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AICGS POLICY REPORT

TRANSPORTATION AND LAND-USE
PLANNING IN GERMANY AND THE U.S.:
LESSONS FROM THE STUTTGART AND
WASHINGTON, DC REGIONS

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with Andrea Hamre and Paul Stoddard



American Institute
for Contemporary
German Studies

JOHNS HOPKINS UNIVERSITY

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FOREWORD

In the past, sustainable transportation and mobility were seldom at the center of relations between Germany and the U.S. But the shared concerns about urbanization, economic development, energy, climate change, and social inclusion have moved policymakers on both sides of the Atlantic to look more closely at the development of innovative transportation practices and technologies that can find mutually beneficial exchanges and applications. The reasons are clear. Whether developing and managing light rail, creating pedestrian-oriented central business districts, or integrating bus rapid transit and regional fare systems, each is as vital to the health of Stuttgart region as it is to Northern Virginia. But it is at the policymaker's, elected official's, and technician's peril to assume that Ludwigsburg's Pedelec or Esslingen's fuel cell car-sharing programs can automatically transfer and fit into the unique political, economic, or environmental context of Fairfax County—or any other jurisdiction in the United States. Understanding how and ways in which these innovations can be traded and applied requires thoughtful attention to a range of special political, technical, and economic conditions.

Analyzing and comparing the opportunities to transfer and apply innovative transportation, land-use, and finance mechanism policies between Germany and the United States was the basis for two reports commissioned by the American Institute for Contemporary German Studies (AICGS). With financial support from the Daimler-Fonds im Stifterverband für die Deutsche Wissenschaft, five premier transportation planning and finance experts from Germany and the U.S. delved into the questions about what makes transportation and land-use planning and financing economic, sustainable, and inclusive. Special emphasis of these papers was the ways in which transportation, land-use, and financing innovations evolved in Germany and the U.S., how the performance indicators compare, and what pieces of the technical and policy innovations can be traded and applied in the unique contexts of Germany and the U.S. The authors included Drs. Ralph Buehler (Virginia Tech University) and Wolfgang June (KIT), Ms. Andrea Broaddus (University of California Berkeley), and Dominic Marcellino and Max Grünig (Ecologic).

This publication is an example of AICGS' commitment to comparative domestic and urban policy programs in Germany and the U.S., and the mutually beneficial applications of those transfers, especially in urban contexts. AICGS is grateful to the authors for their insights, the Daimler-Fonds im Stifterverband für die Deutsche Wissenschaft for its generous support of these reports, and to Kirsten Verclas, Kimberly Frank, and Jessica Riester Hart for their thoughtful investment of time and their editorial efforts.

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Dr. Wolfgang Jung is Senior Researcher at the Institute for Urban and Regional Planning at the University of Karlsruhe. He is an associated member of the Academy for Spatial Research and Planning (ARL) and holds close contacts to planning institutions and regional associations in Germany and Europe. His main activities are urban and regional planning and planning methods and theories. His experiences of national and international research projects are used in planning education as well as presentations at international congresses. Dr. Jung studied Spatial and Environmental Planning at the University of Kaiserslautern and Environmental Planning at the University of Strathclyde, Glasgow. He worked as assistant professor at the Institute for the Foundations of Planning, University of Stuttgart, and received his Ph.D. in Architecture and Urban Planning at the University of Stuttgart.

EXECUTIVE SUMMARY

Federal, state, and local governments in Germany and the U.S. strive to make passenger transportation more sustainable. The goal is a transportation system that fosters economic development, reduces energy consumption and carbon emissions, increases traffic safety, reduces congestion, provides access for all groups, and enhances the quality of life. This report¹ first compares national trends in travel demand and sustainability of passenger transportation systems in Germany and the U.S. After a brief introduction of the national policy context, the report focuses on the Washington, DC (DC metro) and Stuttgart regions, to show how planning for sustainable transportation works at the regional and local level. In both countries, most policies for sustainable transportation are implemented by local or regional governments. The goal of this report is to provide planners and policy-makers from Germany and the U.S. with an introduction to the other country's transportation and land-use planning system as well as best practice examples of planning for sustainable transportation. A better understanding of the context of planning for sustainable transportation in each country will foster the exchange of best practices and ideas about how to achieve a more sustainable transportation system in Germany and the U.S.

Key findings:

- Germany and the United States have among the highest levels of car ownership in the world. Yet, ground passenger transportation in Germany is less car dependent than in the United States.
- Driving for more trips and longer distances makes the U.S. transportation system less sustainable than the German system.
- The Washington, DC metro and Stuttgart regions mirror the national differences in travel behavior. Compared to the Stuttgart region, the DC metro region has much higher levels of car use.
- Dissimilarities in travel behavior are greater within the DC metro than in the Stuttgart region. For example, the cities of Washington, DC and Stuttgart have almost comparable mode shares of car use. However, outlying suburbs in the DC metro region are much more car dependent than outlying suburbs in the Stuttgart region.
- Compared to Germany, U.S. federal, state, and local transportation policies during the last sixty years have been more favorable for the automobile.
- Since the 1970s, all levels of government in Germany have implemented policies that increase the monetary and time cost of car travel. Moreover, German cities and regions have promoted walking, cycling, and public transportation as attractive alternatives to the car.
- In both countries, federal, state, and local governments implement policies that influence land-use and spatial development. However, in Germany different levels of government coordinate their land-use plans in an interactive process. In the United States, land-use planning remains fragmented across jurisdictional boundaries, uncoordinated between levels of government, and typically not integrated with planning for transportation.
- Case studies of Arlington County, Virginia, show best practice cases for coordinating land-use and transportation planning in the United States. Arlington's success highlights the need for coordi-

nating planning for transportation, land-use, economic development, and housing.

Although there are big differences in land-use and transportation planning systems between the two countries, coordinating transportation and land-use planning faces similar challenges.

■ Land-use planning in Germany and the United States traditionally separate types of land-uses. This practice is more problematic in the United States, where the separation of land-uses is stricter and zones cover larger land areas than in Germany. However, in both countries, transportation should be more explicitly considered when planning for land-use and the other way around.

■ Planning practice and regulations in both countries still foster automobile use. For example, in Germany and the United States most municipalities require minimum parking standards for housing, retail, or office buildings.

■ In both countries the automobile industry plays an important role in the economy and motorist lobbying organizations are strong. This is especially true for the Stuttgart region, home to the car manufacturers Daimler and Porsche, as well as a large number of automotive component suppliers, such as Bosch.

■ Effecting changes in individual behavior as well as land-use and transportation systems takes time. In both countries politicians and residents often emphasize short-term goals.

SIMILARITIES AND DIFFERENCES BETWEEN GERMANY AND THE UNITED STATES

Germany and the U.S. present many similarities that facilitate a comparison of sustainable transportation. Both are affluent, western countries with market economies and a high standard of living. In 2011, gross domestic product (GDP) per capita was \$45,500 in Germany compared to \$48,200 in the U.S.² Germany and the U.S. are democratic countries with a federal system of government in which the interaction between federal, state, and local governments shapes transportation policies.³ Both countries have large networks of limited access highways. In Germany, there are still many stretches of the Autobahn network without speed limits. In both countries, roughly 70 percent of the population holds a driver's license.⁴ In Germany and the U.S., the automobile and associated industries are important for the national economy.⁵ Automobile user organizations, such as AAA in the U.S. and ADAC in Germany,⁶ as well as automobile industry associations, such as MVMA and VDA,⁷ have important political influence. In both countries most suburban development occurred after World War II during a period of rapid motorization and suburbanization. Moreover, in Germany many cities were adapted to the automobile during rebuilding after World War II.⁸

Germany and the U.S. have among the highest motorization rates in the world and in both countries automobiles are important symbols of economic status.⁹ Figure 1 (page 13) shows that during the last fifty years Americans have owned more automobiles and light trucks per capita than Germans. The percentage difference in car ownership has decreased over time. In 1960, Americans owned nearly four times as many cars per capita as West Germans (306 versus 80). Between 1960 and 1990, car ownership in West Germany increased six fold—reaching 482 cars per capita. Car ownership levels

in East Germany were much lower than in West Germany. Just before reunification in 1990, West Germans owned twice as many cars as East Germans. After German reunification, however, car ownership levels in eastern Germany skyrocketed and reached western German levels in less than a decade. In 2010, car ownership levels in eastern and western Germany were at about the same level. In 2010, Americans still owned 30 percent more cars and light trucks per capita as Germans (766 versus 585).

In 2008/2009, Americans made 3.8 trips per day compared to 3.5 trips per day in Germany.¹⁰ However, Americans made 83 percent of those trips by automobile—compared to only 58 percent in Germany (see Figure 2 on page 13). Compared to Americans, Germans were 4 times more likely to make a trip by public transportation, 2.5 times more likely to walk, and 10 times more likely to make a trip by bicycle. Americans even drove for 65 percent of trips shorter than 1 mile (1.6km) compared to only 28 percent of short trips by car for Germans. Overall, average trip distance in the U.S. is longer than in Germany: 9.8 versus 7.0 miles (16km versus 10km). In total Americans travel about 37.2 miles per day compared to 24.5 miles for Germans (59.5 versus 39.2km).

More trips, longer trip distances, and a higher share of trips by automobile help explain much higher annual driving distances for Americans. In 2008/2009, Americans traveled about 21,500km in a car per year, compared to only 11,000km for Germans (about 13,437 versus 6,875 miles). Figure 3 (page 14) shows that in both countries car use has increased since the 1970s: from 6,000km to 11,000km per year in Germany and from 15,500 to

21,500km in the U.S.¹¹ The decline in car use between 2000 and 2008/2009 in the U.S. is likely explained by volatile gasoline prices and the economic crisis of 2008, which was more severe in the U.S. than in Germany.¹²

Sustainability of the Transportation System

Table 1 (page 15) compares indicators for the sustainability of the transportation systems in Germany and the U.S. The categories displayed in Table 1 cover dimensions of the three commonly cited aspects of sustainability: equity, environment, and economy. On all indicators the German transportation system seems more sustainable than the American transportation system.

EQUITY: SAFETY AND HEALTH

Traffic is safer in Germany with twice as many traffic fatalities per capita in the U.S. Even adjusting for more automobile use in the U.S., there are still 20 percent more traffic fatalities per kilometer of car and light truck travel. Adjusting for daily walking and cycling levels, cycling is 3.4 times more dangerous in the U.S. (5.5 versus 1.6 cyclist fatalities per km cycled) and walking is 5.1 times more dangerous (9.7 versus 1.9 pedestrian fatalities per km walked).

The German transportation system offers more travel options for poorer, car-less households, children who are not allowed to drive, and the elderly who no longer want to drive. Seniors in the U.S. in particular suffer sharply reduced mobility when they can no longer drive.¹³ More daily physical activity through walking, cycling, as well as walk and bike trips to and from public transportation contribute to lower obesity levels in Germany than the U.S.:¹⁴ 12.1 percent of adults in Germany are considered obese compared to 23.9 percent in the U.S.

ECONOMY: COST

Transportation accounts for 17 percent of household expenditures in the U.S. compared to only 14.6 percent in Germany. This percentage difference amounts to roughly \$2,500 greater transportation expenditures per household per year in the U.S. than in Germany. This difference is partly explained by

higher car ownership levels for Americans; compared to Germany, U.S. households are more likely to own multiple automobiles. U.S. governments also spend more on transportation. In 2006, all levels of government in the U.S. spent about \$600 per inhabitant in capital and operating expenditures for highways and public transportation combined. German governments only spent about \$450 per capita.¹⁵ Moreover, governments in the U.S. spent more on roadways than they collect in taxes and fees from roadway users. In 2009, roadway user taxes and fees, such as gasoline taxes, registration fees, and tolls, only accounted for 58 percent of expenditures for investments, operating, and maintenance of roadways. Most of the subsidies in the U.S. occur on the state and local level where general funds are used to pay for transportation expenses.¹⁶ At the federal level, the Highway Trust Fund (HTF), supplemented primarily by the federal gas tax, has traditionally paid for transportation expenditures. However, in the last five years general funds had to be injected in the HTF to keep it solvent. In Germany, roadway users paid 2.2 times as much in fees and taxes as governments spent on roadways. In fact, the German federal government has used the gasoline tax to pay for non-transportation expenditures, such as German reunification or social security. Public transportation operation is also more financially efficient in Germany. Government subsidies account for only 25 percent of public transportation operating costs in Germany, compared to approximately 60 percent subsidy in the U.S.¹⁷

ENVIRONMENT

Germany's transportation system is more sustainable from an environmental perspective. For example, the U.S. transportation system uses three times more energy per person than the German transportation system. Similarly, CO₂ emissions per capita, the main greenhouse gas (GHG) from transportation, are three times higher in the U.S. than in Germany. The trend is also more favorable in Germany. Between 1990 and 2010, CO₂ emissions from passenger transportation fell by 15 percent in Germany, but increased by 12 percent in the U.S.¹⁸

More energy use and higher GHG emissions from passenger transportation are partially explained by

more car use in the U.S. Likewise, the U.S. vehicle fleet is less fuel efficient than cars and light trucks in Germany. In 2010, the German vehicle fleet was more fuel efficient than the American vehicle fleet (32mpg versus 23mpg).¹⁹ Interestingly, the American vehicle fleet of 2010 was still less fuel efficient than the average car and light truck in Germany in 1980 (23mpg versus 24mpg).²⁰ Larger and heavier vehicles, and lower gasoline prices, explain lower fuel efficiency in the U.S. compared to Germany. Energy use and CO₂ emissions per public transportation passenger are also higher in the U.S. than in Germany, mainly due to lower average passenger loads on vehicles and a higher share of bus versus rail public transportation in the U.S.²¹ More driving, less fuel efficient vehicles, and lower passenger loads on public transportation in the U.S. help explain why, in 2010, the transportation sector was responsible for 31 percent of GHG emissions in U.S. compared to 20 percent in Germany.²²

Federal Transportation Policies

REGULATION AND TAXATION OF AUTOMOBILE OWNERSHIP AND USE

Federal transportation policies in Germany provide incentives for sustainable transportation. Compared to the U.S., federal taxes and regulations make car ownership and use more expensive in Germany. For example, sales taxes on automobiles were 19 percent in Germany in 2012, about four times higher than in most U.S. states (ranging from 0 to 7 percent). Similarly, in Germany gasoline taxes were about nine times higher than in the U.S. (\$4.84 versus \$0.53 per gallon). The difference in gasoline retail price between Germany and the U.S. has been increasing. In 1986, gasoline cost about 80 percent more in Germany than in the U.S.²³ In 2010, the price of gas was 140 percent higher in Germany.²⁴ Part of the difference is explained by a special environmental tax, which incrementally raised the gasoline tax by the equivalent of \$0.70 per gallon over a five year period between 1999 and 2003.²⁵ The tax was designed to curb energy use from transportation and to encourage more fuel efficient cars and less driving. By contrast, federal gasoline taxes in the U.S. have not been raised since the early 1990s.²⁶ Inflation and decreasing purchasing power are putting increasing

strain on funding and maintaining transportation infrastructure in the U.S. Moreover, U.S. federal gasoline tax receipts are distributed to the states based on a formula that rewards vehicle miles of car travel (among others). Thus, states with more driving pay more gasoline tax into the federal Highway Trust Fund (HTF), but they also receive a higher share of federal transportation funding from the HTF.

In 1975, the U.S. implemented the world's first fuel economy standard for cars and light trucks, called Corporate Average Fuel Efficiency (CAFE) standards, to boost fuel efficiency and reduce energy use.²⁷ Between 1980 and 1991, the fuel efficiency of the U.S. light duty vehicle fleet increased from 16mpg to 21mpg.²⁸ Progress has been slower since then, reaching a fleet average of 23mpg in 2009. Decreasing gains in fuel efficiency are partially explained by the failure to raise CAFE standards for new passenger cars after reaching 27.5mpg in 1985. Moreover, CAFE set lower fuel economy standards for increasingly popular light trucks that surpassed the sales of passenger cars in 2002.²⁹ The result is that in 2011 the average fuel economy of German cars and light trucks was much higher than in the U.S.³⁰ In recent years, both the European Union (EU) and the U.S. have set ambitious goals to reduce energy use and CO₂ emissions from new passenger cars and light trucks through revised CAFE standards (U.S.) and new CO₂ tailpipe emission standards (EU).³¹ However, compared to the U.S., stricter EU vehicle regulations, combined with higher gasoline taxes in Germany, favor more fuel efficient vehicles.

ROADWAY USER REVENUES AND ROADWAY EXPENDITURES BY ALL LEVELS OF GOVERNMENT

As already indicated above, revenues from gasoline taxes and vehicle registration fees in Germany exceed federal, state, and local government expenditures on road construction and maintenance. This was not always the case. In 1975, Germany provided net subsidies to roadways, only covering 92 percent of roadway expenditures through revenues from road users. Since then this share has increased to 222 percent in 2010. Thus, revenue from roadway user taxes and fees in Germany is more than twice as high as government roadway expenditures. In sharp contrast, roadway users in the U.S. have covered only

60 to 70 percent of government roadway expenditures (all levels combined) over the same time period.³²

In both Germany and the U.S., the federal government paid for the construction of limited access highways: the German Autobahn and the U.S. Interstate Highway System.³³ However, the German federal government has rarely financed limited access highways within urban areas, only between them and around them.³⁴ By comparison, the U.S. federal government also subsidized highways in most cities. In 2010, over half (63 percent) the vehicle miles traveled on the U.S. Interstate Highway System were within urban areas.³⁵

MAJOR FEDERAL POLICY CHANGES THAT PROMOTE PLANNING FOR SUSTAINABLE TRANSPORTATION

German state and federal governments jointly developed the Federal Transportation Plan, which delineates national transportation strategy. Until the early 1970s, this plan focused mainly on automobile travel. Since 1973, however, the plan has included societal goals, such as preserving open space and reducing traffic fatalities, energy use, and vehicle emissions.³⁶ Since the mid-1970s, the federal government has encouraged the coordination of transportation planning across modes and jurisdictional boundaries. For example, the German federal government has provided dedicated matching funds to state and local governments for public transportation capital investments—if projects are part of local comprehensive transportation plans, comply with land-use plans, and consider the needs of the disabled and the elderly.³⁷

The German federal government's role in promoting walking and cycling primarily involves federal traffic laws protecting cyclists and pedestrians and making their safety an integral part of the German driver's license written exam and road test. Since the early 2000s, the German government has also published a national bicycle master plan (FahrRad!).³⁸ However, funding is limited and the plan does not include binding goals. Most innovations, such as integrated city-wide bicycling networks, were pioneered and then widely implemented at the local government level. The federal government supported local efforts with technical guidance and flexible

funding mechanisms, which allowed municipalities to divert highway funds to non-motorized modes.

