



Sustainable Mobility in the Bay Area

The Dutch approach

EXCELLENT CITIES: USING PROVEN DUTCH MOBILITY
STRATEGIES TO CREATE BETTER CITIES

Welcome!





Excellent cities

Cities are growing

Worldwide cities are growing rapidly. In the year 2050 more than 70% of the world's population will be living in cities. Cities and metropolitan regions are the economic engine of countries. Meanwhile cities are facing massive mobility issues. Road-networks are heavily congested, public transport-systems are insufficient and cycling is unsafe. Mobility planning has become a key-factor in a successful further development of our cities. Cities will have to make crucial changes in their mobility planning to be able to adapt to the increasing population in a proper sustainable way.

Our vision: excellent cities using successful mobility planning

Excellent cities are economic vital, attractive, sustainable and social equitable. We believe in the power of mobility planning as a tool in the hand of governments to improve our cities in all these fields. With our program "Excellent Cities" we provide more than 50 years of experience in urban mobility planning for excellent cities in the Netherlands, one of the most populated countries in the world. We understand all aspects of urban mobility in design, effects and tooling but also in actor-involvement, decision-making and engineering. We are three companies, one family: Goudappel Coffeng (consultancy), DAT Mobility (tooling) and Move Mobility (international projects). Founded in 1963 with over 250 mobility-experts.

Purpose driven, integrated and effect-based

- integrated: we think and work with integrated networks. Three mobility networks in our cities are influencing each other and need to be designed in coherent ways: car-networks, crossings and parking, public transport networks and cycling and walking. Urban developments and spatial development interact with these networks.
- purpose-driven: for us mobility is no goal in itself. It aims to improve the economic vitality, the spatial development, the urban quality, the social equity and the environmental impact in our cities.
- evidence-based: we are binding together a quantitative approach using a variety of mobility-data and designing skills of urban mobility-systems on different levels (regional, local). The result is a compelling plan with clear evidence on the effects.



Mobility Challenges in the Bay Area: Setting the Stage

Sustainable mobility is a major topic of discussion in the Bay Area and for good reason. A well-connected transportation network has the power to improve the environment, the economy and our everyday lives.

In the Bay Area, transportation infrastructure has been focused almost entirely around the car. Although the transportation network has played a crucial role in creating the vibrant region we know today, increased congestion and rising CO2 emissions have made it clear that auto-centric planning is unsustainable. The transportation network should instead incorporate the car with all other modes of transportation (walking, biking, and public transit) in order to create a diverse and functional integrated mobility network. A successful integrated mobility network favors no mode over another.

Thus, the network is designed using strategic planning efforts and has infrastructure to support all modes of travel, not only to and from destinations but transfers between networks.

One of the best examples of an integrated mobility network is found in the Netherlands. The Netherlands, specifically in the economic region of the Randstad, is home to a world-renowned transportation system that boasts an efficient regional train network, safe and connected bike infrastructure, and low car modal shares.

As the Bay Area strives to become a more sustainable and transportation efficient region, we should consider what there is to learn from a similar region like the Randstad and how their success could be translated to the Bay Area.

This report provides a broad overview of the transportation challenges the Bay Area faces in the 21st century, the history and transportation planning methods utilized in the Randstad region, and lays out a strategy for translating Dutch transportation concepts to the Bay Area.

“The transportation network should incorporate the car with all other modes of transportation to create a diverse and functional integrated mobility network.”





The Bay Area is one of the most interconnected and economically vibrant regions in the United States. It is comprised of 101 cities within nine counties that surround the San Francisco Bay in northern California. In recent years, the region has been on the forefront of technological innovations, economic success, and academic achievements. This rapid success, however, has brought with it with an onslaught of new mobility challenges to its car-dominated transportation network.

Population and Housing Cost Increase Puts Stress on Transportation Network

One of the biggest challenges the transportation network faces in the upcoming years is population growth. According to the Metropolitan Transportation Commission's (MTC) report "Plan Bay Area 2040", the Bay Area population is expected to grow 33% by 2040. This rise in population will naturally increase the stress on current transportation infrastructure. Currently, public transportation is struggling to keep up with rising demand and major highways have seen a 80% rise in congestion since 2010.

In addition to the rising population, high housing prices in the central business core of the Bay Area (Oakland, San Jose, and San Francisco) are pushing residents farther away from their jobs. The region already has 30% of the workforce commuting to a different county for work, but as residents move further their commutes will become longer and more strenuous.

Not only will these commutes be longer, but will most likely be travelled by car. The most recent American Community Survey showed that over 75% of the workforce drives a car to work, and 65% of residents drive alone. This dependence on the car not only makes the roads more congested but is also a direct contributor to one of the most pressing issues the Bay Area faces: climate change.

