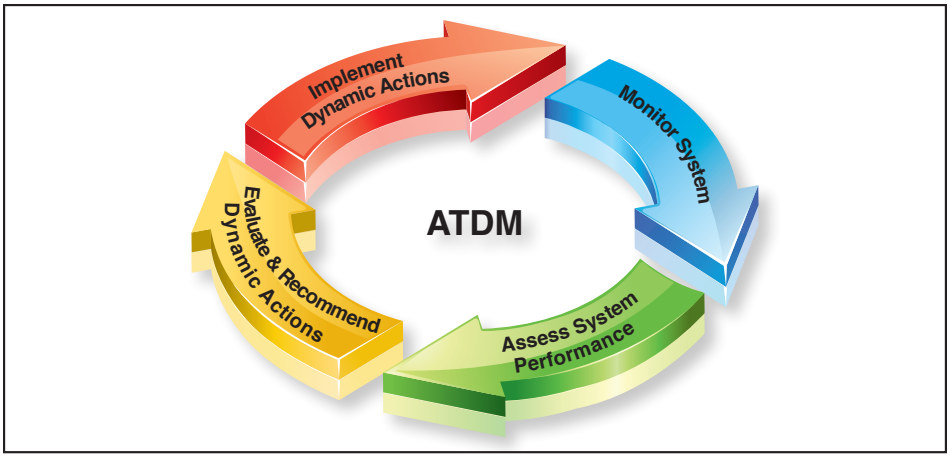
Active Transportation and Demand Management

U.S. Department of Transportation
Federal Highway Administration

ATDM Program Brief: The International Influence on ATDM in the United States

What is Active Transportation Demand Management (ATDM)?

ATDM is the dynamic management, control, and influence of travel demand, traffic demand, and traffic flow of transportation facilities. Through the use of available tools and assets, traffic flow is managed and traveler behavior is influenced in real-time to achieve operational objectives, such as preventing or delaying breakdown conditions, improving safety, promoting sustainable travel modes, reducing emissions, or maximizing system efficiency. Under an ATDM approach, the transportation system is continuously monitored. Using archived data and or/predictive methods, actions are performed in real-time to achieve or maintain system performance.



Purpose of the brief

Active management of transportation and demand can include multiple approaches spanning demand management, traffic management, parking management, and efficient utilization of other transportation modes and assets.

This Informational Brief provides an overview of the origins and the evolution of active management concepts in Europe and elsewhere and how this international experience is influencing the evolving ATDM program in the United States.

The International Experience — Antecedents and Evolution

The antecedents of the ATDM program in the United States emerge from international experience with active traffic management on key highways as well as observing how travel demand management and traffic management are more closely integrated in some other countries.

Active Traffic Management

In 1995, the UK Highways Agency in England began to actively manage traffic via variable speed limits. In 2002, full Active Traffic Management (ATM) was installed on the M42 near Birmingham and this project has become the most widely-cited example of ATM. The focus of ATM is to reduce bottlenecks and traffic perturbations, by utilizing hard shoulder running during peak flows, ramp metering, variable speed limits, dynamic lane control, detecting and clearing incidents quickly and improved real-time traffic information.

Since 2002, similar projects have been implemented in the UK under the banner of the "Managed Motorways." ATM has most recently been planned and implemented in Scotland, Australia, and New Zealand, using the experience of the Highways Agency and its consultants. For example in Australia, the Queensland Department of Transport and Main Roads Western Australia is planning to progressively implement ATM across facilities in south-east Queensland, integrating coordinated ramp metering strategies, lane use management, variable speed limits, dynamic message