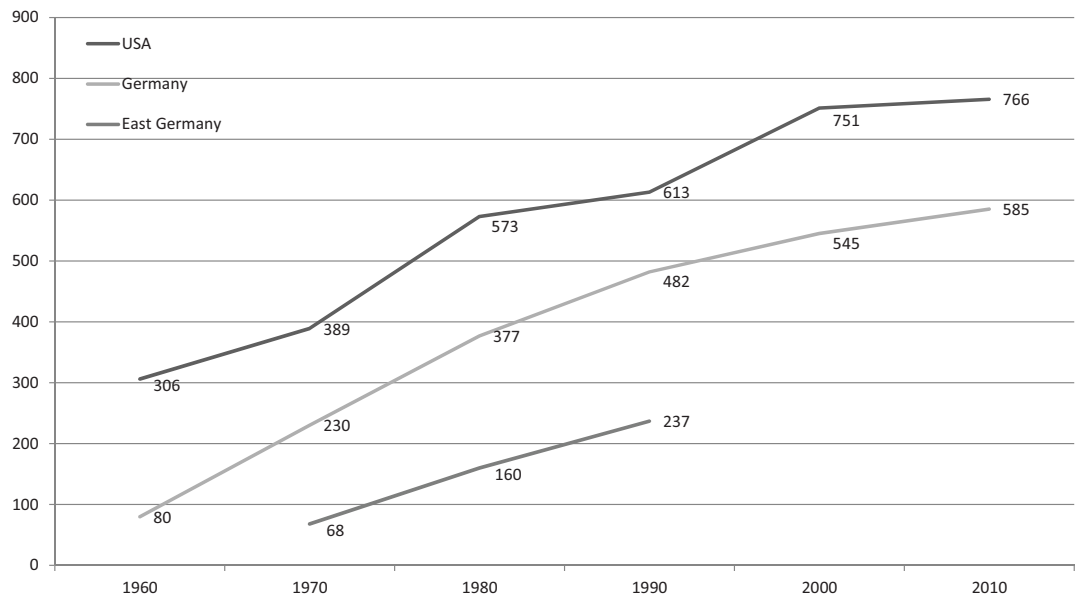
Since the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991, the U.S. federal government has also increased funding for public transportation, walking, and cycling.³⁹ However, ISTEA's attempts to promote alternatives to driving were accompanied by simultaneous increases in federal expenditures on roadways.⁴⁰ ISTEA required and helped fund regional transportation planning and coordination. However, most metropolitan planning organizations (MPOs) do not have any legal authority or political power to enforce regional policy priorities or to alter decisions made by local government jurisdictions or state departments of transportation. Moreover, MPOs do not make any specific land-use planning decisions.⁴¹

BRIEF INTRODUCTION TO PLANNING FOR LAND-USE AND TRANSPORTATION

As described in detail further below, in Germany, federal, state, regional, and local governments interact in a bottom-up and top-down land-use planning process, which is organized around cooperation and mediation.⁴² Federal involvement in spatial planning is limited to defining the legal framework for planning, ensuring consistency of planning techniques, and—in collaboration with the states—setting broad strategic goals for spatial development such as sustainability.⁴³ Similar to communities in the U.S., municipal governments in Germany draw up detailed land-use plans and decide the specific allowable uses of land. Local plans in Germany, however, are restricted by regional and state plans and must be in compliance with federal land-use, transportation, and environmental laws.⁴⁴

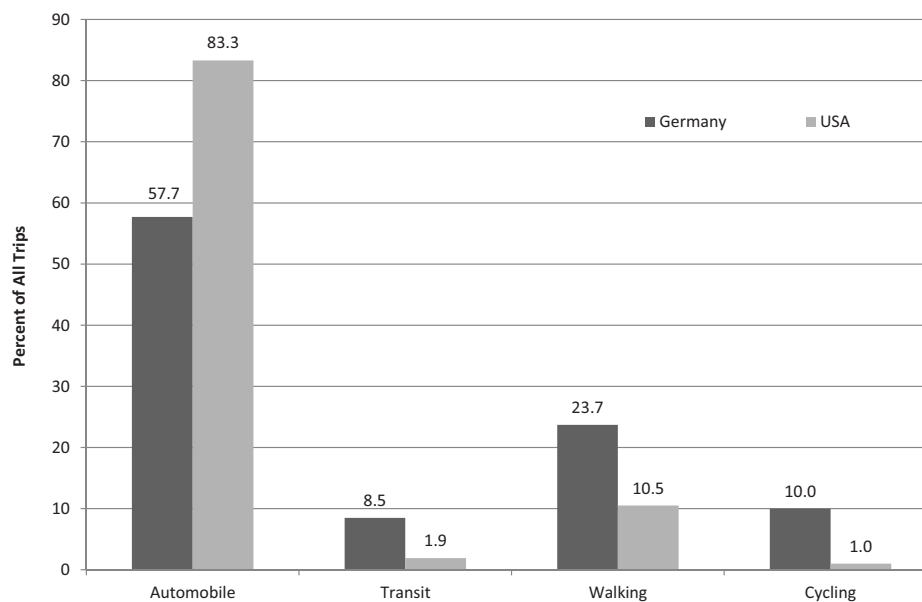
In sharp contrast, there is no federal land-use planning in the U.S., and state-wide land use planning has been limited. Only a few states, such as Maryland, Oregon, and New Jersey, have attempted to develop and enforce state land-use plans. The role of individual property rights also varies within states, but on the whole is much more significant and litigious in the United States than in Germany. As a result, most land-use planning in the U.S. is fragmented, uncoordinated, and almost always in the domain of local government jurisdictions.⁴⁵

Figure 1: Trend in Motorization in the U.S. and Germany, 1960-2010
(Cars and Light Trucks per 1,000 Population)



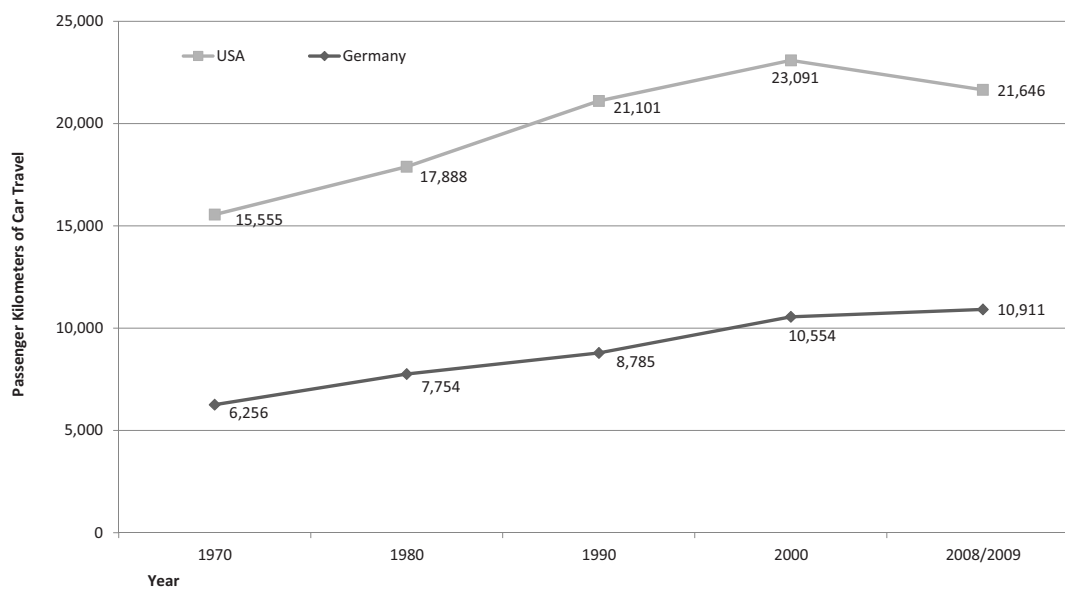
Source: USDOT, Transportation Statistics (Washington, DC: U.S. Department of Transportation, Federal Highway Administration, 2000-2012); BMVBS, Verkehr in Zahlen. German transport in figures (Berlin: German Federal Ministry of Transportation and Urban Development, 1991-2012).

Figure 2: Percentage of Trips Made by Automobile, Public Transportation, Walking, and Cycling in Germany and the U.S., 2008/2009



Source: BMVBS, Mobilität in Deutschland 2008/2009 (Bonn/Berlin: German Federal Ministry of Transportation, 2010); USDOT, National Household Travel Survey 2009. Version 2.0/2010 (Washington, DC: U.S. Department of Transportation, Federal Highway Administration, 2010).

Figure 3: Trend in Annual Passenger Kilometers of Car and Light Truck Travel per Person in Germany and the U.S., 1970-2009



Source: BMVBS, Verkehr in Zahlen. German transport in figures (Berlin: German Federal Ministry of Transportation and Urban Development, 1991-2012); USDOT, Transportation Statistics (Washington, DC: U.S. Department of Transportation, Federal Highway Administration, 2000-2012).

Table 1: Sustainability Indicators for German and U.S. Transportation Systems

		USA	Germany
Safety and Health	Traffic Fatalities per 100,000 Population	11.1	5.1
	Traffic Fatalities per 1 Billion Vehicle Kilometers	7.1	5.9
	Cyclist Fatalities per 100 Million Kilometers Cycled	5.5	1.6
	Pedestrian Fatalities per 100 Million Kilometers Walked	9.7	1.9
	Percent Population Considered Obese (BMI>30; self-reported data)	23.9	12.1
Cost	Share of Household Expenditures for Transportation	17.0%	14.6%
	Annual Household Expenditures for Transportation	\$7,677	\$5,117
	Ratio of Roadway User Fees & Taxes vs. Roadway Expenditures by All Levels of Government	0.58	2.22
	Government Subsidy as Share of Public Transportation Operating Budgets	59%	25%
Environment	Annual Ground Passenger Transport Energy Use per Person (in million BTU)	54.6	18.0
	Transportation Sector Share of CO ₂ Emissions	32%	19%
	Kg of CO ₂ Equivalent Emissions per Capita from Ground Passenger Transport	3,800	1,200
	Grams of CO ₂ Equivalent Emissions per Passenger Km	210	110

Source: APTA, Public Transportation Factbook 2011 (Washington, DC: American Public Transportation Association, 2012); David R. Bassett et al., "Walking, Cycling, and Obesity Rates in Europe, North America and Australia," *Journal of Physical Activity and Health* 5 (2008), 795-814; Ralph Buehler and John Pucher, "Sustainable transport in Freiburg: Lessons from Germany's environmental capital," *International Journal of Sustainable Transportation* 5:1 (2011), 43-70; Ralph Buehler, John Pucher, Uwe Kunert, *Making Transportation Sustainable: Insights from Germany* (Washington, DC: The Brookings Institution, 2009); EPA, CO₂ Emissions from Fossil Fuel Combustion in Transportation End-Use Sector (Washington, DC: Environmental Protection Agency, 2012); IEA, CO₂ Emissions from Fuel Combustion: 1971-2009 (Paris: International Energy Agency, 2012); IRTAD, Traffic safety statistics. International Road Safety and Data Analysis Group, OECD (Paris: OECD, 2012). OECD, Factbook (Paris: Organization for Economic Cooperation and Development); USDOE, Transportation Energy Data Book, 26 ed. (Oak Ridge: U.S. Department of Energy, Oak Ridge National Laboratories, 2005-2012); John Pucher and Ralph Buehler, *City Cycling* (Cambridge, MA: MIT Press, 2012); UBA, CO₂-Emissionsminderung im Verkehr in Deutschland (Dessau, Germany: Umweltbundesamt, 2010); UBA, CO₂ Emissions from Passenger Transport (Dessau, Germany: Umweltbundesamt, 2012); USDOL, Consumer Expenditure Survey. (Washington, DC: U.S. Department of Labor, Bureau of Labor Statistics, 2010); VDV, VDV Statistik 2010 (Berlin: Verband Deutscher Verkehrsunternehmen, 2011).

BRIEF OVERVIEW: TRANSPORTATION DEMAND IN WASHINGTON, DC AND STUTTGART REGIONS

In this report the Washington, DC region (DC metro region) and the Stuttgart region serve as examples for similarities and differences between Germany and the United States in land-use planning, transportation systems, coordination of transportation and land-use planning, and sustainable transportation. Although there are significant differences in land area, population size, administrative structure, and economy, both regions share many similarities that render a comparison meaningful. Both are among the wealthiest regions of their country with strong economies and labor markets. Both regions showed relative economic stability during the recent economic crisis and experienced strong population in-migrating, resulting in a more diverse population. In both regions government plays an important role—with Stuttgart as the state capital of the Federal State of Baden-Württemberg and the Washington region as the seat of the federal government of the United States. While Washington, DC has a larger government sector and more industries associated with government, Stuttgart has a stronger manufacturing and industrial engineering base. The population in the Stuttgart region is characterized mainly by industry, attracting a highly skilled working class, while the government functions of the Washington, DC region result in a high share of transient populations, moving to and from the area with each election cycle.

The Stuttgart region (Verband Region Stuttgart) consists of 179 municipalities in the counties Böblingen, Esslingen, Ludwigsburg, Göppingen, and Rems-Murr-Kreis as well as the city of Stuttgart (the state capital of Baden-Württemberg) covering 3,654 square kilometers (1,411 square miles) with 2.67 million inhabitants. The GDP in the Stuttgart region was roughly €93 billion (in dollars as of October 2012: \$120.3 billion), or €34,800/inhabitant,

(\$45,000/inhabitant) in 2009.⁴⁶ In other words: on 10 percent of the space of the State of Baden-Württemberg live 25 percent of its inhabitants, producing 30 percent of the state-wide GDP.

The economically strong position of the Stuttgart region derives mainly from an—for a German city or city-region of this size—unusually high amount of industry, especially engineering. The Stuttgart region's share of manufacturing activities contributing to the GDP is about double (Frankfurt) or triple (Hamburg, Munich) that of other major cities in Germany. The best known examples are Daimler and Porsche (automobile), Bosch (automobile parts, electronics), Kärcher (cleaning machines), Stihl (chain saws), and a high number of further “global players” in their fields, like Mahle, Festo, or Schuler. This results in a high number of European Patent Office (EPO) patents: Germany is ranked first within Europe according to EPO patents (186.4 patents per 1 million inhabitants in 2007).⁴⁷ The State of Baden-Württemberg, however, has about double the amount (360.6) and the Stuttgart region about 60 percent higher figures than the state average.⁴⁸ Regarding EPO patents, a common German prejudice comes true of the people of the State of Baden-Württemberg being “*Tüftler*” (tinkerers, like Walt Disney's Gyro Gearloose) and hence having the highest amount of patents per inhabitants.

The DC metro region is comprised of jurisdictions across the District of Columbia, the Commonwealth of Virginia, and the State of Maryland. In addition, the U.S. Census Bureau includes one jurisdiction from West Virginia in defining the Washington Metropolitan Statistical Area. In 2010, the region's jurisdictions had a population estimated at 5,582,170 and a land area of about 10,274 square kilometers

(3,967 square miles).⁴⁹ Both educational attainment and median household incomes across the DC metro region are among the highest in the nation.⁵⁰ The median household income of the region is estimated at about \$72,800. The region's top employers include federal government agencies, government contract firms, as well as engineering firms. Many nonprofit organizations, biotechnology, and defense technology firms also have headquarters in the region. The region has been called a "human capital magnet" and has experienced a relatively high degree of stability in light of the recent downturn in the global economy in terms of housing appreciation, unemployment, and household income.⁵¹

Car and light truck ownership levels are higher in the DC metro region than in the Stuttgart region: 744 versus 544 cars and light trucks per 1,000 population. The average Stuttgart household owns 1.1 cars or light trucks compared to 1.8 cars for Washington households. Travelers in the DC metro region make about 3.9 trips per day compared to 3.5 trips per day in the Stuttgart region. Average trip distances (~11km) are similar in the two regions and median trip distance was only slightly longer in the DC metro region (5.6km versus 5.0km in the Stuttgart region).

Because of the slightly greater number of daily trips, inhabitants of the DC metro region travel longer distances per day (44km in the DC metro region versus 40km in the Stuttgart region). Similarly, self-reported total daily travel time is slightly longer in the DC metro region than in the Stuttgart region (80 versus 75 minutes of travel per day). Average trip speed was 28km/h in the DC region and 27km/h in the Stuttgart region. It is surprising that average trip speed as well as average travel distance and daily travel time per person are similar, because DC metro region residents drive for a much larger share of trips and are less likely to walk, cycle, and ride public transportation.

In 2008/2009, driving accounted for 80.6 percent of all trips in the DC metro region, compared to 56.6 percent in the Stuttgart region. Between the mid-1990s and the late 2000s, the share of trips by car declined significantly in the Stuttgart region from 60.1 percent to 56.6 percent of all trips. The driving share of trips declined slightly in the DC metro region (81.1

to 80.6 percent of trips). In 2008/2009, residents of the Stuttgart region were more than twice as likely to ride public transportation as residents of the DC metro region (14.5 percent versus 6.1 percent). In both regions the share of trips by public transportation increased during the last two decades. However, public transportation use increased more strongly in the Stuttgart region (from 12.2 percent to 14.5 percent) than in the DC metro region (from 5.5 percent to 6.1 percent).

In 2009, residents of the Stuttgart region were 14 times more likely to make a trip by bicycle than DC metro region residents (7.4 percent versus 0.5 percent). Cycling in the DC metro region is rare in outlying areas and concentrated within Washington, DC, Alexandria, and Arlington (about 1.5 percent of trips). Cycling levels in Washington, DC, Arlington, and Alexandria have likely increased since the last travel survey because of the expansion of the bikeway network and the opening of a bike-sharing system (Capital Bikeshare).

Finally, residents of the Stuttgart region were about 2.5 times as likely to make a trip on foot as residents of the DC metro region (21.2 versus 8.5 percent of trips). In both regions the walk share of trips increased slightly between the two survey periods. Again, walking levels are higher in the center of the two regions than the regional average suggests.

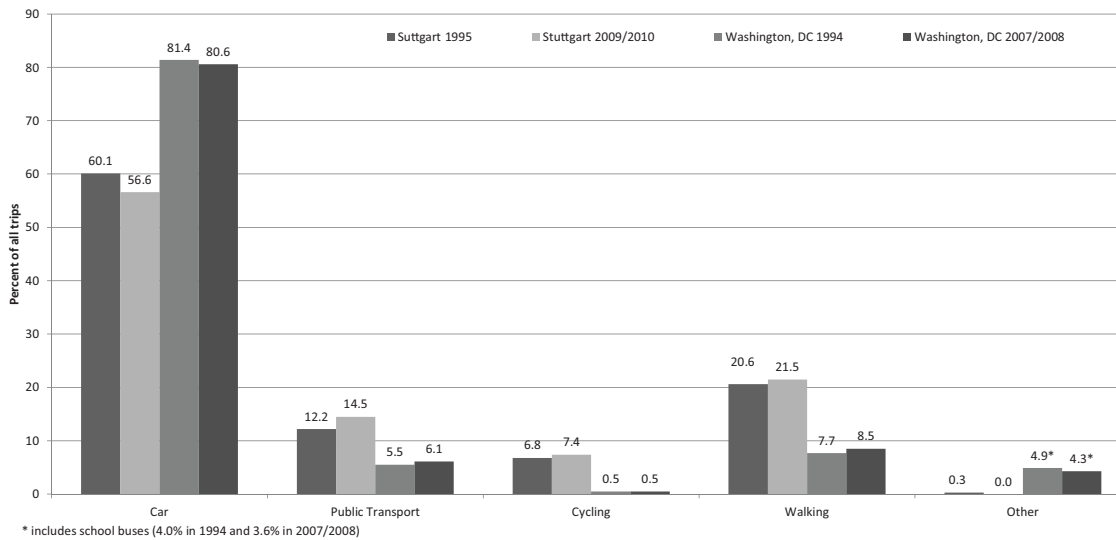
Trip distances cannot fully explain the difference in transportation mode choice between the regions. In both regions a similar share of trips was shorter than 2km (29 percent of trips in the Stuttgart region and 25 percent of trips in the DC metro region) and shorter than 5km (50 percent of trips in the Stuttgart region and 47 percent of trips in the DC metro region). However, in the DC metro region slightly over two-thirds of trips shorter than 2km are made by automobile. Transportation and land-use policies that make walking, cycling, and public transportation more attractive, and restrict car use, may help explain this dissimilarity in mode choice.