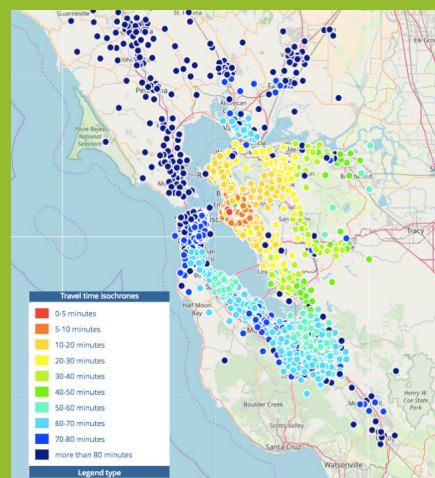
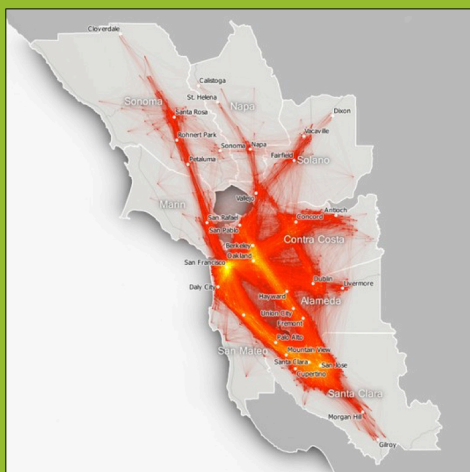
Climate Change

Climate change makes the matters of transportation challenges in the Bay Area urgent. Vehicles are now America's largest producers of CO₂, one of the main contributing factors to rising sea levels.

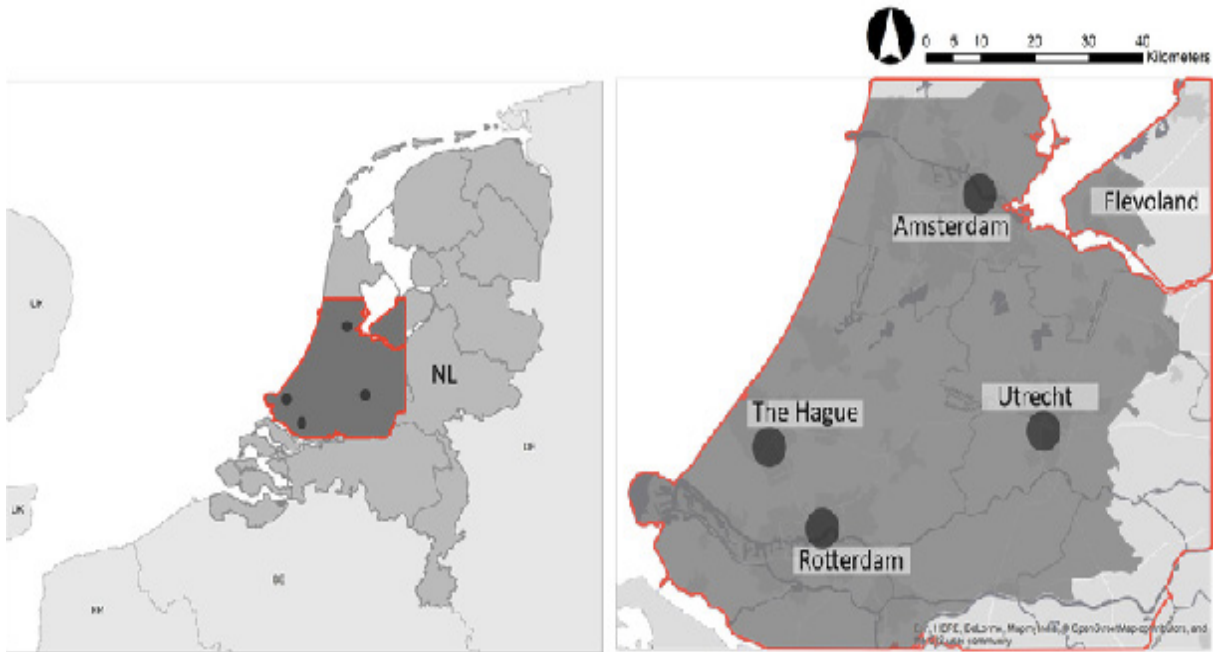
The Bay Area's position next to large bodies of water puts the area at a higher risk when compared to other metropolitan areas. The car-centric network in the Bay Area has proven itself to be unsustainable both from an economic and environmental perspective, but regional commuters are not provided transportation alternatives that would allow them to drive less.

There's a Demand for Change!

The challenges described previously (congestion, longer car commutes, climate change, overcrowding on public transit) demonstrate that not only is there a demand for a multi-modal transportation network in the Bay Area, but that the planning stages for this type of network begin now. As the Bay Area seeks change for its future, it is important to take note of other regions in the world that have been successful in solving many of the challenges that the Bay Area faces today. In this document, we will be focusing on the Randstad region located in the Netherlands.



