transit System	Single Ride	Monthly Pass	Annual Pass	Discounted Fare for University Students?
Athens Transit (GA)[23]	$1.75	$18	N/A	Yes, Free
MTD (Champaign-Urbana, IL)[24]	$1	$20	$84	Yes, Free
COMOconnect (Columbia, MO)[25]	$1.50	$50	N/A	No*
Madison Metro (WI)[26]	$2	$65	N/A	Yes, Free
SMART (Moscow, ID)	Free	N/A, Free	N/A, Free	N/A, Free
Pullman Transit (WA)[27]	$0.50	$14	$141	Yes, Free
Tuscaloosa Transit (AL)[28]	$1	N/A	N/A	No^

[22] Levinson, D. (2013, June 03). Farebox recovery: A thought experiment. Retrieved December 16, 2017, from https://streets.mn/2013/06/03/farebox-recovery-a-thought-experiment/

[23] (2017, July 1). Retrieved December 16, 2017, from https://www.athensclarkecounty.com/1770/Fares-Passes

[24] Fares & Passes. (2017). Retrieved December 16, 2017, from https://www.cumtd.com/riding/faresandpasses/

[25] Home. (n.d.). Retrieved December 16, 2017, from https://www.gocomotransit.com/fares-passes/bus-passes/

[26] City of Madison. (2017). Retrieved December 16, 2017, from https://www.cityofmadison.com/metro/fares/PassPrograms/ASM.cfm

[27] Rader, B. (2017, August 17). Fares & Passes:. Retrieved December 16, 2017, from http://www.pullman-wa.gov/departments/pullman-transit/52-departments/pullman-transit/1168-fares-passes

[28] V. J. (2013). Retrieved December 16, 2017, from http://www.tuscaloosatransit.com/routeInfo.php

**COMO connect offers a $100 semester pass for University of Missouri and Columbia college students, but there is no discount for individual fares*
^Tuscaloosa only provides free service on the University of Alabama Shuttle, not systemwide

One of the most notable dissimilarities between integrated and independent systems is the availability for discounted and waived fares for university students. Students are invaluable for ridership on transit systems, as they will oftentimes not own a personal automobile and will seek inexpensive forms of transportation like walking, cycling, or transit[29]. It is likely that the flagship public institutions that offer discounted fares in these cities recognize this and forge agreements with local transit agencies to subsidize student rides. Oftentimes, university students pay transit costs included in their tuition fees; for example, every University of Illinois student pays a yearly fee of $84 (the equivalent of an annual pass for the Champaign-Urbana MTD) for unlimited transit usage. University investment in local transit systems does a few things to improve transit: it makes mass transit a viable transportation mode for university students, encourages better service in the campus area and between campuses and other activity hubs throughout the community (often serving non-university residents in the process and along the corridors), and, most importantly, shares the wealth of the institution with the municipality and transit agency. Even though every University of Illinois student pays the $84 annual fee, not every student is a regular rider of the bus. Just from the added student fee, UIUC students contribute roughly $3.5 million to the MTD annually (for reference, this is almost twice as much as Tuscaloosa Transit's annual budget), allowing for improvements of transit both on- and off-campus.

This type of collaboration between universities and regional agencies takes place in every city with integrated systems, allowing both interests to have a say in the routing and frequency of bus lines, but this also takes place in Athens, Georgia, where the University of Georgia not only operates its own, campus-centric bus service, but also provides funding to the regional entity for free rides for its students. Despite this, the campus service is clearly the preferred mode of transportation; it accumulates almost seven times as many annual rides as the municipal system. Though mass transit is strong on the University of Georgia campus, the quality is clearly not reciprocated throughout the rest of the Athens area.

It does not seem to be a coincidence that Columbia, MO and Tuscaloosa, AL, which scored the lowest in AllTransit (3.5 and 1.9, respectively) and have the lowest annual municipal transit ridership of the six areas observed (counting Pullman-Moscow as one metro), also do not provide systemwide discounted rides for students. Students are less likely to bolster these transit services because they aren't given passes and the universities do not provide the resources needed to improve service.