The differences in percentage of trips by mode of transportation between core jurisdiction and suburban areas are much larger in the DC metro region than the Stuttgart region. Excluding suburban

areas, the two cities of Washington, DC and Stuttgart show more comparable travel behavior than the data for the regional level presented above. Public transportation accounts for 22 percent of all trips in Washington, DC and 24 percent of all trips in Stuttgart. Similarly, walking and cycling (29 and 32 percent, respectively) and the car (51 and 44 percent, respectively) account for more comparable shares of trips in both cities.⁵² In the DC metro region, the automobile accounted for more than 90 percent of all trips in suburban Fauquier, Prince William, Prince Georges, Anne Arundel, Charles, and Fairfax coun-

ties.⁵³ By contrast, the two most car-dependent suburban jurisdictions in the Stuttgart region—Nürtingen and Geislingen—had car mode shares of 70 and 75 percent.⁵⁴ Walking and cycling only accounted for about 6 percent and public transportation for less than 2 percent of trips in most suburban jurisdictions in the DC metro region. Even in the most car-oriented jurisdictions of the Stuttgart region, walking and cycling account for more than 22 percent of trips and public transportation's mode share is above 3 percent.

Figure 4: Percentage of Trips Made by Automobile, Public Transportation, Walking, and Cycling in the Washington, DC and Stuttgart Regions, 1994/1995-2007/2008.



Source: MWCOG, 2007-2008 Regional Household Travel Survey (Washington, DC: Metropolitan Washington Council of Governments, 2010); TPB, Changes in daily Travel Patterns (Washington, DC: Transportation Planning Board, MWCOG, 2010); Dirk Zumkeller, Verkehr in der Region Stuttgart (Stuttgart, Karlsruhe Institute of Technology, 2011).

COORDINATING TRANSPORTATION AND LAND-USE PLANNING

The remainder of this report will introduce transportation and land-use planning systems in Germany and the U.S. using the DC metro and Stuttgart regions as examples. The discussion of planning systems in both regions is embedded in a brief introduction of the overall transportation and land-use planning system in each country. Best practice case studies from both regions highlight successes in planning for sustainable transportation in the DC metro region and the Stuttgart regions.

Coordinating Transportation and Land-Use Planning in the Stuttgart Region

BRIEF OVERVIEW OF THE GEOGRAPHY AND STRUCTURE OF GOVERNMENTS

The Stuttgart region is one of the twelve defined planning regions in the State of Baden-Württemberg. The regional organization, Verband Region Stuttgart (VRS), was re-established in 1994 in the state of Baden-Württemberg as a corporation of public law.

The tasks of the Stuttgart regional organization are defined in the “Act on setting up the Verband Region Stuttgart.”

Mandatory tasks are: regional planning; landscape planning; landscape park for the Neckar River; regional transportation planning; regional business development; local public transportation of regional importance; aspects of waste management; and regional tourism marketing.

Voluntary tasks are: organize and coordinate trade fairs or trade fair cooperation of regional importance; organize and coordinate cultural and sporting events; organize public transportation of regional importance;

and organize a regional landscape park, if at least 50 percent of the overall costs are paid by the municipalities.

SPATIAL PLANNING IN GERMANY AND THE STUTTGART REGION

Institutional Context and Legal Framework of Spatial Planning in Germany

Spatial planning in Germany cannot be described without the general institutional and legal framework of the Federal Republic of Germany itself, as spatial planning is strongly bound to the administrative levels within Germany.

The spatial planning system is rooted in the German Basic Law (*Grundgesetz*, GG), which asserts municipalities’ right to self-government. Article 28:2 guarantees the right of autonomous self-government of the municipalities, reflecting the principle of subsidiarity, meaning that every administrative act has to be performed at the lowest possible administrative unit. Only when problems, challenges, or duties cannot be handled on the local level does the supra-local level intervene.

Federal Level (Bund)

The federal government (*Bundesregierung* or *Bund*) itself does not set up a comprehensive spatial plan but is responsible for strategic development planning and has the competence of legislation, which sets guidelines for further or even competing legislation by the German federal states (*Bundesländer* or *Länder*). Although the Bund has no executive authority in the field of spatial planning, it has great influence on spatial planning by legislation of the Federal Spatial

Planning Act (*Bundesraumordnungsgesetz, ROG*), the Federal Building Code (*Baugesetzbuch, BauGB*), and the Land-Use Ordinance (*Baunutzungsverordnung, BauNVO*). The first gives a framework for spatial planning on the federal, state, and regional level, while the latter two require “lower levels of government to make plans that are vertically and horizontally consistent and standardizes the level of expertise, rules and symbols utilized in compiling plans.”⁵⁵ Additional financing tools like the Federal Transportation Infrastructure Act (*Bundesverkehrswegegesetz, BVWG*), the Urban Development Promotion Act (*Städtebauförderungsgesetz, StFG*), building and maintenance of traffic routes owned by the federal state, and spatially effective sector planning instigated by different federal ministries, have a strong influence on spatial planning down to the lowest level.

Standing Conference of Federal and State Ministers Responsible for Spatial Planning (Ministerkonferenz für Raumordnung, MKRO)

To coordinate planning purposes and intentions between the Bund and the Länder, the Standing Conference of Federal and State Ministers Responsible for Spatial Planning (*Ministerkonferenz für Raumordnung, MKRO*) was established. The MKRO also develops guidelines for spatial planning, like the Spatial Planning Policy Guideline (*Raumordnungspolitische Orientierungsrahmen*, 1993) and the Spatial Planning Policy Framework for Action (*Raumordnungs-politischer Handlungsrahmen*, 1995).

State Level (Bundesländer)

The Bundesländer hold the next level of administration and planning authority, assigning spatial planning to state government or ministries, often the Ministry of Economics or the Ministry of Environment. The state level is responsible for the individual Land's planning legislation (State Spatial Planning Acts or *Landesplanungsgesetz, LplG*) and planning policy guidelines, so-called state development plans (*Landesentwicklungsplan* or *Landesentwicklungsprogramm*). Additionally, the federal states pass State Building Codes (*Landesbauordnung*), regulating details of construction and procedures of buildings.

Regional Level (Planungsregionen)

Planning regions (*Planungsregionen*), whose borders and organizations are determined by the states, are the next level of spatial planning. In contrast to the other levels of spatial planning that correspond to the general administrative structure, the planning regions and authorities are only responsible for spatial planning, not for different administrative duties. The regional planning authorities provide a regional plan (*Regionalplan*), detailing the state development plans and setting a framework of supra-local interests of spatial planning within the region. The municipalities of such a regional planning association participate indirectly by the county councils (and local councils of the cities not belonging to a county) in the development of a regional plan by a regional assembly.⁵⁶

Municipal Level (Gemeinden)

The lowest level of the German spatial planning system is that of the individual municipalities. In general, the municipalities have the exclusive planning right in their territories according to the Grundgesetz (Art. 28:2 GG), which means that the concrete design of local plans cannot be influenced by a higher level. Nevertheless, they are bound to the goals (binding stipulations on the development) and principles (general precepts concerning the development, structuring, and securing of spatial entities) of spatial planning of the higher levels and have to stick to the regulations of the Federal Building Code and Land-Use Ordinance.

The two main instruments at the local planning level are the land-use (or Zoning) Plan and the Local Building and Construction Plan. The Land-Use Plan (*Flächennutzungsplan*) is a preparatory plan laying out the general outline of existing and future land-use by type (general types of use: housing land, mixed building land, industrial and commercial land, special building land) and is not legally binding for individuals (e.g., land-owners). Furthermore, the Land-Use Plan defines the so-called “inner zone” (*Innenbereich*) and “outer zone” (*Außenbereich*) of a municipality. In the outer zone, no construction is allowed, besides those types of uses which are typically to be found and placed in the outer zone (e.g., agriculture, energy production).

The Local Building and Construction Plan (*Bebauungsplan*) is a legally binding land-use plan and consists of legally binding stipulations for the urban development ordinance. In the Local Building and Construction Plan, the specific categories of land-uses, defined by the Land Utilization Ordinance, are constituted for small holding areas, purely residential areas, general residential areas, special residential areas, village areas, mixed areas, core areas, commercial areas, industrial areas, and special areas. Although these categories are in the tradition of the separation of uses of the Charta of Athens,⁵⁷ all categories allow different uses to a smaller or wider degree: for instance, residential areas can generally contain housing units as well as shops, restaurants, smaller enterprises of craftsmen, and facilities of cultural, religious, health, or athletic purposes.⁵⁸ The following can be given exceptions and admitted: hotels, non-disturbing enterprises (like offices or smaller business enterprises), administrations, gardening for commercial purposes, and gas stations.⁵⁹

Furthermore, the density of development is defined in the Local Building and Construction Plan, either by definition of the municipality or automatically linked to the categories of land-use (the Land-Use Ordinance sets upper limits for the density in each category of land-use). By this, the planning authority is able to steer the density of development and the construction height of physical structures, and the proportion of a development site that can be built on.

Participation in the German Planning System

As discussed further below, the land-use planning system in the U.S. mainly relies on local government regulation and is thus more easily accessible for input by (local) stakeholders and citizens than the German system that involves multiple levels of government and layers of regulation from different levels of government. However, public participation plays an important role in German land-use planning, too. Participation takes place in three ways:

1. Inherent to the German planning system is the so-called “counter-current principle” enshrined in Section 1:3 of the Federal Spatial Planning Act to guarantee involvement and participation from the

lower levels and hence from democratically legitimated bodies of the municipalities: “Planning is organized as a process of reciprocal influence by federal, state, and municipal authorities on each other’s proposals, commonly referred to as the ‘counter-current principle’ (*Gegenstromprinzip*). The system is organized around mediation and consensus building, and allows for input and participation from lower levels, as long as the plans are consistent with higher-level goals and objectives, once these goals are (often collaboratively) established. Municipalities are represented at the regional level, while regional representatives provide input into state plans, and state ministries are involved in setting federal planning guidelines and visions.”⁶⁰

2. The “agents of public concerns” (*Träger öffentlicher Belange*) are bodies with a statutory consultative role, e.g., the actors from sectoral planning or cultural and environmental associations. They are involved in all levels of the planning system, especially when a plan is constituted that may not be legally binding for the individual, but for public bodies (*behördenverbindlich*). This is the case for the State Development Plan of Baden-Württemberg, the Regional Plans of the regions of Baden-Württemberg, and the Land-Use Plans of the municipalities. Involvement of the agents of public concerns is also binding for sectoral planning processes, the so-called Planning Approval Procedure (*Planfeststellungsverfahren*), concluding with a legal binding decision. The planning approval “includes all of the other required decisions by public authorities (e.g., licenses, permits, concessions, consent), and regulates all public law relationships between the developer and those affected by the project.”⁶¹

3. For municipalities, the Land-Use Plan and Local Building and Construction Plan are subject to public participation, as stipulated in the Federal Building Code (*Baugesetzbuch*). For both the Land-Use Plan and Local Building and Construction Plan, a two-tiered participation process is foreseen: premature public participation about aims and content of the plan and a formal participation about the sketch of the plan. The citizens as well as the “agents of public concerns” may address their concerns to the planning authority within a month. The planning authority has to check those concerns and integrate them into their

planning or justify why those concerns are neglected.

A unique feature exists in the Stuttgart region. Rather than consisting of delegates from the municipal or county councils, whose constituencies can make consensus-finding difficult,⁶² as they are subject to the decision processes of the entity that sent them,⁶³ the association of the Stuttgart region is a body under public law that has self-governing rights. Instead of a regional assembly, the decision-making body of the Verband Region Stuttgart constitutes of a directly-elected regional parliament. "The fact that the members of the regional parliament have been elected directly, and have not been sent as representatives of the municipal and district councils, increases the political power of this body within the region and reduces commitment to local interests."⁶⁴

Central Places: The Main Underlying Principle of German Spatial Planning

Since the establishment of the German Spatial Planning system, the key principle for spatial development in Germany is the approach of "decentralized concentration" (or "concentrated decentralization") embodied at the federal level in the Federal Spatial Planning Act and the Spatial Planning Policy Guidelines. It is intended to prevent strong disparities by a decentralized settlement structure for the entire national territory, the federal states, and for each region.. Development (e.g., of settlement, infrastructure, or economy) shall take place not only in the growing, prosperous parts of a region, but within the whole region. That does not mean that such a development shall be spread all over the region, but concentrated in a fixed number of central places and along the axis between those central places. As such, the overburdening of growing regions and cities, as well as strengthening economic and social structures in rural, distant regions, shall be reached.

This guiding principle derives from Walther Christaller's central place theory, published in 1933.⁶⁵ Based on von Thünen's "Ring Theory,"⁶⁶ Christaller developed a concept to explain the locations, sizes, and interrelations of urban settlements. Three principles—supply or marketing (central places serve as markets for so-called central goods and services for the surrounding areas); transportation or

communication (settlements located within a high capacity transportation infrastructure area or corridor develop faster than those with poor accessibility); and administrative or political principle (administrative allocation of centers of lower order to one of higher order)—"lead to a hierarchy of central places, where the importance of a center is not equal to the number of people living there, but depends on the intensity with which central functions are executed."⁶⁷ Deriving from the hierarchy of the central places and the range of a central place, a hexagonal pattern of settlements develops, serving and supplying the whole population of a state or region (see Figure 7 on page 30).

Christaller stressed that the pattern explained is to be seen as a dynamic process, not a steady state. New products and technologies, cheaper production and transportation, and growing or shrinking population will influence the location and hierarchy of central places. After WWII, Christaller's Central Place Theory became the most important theoretical concept for spatial planning in Germany. In adaption of this theory, the states developed a hierarchy of three to four stages of central places, each serving different functions for the population. The defined regions for spatial planning are in general constituted around one "Upper Center" (e.g., the city of Stuttgart), surrounded by a number of "Middle Centers" (e.g., Ludwigsburg north of Stuttgart). Both Upper and Middle Centers are defined by the state planning authority. "Lower Centers" and "Small Centers" are defined by the regional planning authority (see Figure 8 on page 31).

The designation of central places of different order is not only meant to define places hosting central functions for serving the population, but also to concentrate development within a state or region. Central places and development axes connecting them are bound to the axes of public transportation, in particular, railway lines. In this regard, the central places (and, linked to them, the designation of growth poles and regional centers for housing; see the section on "Coordinating Transportation and Land-Use Planning" below) can be compared to the bull's eye concept used in the Rosslyn-Ballston Corridor.

TRANSPORTATION PLANNING IN THE STUTTGART REGION

The backbone of public transportation in the Stuttgart region is the Stuttgart Regional Public Transportation Organization (Verkehrsverbund Stuttgart, VVS). The VVS is not only responsible for the operation of public transportation, but also for the planning and building of new railway lines.

The VVS was founded 1978 and has existed in its current form since 1995. It consists of forty-one transportation companies, both private and state owned, and serves the counties of Böblingen, Esslingen, Ludwigsburg, Rems-Murr-Kreis, and the City of Stuttgart (together about the delimitation of the Verband Region Stuttgart, except for the county of Göppingen in the southeast of the Stuttgart region). Together, these municipalities account for approximately 3,000 square kilometers (1,160 square miles) with 2.4 million inhabitants.⁶⁸ The VVS network comprises all public transportation in the region, and its fee applies to all modes of public transportation: "The integration of different modes of public transportation at metropolitan, regional, and national levels makes public transportation convenient and attractive in Germany. This coordination includes public transportation services, schedules, and fares within metropolitan areas. Transfers between bus and rail are virtually seamless, both in terms of timing as well as distance walked [...] Passengers can use one ticket for an entire trip inside a metropolitan area, regardless of how many transfers are necessary or how many public transportation modes used."⁶⁹

This coordination and integration of different modes of transportation (railway, metro, light rail, bus) and different transportation companies (forty-one different companies in the Stuttgart region, as mentioned above) is an important feature for the acceptance and numbers of ridership. It is immaterial to the user of public transportation in the region which single company offers transportation: the rider has one ticket, one coordinated schedule, and one single source for information for trip planning (www.vvs.de).

Also, as in all German cities with a regional transportation organization, the organization offers steep discounts for daily, weekly, monthly, or annual

tickets.⁷⁰ This is especially attractive for daily commuters using public transportation as an alternative to the car.⁷¹ There are additional discounts for students and the elderly not travelling within peak hours. Furthermore, nine transportation associations cooperate to simplify travelling within the Metropolitan Area Stuttgart, which consists of the Stuttgart region and four other planning regions, by providing a ticket valid in the whole metropolitan area of about 5.4 million people (www.metropolticket.de).

COORDINATING TRANSPORTATION AND LAND-USE PLANNING

Steering Spatial Development: "Inhabitant-Based Development" versus "Growth Poles"

Each planning region defines the network of Lower and Small Centers on its own as well as axes of regional importance additional to the Upper and Middle Centers, the catchment area of a center, and state relevant axes between those defined in the State Development Plan. The axes are mainly based on the railway lines (see Figure 8 on page 31). Therefore, regional planning sets up a stringent coordination of railway lines and settlement as a guideline to provide a wide accessibility to workplaces, educational institutions, cultural attractions, or leisure time facilities and so to diminish automobile traffic.

The regional structure of central places and axes is amended by growth poles for settlements (*Siedlungsbereiche*), regional centers for housing (*Schwerpunkte des Wohnungsbaus*), centers for commercial development (*Schwerpunkte für Industrie, Gewerbe und Dienstleistungseinrichtungen*) and locations for shopping centers and large retail establishments (see Figure 8).

Inhabitant-Based Development

In-between the axes connecting the centers, the municipalities shall only have "self-development" (inhabitant-based development)—those communities are allowed to grow by their own demand but can place no additional requirements for migration gains or for larger industrial development. For the Verband Region Stuttgart, orientation parameters (not legally binding parameters for the municipalities) for self-

development are an increase of housing units of 1 percent over a period of five years, meaning an increase of housing units of 0.2 percent per year.⁷²

Growth Poles for Settlements (Siedlungsbereiche)

Growth poles for settlements are bound to the system of central places in the region. Orientation parameters for so-called “growth poles for settlements” for additional amount of housing units are 1.5 percent within five years or 0.3 percent per year.⁷³ This does not sound like a big difference, but one has to bear in mind that those growth poles for settlements are in general larger than municipalities growing only by “own needs” (inhabitant-based development), so that the total amount of housing units allowed differs strongly from the municipalities serving central functions to those that do not.

Regional Centers for Housing (Schwerpunkte des Wohnungsbaus)

Within the growth poles for settlement there can be another bundling of housing development: the regional plan defines “regional centers for housing” to concentrate housing development with the aim of reducing land-use in the Stuttgart region. Those regional centers for housing are defined if:

- they are part of an axis of the region;
- have access to railway lines by a maximum radius of 500/1,000 meters of an existing or planned railway station;
- they do not conflict with other regulations of the regional plan, like nature, landscape, or water protection; and
- they can be realized as Brownfield development (derelict sites, abandoned or formerly developed for different uses) as far as possible.

In these regional centers for housing, a higher population density is mandatory: like Upper Centers, regional centers for housing shall have a minimum population density of ninety inhabitants per hectare (2.47 acres).⁷⁴ This reduces land-use in the region and leads to a higher number of potential users of

public transportation compared to more sparsely populated areas.

Coordinating Transportation and Land-Use Planning in the DC Metro Region

BRIEF OVERVIEW OF GEOGRAPHY AND STRUCTURE OF GOVERNMENTS

Multiple levels of government influence transportation and land-use planning in the DC metro region. The highest level of government involved in transportation and land-use planning within the region is Washington, DC, and the states of Maryland and Virginia (0.6, 5.8, and 8.1 million inhabitants, respectively). The official Metropolitan Planning Organization (MPO) for the Washington, DC region is the Transportation Planning Board (TPB). The TPB planning area encompasses all of Washington, DC, and portions of Maryland and Virginia—combining 8 counties, 12 independent cities, 5.3 million people, and 3.2 million jobs. The main surface transportation network in the region consists of 15,000 lane miles of highways, 106 miles of Metrorail/subway, and 226 miles of regional/commuter rail. The region is growing fast with anticipated strong population (+28 percent) and job (+37 percent) growth over the next thirty years.⁷⁵

At the lowest level of planning for transportation and land-use are the local governments. Maryland and Virginia local government structures differ from each other and from Germany’s local government administrative structure. In Germany virtually all populated areas are part of a municipality. German counties consist almost entirely of land areas that are part of municipalities. However, many populated areas in Virginia and Maryland are not part of a municipality and are administered directly by county governments. In both Virginia and Maryland, counties have control over land-use planning. Moreover, in Virginia, cities are independent of counties. Thus, both Virginia counties and cities exert control over land-use decisions. In Maryland, municipalities—where they exist—are part of their respective county.