The commute patterns of the Bay Area (shown on the left) have led to extreme commutes (shown on the right). The map on the right depicts travel time isochrones from the Goudappel MoveMeter tool showing a car commute starting in Downtown Oakland to other cities throughout the Bay Area. How can improving other modes of transportation free up the car network for commuters who may need to drive?

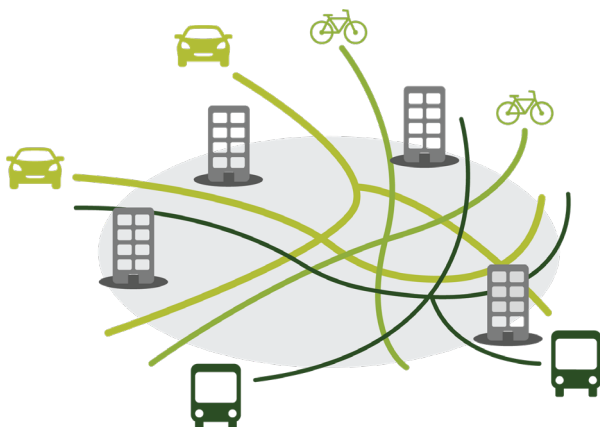


Randstad Sets the Standard

The Randstad, comprised of the area surrounding Amsterdam, The Hague, Utrecht and Rotterdam, is the economic center of the Netherlands. This densely populated region is home to 8.1 million residents and is one of the largest metropolitan regions in Europe. The region is similar to the Bay Area in terms of its size, population, and commuter activity. However, while the Bay Area region struggles to keep its aging transportation system in motion, the Randstad delivers a world-renowned integrated mobility network.

The Randstad ranks number one in the worlds' highest use of cycling (up to 50%). The region also has the worlds safest mobility network, one of the most cost-efficient public transportation systems, and a user-friendly integrated mobility network that provides residents reliable, affordable, and comfortable journeys for all trips and modes of transport.

The following section further elaborates on the similarities and differences between the two regions, including the development of the integrated mobility network, and the transportation strategies that are utilized in Randstad's transportation planning.

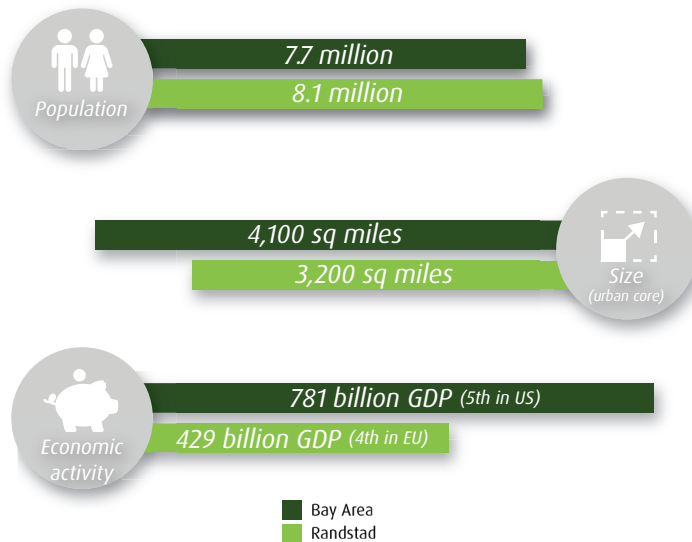


Commute	Distance
Amsterdam - Rotterdam	~ 50 miles
San Francisco - San Jose	
Amsterdam - Utrecht	~ 30 miles
Oakland - Palo Alto	
Rotterdam - The Hague	~ 15 miles
Oakland - San Francisco	



Similarities in Regions

The Randstad and the Bay Area hold much in common. They have similar population, size, and relative economic success. In addition to this, much of the commuting patterns in the Randstad are similar to that in the Bay Area. Many residents live in Rotterdam and commute to Amsterdam in the same way that people live in San Jose and commute to San Francisco (both commutes are approximately 50 miles). Although commuting activity may be similar, the transportation modes for commuters varies between the regions.