[29] Karitis, R. (2017, May 03). The case for free transit for college students. Retrieved December 17, 2017, from https://transitscreen.com/blog/the-case-for-free-transit-for-college-students/

A report from the University of Maryland suggests that university-sponsored passes for transit systems can significantly increase the ridership of the system at large (or at least near the campus in the case of large cities) and improve traffic on campuses by encouraging fewer people to drive[30].

Furthermore, collaborating with universities can allow for the implementation of strategic planning and growth strategies. Transit lines can facilitate the thoughtful expansion of college campuses and student housing in a sustainable manner, allowing for the placement of more dense developments along transit lines, reducing traffic in the campus.

Historical Context

Oftentimes, the present-day effectiveness and comprehensiveness of a transit system is based off of the extent of historical transit service. Madison, Champaign-Urbana, Tuscaloosa, and Athens have all played host to an electric streetcar network in some form in the early twentieth century. The Great Depression spelled the end for each of these streetcar systems; Tuscaloosa's system had the best longevity and operated until 1941, Athens' only lasted until 1930. There seems to be no correlation between the prevalence of turn-of-the-century transit infrastructure and objective quality of the current-day system[31] [32] [33].

Private bus companies filled the transportation gap in cities where streetcar service was discontinued. Columbia, Missouri, was the first of sample regions to assume government control over transit in 1965, wherein the small, unprofitable system was ceded to a government authority 26 years after its inception[34]. Most regional and municipal transit authorities shouldered the responsibility for transit in the 1970s, with Madison Metro forming in 1970, Champaign-Urbana's MTD and Tuscaloosa Transit in 1971, and Athens Transit in 1976[35] [36]. These transitions were met with mixed results. While Champaign-Urbana's MTD created tailored transportation plans for the hometown university and the region in 1989, Athens scaled back municipal service in 1979 as the University of Georgia grew its own system; Tuscaloosa and Madison both incrementally scaled back and expanded transit service, respectively[37]. In 1979, Pullman, Washington, which had no prior transit introduced a integrated system, Moscow, Idaho and the University of Idaho introduced SMART in 1993, both systems became popular[38] [39].

---

[30] *The Case Study of Universal Transit Pass (U-Pass) Programs*(Rep.). (2017, August). Retrieved December 16, 2017, from Iseki, H: University of Maryland, College Park website.

[31] Storey, S. (n.d.). Streetcars in Athens. Retrieved December 16, 2017, from https://railga.com/oddend/streetrail/athens_str.html

[32] Writer, R. D. (2010, July 19). Remembering the trolley line. Retrieved December 16, 2017, from http://www.tuscaloosanews.com/news/20100719/remembering-the-trolley-line

[33] Streetcars in Madison. (2006, February 20). Retrieved December 16, 2017, from http://www.downtowntrolley.org/proposals/index.php?category_id=1588

[34] History. (2017). Retrieved December 17, 2017, from https://www.gocomotransit.com/about-us/history/

[35] Vandervoort, B. (n.d.). Retrieved December 17, 2017, from https://www.chicagorailfan.com/madhist.html

[36] Transit History in Athens. (n.d.). Retrieved December 17, 2017, from https://www.athensclarkecounty.com/2173/Athens-Transit-History

[37] MTD's History - Buses. (n.d.). Retrieved December 17, 2017, from https://www.cumtd.com/about-us/history/buses/

[38] Mitchell, C. (2011). Pullman Transit History. Retrieved December 17, 2017, from http://www.pullman-wa.gov/52-departments/pullman-transit/876-pullman-transit-history

[39] About. (n.d.). Retrieved December 17, 2017, from http://www.smarttransit.org/pages/2

University systems in the sample towns with independent systems all came at different times in the transit timeline. University of Georgia introduced its university system in 1966, a whole decade before the formation of Athens Transit. The University of Missouri's Tiger Line grew from beginnings as a network of gameday shuttles in tandem with the creation of Columbia's transit system in 1965, but eventually became a university entity. University of Alabama's Crimson Ride was introduced far more recently in 2007, likely as a response to inadequate service on campus.