The administrative distinction between cities and counties in Virginia does not describe urban form, however. For example, the city of Virginia Beach

includes large non-urbanized areas, while Arlington County is almost fully urbanized and is more reminiscent of what Germans would call a “city.” In contrast to cities, a Virginia town is officially part of its county, but similar to cities, towns have land-use authority over their own land area.⁷⁶

Within Maryland, counties have typically the greatest control among local governments over land-use decisions and transportation funding. However, within counties there are some incorporated towns that also exert control. The distribution of responsibilities between county and town is not uniform and varies across towns.⁷⁷

In contrast to some German city-states, like Berlin or Hamburg, Washington, DC, is not considered a state, but a Federal District with its own set of authorities and dependencies on the federal government. For example, even though the mayor of the District of Columbia gained the right to plan through the Home Rule Act in 1973, the (partially federally appointed) National Capital Planning Commission (NCPC) still serves in review and “advisory” functions for certain local planning decisions.⁷⁸

LAND-USE PLANNING

As in Germany, federal, state, and local governments have influenced land-use planning in the United States. However, in contrast to Germany, in the U.S. there is no system of land-use planning that connects federal, state, regional, and local levels of government. U.S. local governments play the predominant role in land-use planning and regulation. The U.S. federal government does not engage in land-use planning and, in contrast to Germany’s *Bundesraumordnungsgesetz* or *Baugesetzbuch*, there is no federal legislation prescribing the overall land-use planning process at lower levels of government.⁷⁹ Federal programs in the U.S. influence spatial development and land-use decisions on the local level, but there is no coordination on the federal level. Federal policies with local spatial impacts include transportation policy and finance, environmental regulation, housing and economic development, military spending, and the management of nationally owned lands.⁸⁰ There are certain federal planning requirements associated with federal funding, including

federal monies for transportation and housing.

The U.S. federal government influenced land-use planning and zoning throughout the U.S. by drafting two model acts that were copied in most states: the Standard State Zoning Enabling Act (1924) and the Standard City Planning Enabling Act (1928).⁸¹ The zoning enabling act was ratified by all fifty states and still exists in some form in the vast majority of states.⁸² Even though states played an important role in passing this legislation, the main responsibility for land-use planning and regulation resides with U.S. municipalities. The exact relationship between local government and states varies by state.

In the U.S., the most common type of local land-use plan is called a comprehensive or master plan, which typically consists of maps and text.⁸³ However, zoning, and not land-use planning, is the main tool of land-use control.⁸⁴ With a few exceptions, virtually all local governments have passed zoning ordinances that limit the use of land in the entire jurisdiction. In both countries, industrial and residential uses are deemed incompatible. However, in contrast to Germany, with a few exceptions, U.S. zoning has emphasized the separation of all types of land-uses. For example, in Germany residential zones can include doctor’s offices, apartment buildings, businesses, small shops, and restaurants. In the U.S., single family residential zones typically do not allow for any land-use other than single family residential. As a result, many German “residential” areas would be considered mixed-use in the U.S. Additionally, compared to the U.S., German municipalities apply their zoning to smaller land areas—sometimes as small as a block. U.S. municipalities typically apply their zoning to larger areas of land.⁸⁵ This results in longer trip distances that often make walking and cycling impractical.

As in Germany, local planning in the U.S. is influenced by the need to achieve development patterns that best support the local budget. However, compared to German municipalities who compete for business taxes, U.S. local governments rely heavily on local property taxes to fund local expenditures, such as police, water and sewer, or court services.⁸⁶ In 2009/2010, U.S. counties, municipalities, and townships received about 65 percent of their revenues

from local sources. Property taxes constituted about 30 percent of local government general revenue.⁸⁷ Many U.S. local governments zone to attract those land-uses that generate the greatest property tax revenues while requiring the least expenditure of public funds.⁸⁸

Although U.S. local governments exert considerable control over land-use decisions, that authority is not absolute. Both state and regional governments also influence planning and land-use decisions. For example, in Virginia the state requires localities to update their comprehensive plans every five years (Virginia Code §15.2-2230). A Maryland statute limits the spending of state funding for water and sewerage programs to designated priority areas (for more information, see the Arlington County Case Study).⁸⁹

TRANSPORTATION PLANNING

Federal legislation in the U.S. requires long- and short-range transportation planning for states and metropolitan areas.⁹⁰ State Departments of Transportation (DOTs), such as the Virginia and Maryland Departments of Transportation (VDOT and MDOT), are responsible for statewide transportation planning. In Washington, DC, the District Department of Transportation (DDOT) receives state planning funds from the federal government. Moreover, all urbanized areas with more than 50,000 inhabitants are required to form a Metropolitan Planning Organization (MPO), which is charged with regional transportation planning.

Historically, state DOTs were founded to build highways. Moreover, the federal government required regional transportation planning in the 1960s to facilitate building the federally subsidized (90 percent federal match) interstate highway system in urban areas. Traditionally, most state and regional transportation plans considered only roadways and to a lesser extent public transportation.⁹¹ Since the early 1990s, with the completion of the interstate highway system, walking, cycling, and public transportation have received more attention.⁹² Organizational structure and function of MPOs and their relationship with other government agencies vary and depend on local circumstances. MPOs generally do not implement projects; but they provide a setting for regional deci-

sion-making, coordinate planning and programming of funds, involve transportation and other stakeholders, facilitate public input, and conduct analysis and evaluations of proposed projects.

As discussed above, in the DC metro region the Transportation Planning Board (TPB) is the main MPO. The TPB was founded in 1965 in response to federal legislation requiring regional planning in areas with more than 50,000 inhabitants.⁹³ Voting TPB board members are appointed by transportation agencies of Washington, DC and the states of Maryland and Virginia, local governments, the Washington Metropolitan Area Transit Authority (WMATA), and the Maryland and Virginia General Assemblies. The Metropolitan Washington Airports Authority (MWAA) and federal agencies additionally send non-voting members to the TPB board.⁹⁴ The TPB is hosted by the Metropolitan Washington Council of Governments (MWCOG), which represents and coordinates the interests of local governments in the region.

Federal legislation postulates that states develop Statewide Long-Range Transportation Plans (SLRTP) and short-range State Transportation Improvements Programs (STIP) considering rural and metropolitan areas in the state. Long-range plans identify a vision for the state's transportation system and services with a time horizon of twenty years or more.⁹⁵ They differ by state and can vary from broad policy visions to lists of specific projects. For example, goals in the MDOT long-range plan include enhanced quality of service, better safety and security, system preservation, environmental stewardship, and improved connectivity for daily life. VDOTs long-range plan has similar goals including safety and security, system maintenance and preservation, environmental stewardship, economic vitality, coordination of transportation and land-use, better service delivery, and improved mobility, connectivity, and accessibility.⁹⁶

Based on the SLRTP, states develop four-year short-term STIPs, which prioritize projects and identify funding sources. STIPs include all projects that receive funding from FHWA and FTA and also significant projects that require federal action regardless of a funding source. SLRTPs and STIPs are developed with consultation of state and local agencies including

those responsible for land-use management, among others. The planning process has to provide opportunities for input from affected public agencies, organizations, and system users.⁹⁷

Similar to the state level, MPOs are mandated to develop and maintain metropolitan long-range plans (LRTPs) and metropolitan Transportation Improvement Programs (TIPs). LRTPs contain a region's transportation goals for a time horizon of twenty years and longer and describe strategies how to achieve these goals. LRTPs estimate a region's future transportation needs based on land-use forecasts, which can include housing, economic development, and employment forecasts. LRTPs are updated every four to five years and represent the region's priorities. The plans are financially constrained—meaning that they are not a wish list, but have to include a financial plan with reasonable cost and revenue estimates.⁹⁸ Key regional challenges identified in TPBs long range plan for the Washington, DC region include funding, congestion on roadways and public transportation, serving dispersed populations and jobs, maintaining the system, environmental quality, and reducing CO₂ emissions.⁹⁹ In 1998, TPB also published a policy vision that guides regional transportation investments. The goals include: provide a range of transportation options, reduce auto dependency, increase public transportation use, coordinate transportation and land-use, and maintain the existing transportation system.

TPBs vision and its long-range plan are closely related to MWCOGs region-wide plan titled Region Forward. As a result, the three plans' transportation goals are consistent with each other. For example, the plans call for a focusing of development in regional activity centers that have a mix of jobs, housing, and services in walkable distance.¹⁰⁰ While the land-use vision and scenarios developed by MWCOG and TPB are not legally binding for member jurisdictions, the plans do provide a forum for regionally-focused discussion.¹⁰¹ Additionally, MWCOG and TPB provide technical planning assistance to member jurisdictions through the Transportation/Land-Use Connections Program. The program provides planning support to help promote sustainable planning practices.¹⁰² Finally, TPB also functions as a transportation and land-use data clearinghouse, providing

information about local and national policies and plans.¹⁰³

TIPs prioritize projects from the LRTP, include projects to be built within the next three to five years, are updated every four years, are fiscally constraint, and are incorporated without changes in the STIP—after approval by the MPO or the state governor.¹⁰⁴ To be eligible for federal funding, a transportation project has to be included in USDOT-approved statewide and metropolitan short range transportation plans.¹⁰⁵ Federal planning requirements focus on the planning process and leave most of the substance of plans to regions and states; however, within the framework of established federal transportation funding programs that direct funds toward different modes of transportation and historically favor the automobile (see section about transportation policy above).¹⁰⁶ Transportation projects and programs have to be part of a comprehensive, cooperative, and continuing planning process.¹⁰⁷ State and metropolitan transportation planning is tightly coordinated with State Plans to achieve National Ambient Air Quality Standards (NAAQS) for specific pollutants as defined by the Clean Air Act (CAA).¹⁰⁸

COORDINATING TRANSPORTATION AND LAND-USE PLANNING

In the United States land-use decisions are typically in the domain of local governments and coordination with transportation plans at the regional or state level is limited.¹⁰⁹ Even on the local level, many municipalities focus on zoning ordinances and not on integrated transportation and land-use plans. We will illustrate best practices in the U.S. with two in-depth examples from Arlington County, VA—a national leader in coordinating transportation and land-use for over thirty years.

There are some attempts by the federal government to encourage the coordination of transportation and land-use. For example, the federal government encourages state and MPO planners to consult and share information with agencies responsible for land-use and spatial development. Moreover, transportation forecasts for long-range plans should be based on the latest available land-use, employment, and economic development projections.¹¹⁰

In 2009, the federal government launched the “Partnership for Sustainable Communities” between the U.S. Department of Transportation, U.S. Department of Housing and Urban Development, and the U.S. Environmental Protection Agency. The Partnership adopted six principles that cut across transportation, housing, and environmental issues:

1. Provide more transportation choices;
2. Promote equitable, affordable housing;
3. Enhance economic competitiveness;
4. Support existing communities;
5. Coordinate and leverage federal policies and investment; and
6. Value communities and neighborhoods.

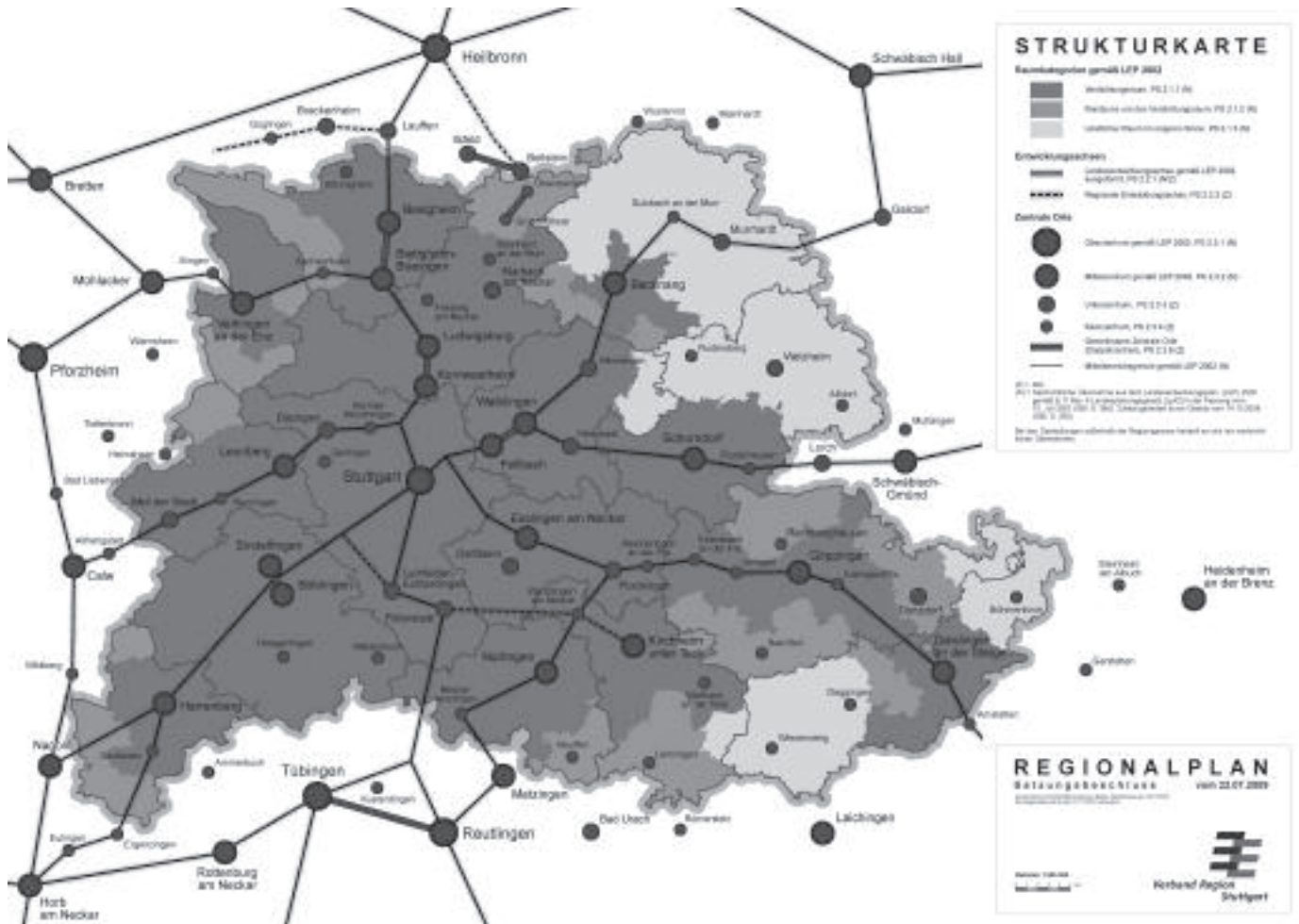
Through their funding programs, policy guidance, and regulatory frameworks, each of the agencies is working to advance these principles. Over \$3.5 billion has been awarded, some of it jointly, to more than 700 communities over the past three years to provide incentives and accelerate projects that integrate housing with transportation and other economic and environmental goals. The Partnership has also included a strong focus on coordinating federal planning efforts across agencies.

States also attempt to influence land-use planning. The State of Maryland is a national leader in promoting the coordination of transportation, land-use, and “smart growth.” For example, in 1997, Maryland passed the Priority Funding Areas Act. The act attempts to enforce smart growth policy through legal requirements and requires state funding for infrastructure to be spent in “Priority Funding Areas.” These areas primarily include already urbanized land.¹¹¹ The intent of the act is to leverage state funding to focus development in particular areas, thus limiting sprawling development. The act has succeeded in directing 70 percent of state money to designated growth areas.¹¹² However, residential development outside of Priority Funding Areas has exceeded development inside Priority Funding Areas since passage of the legislation.¹¹³ While the act

may not have influenced development patterns over the last ten years, it has created a mechanism for dialogue between state and local planners. Since 2009, new Maryland state legislation has attempted to strengthen local comprehensive planning, has created visions for sustainable growth, and has required counties to track and report growth-related data to the Maryland Planning Department.¹¹⁴

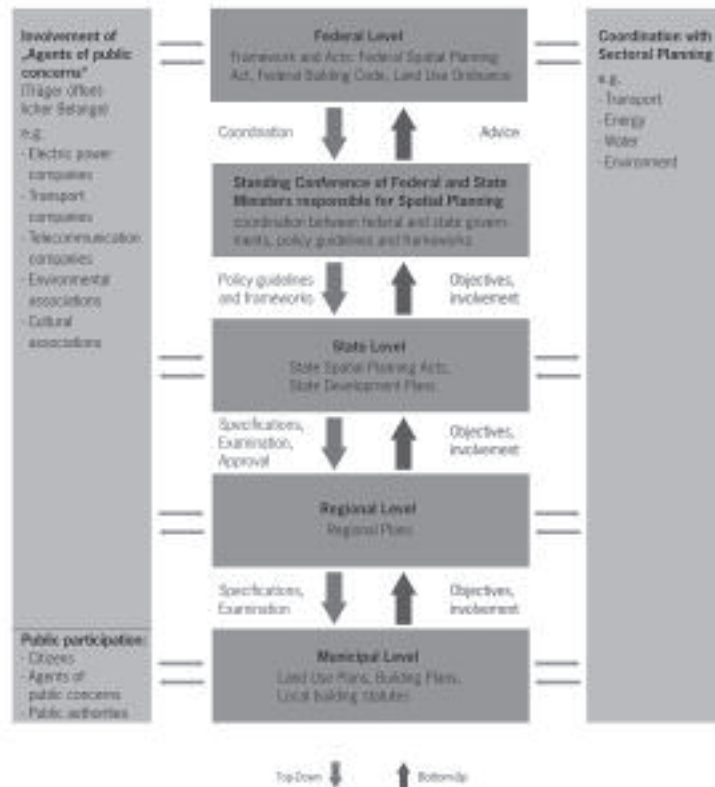
In contrast to Maryland, a national leader in smart growth, the state government of Virginia lags behind in coordinating transportation and land-use. However, within the last few years, the state government of Virginia has adopted legislation requiring high population or fast growing localities to establish “Urban Growth Areas.”¹¹⁵ These designated areas must allow for increased residential and commercial densities and include elements of traditional neighborhood design, including smaller streets with a pedestrian orientation. Additionally, infrastructure investments should be prioritized for these areas. No studies have evaluated success or failure of this recent policy change. In 2010, the Washington, DC Department of Transportation (DDOT) adopted its “Sustainability Plan 2010.”¹¹⁶ The plan calls for the improvement of transportation infrastructure to further the goals of sustainability and for better coordination with the office of planning, which controls land-use decisions.

Figure 5: Overview of the Stuttgart Region



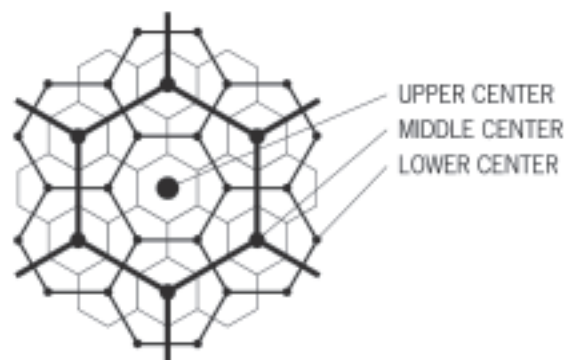
Source: Region Stuttgart, Regionalplan. Satzungsbeschluss vom 22.09.2009 [Regional Plan. Statute of 22 September 2009] (Stuttgart: Verband Region Stuttgart, 2009).