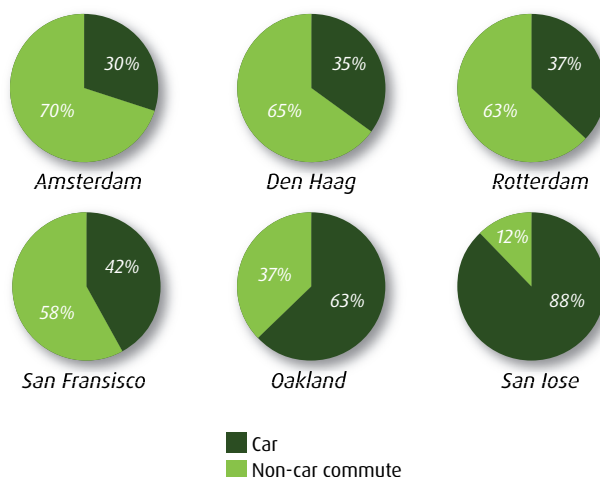
Differences in Mobility

As shown by the graphic to the right, the Dutch have been able to achieve a more balanced modal split in their transportation network. The three largest cities in the Netherlands have an almost even split between cars, transit, and bikes for commuter trips, while the Bay Area is much more dependent on the car.

This balanced modal split in the Randstad can be attributed to an emphasis on integrated transit planning, where transportation networks are planned in unison to provide smooth transfers and multiple options for the entire duration of the trip. In the Randstad, the main goal of transportation planners is to move people, not cars, from point A to point B in the most efficient way possible.

When efficiency is the goal, no mode is favored over the other. Cars are necessary for long commutes that aren't serviced by public transit, public transit is necessary to connect large business districts, and bikes are used for all short trips. Taken together, the transit system functions like a well-oiled machine, and provides the empirical evidence that an integrated mobility network is successful on a large geographic level.

CAR V/S NON-CAR COMMUTE



History of the integrated mobility network in the Netherlands:

In order to examine the integrated mobility network in the Randstad it is first important to understand the history that set the foundation for its successful transportation regional system. Two elements in Dutch history, collaborative planning and the equal emphasis on transit modes, have been essential to creating the world-renowned transit network that exists today.

Collaborative Planning

The foundation for the integrated mobility network in the Netherlands is embedded in the country's history of collaborative planning. Since most of the country is located below sea-level, the Dutch have collaborated and worked together amongst cities and regions to protect their land from water. Their system of intricate dams, levees, and windmills was one of the first examples of successful Dutch collaboration in planning. From then on, this collaborative effort has expanded beyond water-management and into other forms of planning, such as transportation. The collaborative style of planning has led to efficient, user-friendly regional and local transit networks.

An example of collaborative planning in the Netherlands is the integration of land use and transportation planning. In the early 90's the "ABC Location Policy" was developed to find the right accessibility for every facility. Facilities with high numbers of workers and visitors (such as universities, hospitals, civic centers) should be placed near hubs in the transit network (A-location), facilities with high number of

workers and lots of business trips should be placed at locations with good access by car and public transport (B-location) and facilities with low number of workers and higher number of freight traffic (C-location) should be placed near highways. This was also combined with a parking strategy with only 1 parking spot for every ten workers in an A-location and 1 for every 5 workers in a B-location.

Emphasis on all Modes

In addition to the collaborative planning efforts, the formation of an integrated mobility network relies on emphasis of all modes of transportation. In the Netherlands, infrastructure funding has been spread amongst all modes (car, train, bus, ferry, bike, walk etc...) In this sense, the network becomes more about mobility (how one moves freely), rather than how one is transported.

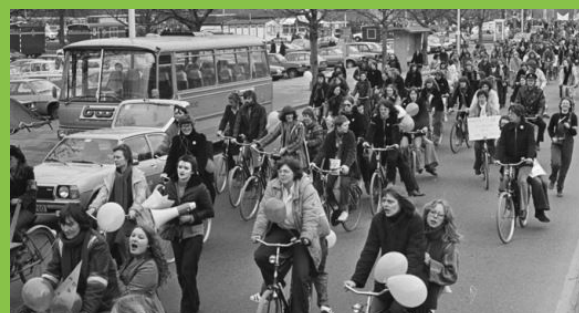
Not only has this led to safe bike lanes and efficient rail networks, but the emphasis on all modes of transportation has led to a system with smooth transfers between networks. Rail stations have adequate parking for both bikes and cars, bus stops can be safely accessed by pedestrians and cyclists, and a single transit card services the entire country. This attention to all modes of transportation, as well as the collaborative efforts in transportation planning, makeup the core of the integrated mobility network in the Netherlands.

History of cycling in the Netherlands

The Dutch have the highest cycling share in the world. Of course, a flat country and a moderate climate helps, but the high share of cycling we have today is mostly due to deliberate policies that originated in the seventies.

After the Second World War the number of people cycling was dropping dramatically as a result of rapid motorization and a disregard for cyclist's safety. This led to massive citizen protests fighting against the restructuring of inner cities to favor the car and the unsustainable nature of the transportation system as a whole. The protests led to a paradigm shift in local transport policy, where the new focus would be to limit growth of car traffic in inner cities and promote sustainable modes of transport: especially cycling.