The historical presence of transit in these focus cities and regions does not appear to be a telltale sign of present-day transit quality. Rather, the transit policies enacted in the 1970's and subsequent decades do appear to be far more indicative of the current quality of service. The decisions made to either serve the university campus, reduce service, or create an entire new service have a much more tangible impact today. Municipal systems that joined forces with the university or the introduction of new integrated systems altogether fared better than cities that slashed service or allowed institutions to implement their own transit network.

Additional Factors and Limitations

There are a multitude of other factors that come into play when determining the effectiveness of a transit system, but many are outside of the scope of this research paper. Connectivity to intercity transportation may play a role. However, conclusions from these data are hard to ascertain, as there is so much variation between the extent of outside connections in these metropolitan areas. Each of these cities have some form of a regional airport, but many don't have high traffic, just a few daily flights to nearby hub airport; Madison-Dane County Airport is by far the largest and very well-connected by transit, but there are no airports with similar passenger figures in the areas studied. Only two of these metro areas (Tuscaloosa and Champaign-Urbana) have Amtrak service and only Champaign-Urbana has regular, daily service, it is hard to draw conclusions from this alone. Athens is closest to a major metro area (Atlanta) but it doesn't seem to translate into a higher transit mode share, this may change in the event that the Athens-Atlanta "Brain Train" commuter rail line is built[40].

The politics of these transportation systems are in line with long-held partisan opinions of public transportation: liberals are pro-transit, conservatives are austere. Most of the independent systems are in historically red states, whereas most integrated systems are in blue states. The most notable exception to this rule is left-leaning Madison, which is in the recently-red state of Wisconsin; despite the rise of the Republican Party in the state, the historic legislation and the long-standing political beliefs of Madison are primarily left-leaning. Moscow, in the red Idaho, is also an exception, but its relatively small transit system (only three lines) likely doesn't require sizable subsidies or much political support to operate. All of the independent systems are in mostly red states, Missouri is the

[40] Crane, B. (2017, August). Georgia View: All Aboard the Brain Train. Retrieved December 16, 2017, from http://www.georgiatrend.com/August-2017/Georgia-View-All-Aboard-the-Brain-Train/

closest to a moderate state of all of these, but still more conservative than liberal in terms of its voting history[41].

Aside from the additional factors, there are few limitations that must be noted in the analysis of these transit systems and their respective cities. The first is the inherent difficulty that comes with assessing transit ridership within the integrated transport networks of college towns, it is difficult to determine just how many local (non-university-affiliated individuals) frequent the transit system. There are oftentimes little data distinguishing the riders. This could skew ridership numbers in favor of integrated systems, so other factors were analyzed to mitigate any confounding findings. Additionally, Census transportation data were used to attempt to rid the analysis of the counting of students when they should not be counted and similar errors. Integrated systems may also see significant reductions in service during breaks, this may impact service for the region at large. For service hours and frequency, we examined the service provided *during* the school year. These periods of abnormal service are also factored into AllTransit Scores.

Accurate social mobility measures are also hard to ascertain. Mainly because social mobility varies so much dependent on income, education, race, and other factors that cannot really be averaged. Additionally, the figures are grouped into large reasons; outcomes may be very different for someone who grows up in Champaign than it is for someone who grows up in the relatively economically-stagnant Decatur, or Athens and Winder, Georgia, or Pullman and Albion, Washington.