Figure 6: Overview of the German System of Spatial Planning



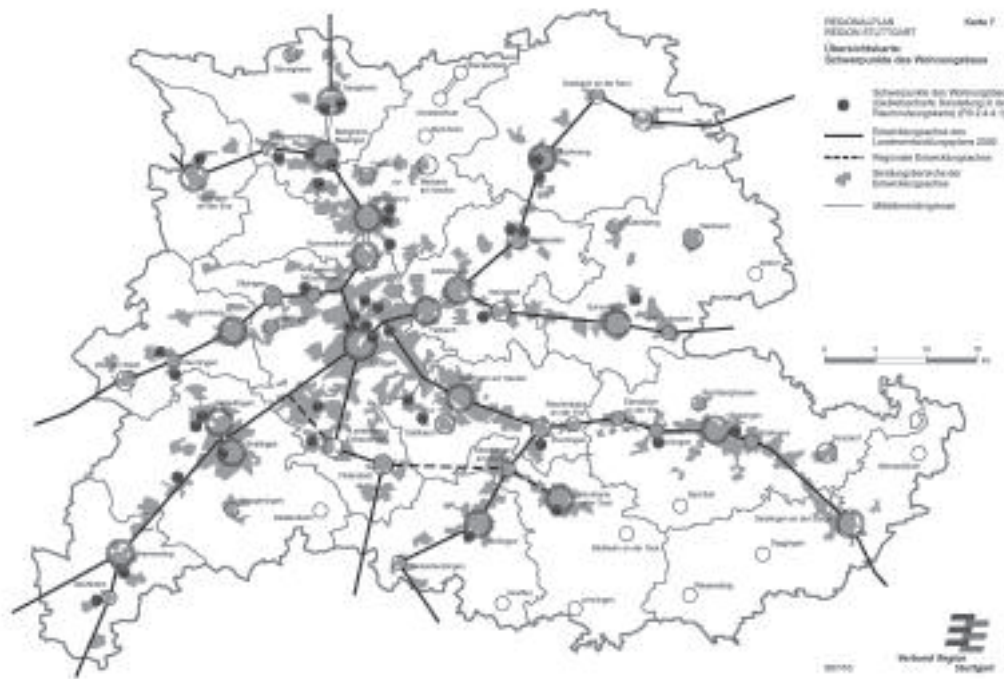
Source: Own graphic adapted from Stephan Schmidt and Ralph Buehler, "The Planning Process in the U.S. and Germany: A Comparative Analysis," International Planning Studies, Vol. 12, No. 1 (2007), 58

Figure 7: The Hexagonal Pattern of Central Places According to the Supply Principle



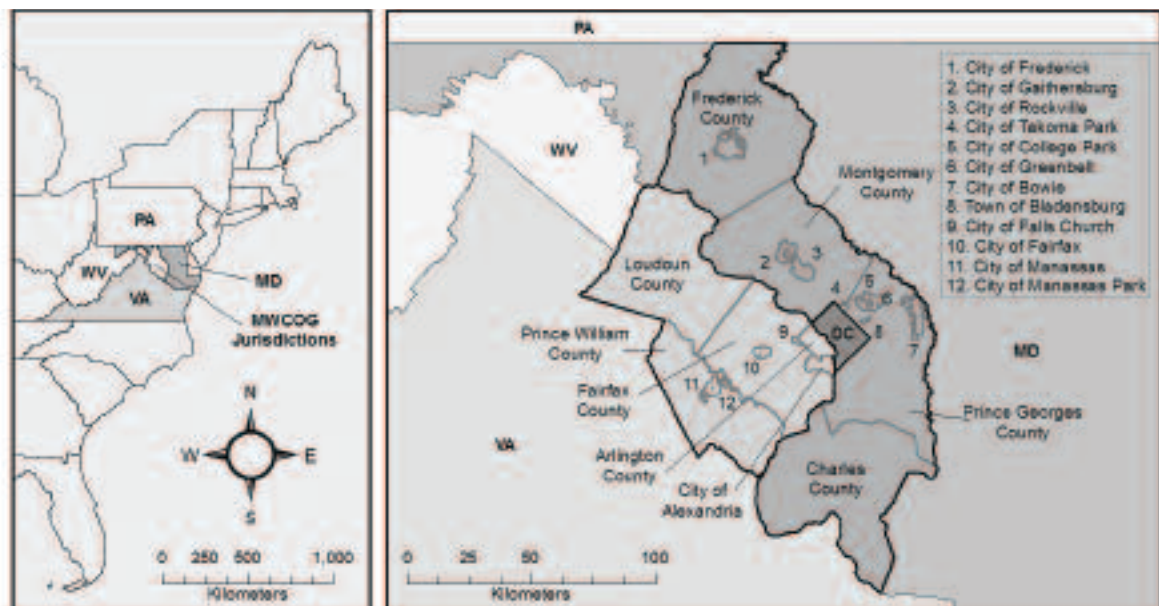
Source: Own graphic adapted from Walter Christaller, Die zentralen Orte in Süddeutschland: eine ökonomisch-geographische Untersuchung über die Gesetzmässigkeit der Verbreitung und Entwicklung der Siedlungen mit städtischen Funktionen [Central places in Southern Germany: a geographic-economic survey on the principals of locations and development of settlements with urban functions] 2nd ed. (Jena: Fischer, 1933/1968).

Figure 8: Central Places, Axes, Growth Poles for Settlements and Regional Centers for Housing in the Stuttgart Region



Source: Region Stuttgart, Regionalplan. Satzungsbeschluss vom 22.09.2009 [Regional Plan. Statute of 22 September 2009] (Stuttgart: Verband Region Stuttgart, 2009).

Figure 9: The Washington, DC Region



Source: Created by Paul Stoddard

CASE STUDIES

To show how successful integration of transportation and land-use planning works on the local level, this section provides two examples, one for each region, of planning for sustainable transportation and land-use. For the Stuttgart region we present Scharnhauser Park, a conversion project of a former military site to a new housing area in Esslingen, east of the city of Stuttgart. For the DC metro region we showcase Arlington County, a national leader in coordinating transportation and land-use. First, a case study of the Rosslyn-Ballston Corridor highlights Arlington's historic turn around toward coordinating transportation and land-use planning since the 1960s. Second, a case study of Arlington's plans for the redevelopment for the Columbia Pike Corridor highlights current planning in the county.

Case Study Esslingen County

The county of Esslingen borders the city of Stuttgart to the east. Not surprisingly, the modal split in the county of Esslingen shows a stronger car orientation and fewer trips by public transportation compared to the average of the Stuttgart region (see Table 2 on page 36).

Scharnhauser Park, serving as case study in the following chapter, is part of the county of Esslingen in close proximity to Stuttgart. Car-dependency outside the medieval city of Esslingen is again higher than in the Stuttgart region, with approximately 60 percent car use and only 9.4 percent public transportation.¹¹⁷

The whole county experienced an increase of population in recent years, growing by almost 40,500 inhabitants from 1990 to 2010 (+7.78 percent).¹¹⁸

SCHARNHAUSER PARK

The settlement Scharnhauser Park belongs to the city of Ostfildern, county of Esslingen. The city of Ostfildern was created in 1975 as a merger of the municipalities Kemnat, Nellingen, Ruit, and Scharnhausen with a combined 28,000 inhabitants in 1975.

Overview of Land-Use Planning

Scharnhauser Park is a former U.S. military site—Nellingen Barracks—that housed approximately 7,000 U.S. soldiers until it was abandoned in 1992.¹¹⁹ In the same year, a first feasibility study and urban design competition started to develop new ideas for how to re-use the site. After an interim use for the athletes of the World Athletics Competition in 1993, the city of Ostfildern bought the whole area from the federal government and contracted the municipality-owned company (*Sanierungs- und Entwicklungsgesellschaft Ostfildern*, Reconstruction and Development Corporation) for the development. Together with a "development freeze/change barrier,"¹²⁰ a development statute (*Entwicklungssatzung*) was enacted that gives the municipality the right of receiving the gains of property value for parcels of land formerly belonging to the outer zone. The value for land in the outer zone in Ostfildern ranges from €2 (forest) to €16 (areas for summer houses), the value for housing purposes in Scharnhauser Park is €520 in 2012.¹²¹ Parts of these increases of land value can be absorbed by the municipality. These received gains shall be used to build the infrastructure needed.

With the successful application to the ExWoSt Program (experimental housing and urban development) "Conversion: urban design possibilities by re-

using military facilities" by the Federal Office for Building and Regional Planning (*Bundesamt für Bauwesen und Raumordnung*) in 1994, a master plan for the re-use was created and first developments undertaken. The master plan foresaw about 3,000 housing units for about 9,000 new inhabitants and retail spaces and office/commercial space for about 2,000 employees on an area of altogether 141.3 ha (349.2 acres). The settlement pattern foreseen was characterized by short distances to the stops of public transportation and high density figures ranging for housing from 0.8 to 1.8 meters, according to the floor space index (see Figure 11 on page 37).¹²²

Another acceleration of the political will to develop the former military site was that the Stuttgart region refused a different Local Building and Construction Plan from the city of Ostfildern, so that the main potential for growth of the city of Ostfildern was seen in the area of Scharnhauser Park (see Figure 12 on page 38).

Hence, the city parliament decided to change the Land-Use Plan: the quarters of Kemnat, Nellingen, Ruit, and Scharnhausen shall only have inhabitant-based development, while gains from migration shall be directed to Scharnhauser Park. The new housing area is seen as a new city quarter on its own, not an addendum to Scharnhausen or a new center of the city of Ostfildern.

As a matter of fact, the Regional Plan of 1998 appointed Scharnhauser Park as a "regional center for housing" in the northern and "center for commercial development" in the southern part of the area under the precondition that a proper link to the existing rail infrastructure in the region is planned. This precondition was cancelled in the Regional Plan of 2009, because the new rail line had been put into place.

Already in 1994 the first new inhabitants moved in the former Housing Area of Nellingen Barracks, while planning for re-densification of this part of the military site continued.

Scharnhauser Park is a mixture of low, medium, and high-density housing (single and semi-detached houses, row houses, town houses, city mansions,

tower blocks), most of which are condominiums, only a small share are apartments. There are also areas of mixed use and for commercial activities.

From its founding in 1975 to 2011, the city of Ostfildern grew by 8,500 inhabitants, from 28,000 to 36,500 inhabitants. More than 70 percent of this increase occurred after the first new families moved into Scharnhauser Park in 1994.¹²³ Compared to the State of Baden-Württemberg, in which between 2001 and 2011 the overall (natural increase and immigration) population development ranged from slight losses of population in 2008-2009 to a maximum of 0.7 percent, Ostfildern had increases between 0.65 to 2.86 percent. In particular, population gains due to migration are on average 7 times higher compared to the State of Baden-Württemberg.¹²⁴ In terms of relative growth, Ostfildern was the third-fastest growing municipality in the county of Esslingen (after two municipalities of less than 2,000 inhabitants).¹²⁵

Most of these gains were due to the development of the settlement of Scharnhauser Park. Compared to the State of Baden-Württemberg, figures show a steady natural increase of population, while net balance of births is negative in Baden-Württemberg from 2006 on.¹²⁶ Still, the increase in population is mainly due to positive migration, but with decreasing intensity—although people are still moving to Ostfildern, the numbers show a slight downturn, as main parts of Scharnhauser Park are already built.¹²⁷ Most of the in-migrating populations are young families, which can be seen by the positive net balances of births and the percentage of children under 15 years old in relation to the overall population, or the so-called child dependency ratio.¹²⁸ All figures show that Ostfildern is performing better than the average of the State of Baden-Württemberg, having about 10 percent more children in relation to the overall population—about a 10 percent higher child dependency ratio.¹²⁹

Financing of Scharnhauser Park

First calculations in 1994 foresaw:

■ DM 320 million (€164 million/\$212 million) for construction until 2008

■ DM 94 million (€48 million/\$63 million) for

purchase of the land

■ DM 101 million (€52 million/\$67 million) for construction of infrastructure (road and rail)

■ DM 54 (€28 million/\$36 million) million for public facilities

■ Gains from the sale of parcels of land: DM 250 million (€128 million/\$166 million)

By being part of Baden-Württemberg's rehabilitation program (*Landessanierungsprogramm*), the city of Ostfildern received funds of DM 9 million (€4.6 million/\$6 million) for the purchase of the area. Additional funds (DM 4.8 million/€2.5 million/\$3.2 million) were received by the state program for the advancement of urban development (*Landesprogramm zur Förderung der städtebaulichen Entwicklung*).

The city of Ostfildern also applied for the State Garden Exhibition (*Landesgartenschau*), an event taking place regularly in nearly all German states. The Federal or State Garden Exhibitions are exhibitions of gardening, but also mainly used for urban or regional development, especially Brownfield areas. Like a lot of cities, Ostfildern tried to link this exhibition with the new development in Scharnhauser Park. The core of the exhibition was along the established landscape stair (*Landschaftstreppe*), the main axis for pedestrians and cyclists in the settlement. The landscape stair is a one kilometer long and forty meters wide public space using the topography of the area from north to south with a view of the Swabian Alp. Together with the market square at the town hall, the landscape stair is the main public space in Scharnhauser Park; it is also used for the leaching of rain water. With the approval in 1997 the city received grants of DM 7.7 million (€4 million/\$5.1 million) for the garden exhibition taking place in 2002.

Transportation

Enhancing the transportation infrastructure, especially public transportation, was required as a precondition for development. The mayor of Ostfildern stressed that the development of Scharnhauser Park would only take place if the light rail to the area was extended.¹³⁰ Based on a calculation of about 10,000

passengers per day if Scharnhauser Park was developed as stated in the Master Plan, the Stuttgart Straßenbahnen AG (SBB) decided to extend the existing railway line from Heumaden to Nellingen via Scharnhauser Park. That meant: "No light rail without Scharnhauser Park, no Scharnhauser Park without light rail."¹³¹

The 6.2 kilometers (3.9 miles) of the new railway were calculated to DM 187 million (€96 million/\$124 million), of which 60 percent would be paid by the federal government's Municipality Transportation Financing Act (*Gemeindeverkehrsfinanzierungsgesetz*, GVFG).

In June 1995, a formal agreement on the construction and financing of the extension of the light rail from Heumaden to Nellingen was signed between the mayor of Ostfildern, the SBB, and county administrator of Esslingen. The municipal council approved a project of over DM 226 million (€116/\$150) of which about 75 percent (DM 170 million/€87 million/\$113 million) would be paid by the federal and state government, DM 32 million (€16 million/\$21 million) by the city of Ostfildern, and DM 24.4 million (19.4 million for construction, 5 million for vehicles) (€12.5 million/\$16 million) by the county of Esslingen.

Another extension from Nellingen to Esslingen was considered using a track that was abandoned in 1978. Approximately 10,000 passengers a day were expected on this stretch of about 3.7 kilometers (2.3 miles). Still, these figures were seen as too low to get funds from the federal and state government for the construction of this track. The project continues to be integrated in the regional plan, as the proposed track is kept free of different development or uses.

The legal basis for the construction of such a rail track is the planning approval procedure, executed by the District Authority (Regierungspräsidium Stuttgart)¹³² in four parts:

- Heumaden-Ruit (04/1995-10/1996)
- Ruit-Zinsholz (12/1995-08/1997)
- Zinsholz-Kreuzbrunnen (08/1997-06/1998), and
- Kreuzbrunnen-Nellingen (06/1998-03/1999)

With the formal approval of the first section, construction for the extension of the rapid transit started in 1997, opening the new tracks for public transportation in the year 2000. In the beginning, just one line served the extension from Heumaden to Nellingen, but already in 2000 the city of Ostfildern and the SSB decided to establish a new line, the U8. In the beginning, the U8 ran only during peak hours; however, due to the success of public transportation within Ostfildern and further to Stuttgart, the schedules were extended to the whole day and the line was also extended from Stuttgart-Möhringen to Stuttgart-Vaihingen using existing tracks in 2002. This is due to the high ridership: already in 2001, about 9,200 passengers a day rode between Nellingen and Heumaden using the U7, with another 3,400 a day using the U8.

Infrastructure

In addition to transportation infrastructure, the city of Ostfildern saw another important piece of infrastructure for the new settlement of Scharnhauser Park: schools. In 1995, the municipal parliament decided not to extend the existing lower secondary school (*Hauptschule*) in Ruit, but to build a new *Hauptschule* in Scharnhauser Park, which would also serve students from Kemnat and Ruit, and be complemented by an elementary school. Elementary schools are seen as a precondition for the settling of families. After an eighteen month construction phase, the prize-winning *Hauptschule* between the train stops Parksiedlung und Scharnhauser Park opened in 1999, followed by the elementary school in 2002.

Another element of social infrastructure was kindergartens. In contrast to most municipalities, the number of children age 0-5 is not expected to shrink until the year 2020, due to the in-migration of young families to the city of Ostfildern. This development can also be seen by the annual net balance of births per 1,000 inhabitants, which was 3.2 births/1,000 inhabitants, compared to -0.6 for the State of Baden-Württemberg from 2008 to 2010.¹³³ The existing former school building was turned into a kindergarten, meeting demand from new inhabitants of the old Barracks' Housing Area. New developments in addition to the Housing Area required additional capacity; three additional kindergartens were established in Scharnhauser Park.

LESSONS

Housing is one of the major concerns in the Stuttgart region. On the one hand, there is still a significant amount of population in-migrating to the Stuttgart region; on the other hand, land is a scarce resource in the region, resulting in a rather high population density and real estate prices that are among the highest in Germany. Politics and planning has to deal with the conflict of offering enough parcels of land for the population while at the same time protecting the landscape and nature from exhaustive land claims and reducing traffic caused by commuting.

With the conversion of the former military site Nellingen Barracks to the Scharnhauser Park development, a unique but challenging opportunity arose for the city of Ostfildern and the region as a whole. By negotiations between the different levels of government and spatial planning agencies, financial support for the municipality was guaranteed, spatial aims of future development of the city of Ostfildern were changed, and further development was channeled to the area of Scharnhauser Park. This could happen in particular by their counter-current revised spatial plans of the Verband Region Stuttgart and the city of Ostfildern, by which the city of Ostfildern could get the right of additional land claims needed for the development of the Scharnhauser Park. The land-use agreement demanded higher population densities in the area to be developed: not the typical suburban, low-density, single and semi-detached housing structure, but rather urban forms of housing had to be and were established in Scharnhauser Park.

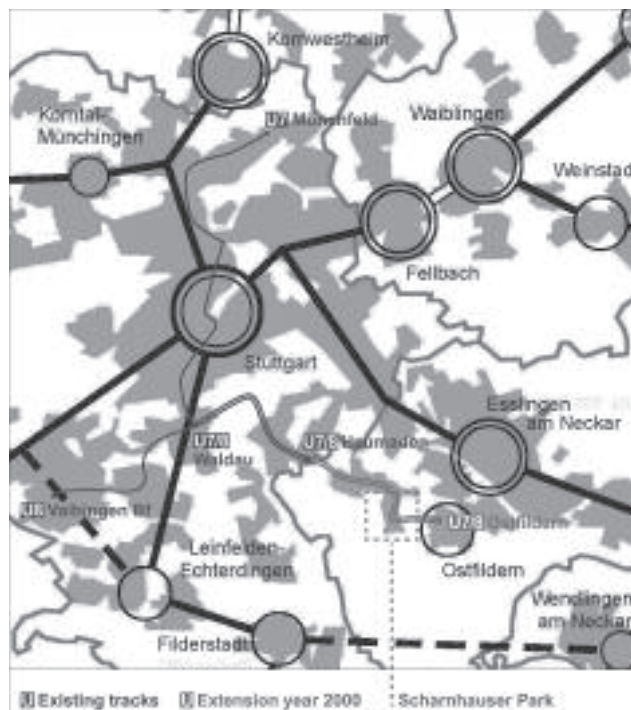
At the same time, Ostfildern, the county of Esslingen, and the transportation agency agreed on the simultaneous construction of Scharnhauser Park and the extension of the railway line, tying the new settlement to the transportation system of the Stuttgart Regional Public Transportation Organization. By this, Scharnhauser Park gives a good example of how public transportation is a catalyst for the (re-)development of certain areas, while at the same time, this development is the prerequisite for investments in public transportation.