Specific policies to increase the number of cyclists were aimed at improving cycling infrastructure, designing safe roads, educating young people, implementing traffic calming measures and providing better protection of cyclists by law.



Dutch cyclists take to the streets in protest in the 1970's



A Case Study of an Integrated System at Work: Bicycle Parking at Utrecht Central Station

Approximately 22,000 high-quality bicycle parking places will be realized at the largest transit hub in the Netherlands: in the new Utrecht Central Station area, near the public-transport terminal. These parking places will be divided over five large bicycle parking garages located on the Jaarbeurs side and the side of the city centre, where cyclists park their bicycles at locations close to the station entrances. Parking any closer to the station is impossible.



The bicycle/train combination has a number of major benefits, both for cyclists and the transport system. Combined bike/train journeys have increased tremendously in the Netherlands in recent years due to more people cycling to the station. In 2013, 46% of all journeys to train stations were already made by bicycle. Use of the public transport rental bike scheme has also seen a spectacular increase. These bicycles are mostly used to get from the station to your final destination. Because people are also using the railways more, total growth of the bicycle/train combo has been around 5% a year.

Cycling has expanded the catchment area of train stations in the Netherlands. From the cyclist's perspective, it has brought the train station - or multiple stations in large cities - within easy reach. The larger train stations with many destinations and high-frequency services, in particular, are attracting more and more cyclists. Because the trip to the station has a relatively large impact on the total journey time, the quality of transport before and after the train journey determines the quality of the total trip to a large extent. It also influences whether you decide to go by train or (reluctantly) take the car as your main means of transport. Obviously, the quality of cycle parking plays an important part in the bicycle/train combination.



The multi modal design of the Utrecht Biking garage makes locking and retrieving your bike an easy task

Elements for Mobility Success in the Netherlands:

When putting the collaborative planning efforts and multi-modal system into practice, the Dutch integrated mobility network traces their success back to two strategies: the hierarchy of nodes within the network and the focus on four levels of connectivity. Together these strategies provide the backbone to the integrated mobility network that exists in the Randstad. By analyzing both strategies we can better think about how they may be utilized in the Bay Area.

Hierarchy of Nodes

The leading strategy in the Dutch integrated mobility network is the hierarchy of nodes embedded in the system. The creation of a hierarchy of nodes starts with a simple understanding that not all nodes (any

Transit Nodes in Randstad	Catchment Zone	Travel Distance	Operational Speed	Frequency
International	3 miles	50-100 miles	60 - 90 MPH	1-2x / hr
Regional	2 miles	20-50 miles	50 MPH	2-4x / hr
Metropolitan	1 miles	1-20 miles	15-25 MPH	4-8x / hr
Local	<1 miles	0-1 mile	10-15 MPH	On demand 1-4x / hr

transit stop) in a transportation network are treated as equal. Rather, based off of transit data, nodes are divided into international, regional, metropolitan, and local nodes. These classifications then have a defined set of travel distances, speeds, and frequencies in order to most efficiently connect the system.

In the creation of the hierarchy of nodes, services and funding can be focused to make sure that the most travelled routes have the most frequent service and amenities. The

lower nodes on the hierarchy are then used as a feeder system in order to connect to higher nodes that can bring travellers anywhere in the country. These higher nodes (international, regional and metropolitan), referred to as transit hubs, have a specified "catchment zone", which sets goals for the distance around the node which travellers are expected to access the node. These catchment zones set the geographic boundaries for the *Four Strategies for Connectivity*.

Transit Hubs in the Netherlands

International Nodes:

NL Example: Utrecht Centraal
 Catchment zone: 3 miles
 Daily Boardings: 175,000
 Types of Services: international, intercity, regional rail, regional bus, regional lightrail, local bus
 Bike Parking Spaces: 25,000
 Bay Area Comparisons: Salesforce Transit Center (San Francisco)



Regional Nodes:

NL Example: Haarlem Centraal
 Catchment zone: 2 miles
 Daily Boardings: 38,000
 Types of Services: intercity, regional rail, regional bus, local bus
 Bike Parking Spaces: 5,000
 Bay Area Comparisons: 12th Street Bart (Oakland)



Metropolitan Nodes:

NL Example: Barendrecht
 Catchment zone: 1 miles
 Daily Boardings: 5,000
 Types of Services: regional rail, local transit
 Bike Parking Spaces: 1,500
 Bay Area Comparisons: Concord BART (Concord)





Four Strategies for Connectivity:

The hierarchy of nodes in the Dutch transportation network helps create efficient public transit, but doesn't solely achieve a multi-modal integrated mobility network. The four strategies for connectivity focus the hierarchy of nodes to be accessible by all modes of transportation. Within each catchment zone of the transit hubs, the four strategies of connectivity are utilized to ensure an expansive and equitable network. The four strategies are as follows: Connection between the Node and Development (land use), Connection between Nodes (regional), Connection to the Node (local), Connection within the Node (as a destination).