Also notable is the lack of accurate data in the Pullman-Moscow area, partially due to its small sample size of fewer than 100,000 residents in total, or the foregoing of other specific data collection that is normally collected for larger metro areas. Other Census data did not provide enough detail; for example, households without vehicles does not specify whether or not these household are car-free by choice or because of financial restraints; this is likely to prevent any issues with privacy in Census information. Poverty rates and per capita income can also be deceptive, federal figures don't account for cost of living variations from place to place; some of these places are bound to be more expensive than others, whether it's due to housing demand, price of necessities, or state and municipal taxation.

Though the data suggest that implementing integrated system is regionally beneficial, putting these transit networks into place can prove to be a challenge in of itself. The institutions mentioned are large, well-endowed flagship universities; smaller state schools like UW-Whitewater, Western Illinois University, and Georgia Southern, for example, may not have as much financial influence to bring to the table in similar transportation musings. Private schools represent another challenge in the integration of transit services. Some private institutions like Syracuse University subsidize certain bus lines for student use, and many universities in large urban areas like DePaul in Chicago provide student passes; other schools like Case Western Reserve University in Cleveland and Evanston, Illinois' Northwestern University provide exclusive shuttles rather than collaborate with municipal transit

[41] Staff, T. H. (2016, November 09). How red or blue is your state? Retrieved December 18, 2017, from http://thehill.com/blogs/ballot-box/house-races/221721-how-red-or-blue-is-your-state

agencies, some private universities don't provide any buses, but instead pay for ridesharing services, like unlimited, free Lyft rides for the students of University of Southern California[42] [43] [44] [45] [46]. Integrated systems may be complicated in many cases, but they seem to come with clear benefits.

Conclusion

Overall, these various analyses appear to build a strong case for integrating university and municipal transit systems. Cities with a unified bus transportation network show overall higher transit mode share, more comprehensive and frequent networks, higher levels social mobility, lower commute times, and more compact, dense urban fabrics. Although not all these benefits can be tied directly to a municipal-institutional transportation partnership, the correlation between these factors can be at least partially attributed to the comprehensiveness of the transit systems.

There are benefits to both "town" and "gown" interests from streamlining the process, funding from the student body and administration of the local university can improve on-campus transit and system-wide service, improving accessibility even for those unaffiliated with the institution. University passes may encourage students to be more adventurous and explore the area outside of what is adjacent to campus. Strong on-campus transportation can facilitate the expansion of campus facilities and student housing past what would be considered a "walkable" distance; transit reduces the need for cars on campus, which affords the university the opportunity to transform some of its surface lots into new buildings or public space that is more beneficial for the students and the overall beauty of the campus; and frequent transit can address the omnipresent issue of drunk driving by providing affordable, alternative transportation options.

Another unforeseen benefit of integrated transit systems is the availability of data. These systems tend to have more robust open data portals, higher quality bus tracking services, and information on services. This makes sense, university students demand high quality information and arrival times, therefore, it is imperative that these transit systems meet this demand to encourage ridership and awareness among university students.

As American universities continue to grow and encroach on the spaces around them, a unified transit system can allow for harmonious expansion and should be considered as regions and institutions draft ongoing transportation plans. All the while, system integration can improve prospects, encourage density, and lower commute times, strengthening the region alongside the university campus. In sync.

---

[42] Syracuse University Service. (2017). Retrieved December 16, 2017, from https://www.centro.org/colleges/syracuse-university

[43] U-Pass @ DePaul. (2017). Retrieved December 16, 2017, from https://offices.depaul.edu/information-services/services/identity/Pages/upass.aspx

[44] Shuttles. (n.d.). Retrieved December 16, 2017, from https://case.edu/access-services/shuttles/

[45] TRANSPORTATION & PARKING. (2017). Retrieved December 16, 2017, from http://www.northwestern.edu/transportation-parking/shuttles/routes/intercampus.html

[46] How USC Students Can Use Lyft. (2017). Retrieved December 16, 2017, from http://transnet.usc.edu/index.php/campus-cruiser-program/how-to-use-lyft/