Table 2: Average Modal Split in the Jurisdictions of the Stuttgart Region in the Years 2009/2010

Jurisdiction	Walk	Bicycle	Car	Public Transportation
Böblingen	22.1	7.9	61.0	8.9
Esslingen	20.9	8.7	62.1	8.3
Göppingen	21.1	5.0	68.3	5.7
Ludwigsburg	24.4	6.2	60.3	9.0
Rems-Murr-Kreis	23.6	6.7	59.2	10.4
Stuttgart	26.4	5.3	44.1	24.2
Stuttgart Region	23.6	6.8	57.1	12.5

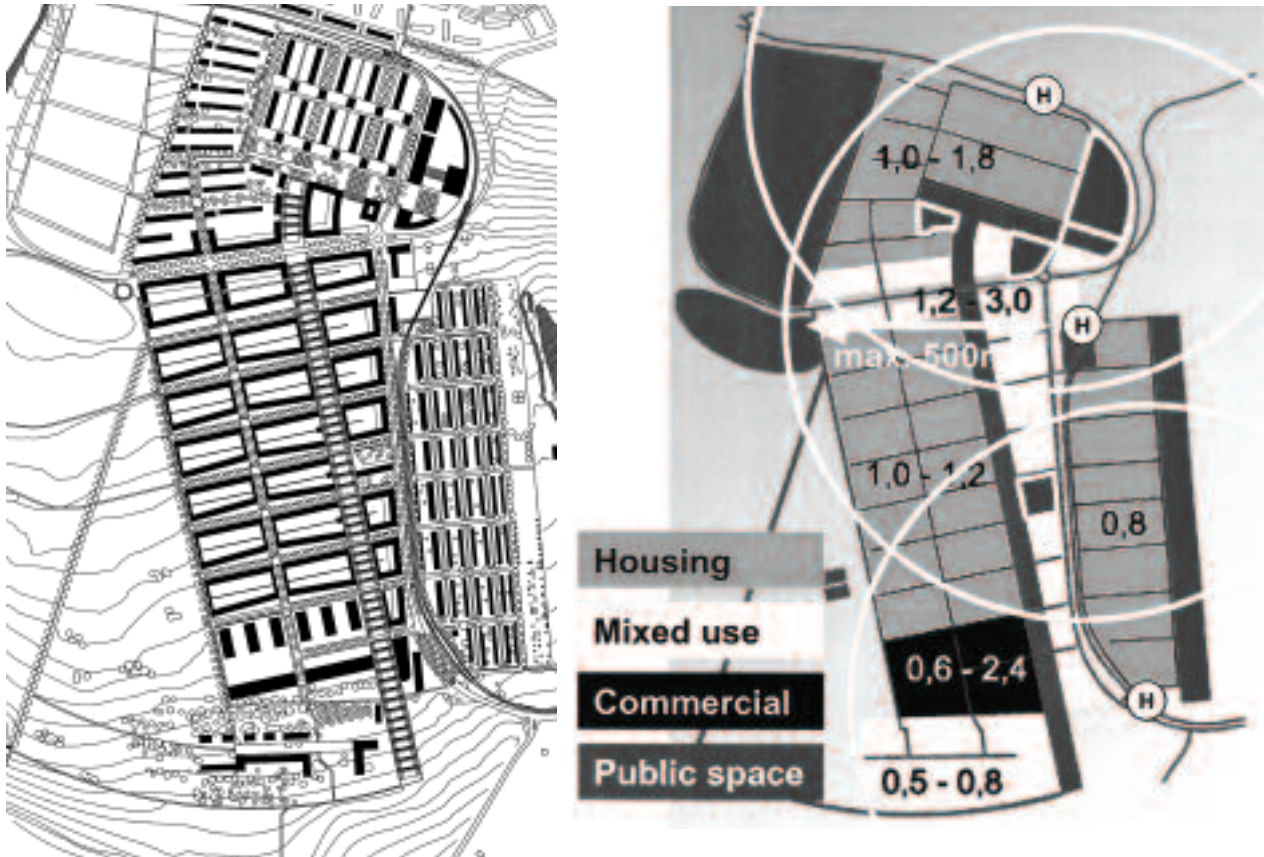
Source: Verband Region Stuttgart, Begleituntersuchungen zur Fortschreibung des Regionalverkehrsplans – Band 1: Mobilität und Verkehr in der Region Stuttgart 2009/2010. Regionale Haushaltsbefragung zum Verkehrsverhalten (Stuttgart: Verband Region Stuttgart, 2011).

Figure 10: Location of the City of Ostfildern and Scharnhäuser Park



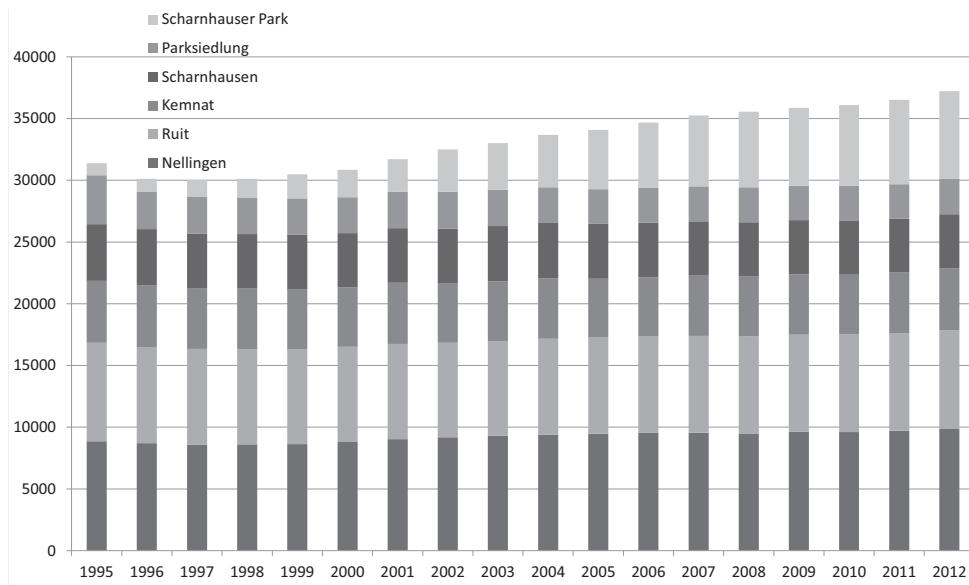
Source: Verband Region Stuttgart 2009. Regionalplan, modified

Figure 11: Master Plan, Scharnhauser Park



Source: Klaus Weiss, "Stadt im Park: zehn Jahre Stadtteil Scharnhauser Park," *Werk, Bauen + Wohnen* 93:9 (2006), 12-17. <http://dx.doi.org/10.5169/seals-1845>; Stadt Ostfildern 2012: Stadtentwicklung Ostfildern, Email from 20 November 2012.

Figure 12: Development of Inhabitants in the City of Ostfildern, 1975-2011



Source: Graph based own Statistisches Landesamt Baden-Württemberg [Statistical Office of the State of Baden- Württemberg] 2012. Regionaldatenbank [Regional data base], <http://www.statistik-bw.de/SRDB> and Stadt Ostfildern 2012: Wohnbevölkerung Ostfildern; Email from 20 November 2012.

Figure 13: The Settlement of Scharnhauser Park
(re-densification of the former Housing area with tower houses on top, landscape stair in the middle, new railway line at right and top)



Source: Brücke-Osteuropa 2012. Wikimedia Commons, licensed under CreativeCommons-Lizenz Brücke-osteuropa, http://upload.wikimedia.org/wikipedia/commons/c/c2/Scharnhauser_Park.jpg

Case Study Arlington County¹³⁴

Washington, DC's neighbor to the west, Arlington County, Virginia, is a leader in sustainable transportation in the U.S. The county achieved a more sustainable transportation system through coordination of a wide array of transportation, land-use, housing, and economic development policies. The county has received a number of national awards for its achievements,¹³⁵ including the 2002 National Award for Smart Growth Achievement in the category of "Overall Excellence in Smart Growth" from the United States Environmental Protection Agency,¹³⁶ the League of American Bicyclists' designation as a Bicycle Friendly Community,¹³⁷ the American Public Transportation Association's award for an "Outstanding Public Transportation System,"¹³⁸ mention on the American Podiatric Medical Association's list of Top 10 Best U.S. Walking Cities,¹³⁹ and recognition as one of the "Great Places in America" by the American Planning Association.¹⁴⁰

Arlington County's achievements in sustainable transportation planning have come about concurrent with steady increases in residential population and employment since 1970. Between 1970 and 2010, population and employment increased by 19 percent and 48 percent, respectively. Strong increases in population and employment are projected to continue through 2040 (see Figure 14 on page 51). As depicted in Figure 15 (page 51), in 2010, nearly half of all commuters in Arlington County used an alternative to driving alone. The share of public transportation for commuters, at nearly 30 percent, is second only to Washington, DC, as compared to other jurisdictions in the inner core of the Washington metropolitan region (see Table 3).

Two corridors within Arlington County highlight the planning approaches that have been pursued, the challenges that have arisen, and the broader lessons that can be learned for sustainable transportation planning. The first is the Rosslyn-Ballston Corridor, for which Arlington County is probably most famous. The Rosslyn-Ballston Corridor is located at the east end of the county and adjacent to the nation's capital (see Figure 16 on page 52). This corridor has been recognized as an exemplar for sustainable transportation

Table 3: Percent of Commuters Using Public Transportation as Main Mode to Work

Jurisdiction	Public Transportation Use
Washington, DC	39.6%
Arlington County, VA	28.4%
Prince George's County, MD	19.5%
City of Alexandria, VA	18.2%
Fairfax County, VA	9.9%
Montgomery County, MD	2.7%

Source: United States Census Bureau, American Community Survey, 2011, <http://www.census.gov/acs/www/>.

and has earned the county its reputation as a leader in transit-oriented development (TOD). TOD is a broad concept describing dense, mixed use, pedestrian-friendly, and public transportation-supportive development.¹⁴¹ Over the last thirty years the Rosslyn-Ballston Corridor's dense mixed-use development around five Metrorail stations has increased transportation sustainability and fostered economic growth. Some commentators even suggest that together with the Rosslyn-Ballston Corridor's geographic proximity to Washington, DC, Arlington's focus on TOD has helped the county to weather the Great Recession better than most other communities and has earned Arlington recognition as "an oasis of stability" amid the recent economic downturn.¹⁴² Thus, the Rosslyn-Ballston Corridor represents an achievement in sustainable transportation that continues to be improved upon.

The second is the Columbia Pike Corridor, which is currently undergoing redevelopment planning. In contrast to the Rosslyn-Ballston Corridor, the Columbia Pike Corridor does not contain Metrorail stations. Instead, the corridor will be redeveloped around a new streetcar line. The plan is to coordinate transportation and land-use planning to form a "linear village" along the Columbia Pike portion served by streetcar. Redeveloping the corridor presents distinct

challenges and opportunities for sustainable transportation planning.

Figure 16 (page 52) depicts Arlington County in relation to Washington, DC, and highlights both the Rosslyn-Ballston Metrorail stations and the portion of Columbia Pike contained within Arlington County.

Table 4 facilitates a comparison among Arlington County as a whole, the Rosslyn-Ballston Corridor, and the Columbia Pike Corridor. The Rosslyn-Ballston Corridor contains 21 percent of the county's residents, while the Columbia Pike Corridor contains 18 percent. In addition, both the Rosslyn-Ballston and Columbia Pike Corridors have higher population densities than the county as a whole. In the Rosslyn-Ballston Corridor and in Arlington County as a whole over 60 percent of households have an income of \$75,000 or greater, while only 40 percent of the Columbia Pike Corridor household have incomes of over \$75,000. The share of commuters using public transportation as their main mode is slightly below the county share in the Columbia Pike Corridor, but well above the county average in the Rosslyn-Ballston Corridor. Finally, both the Rosslyn-Ballston and

Columbia Pike corridors contain a higher share of households with zero vehicles than the county as a whole. Overall, the two corridors highlight how Arlington County has increased in both residential population and employment but has also experienced success in encouraging public transportation use and other alternatives to driving.

Key lessons from Arlington County and the two case studies described below include:

- 1) The potential for public transportation and redevelopment to mutually reinforce one another.
- 2) The importance of a codified planning vision that leverages stakeholder participation through stable and participatory processes, as exemplified by the "Arlington Way."
- 3) The ability for coordination among policies and programs regarding transportation, land use, housing, and commercial entities, to promote community vitality.

Table 4: A Comparison of Select Population, Income, and Transportation Characteristics of Arlington County and the Rosslyn-Ballston and Columbia Pike Corridors

	Population (2006-2010 Estimate)	Density (1,000 Persons/ Square km)	Households With Income of \$75,000 Or Above (Percent)	Public Transportation's Share As A Main Mode to Work (Percent)	Car-Free Households (Percent)	Share of County Population
Arlington County	197,467	48.6	62%	27%	12%	100%
Rosslyn-Ballston Corridor	41,372	133.6	64%	40%	16%	21%
Columbia Pike Corridor	36,048	85.0	40%	25%	13%	18%

Source: Arlington County, Major Planning Corridors Demographic Trends, 2012,
http://www.arlingtonva.us/departments/CPHD/planning/data_maps/Census/page86060.aspx.

THE ROSSLYN-BALLSTON CORRIDOR AND TRENDS IN SUSTAINABLE TRANSPORTATION

In 1970, the Rosslyn-Ballston Corridor had 5.5 million square feet of office space and 7,000 housing units, while today it has about 20.8 million square feet of office space and 26,572 housing units.¹⁴³ Yet despite these large increases in office space and housing units, redevelopment has only generated modest increases in traffic on local streets.¹⁴⁴ Many of the newly generated trips are by public transportation. Between 1990 and 2012, average weekday passenger trips by public transportation in the corridor rose from 67,600 to more than 96,000, a 42 percent increase.¹⁴⁵ In 2010, public transportation ridership in the corridor was higher than anywhere else in the region outside of Washington, DC.¹⁴⁶ The Rosslyn-Ballston Corridor's redevelopment, which is oriented around public transportation stations, has also enabled residents to live a car-free or car-lite lifestyle. Approximately 16 percent of corridor households do not own a vehicle, and in some residential developments, an estimated 40-60 percent of tenants do not use a vehicle on a daily basis.¹⁴⁷

Single occupancy vehicle commuting has been declining in the corridor, while commuting by walking, biking, and public transportation have been increasing. Compared to the regional average, the Rosslyn-Ballston Corridor's share of single occupancy vehicle commuting trips is one third lower, public transportation ridership is two times higher, cycling is three times higher, and walking is six times higher.¹⁴⁸ Thus, the Rosslyn-Ballston Corridor exemplifies the trends that Arlington County has experienced as a whole in recent decades—sustained increases in the residential population and employment together with modest increases in traffic and high levels of alternative modes of transportation.

A Brief History of the Rosslyn-Ballston Corridor Planning Process

Like many urban areas in the U.S., Arlington County experienced an influx of residents and development after World War II, and then steady decline as the “postwar boom” receded. For example, the broader trend of suburban home ownership oriented around

automobile travel led to neglect and decline in Clarendon, Arlington's historic downtown. The *New York Times* observed that Rosslyn started to become “little more than a collection of pawn shops and auto repair shops” during this time.¹⁴⁹ By the early 1970s, when redevelopment began, retail sales and population were already in decline and between 1972 and 1980 the Rosslyn-Ballston Corridor lost 36.4 percent of its population.¹⁵⁰ Street closures and other negative side-effects of construction of the transportation stations likely exacerbated these trends.

An Emerging Vision Leads to Highway and Transportation Negotiations

The history of the Rosslyn-Ballston Corridor is inextricably linked to the coinciding planning and funding for the region's interstate highways.¹⁵¹ The construction and routing of Interstate 66, part of the federally funded U.S. interstate system, was debated between 1956 and 1976. A route through Arlington County was first proposed in 1956, but local opposition arose regarding air quality, noise, and community impacts. This resulted in lengthy court proceedings and negotiations with the U.S. Secretary of Transportation. A final agreement in the 1970s resulted in a scaled-down four lane version of the interstate and incorporation of a subway line as part of the new regional Metrorail system (which came to be commonly called “Metro”). Initially, the Metro stations in Arlington were to be routed in the northern part of the county above ground in the median of the new interstate, since this would produce the lowest construction costs.¹⁵² However, Arlington County planners had focused on the potential to leverage public transportation to catalyze revitalization of the Rosslyn-Ballston Corridor since planning for the regional transportation system began in 1960. As a result, during the interstate negotiations, the county bargained for the rerouting of the planned Metro line away from the interstate highway's median and toward a route directly under the declining Rosslyn-Ballston Corridor.¹⁵³

Arlington planners succeeded in getting their preferred alignment of the Metro line in 1968.¹⁵⁴ As a result of this realignment, opportunities for coordination among transportation, land-use, and development planning were greatly increased.¹⁵⁵ In addition to the realignment of the stations, planners also

sought a high number of stations in order to create a density of stations in the corridor that allowed for easy pedestrian access from and to anywhere in the Rosslyn-Ballston Corridor. Planners focused redevelopment within a quarter-mile walking radius of stations and lobbied for the most stations possible.¹⁵⁶ When leaders in the Georgetown neighborhood of Washington, DC, across the Potomac River from Rosslyn, declined funding for a Metrorail station, Arlington County successfully lobbied for the redirecting of those funds to an additional Rosslyn-Ballston Corridor station, thus enabling the development of the urban village at what is now the Virginia Square station.

Forging a Collaborative Blueprint for Redevelopment Success

In conjunction with seeking the preferred number, spacing, and alignment of public transportation stations, Arlington leaders also conducted extensive outreach efforts to foster consensus and collaboration among community stakeholders that resulted in a “broad set of assumptions and expectations that became the framework for policy” for decades to come.¹⁵⁷ Community meetings and workshops, some sixty in number, enabled the community to have a major role in informing the original policy framework leading up to the adoption of the revised land-use plan and transportation policies that guided the urban village redevelopment of the Rosslyn-Ballston Corridor.¹⁵⁸ Codifying these planning guidelines in the General Land Use Plan (GLUP) and broader Comprehensive Plan created a dependable business environment for developers, a transparent and participatory process for citizens, and an effective operating environment for the County Board and staff.¹⁵⁹

This process exemplified what has come to be known as “The Arlington Way.” Described by current Arlington County Board Chair Mary Hughes Hynes as “inclusive, accessible, respectful, constructive, persistent and purposeful dialogue between government, and those who live here and work here,” the Arlington Way describes a multifaceted process and strategy for engendering collaboration and participation and is pursued as a guiding principle throughout county government initiatives. It continues to be reinvigorated, as demonstrated by the 2012 launch of the

Participation Leadership and Civic Engagement (PLACE) initiative.

Overall, Arlington County leaders forged an early consensus to seek routing of Metro in the Rosslyn-Ballston Corridor with an underground alignment and close station spacing—all factors that worked to privilege pedestrian accessing of the stations—and then steadfastly negotiated for the realization of this vision.¹⁶⁰ At the time, public transportation as a catalyst for redevelopment and orienting plans around pedestrian access were new and largely untested concepts in the U.S.¹⁶¹ Metrorail service between Rosslyn and Ballston began in 1979.¹⁶²

PLANNING FOR SUSTAINABLE TRANSPORTATION IN THE ROSSLYN-BALLSTON CORRIDOR

The wide array of policies and programs utilized in support of the development of the Rosslyn-Ballston Corridor are characterized by three key features that have contributed to Arlington’s success in planning for sustainable transportation:

1. targeted “bull’s eye” zones of mixed-use and high density development centered around public transportation stations, combined with tapering to low density neighborhoods and open spaces;
2. an array of planning and zoning documents that together provide a mutually-reinforcing, coherent, codified blueprint of the planning vision; and
3. coordinated programs and policies to support the development of choices in transportation, housing, and business.