Connection between the Node and Development (land use):

How does the planning organization prioritize and develop nodes?

Once the nodes have been prioritized in a hierarchy, development within the catchment zone of the transit hubs is necessary to ensure the proper densities needed to supply the various levels of hubs and their frequencies.

Connection between Nodes (regional):

How does the region access the node?

This strategy focuses on the frequencies and quality of transit between the Regional Hubs within the system. As stated before, the Randstad has a high number of commuters that require daily travel between cities. Ensuring that the travel times and quality is competitive to that of a car is important to incentivize those within the catchment zone of each hub to use it for their travel needs.

Connection to the Nodes (local):

How does the city access the node?

This strategy emphasizes the importance of first and last mile within the catchment zones of the hubs. By allowing safe, efficient, and connected travel for both cyclists and pedestrians, residents of the Randstad are able to rely on the integrated mobility network to provide infrastructure for the entire journey from door to door.

Connection within the Node (as a destination):

How does the individual experience the node?

Connection to the Node as a destination is all about user-experience at the transit hubs. This means that there is adequate parking for both bikes and cars, sign-age is easy to understand, and the space is designed in a way to provide a pleasant experience. Amenities such as food, cafés, and stores attract commuters to stay and experience the transit hub as a pleasant destination. Within the hubs, having mobility services at hand (bike share, ride share, etc.) allows for seamless transfers onto the local networks.

TOD Development in Utrecht:

The City of Utrecht wants inner-city densification to contribute to a healthy future for the city, in which economic vitality, tourist appeal, cultural vitality, quality of life, safety, and sustainability in districts and neighbourhoods are interlinked ("Healthy Urban Living").



In order to achieve this, the total use of space for mobility at the same level despite the increasing population, it is necessary for people to opt more for space-efficient forms of mobility (walking, cycling, and public transport). Utrecht makes this concrete by developing a new inner-urban development location for 6000 to 9000 new homes. This is intended to be a complete neighbourhood and a show-piece of healthy and sustainable living and mobility solutions.

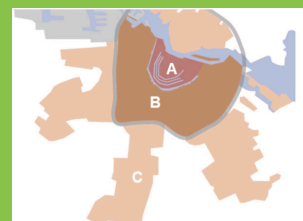
2040 Netherlands Rail Plan

The Dutch government has identified the main economic hubs located in the Netherlands and have committed to increase speeds and frequencies between these hubs. By 2040, the goal is to have all of the regional and international hubs connected that can offer faster speeds center to center compared to the car.



ABC Zoning

ABC Zoning is a concept in which the location (zone) determines the mobility arrangement. It defines the way that multi-modality is approached in the urban space. This concept was successfully introduced in Utrecht, Netherlands and has become a part of the urban strategy in other Dutch cities.



OV Fiets

OV-Fiets is the Dutch bike share system that is operated by the Dutch Railway NS. The bike share system is fully integrated with the rail network and is designed as a quick and easy solution for the first and last mile of trips. OV-Fiets stations are located within the train stations themselves and can be accessed with the users transit card. The bikes are rented at €3.85 (\$4.40)



for 24 hours and allow travellers convenient door to door service at a competitive price.

Creating an Integrated Mobility Network in the Bay Area

Now that we understand the history and strategy of the Randstad's integrated mobility network, what steps can the Bay Area take to utilize the Dutch approach? First, we would want to consider utilizing as much current infrastructure, in both housing and transportation, as possible. The Dutch strategies that have been explained in the sections above do not necessarily require massive investment in transportation infrastructure, but can help reorganize priorities and existing infrastructure to better promote a multi-modal system.

The following section provides an example of how Dutch transportation strategies could be utilized in the Bay Area. Ultimately, this framework should be re-worked to fit the needs of your specific city and experiences as a planner in the Bay Area.

Hierarchy of Nodes in the Bay Area

To create a hierarchy of nodes in the Bay Area, various datasets were layered on top of each other and weighted in order to locate the most important nodes within the Bay Area transportation system (for weekday commutes). The layers used to calculate the hierarchy of nodes are as follows:

1. Population Density (2015 American Community Survey)
2. Employment Density (2015 American Community Survey)
3. Current Transit Infrastructure (MTC Open Data)
4. Top Destinations for Trips (2015 MTC Traffic Modal One)