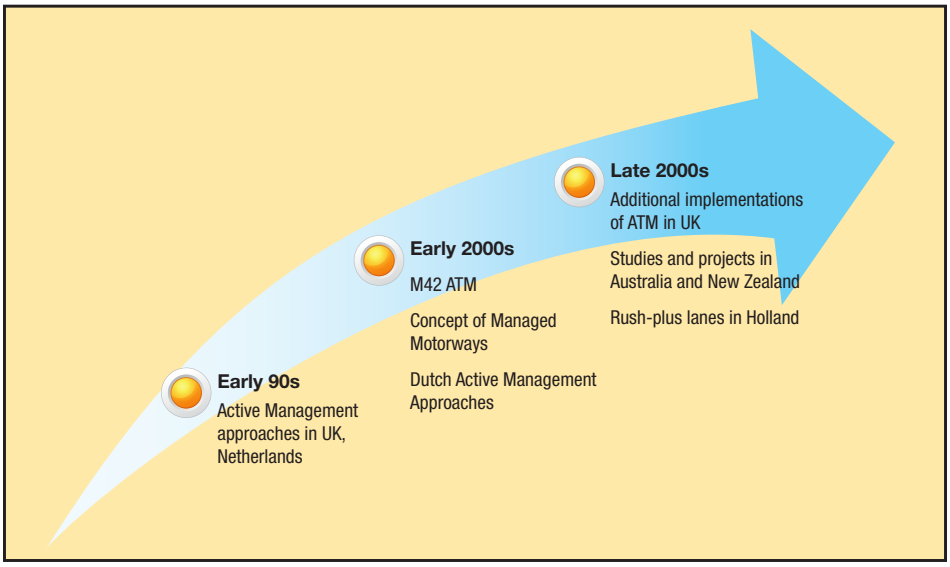


Figure 1. International ATM evolution.

signs, improved incident detection, fixed speed enforcement cameras, priority access for high occupancy vehicles and freight interchange controls and queue management.

Similarly, the Dutch Ministry of Transport has been implementing active traffic management since the early 1990s. The current Dutch transport policy is aimed at network optimization, and actively manages the system to reduce structural congestion (recurring) and nuisance congestion (non-recurring). The Dutch have employed aspects of ATM for some time, starting with variable speed limits and 119 dynamic route information panels (DRIPs), or variable message signs with travel times for parallel routing. More recently, the Dutch have employed 16 "rush hour lanes," using the hard shoulder and reducing speeds during heavily congested periods.

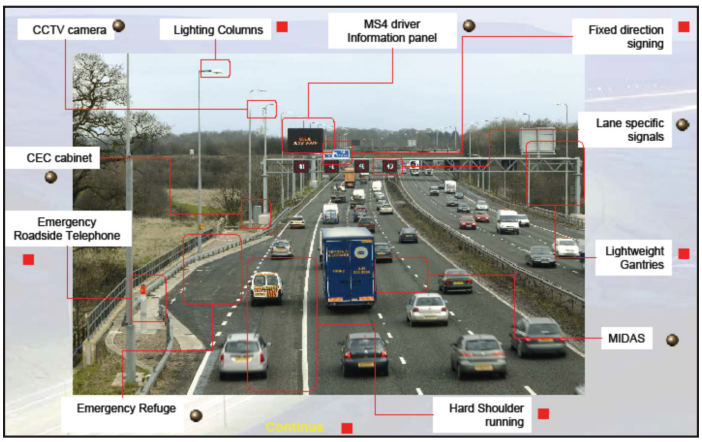
ATM planners in Europe and elsewhere now use a diverse and flexible set of tools to manage their facilities. Commonly used strategies as part of ATM implementations include:

- **Variable Speed Limits —** adjusting speeds in response to or in anticipation to conditions upstream
- **Hard Shoulder Running —** operating shoulders as travel lanes for additional temporary capacity
- **Dynamic Merge Control —** controlling merge behavior and lane utilization on mainline and ramps using lane control signs
- **Adaptive Ramp Metering —** metering of the entire facility and coordination with adjacent signal networks
- **Queue warning and traveler information —** providing travelers with queue, congestion and incident warnings on side-mounted or overhead message signs

As the UK, the Netherlands and other countries implement these strategies, they have had to consider revising or adapting their design standards for shoulder functionality, street lighting, signage, lane widths, emergency breakdown areas and junction design. More broadly, the adoption of ATM tools has pushed agencies toward a more performance- or risk-based approach to design. On an actively managed roadway, the needs and solutions may differ from a traditionally managed facility. Given that many of these projects were pilots, agencies typically undertook extensive feasibility studies to analyze, model and determine appropriate selection of tools based on the problem and the roadway geometry.