The Bull’s Eye Concept

First, the station area “bull’s-eye” concept is a defining characteristic of the Rosslyn-Ballston Corridor.¹⁶³ The corridor is a two square mile area oriented around five Metrorail stations.¹⁶⁴ In addition to serving as public transportation hubs, the stations also serve as focal points for distinct “urban villages” with mixed land uses and varying emphases on government, educational, retail, and business development that foster a balance of land-uses throughout the corridor. The station areas at Rosslyn and Ballston function as

business centers; the Court House station is a governmental center; the Clarendon station is a retail and nightlife center; and the Virginia Square station focuses on educational and cultural institutions.¹⁶⁵

The Rosslyn-Ballston Corridor public transportation stations are about 1 km to 1.5 km apart so that access to a station is within a ten to fifteen minute walk from anywhere in the corridor.¹⁶⁶ Density around the stations is planned so that the highest intensity development is in the immediate vicinity of the stations, while development density “tapers” down progressively as the distance from a station increases. As a result, “the intensity of development and mix of uses is quite varied by design,” and throughout the corridor there are high-, mid-, and low-rise buildings as well as single-family homes.¹⁶⁷ The result of the “bull’s eye” pattern of development is that in 2010 Arlington had more office space than the downtowns of Dallas, Pittsburgh, or Denver, a public transportation modal split reflective of large European cities, and a concentration of 21 percent of residents on just 8 percent of the land area of the county.¹⁶⁸ The county estimates that the development in the Rosslyn-Ballston Corridor would cover more than 22 square km if built in low-density suburbia.¹⁶⁹

A Blueprint of the Planning Vision

A second defining feature of the Rosslyn-Ballston Corridor is the county’s planning vision that served as a blueprint for the corridor’s development. The key document of this vision is the Arlington County Comprehensive Plan, which is currently comprised of the following documents:

- General Land Use Plan;
- Master Transportation Plan;
- Storm Water Master Plan;
- Water Distribution System Master Plan;
- Sanitary Sewer Collection System Master Plan;
- Recycling Program Implementation Plan and Map;
- Chesapeake Bay Preservation Ordinance and Plan

Ordinance;

- Public Spaces Master Plan; and
- Historic Preservation Master Plan.

In particular, the General Land Use Plan (GLUP), which was first adopted in 1961, has been instrumental in shaping the Rosslyn-Ballston Corridor development. As the main policy guide for development of the county, the GLUP has had a role in establishing “the overall character, extent, and location” of development.¹⁷⁰ Key development concepts employed by the county include concentrating redevelopment around Metro stations, encouraging a mix of land-uses and services around the Metro stations, creating a high quality multimodal built environment along with open spaces, and preserving established residential neighborhoods.¹⁷¹ The GLUP and Comprehensive Plan have been developed through extensive outreach efforts to the community, developers, and other stakeholders.¹⁷² As a result, policy-makers, developers, and community members have been able to work together using a broad and stable understanding that is also conducive to refinements to the planning principles and innovations.¹⁷³

In conjunction with the county-wide GLUP and Comprehensive Plan, Sector Plans outline the overall vision of development around each Metro station, including design standards, public improvements to the streetscape and open space, and locations of various development uses.¹⁷⁴ In addition to the station-specific plans, additional corridor-wide and multi-station plans have been developed to ensure cohesive and consistent development throughout the Rosslyn-Ballston Corridor. These include the Rosslyn-Ballston Corridor Retail Action Plan, the Rosslyn-Ballston Corridor Streetscape Standards, and the Rosslyn to Courthouse Urban Design Study.

A final major component contributing to this overall planning vision outlined for the Rosslyn-Ballston Corridor is the site plan review and approval process. The County’s Planning Commission has a Site Plan Review Subcommittee comprised of county staff from planning, economic development, and public works departments, along with other stakeholders, such as representatives from the business community and

civic associations. Here a concerted effort is made to coordinate site-specific issues together with county-wide goals.¹⁷⁵ Additional commissions, such as the Transportation Commission, have influence on the scope and size of projects as well.

Together, the GLUP, Comprehensive Plan, Sector Plans, and site review and approval processes create a mechanism for constructive engagement among an array of community stakeholders.¹⁷⁶ The result of this multi-faceted body of planning documents and adjoining processes is a blueprint of the planning vision for the corridor that embodies “the Arlington Way” and is at once stable and coherent while also participatory and dynamic.

A Diversity of Opportunities

Finally, a third major feature of the Rosslyn-Ballston Corridor is the coordinated programming and policies that together support diverse transportation, housing, and business opportunities. In terms of transportation, Rosslyn-Ballston Corridor planners leverage public transportation service, pedestrian and bicycle facilities, parking regulations, transportation demand management programs, and marketing in order to encourage and enable use of alternatives to the automobile.¹⁷⁷ The corridor offers a wide array of transportation options that are centered around the five Metro stations. Additional transportation options include local and regional bus service via Metrobus and Arlington Transit, bike-sharing through Capital Bikeshare, and car-sharing through ZipCar.

Arlington planners consider each component in the transportation mix to be a tool that offers new opportunities for addressing transportation needs and challenges. For example, the promotion of a car-sharing program is seen as one tool to support overall “transportation demand management” strategies.¹⁷⁸ This toolbox approach fosters innovation that has materialized in myriad ways, including the county becoming a founding partner of the region’s Capital Bikeshare system and an innovator in public-private partnerships for car-sharing.¹⁷⁹

Supporting the transportation alternatives themselves is a coordinated marketing scheme featuring programs such as BikeArlington, WalkArlington, and

a “Car-Free Diet” campaign that all foster awareness of sustainable transportation at the community level. The transportation marketing messages for the various programs are consistent, often repeated, engaging, and entertaining. This recipe makes Arlington’s alternative transportation options recognizable and appreciated by visitors, long-time residents, and newcomers alike. Overall, Rosslyn-Ballston Corridor policies regarding transportation work in concert with one another and also support the larger policy framework’s consistent theme: the bull’s eye concentration of development around public transportation stations and the utilization of alternatives to automobiles as much as possible.¹⁸⁰ The results in the corridor have been increasing levels of public transportation use, cycling, and walking, together with stable and even declining rates of driving all in light of growth in the level of business activity and residential population.

The Rosslyn-Ballston Corridor also offers a variety of housing options, including high-end condos and rental apartments concentrated in the immediate vicinity of the five Metro stations, mid-rise townhomes and garden apartment complexes, and single family home residential neighborhoods. The GLUP and site plans for each urban village have guided this mix of residential redevelopment. In addition, deliberate policies to preserve and expand the supply of affordable housing have also been put in place, in light of the upward trend of market-rates for rental units caused by the high demand for housing near the five Metro stations. See below for further discussion about Arlington’s challenge with housing affordability.

The opportunities for business are also diverse in the Rosslyn-Ballston Corridor. Arlington County as a whole is “strategically positioned in the center of a robust government-industry-university triangle” and the Rosslyn-Ballston Corridor in particular capitalizes on and contributes to the vitality of the region.¹⁸¹ One measure of this is the corridor’s vacancy rates for office and retail space, which tend to be consistently lower than neighboring jurisdictions and outlying suburban office centers, and on par with those found in the nearby central business district of Washington, DC—even in times of recession.¹⁸² As with housing and transportation, there is a mix of corporate high-rises, government and nonprofit centers, mixed retail

multi-level complexes, and small independent ground-level businesses, with each urban village along the corridor having a distinct emphasis.

The results of policies and processes set forth in the Comprehensive Plan, GLUP, and site plans have enabled this business community to emerge. For example, citizen engagement helped steer a development in Clarendon away from a large retail “box store” and toward the mixed-use retail and residential development known as The Market Common.¹⁸³ Overall, the Rosslyn-Ballston Corridor is successfully attracting development due to its location, transportation system, government services, and stable development review and approval process.¹⁸⁴ Observers have noted the consistent, self-contained, and vibrant character of development projects throughout the corridor, a place one developer noted has “tremendous economic fundamentals in place.”¹⁸⁵

CHALLENGES AND LESSONS FROM THE ROSSLYN-BALLSTON CORRIDOR

Arlington County planners harnessed the public investment of the Metrorail system to reorient the development trajectory of the Rosslyn-Ballston Corridor and their community as a whole, and in general redevelopment in the Rosslyn-Ballston Corridor is perceived to have met or exceeded official goals and expectations.¹⁸⁶ Today, the corridor is recognized as one of the best examples of TOD in the U.S. and is a rare case where a Metrorail line averages more boardings than the estimated number of trips made on the nearby interstate highway. It is estimated that the Rosslyn-Ballston Corridor Metro stations are at least three times more productive than neighboring Interstate 66 on a per lane basis.¹⁸⁷

Key future challenges for the county include affordable housing, historic preservation, the cohesive design of the built environment, and the continued improvement of facilities for pedestrians and bicyclists.¹⁸⁸ Housing affordability in particular is one of the greatest challenges facing the Rosslyn-Ballston Corridor. While several policies are in place to counter market trends toward increasing housing prices and rents, affordable units in some areas have been lost to redevelopment projects.¹⁸⁹ However,

the county has developed several tools to preserve and promote affordable housing. The primary tool is the zoning framework, which provides a variety of incentives for affordable units, including density bonuses and a requirement of one-for-one replacement of affordable units in a designated area called the Special Affordable Housing Protection District.¹⁹⁰ In addition, the county has established a revolving loan fund, the Affordable Housing Investment Fund, which finances affordable housing development in the county.¹⁹¹ While no policies explicitly focus affordable housing near the public transportation stations, the demand for housing near the stations has made affordability a central concern in these areas. As a result, the county’s policies to promote affordable housing have the indirect effect of supporting the affordability of living near the transportation stations.¹⁹² Thus, housing-specific policies have reinforced and supported the bull’s eye policy framework to create a corridor with diverse housing options, ranging from luxury units to affordable (“below market-rate”) units.

Another challenge in the corridor has been the preservation of buildings deemed to have historic significance. Zoning ordinances to address historic preservation concerns were adopted in 1976 and the county also created a Historic Landmark Review Board.¹⁹³ As development in the corridor continues, pressures regarding historic buildings will increase. However, the county has in place a set of policies and processes that should enable the evaluation and preservation of historically significant buildings.

The model developed in Arlington County offers several key lessons:

1. First, public transportation can successfully be leveraged to catalyze redevelopment, and redevelopment can in turn support public transportation use.
2. Second, a coherent planning blueprint that is developed with broad stakeholder participation can engender stable, efficient, and dynamic redevelopment.
3. Third, coordinated policies to promote transportation, housing, and business choices are important to ensuring the long-term success and viability of rede-

velopment projects.

Columbia Pike: Streetcar History, Streetcar Vision¹⁹⁴

Building off the successes achieved in the Rosslyn-Ballston Corridor, Arlington County continues to utilize Transit Oriented Development (TOD) principles. In 2002, the county adopted, and in 2005 updated, a small area plan calling for the revitalization of the aging Columbia Pike Corridor. The plan proposes the use of a new streetcar line to serve as a catalyst for redevelopment as well as to anchor and shape development into distinct nodes with higher density and a mix of land uses along the streetcar line.¹⁹⁵ Figure 18 (page 53) depicts the Columbia Pike planning corridor, including the planned development nodes and significant existing development area.

The Columbia Pike Corridor first began to develop in the early 1900s, and by World War I, a streetcar ran through the corridor. At that time, the built environment exhibited many features supportive of walking, including ground floor retail, closely spaced buildings oriented toward the street, and little surface parking for cars. Following World War I, new development was oriented to support automobile travel. First to appear were retail centers with prominent surface parking. Later came drive-through banks, fast food restaurants, and convenience stores. Much of the original form and spirit of the Pike had been lost. The current plan for Columbia Pike, titled Columbia Pike Initiative: A Revitalization Plan, seeks to turn Columbia Pike into a "Main Street," with a pedestrian orientation and four distinct nodes of activity.¹⁹⁶ In developing the plan, Arlington County has coordinated with neighboring Fairfax County to the west. Collaboration is necessary because a small portion of the defined planning corridor lies on the Fairfax County side of the jurisdictional line. This case study focuses on the Arlington County portion of the plan.

EXISTING CONDITIONS

The Columbia Pike Corridor stretches 5.6 km (3.5 miles).¹⁹⁷ Beyond the eastern end of the planning area are the Pentagon, Pentagon City, and Crystal City. The Pentagon is home to the headquarters of the

U.S. Department of Defense and houses 23,000 employees.¹⁹⁸ Pentagon City is a large retail and dining area with approximately 200 stores and 40 restaurants.¹⁹⁹ Crystal City is a major commercial area with approximately 1 million square meters (11 million square feet) of office space.²⁰⁰ The Metro system serves all three areas and provides service to the Rosslyn-Ballston Corridor and downtown Washington, DC. At the western end of the planning area, and over the county border, lies Bailey's Crossroads, a commercial and retail area with 300,000 square meters (3.2 million square feet) of commercial space and 185,000 square meters (2 million square feet) of retail space.²⁰¹ The majority of the commercial space is concentrated in the Skyline complex, a collection of eight buildings that provides 232,000 square meters (2.5 million square feet) of the total office space in the Baileys Crossroads area.²⁰² Figure 18 (page 53) shows the geographic location of these areas in relation to the Columbia Planning Corridor. Along the Columbia Pike Corridor, the development is a mix of commercial, retail, and residential uses. The commercial and retail development features older shopping centers, motels, office buildings, and restaurants. The residential development mixes older detached homes and garden style apartments with newer condos and townhomes.²⁰³ Residents of the corridor come from over 100 different countries of origin, and while the corridor holds only 38 percent of the county's total population, it holds 57 percent of the county's Hispanic population.²⁰⁴

Private automobiles and buses are currently the main modes of transportation used along the corridor. Private automobiles are the most prominent form of transportation, with the busiest intersections seeing 35,000 car trips per day. Despite running in congested, mixed traffic, local buses serving Columbia Pike carry 11,000²⁰⁵ riders per day, enabling 25 percent of the area population to commute to work by public transportation,²⁰⁶ and making it the most traveled local bus corridor in Virginia.²⁰⁷ Travel by foot and bicycle is difficult because of the lack of adequate facilities. Pedestrians face long distances between signalized crossings and the burden of walking through surface parking lots to get from the sidewalk to store fronts. The Washington and Old Dominion (W & OD) shared-use

path crosses Columbia Pike, but there are no accommodations for cyclists along Columbia Pike. In fact, along Columbia Pike bicyclists must choose between riding along the sidewalk or in the street with mixed traffic, because there are no bike lanes along the corridor.²⁰⁸

COORDINATING TRANSPORTATION AND LAND-USE PLANNING

Proposed Changes to the Transportation System

The county's plan for Columbia Pike calls for a transformation of transportation infrastructure throughout the corridor. The county envisions Columbia Pike as a "Complete Street"—a street that accommodates all modes of transportation, instead of primarily serving auto traffic. In support of this shift, the plan redefines the street, which "now represents the entire public space between building faces, not just a travelway for vehicles. The street is to be shared by pedestrians, bicyclists, public [transportation] riders and drivers."²⁰⁹ The county's method for achieving this goal is to improve pedestrian amenities and to construct a new streetcar line. There has been considerable debate about the routing for cyclists along Columbia Pike. Some have suggested to route cyclists along traffic calmed residential streets parallel to Columbia Pike. However, others argue that this would push cyclists off the Pike.

Arlington County has already begun providing improved pedestrian and bicycle facilities through its "Columbia Pike Multimodal Street Improvements" project. The improvements project will provide wider sidewalks, enhanced pedestrian crossings, bicycle facilities, and street trees along the entire Pike.²¹⁰ The county sees providing better pedestrian amenities as a necessary condition of developing a streetcar along the corridor, because most public transportation trips start or end with a walk trip.

The streetcar is the hallmark transportation improvement planned for Columbia Pike. The streetcar will serve the entire length of the Columbia Pike Corridor within Arlington County and be supplemented by bus service for destinations not within the corridor. The planned streetcar system has undergone numerous revisions. The latest evaluation and acceptance of the

streetcar came in 2012 when the Federal Transit Administration (FTA) conducted an Alternatives Analysis and Environmental Impact Assessment of the streetcar line.²¹¹ The streetcar will run a distance of approximately 8 km (5 miles) and carry an estimated 20,500 riders per day. To improve system performance, the streetcar will rely on off-board fare collection supported by random proof of purchase inspections. This will be the first use in the region of an entirely off-board fare collection system for public transportation other than on Metrorail. Today, all bus riders must purchase one ride fare upon boarding a bus or show a valid pass to the driver. Currently, bus stops are spaced approximately 200 meters apart (one-eighth of a mile). To reduce travel time, future streetcar stops will be spaced at intervals of 400 to 800 meters (one-quarter to one-half mile), resulting in 18 or 19 stops (depending on final alignment decisions). Combined with the supplemental bus service to areas outside of the corridor, there will be a bus or trolley at each stop every 3 minutes during peak hours and 4 minutes during the off-peak. The short headways are a result of the numerous bus lines that will continue to run the entire length of Columbia Pike but serve a different set of end points. However, in contrast to a light rail system with its dedicated right of way, the streetcar will be affected by congestion, because it will run in mixed traffic.²¹² Some critics argue that a dedicated right of way would be necessary to improve future rail public transportation over the current bus-based system.

A new public transportation center near the western terminus will support the new streetcar line. The center will house multiple bus bays and service as a transfer point for multiple service lines. To accommodate multi-modal travel, the center will also provide park-and-ride options and a pickup and drop-off area.²¹³

In total, the project is expected to bring public transportation mode share in the corridor to 45 percent during peak periods and 12 percent throughout the day—a public transportation mode share comparable to the Rosslyn-Ballston Corridor. This projection would almost double the existing public transportation mode share of commuting to work. Also, the project is expected to reduce automobile vehicle kilometers traveled in the region by 26,000 km (16,000

miles).²¹⁴

Funding for capital costs will come from a mix of federal, state, and local sources, while funding for operations and maintenance will come from fare box recovery and state and local funds. The system is estimated to open in 2016. Capital costs, adjusted for inflation, are expected to total \$246 million. Arlington is applying to the federal New Starts / Small Starts program to cover \$74 million (30 percent) of those costs.²¹⁵ The State of Virginia is expected to provide \$34 million (14 percent) to capital costs. The remaining \$138 million (56 percent) would be left for the local governments to cover. Because the project crosses the jurisdictional line dividing Arlington County and Fairfax County, both counties would contribute to the project.²¹⁶

The operating costs are expected to be \$25.5 million in 2016, the first year of operation. The county expects to cover \$7.5 million (29 percent) of the operating costs with passenger fares. The state is anticipated to cover \$3.8 million (15 percent) of the costs, leaving the local jurisdictions to provide \$14.2 million (56 percent) of operating costs.²¹⁷

Changing Land-Use Along Columbia Pike

The plan for Columbia Pike calls for the creation of four mixed-use nodes spaced along the Pike with residential development in between. The nodes themselves will feature the tallest buildings along the corridor, ranging from three to ten stories.²¹⁸ Building heights will be stepped down into the residential areas, which will have a maximum building height of three stories.²¹⁹ Each of the four nodes provides a different environment. The largest of the nodes, the Town Center, will include commercial space and regional retail and be the central point for the community. The Village Center will have a smaller focus and offer commercial space as well as local retail. Even smaller, the Neighborhood Center will feature a community center, park, and neighborhood retail. Last, the Western Gateway will welcome visitors to the corridor and have a residential focus.²²⁰

The proposed changes in land use were enacted through revisions to the county's General Land Use Plan (GLUP) and the creation of a Form Based Code

(FBC). As discussed in the section on the Rosslyn-Ballston Corridor, the GLUP defines the type, location, and densities of commercial, retail, and residential land uses. A FBC focuses less on the use of land and more on the shape or form of buildings on the land.²²¹ "Unlike conventional zoning, form-based codes place a primary emphasis on the design—rather than the use—of buildings and encourage higher density, mixed use development. The physical result is a more pedestrian-friendly community, mimicking the way cities and towns have traditionally developed."²²² The Columbia Pike FBC defines minimum and maximum building heights, allowable distance from the sidewalk to the building front, configuration of windows and doors along the building front, and a number of architectural details. Along with building design, the FBC does limit land use; however, in contrast to traditional zoning ordinances, FBC land-use categories are very broad, allowing office uses, restaurants, shops, and residential uses.²²³ The goal of regulating building design and simultaneously allowing a broad array of uses is to create a space that is attractive to pedestrians. By regulating building design, a physically attractive street space is created. By allowing for mixed use development, a variety of business can spring up in response to market demand.