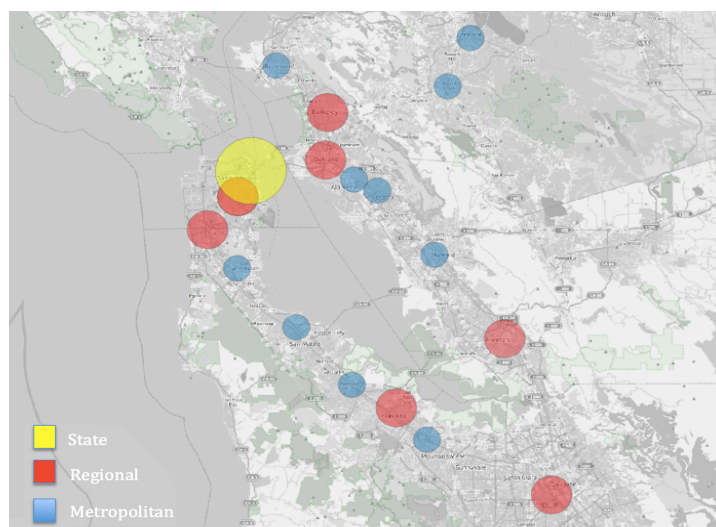
Results

The result of the layered maps highlight the most heavily-trafficked and geographically important transit hubs for commuters. Based on their weighted value, the transit hubs were classified into the same hierarchy of nodes and respective catchment zones as found in the Netherlands (international, regional, and metropolitan). Of course, since we are dealing with different geographies, the 'International Hub' in the Dutch context is translated to a 'State Hub' in the Bay Area. This calculation and classification resulted in the following map showing the hierarchy of nodes for the Bay Area.

By creating this hierarchy of nodes for the Bay Area, we are able to focus our approach for our integrated mobility network while using current transit infrastructure. Combined, these transit hubs and their catchment zones make up only 5% of the land area, but include 51% of the jobs in the Bay Area.

These hubs represent the commuter network that exists in the Bay Area, and despite living close to transit, 69% of residents who live in these specified hubs commute to work by car. While the car is an important part of any transportation system, it is not necessarily the most efficient way of getting from point A to point B. It can be assumed that for commutes that originate within one of these transit hubs would be more efficient to use a non-auto mode of transit.

As we have learned from the Netherlands, the integrated mobility network has led to car commute percentages in the 30's (Amsterdam - 30%, The Hague - 35%, Rotterdam - 37%). Knowing that these percentages are possible for a region similar to the Bay Area, it is our recommendation that these Bay Area Transit Hubs set a goal of 30% car commuters within each catchment zone.





How do we achieve 30% Goal in Bay Area?

By focusing on the four strategies of connectivity to create an integrated mobility network!

The four strategies of connectivity are the key to the Randstad’s integrated mobility network and should be the primary framework for achieving 30% car commuters at car commuter transit hubs. Ultimately, by considering all four strategies of connectivity, the transportation network will be designed in a way that commuters can safely, efficiently, and reliably travel from door-to-door, thus creating an integrated mobility network.

In addition, by focusing on these strategies of connectivity, transportation planners can bypass ineffective collaborative planning on the regional level (which has historically been an issue in the Bay Area) and instead prepare their local transit hubs to be best accessed by the regional population.

The following are examples of each of the strategies of connectivity in the Bay Area. For each strategy a goal is recommended to achieve 30% car-commuters in each transit hub. Ultimately, these strategies will be best transferred into the context of the Bay Area by planners in their respective cities.

Four Strategies of Connectivity in the Bay	Goals
 <p>Connection between the Node and Development (land use): Use current transit data and infrastructure to develop a hierarchy of nodes and prioritize development</p>	<p>Build 60% of new dwellings within walking distance to major transit hubs (in accordance to a regional hierarchy)</p>
 <p>Connection between Nodes (regional): Increase frequencies and travel speeds of public transit between transit hubs</p>	<p>Average Operation Speed for Service Between Hubs: State Hubs: 60 - 90 MPH Regional Hubs: 50 MPH</p>
 <p>Connection to the Nodes (local): Improve first and last mile connections via walking, bike, and transit in the catchment zones of hubs</p>	<ul style="list-style-type: none"> - Metropolitan Hubs: 15 - 25 MPH Reduce Short Car Trips (0-1 Mile) by 50% and replace by bike, walking or transit - Reduce Mid Range Car Trips (1-4 miles) by 30% and replace by bike, walking or transit
 <p>Connection within Node (as a destination): Improve the node as a destination and provide adequate mobility services</p>	<p>Fund all transit hubs to have adequate bike parking facilities, mobility services (bike share, ride share, etc.) and food amenities and other daily services need. Conduct bi-annual surveys about services users would like at hubs</p>

How Would Achieving These Goals Impact the Bay Area?