Dynamic Route Information Panels (DRIPs) in Netherlands. Source: Robert Hull

The benefits of these ATM strategies, especially variable speed limits, have been reported as: compliant drive behavior, improved vehicle throughput, travel time reliability, improved safety (especially during inclement weather) and reduced emissions. A 3-year safety review of M-42 highlighted a reduction in the number and severity of personal injury crashes when the ATM operational regimes were in effect.



Active Traffic Management on M42. Source: UK Highways Agency

Consideration of Demand Management as Part of Transportation Operations

As ATM tools continue to be applied in Europe, both the Dutch Ministry for Transport and the UK Department of Transport recognized that ATM addresses only part of the congestion problem and that there is a parallel and complimentary need to manage the demand on the transportation system.

The Dutch model of travel demand and traffic management involves a three-stage process that recognizes the difference between travel demand management and traffic management and places these concepts into a larger framework of travel choices and congestion-reduction techniques. As shown in Figure 2, the process begins with the consideration of overall travel demand and moves through traffic demand and network demand. Through both traffic and travel demand management strategies, the framework shows how travelers can be provided choices across mode, destination, route, and time.

The framework brings a greater consideration of demand management strategies as a day-to-day operational approach. Branded often under the "Mobility Management" umbrella, demand management approaches provide travelers with smarter multimodal choices in their travel.

Of particular interest in Europe were new partnerships, financial incentives, and access management to affect day-to-day decision-making by the traveler. Enabled by the connectivity offered by wireless technology, today, in many of the corridors receiving ATM treatment, the British and Dutch emphasize

demand management as well to redistribute travel demand to less congested time periods, routes, and shifting of travelers to non-auto modes, such as public transport.

For example, the Dutch have been piloting the concept of Rush Hour Avoidance, which pays commuters for staying off congested facilities at peak times. This involved piloting an incentive program to induce travelers to avoid the A12 motorway between Zoetermeer and The Hague during the rush hour period of 7:30 to 9:30 a.m. Participants were offered a financial incentive of about US $4 per day (or, alternatively, a chance to win a smart phone) to avoid traveling on the facility during this time. Cars were fitted with transponders to record where and when participants traveled. The number of participants traveling during the peak congested hours was halved during the experiment. While some who avoided the peak hours shifted to carpools, transit, and cycling (the opening of a new rail service in the corridor was delayed), the greatest proportion simply shifted the hours they traveled, most to before 7:30 a.m. The success of the experiment is now being replicated on another stretch of the A12 to Gouda. Even public transit operators are using the program to shift riders outside the overburdened peak period.

Similarly, a recent U.K program called Integrated Demand Management, sought to bring both demand-side strategies as well as ATM into a common approach to improving mobility and safety on a facility.