Economic Development Goals

The plan for Columbia Pike is intended to spur economic development in the corridor. The Environmental Assessment of the streetcar outlines three strategies to achieve this goal.²²⁴ First, the streetcar will reduce travel times and attract higher public transportation ridership. These two effects will increase mobility by decreasing the cost of traveling, both in terms of time and money. The report estimates the value of travel time savings and travel cost savings to be \$4.1 million and \$0.9 million per year, respectively. Second, the streetcar is expected to create a sense of place and thus increase values for property closer to streetcar stops. Higher property values will in turn lead to higher tax revenues. The report estimates the increase in tax revenue to be \$750,000 annually. Third, the streetcar will attract more development to the corridor. The streetcar leads to a sense of place in part because of the permanence associated with installing the physical rail infrastructure. That

predictability is valued by developers who are considering long-term investments.

The county's plan²²⁵ describes several financial incentives designed to spur development in the corridor. These described incentives include reducing upfront development costs, reducing after-development tax costs of certain redevelopment, and using value-capture to pay for public infrastructure within the corridor. In 2002, Arlington created the Columbia Pike Development Fund. To date, the fund has been used to pay for community involvement programs like outreach and charettes.²²⁶ However, the fund was intended to help cover certain development costs. In particular, the fund was intended to cover private developer costs that were spent to improve the public realm, like transportation improvements and land acquisition when that land would be put to public use. The plan calls for the establishment of a partial tax exemption for rehabilitation of commercial buildings. The county adopted the latest version of this partial exemption in 2006.²²⁷ The partial exemption applies to the increase in value from rehabilitations of commercial structures.

Last, in 2002, the county established the Tax Increment Public Infrastructure Fund (TIPIF), a tax increment financing district to capture and reinvest the value of redevelopment along the corridor.²²⁸ The TIPIF establishes a base value for property along Columbia Pike. As redevelopment occurs and property values rise, so do tax revenues. That increase in revenue above the base value is captured in a special fund, the TIPIF. Funds in the TIPIF are used to pay for public infrastructure costs associated with future private developments. Examples of such costs include undergrounding utilities, improving sidewalks, and providing improved bus stop facilities. The benefits of this arrangement are twofold. First, the costs of development are reduced and the public space is improved. Second, by capturing the value of improvements, money invested in the corridor can be reinvested several times over.

Planning to Preserve Social Equity

Recognizing that successful redevelopment can lead to higher housing costs, Arlington County took preemptive measures to preserve affordable housing

in the Columbia Pike Corridor. As part of the revitalization effort, the county developed the Columbia Pike Neighborhoods Area Plan.²²⁹ The plan provides a description of existing conditions with regard to affordable housing conditions and establishes goals for the future of affordable housing. Two of the plan's goals capture the spirit of what Arlington is trying to achieve. The first goal is to retain or replace 100 percent of existing market rate affordable units. The second goal is to provide affordable housing opportunities throughout the Columbia Pike Corridor. These goals reinforce a vision established in the revitalization plan that, "Arlington County is committed to providing to households of all income levels an opportunity to live in safe, decent and affordable housing."²³⁰ Defining affordability, the plan aims to provide rental housing for incomes ranging from as low as 40 percent of the area median income, to as high as 80 percent of the area median. The plan also speaks to affordable ownership opportunities, with a goal of providing ownership opportunities for incomes ranging between 60 percent and 120 percent of the area median income.

Arlington works with private developers to provide affordable housing units. Working through a variety of incentives, Arlington leverages public funds by providing some of the funding needed to develop affordable housing and relies on private developers to fund the rest. The Neighborhoods Area Plan recommends several policies for preserving or replacing affordable housing options in the corridor.

■ **Bonus Densities.** Builders commit to providing more affordable units and in return, the county allows for construction of taller buildings. The resulting increase in revenue for the developer makes it possible to provide more affordable housing units.

■ **Affordable Housing Investment Fund.** A revolving, low interest loan fund. With Arlington County's support, developers can borrow money at below market interest and use the money to develop affordable housing units. Proceeds are rolled back into the fund to provide future lending opportunities for money affordable housing.²³¹

■ **Tax Exemption for Redevelopment and Rehabilitation.** A partial tax exemption is granted to

landlords that improve existing affordable housing units and maintain them as affordable housing units. This is particularly important for older units, because without such a program, there is little incentive for landlords to maintain affordable housing units.

■ **Encourage Energy Efficient Building Design.** Utility costs are part of housing costs. Therefore, decreasing utility costs is another means of increasing affordability. The county wants to encourage low cost measures that improve water and energy efficiency.

Fostering Community Participation

As for the Rosslyn-Ballston Corridor, community input has consistently influenced the planning effort for Columbia Pike (the “Arlington Way”). The redevelopment plan notes that, “[The plan] was a cooperative effort between County staff, the Columbia Pike Revitalization Organization and the residents and business and property owners based in this area.”²³² The Columbia Pike Revitalization Organization (CPRO) has been a key community organizer. Created in 1986, CPRO represents the interests of area business owners, property owners, and civic organizations. CPRO serves an important role by coordinating the interests of the various stakeholder groups and working with county staff.²³³

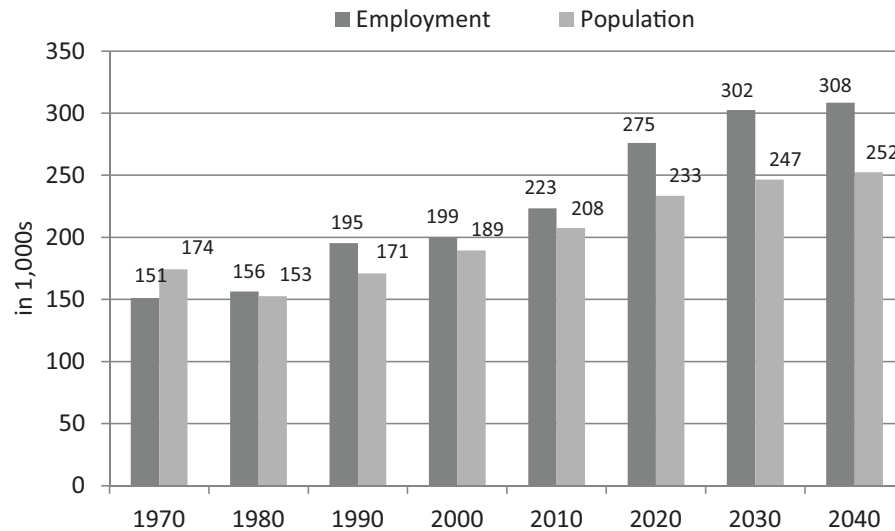
Area citizens actively participated in planning the future look of Columbia Pike. Arlington County hosted a charrette in 2002 to develop design guidelines for future development. Over 700 community residents participated in the seven day event. The results of the charrette were used to create the form-based code that is in effect along the Pike today.

Arlington County involved stakeholders from outside the county as well. Arlington County worked with both Fairfax County and the Washington Metropolitan Area Transit Authority (WMATA) in developing the route for the proposed streetcar. In choosing to work with Fairfax County, Arlington showed a commitment to plan beyond its borders and consider regional needs.

LESSONS LEARNED FROM THE COLUMBIA PIKE CORRIDOR

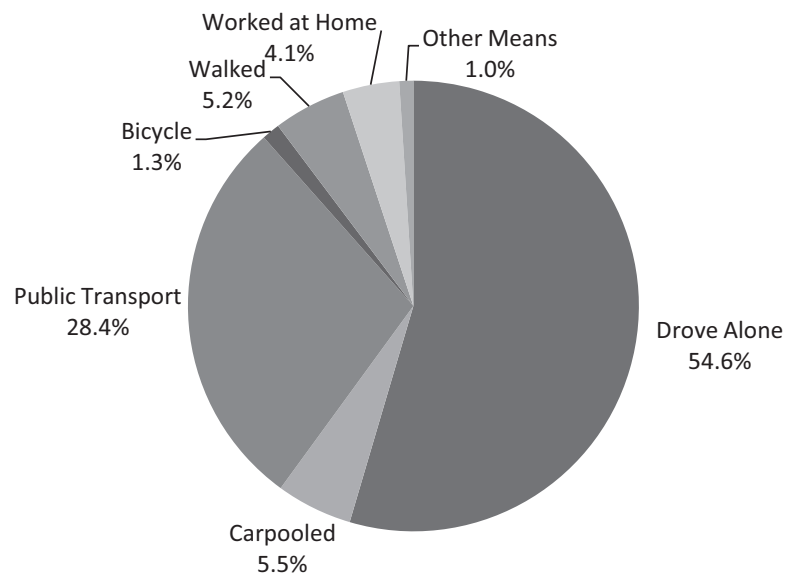
The planning for Columbia Pike provides several lessons regarding sustainable transportation planning. Several of these lessons are applications of good planning practices. First, the plans for the corridor were developed with the input of the existing community. As for planning the Rosslyn-Ballston Corridor, the “Arlington Way” assured a lengthy and involved public participation process. Second, the plan builds on existing community assets. Existing residents already use public transportation heavily, so adding more capacity is a logical next step. Retail and commercial already exist along the corridor; the plan aims to organize those activities. Third, the plan coordinates transportation and land-use planning and uses public transportation as a catalyst for redevelopment. The model of coordinated transportation and land-use planning worked previously in the Rosslyn-Ballston Corridor. Fourth, Arlington worked closely with a neighboring jurisdiction (Fairfax County) to develop and eventually fund a shared transportation resource. In the absence of a stronger regional planning model, agreements and joint projects between neighboring jurisdictions could provide a viable alternative. Finally, plans for Columbia Pike have included policies to preserve and promote affordable housing from the very beginning. Learning from experience along the Rosslyn-Ballston Corridor, Arlington County is striving to maintain affordable housing options throughout the corridor, even as redevelopment projects increase housing costs.

Figure 14: Arlington County Population and Employment: Historic Figures and Forecasts (1970-2040)



Source: Arlington County Profile, Planning Division, 2012, https://www.arlingtonva.us/departments/CPHD/planning/data_maps/profile/file85586.pdf;
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Figure 15: Main Mode to Work for Arlington County Commuters



Source: United States Census Bureau, 2011. American Community Survey. Available Online: <http://www.census.gov/acs>

Figure 16: Arlington County and the Greater Washington D.C. Metropolitan Region (with Rosslyn-Ballston and Columbia Pike Corridors Highlighted)



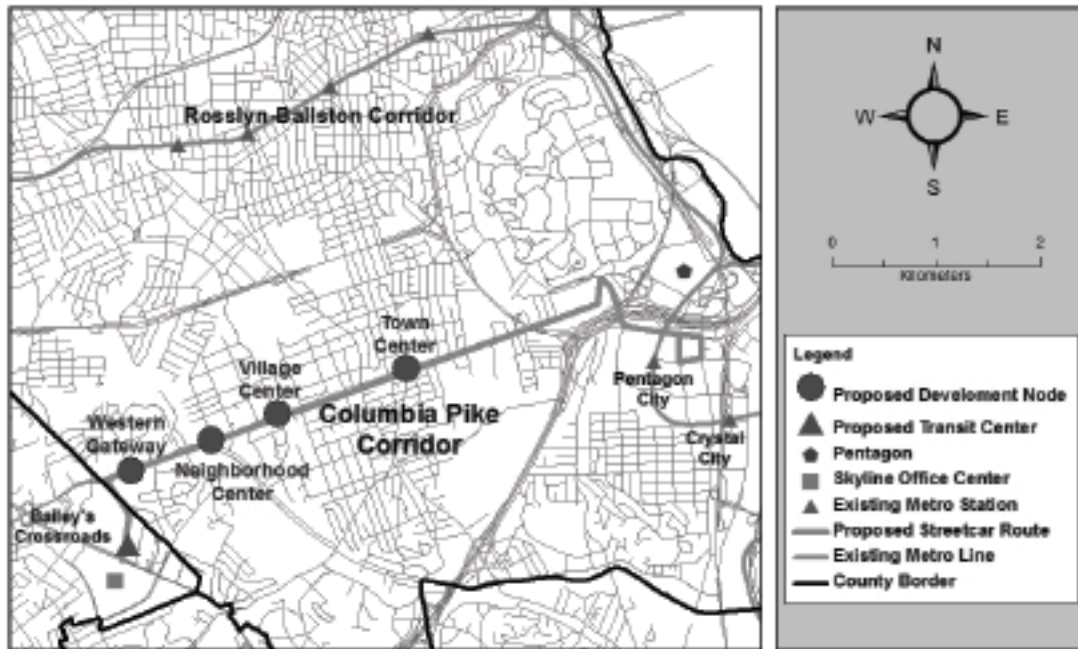
Source: U.S. Department of Transportation, National Transportation Atlas Database, 2011, http://www.bts.gov/publications/national_transportation_atlas_database/2011/.

Figure 17: The “Bull’s Eye” Concept as Envisioned in Early Rosslyn-Ballston Corridor Planning



Source: Dennis Leach, “Meeting Community Sustainability Goals Through Coordinated Development and Transportation Strategies,” Presentation from 15 June 2012.

Figure 18: Map of Proposed Developments in the Columbia Pike Corridor



Source: Created by Paul Stoddard

CONCLUSIONS AND LESSONS FOR GERMANY AND THE U.S.

Even though Germany and the United States have among the highest levels of car ownership in the world, ground passenger transportation in Germany is less car dependent than in the United States. Americans make 85 percent of all trips by automobile compared to 58 percent of trips in Germany. Compared to Americans, Germans are much more likely to walk (24 versus 11 percent of trips), cycle (10 versus 1 percent of trips), or ride public transportation (9 versus 2 percent of trips). Moreover, Americans drive for twice as many kilometers per year as Germans. Walking, cycling, and riding public transportation less and driving for more trips and longer distances makes the U.S. transportation system less sustainable than the German system, when compared along the environment, economic, and social dimensions of sustainability.

The Washington, DC metro and Stuttgart regions mirror the national trends in travel behavior. Compared to the Stuttgart region, the DC metro region has much higher levels of car use (80.6 versus 56.6 percent of trips) and less walking (8.5 versus 21.5 percent), cycling (0.5 versus 7.4 percent), and public transportation (6.1 versus 14.5 percent). Dissimilarities in travel behavior are greater in the DC metro than in the Stuttgart region. For example, the cities of Washington, DC and Stuttgart have almost comparable mode shares of car use (51 percent and 44 percent, respectively). However, outlying suburbs in the DC metro region are much more car dependent than in the Stuttgart region (fewer than 90 percent versus 70 percent of trips by car).

Compared to Germany, U.S. federal, state, and local transportation policies during the last sixty years have been more favorable for the automobile. Since the 1970s, all levels of government in Germany have

implemented policies that increase the monetary and time cost of car travel through higher gasoline taxes, reduced car parking in cities, more expensive car parking, reduced automobile speed limits in neighborhoods (typically <30km/h), and car-free pedestrian only zones. Moreover, German cities and regions have promoted walking, cycling, and public transportation as attractive alternatives to the car.

In the U.S., gasoline taxes are only one-eighth of German levels. Most cities encourage driving with ample and often free car parking. With the exception of large cities, public transportation is rarely a viable alternative to driving outside of the main commute hours and in the peak direction. Additionally, most U.S. municipalities do not provide integrated and connected networks of bike paths and lanes. Some suburban jurisdictions even lack basic pedestrian amenities such as sidewalks or crosswalks.

In both countries, federal, state, and local governments implement policies that influence land use and spatial development. However, in Germany different levels of government coordinate their land-use plans in an interactive process. The same process also prescribes coordination between neighboring jurisdictions and it mandates that spatial planning considers other areas of transportation: water and energy. In the United States, land-use planning remains fragmented across jurisdictional boundaries, uncoordinated between levels of government, and typically not integrated with planning for transportation. Our case study of Arlington County, however, shows a best practice case for coordinating land-use and transportation planning in the United States. The example of Arlington County demonstrates how local governments in the U.S. can successfully integrate transportation and land-use planning. In fact,

Arlington's success highlights the need for coordinating planning for transportation, land use, economic development, and housing, and the importance of stakeholder participation and participatory processes, as exemplified by "The Arlington Way."

Although there are big differences in land-use, transportation planning systems, and the underlying funding mechanism between the two countries, coordinating transportation and land-use planning faces similar challenges in both countries. First, land-use planning in Germany and the United States traditionally separate types of land-uses. This practice is more problematic in the United States, where the separation of land uses is stricter and zones cover larger land areas than in Germany. Strict separation of land uses, including exclusion of apartment buildings, doctor's offices, corner stores, and small businesses from single family residential zones, and larger areas of single use zoning result in longer trip distances in the United States. Long trip distances and the separation of trip origins and destinations necessitate more trips by car in the U.S. because different activities (e.g., shopping, work, leisure) are more dispersed than in Germany. Germany's practice of zoning for smaller land areas and the more flexible zoning code has helped to reduce trip distances and car dependence—even when planners did not explicitly coordinate transportation and land use. In summary, in both countries, transportation should be more explicitly considered when planning for land-use and the other way round.

Second, planning practice and regulations in both countries still foster automobile use. For example, in Germany and the United States most municipalities require minimum parking standards for housing, retail, or office buildings. These parking standards, and the resulting supply of car parking spots, make automobile use more attractive. Car-restrictive and pro walk, bike, and public transportation policies in Germany counterbalance the effect of free car parking to a higher degree than in U.S. cities, where walking, cycling, and public transportation are less attractive. Municipalities in both countries experiment with maximum parking standards or even car-free neighborhoods, but minimum parking requirements are still the norm.

Third, federal and state funding can determine local policy choices. For example, dedicated federal and state funding for roadways in the U.S. has traditionally limited local policies to foster alternatives to the car. Since the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in the early 1990s, municipalities and metropolitan areas have gained more independence to promote walking and cycling using federal (matching) funds. Germany has a longer history of flexible federal, state, and municipal funding for all modes of local transportation, but recent changes in federal transportation regulations threaten this flexible funding source.

Fourth, in both countries the automobile industry plays an important role in the economy and motorist lobbying organizations are strong. This is especially true for the Stuttgart region, home to the car manufacturers Daimler and Porsche, as well as a large number of automotive component suppliers, such as Bosch. Although the automotive industry is increasingly investing in comprehensive mobility solutions (e.g., car2go), their political support for pro-car policies is still strong in both countries.

Fifth, effecting changes in individual behavior as well as land-use and transportation systems takes time. In both countries politicians and residents often emphasize short-term goals. However, the case studies from Arlington and Scharnhauser Park demonstrated that coordinated transportation and land-use planning require long-term strategies that are flexible enough to adapt to changing conditions over time. This suggests that a combination of "muddling-through"²³⁴ and comprehensive planning may be most successful. In the literature this approach is called "perspective incrementalism."²³⁵ This planning approach is at the same time "satisfied with partial success by individual projects, but based on an overall perspective."²³⁶

NOTES

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