Results From the MoveMeter

The MoveMeter is a tool designed and utilized by Goudappel Coffeng that helps illustrate the effects of transportation policy. In the case of the Bay Area, using data from MTC's 2015 Traffic Model One, we can simulate the results on the car network if the Bay Area met the goals outlined by the Dutch approach. The goals that were input into the MoveMeter are as follows:

Regional Goals:

Improved frequencies and speeds of Regional Transit within the integrated mobility strategy has led to 30% Car usage of people within the catchment zone of a transit hub

Local Goals:

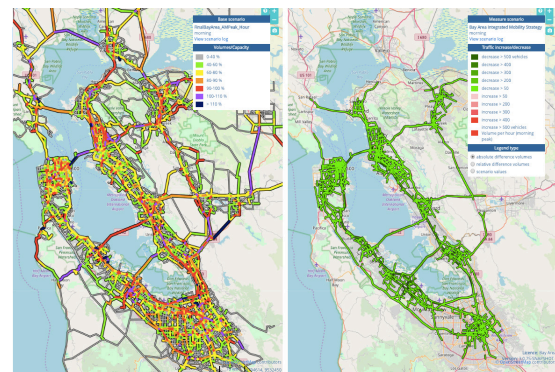
Improved Local Transit/Bike Facilities means that in each hub:

Trips 0-1 mile: 50% of drivers use another form of transportation

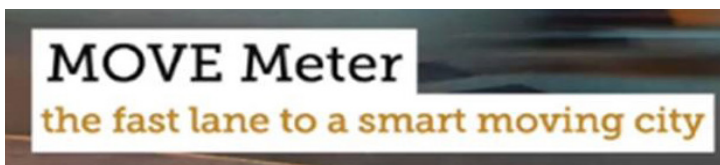
Trips 1-4 mile : 30% of drivers use another form of transportation

When combined these goals will bring the following annual benefits to the Bay Area:

- 900 million less KM travelled by Car
- 225,000 metric tons CO2 reduced (10% reduction)
- 15% Less Car Commuters (Regional Mode Shift)



MoveMeter results highlighting the current congestion (left) and the decrease in congestion (right) that an integrated mobility strategy would bring to the Bay Area during the morning commute



WHAT?

The MOVE Meter is an online tool for analyzing, planning and scenario-building in urban development. It gives online insight into the effects of policy in mobility, traffic and environmental planning. The tool provides data visualization in a quick (10-15 minutes per scenario) and easy-to-use manner for non-traffic experts. The tool also provides sufficient information to finalize choices for measures on a strategic level.

HOW?

The MOVE Meter makes use of the enormous potential of existing data and 'big data' sources (e.g. GPS, GSM, HERE data, traffic information). The tool provides spatial, mobility, and environmental indicators in order to monitor, evaluate, score, and judge scenarios. Due to its GIS/internet applicability, it is capable of assessing and evaluating scenarios without detailed knowledge of transportation modelling software or other mobility data-handling tools and the results are instantly available.

WHO?

The MOVE Meter is useful for a wide range of experts and professionals:

- For consultants, (civil) experts and decision makers in mobility, traffic, and urban planning.
- For local, regional, and national governments.
- For professionals and experts in related fields e.g. safety services, police, city marketing, event planners, outdoor advertising, etc.

WHERE?

The MOVE Meter is designed for use in urban areas and is widely used in the Netherlands to support the decision making processes for urban mobility systems. The tool has also been used in urban areas in other countries such as Denmark, Germany, Uganda, Mexico, South Africa, and the USA.



Conclusion

As shown by the rising congestion, increasing commute times, and threat of climate change, the car-centric Bay Area is ready for a change in its transportation network. While these challenges may seem daunting, they also present an opportunity for cities to reclaim their streets for their residents. As residents grow more frustrated with the car-network they will begin to demand better mobility alternatives and an integrated mobility network sets up the framework to deal with this demand.

While there may be no quick and easy solution, the Randstad at least proves that a mobility network can operate reliably, comfortably, and inexpensively at the regional level.

With that being said, a copy-and-paste Randstad/Bay Area solution is unrealistic. Only by breaking down the history and framework of the integrated mobility network in the Randstad can we begin to think about what elements might be transferable.

Just as the Dutch once had to learn to collectively plan for high water levels, the Bay Area can use rising sea level as a collective call to action. Thinking as a collaborative, cooperative region allows cities to create a regional hierarchy and set goals that make regional travel time competitive to that of a car. In doing so cities will then need to think about how to best concentrate development around current transportation infrastructure in their cities and then target first and

last mile efforts in the identified catchment zone of the hub. The final step is to fund each transit hub so they can be treated as a destination, where travellers can enjoy a cup of coffee, or easily find a non-auto connection to complete the last leg of their journey.

If this strategy is carried out on both a local and regional level, utilizing as much current infrastructure as possible, the Bay Area could begin to address its most immediate transportation challenges. Not only will an integrated mobility network achieve less congestion and less pollution, but will create a more sustainable Bay Area to support future growth where residents can move more freely no matter where they live.





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