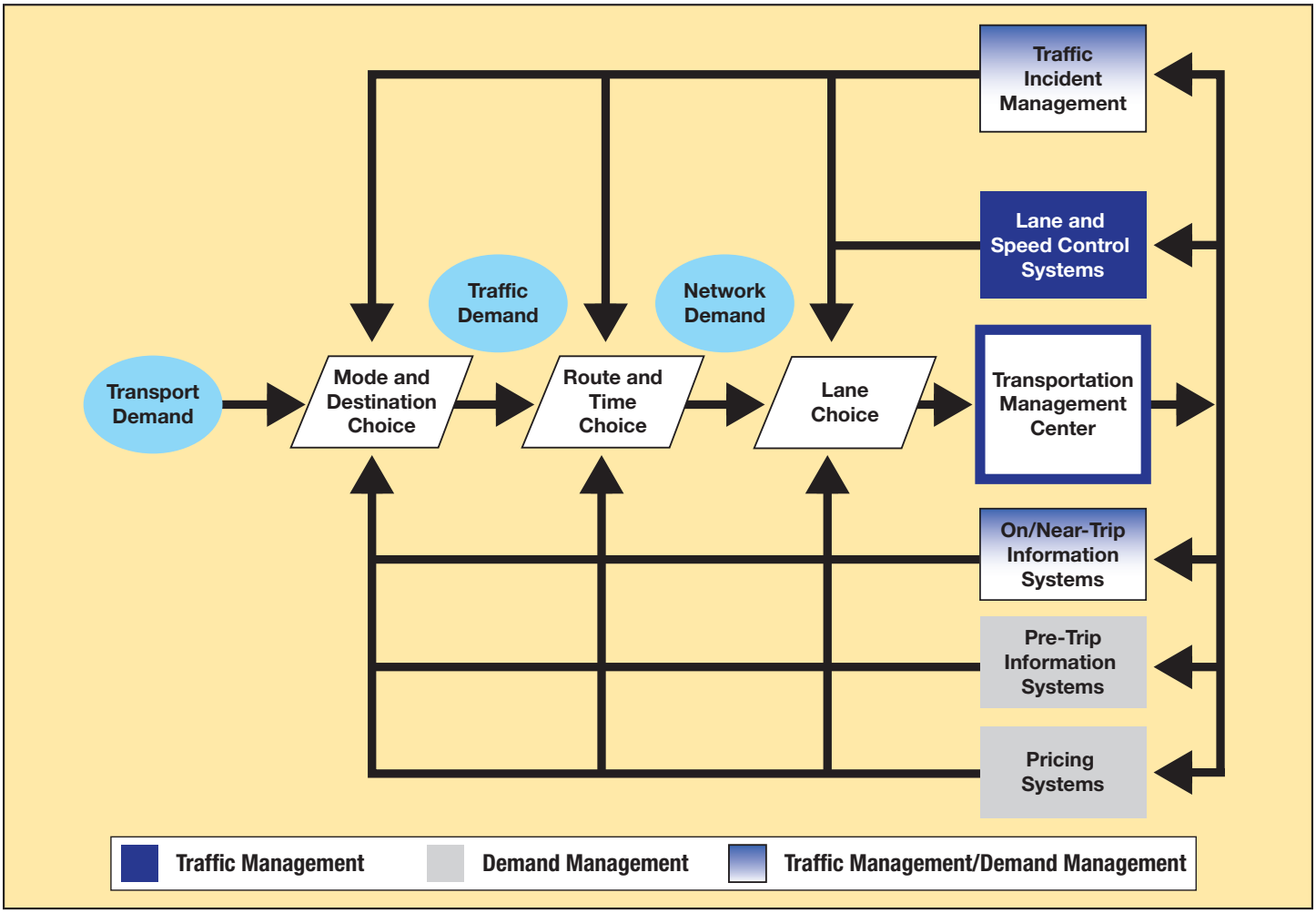


Figure 2. Modified Dutch model of travel demand and traffic management. Source: FHWA, Managing Travel Demand: Applying European Perspectives to US Practice, May 2006

Influence of International Applications on the U.S. ATDM Program

These international experiences have provided the impetus for the development of an ATDM program in the U.S., drawing from the three technical exchanges between U.S. and European transportation professionals in 2005, 2006, and 2011.[1]

The ATDM program has been adapted to meet the needs of the stakeholders in the U.S. The following table highlights the key influences from Europe and how they shape the ATDM program in the U.S.

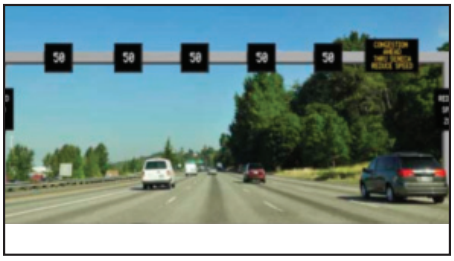
[1] *Managing Travel Demand: Applying European Perspectives to US Practice,* May 2006 (FHWA-PL-06-015)*; Active Traffic Management: The Next Step in Congestion Management,* March 2007 (FHWA-PL-07-012)*; Freeway Geometric Design for Active Traffic Management in Europe,* March 2011 (FHWA-PL-11-004)

ATDM Program Brief: The International Influence on ATDM in the United States

Influences from Europe	Adaptation to the U.S. Environment	Key Thrusts of the ATDM Program
Active management as a tactical philosophy	Through the international scans, the value of being more proactive and dynamic in overall operations was noted. Current operations in the U.S. can benefit from such a shift.	Focus on increasing U.S. operating agency's capability to actively manage their facilities, maximizing the use of data, performance assessment and continuous improvement.
Use of ATM strategies to manage motorways	Many of the ATM strategies are of interest in the U.S. Several have been tried in isolation or as part of pilots here.	Continue to promote adoption of ATM strategies, elaborating on how they can be used in the U.S. environment. Focus on a wide range of tools and a wide range of application settings ranging from spot-specific deployments to synergistic large-scale ATM.
Moving toward a performance- or risk-based approach to design for ATM	ATM strategies need to be adapted to the U.S. environment focusing on the unique challenges faced by agencies in design, operations, maintenance and enforcement.	Specific focus is on how the ATM strategies used in Europe can be adapted to U.S. facilities including appropriate design, operations and maintenance, safety, and institutional considerations. A key aspect of the ATDM program involves the sharing of best practices and the development of guidance and technical support to help agencies evaluate and implement ATM in their regions.
Consideration of TDM strategies as part of traffic operations	Traditional TDM is well established in the U.S. In fact, some areas such as carpooling have a long and storied history in the U.S., more so than in Europe. However, traditional TDM approaches have focused on long-term behavior changes. Examples from Europe point to a more operational use of TDM to influence day-to-day travel behavior via incentives, partnerships and traveler information for a wider variety of applications.	The ATDM program in the U.S. supports the development and adoption of active or dynamic approaches to manage demand, especially for short-term travel behavior modifications. While traditional TDM will continue to play an important role, the ATDM program is focused on strategies that involve influencing travel choices in an active manner.

The ATDM program in the U.S. continues to emphasize the focus on active traffic management pioneered in Europe. Active traffic management is a tactical approach to operating systems programs and technologies differently and focusing on applying more hands-on and dynamic approaches through real-time and predictive data analyses.

The program aims to increase the overall capability of agencies to actively manage their facilities maximizing their use of existing investments in infrastructure and data.



SF Park Parking Information Sign. Source: SF.Streets Blog

Early instances of active management have focused on freeway facilities in the U.S. ATM implementations in Seattle and Minneapolis have directly benefited from European examples and various new deployments are currently in planning stages. There is great interest from the transportation community in deploying some of the strategies seen in Europe. The program seeks to provide technical guidance and support to encourage adoption of such strategies as appropriate.

Additionally, the U.S. ATDM program champions the consideration of active demand management strategies emphasizing choices along the traveler's trip. Through home-grown concepts such as Integrated Corridor Management (ICM) projects in San Diego and Dallas, and innovative TDM technology trials (such as dynamic ride-sharing, parking pricing) throughout the U.S., the ATDM program in the U.S. has taken on a multimodal flavor involving a larger group of stakeholders in the U.S.

ATDM Project Informational Briefs

This informational brief is one of the ATDM briefs in the Program category of the FHWA ATDM Briefs Series. ATDM briefs are or will be available in the categories of:

- ATDM Program Yellow
- ATDM Planning Purple
- ATDM Analysis Orange
- ATDM Design Green
- ATDM Operations Red

For more information:

Bob Sheehan
Robert.Sheehan@dot.gov
(202) 366-6817

James Colyar
James.Colyar@dot.gov
(360) 753-9408

Jim Hunt
Jim.Hunt@dot.gov
(717) 221-4422

Greg Jones
GregM.Jones@dot.gov
(404) 562-3906

FHWA-HOP-12-048
AUGUST 2012