Division 44
Environment and Infrastructure
Sector project "Transport Policy Advice"

Sustainable Transport:
A Sourcebook for Policy-makers in Developing Cities
Module 3e

Car-Free Development

Deutsche Gesellschaft für
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Overview of the Sourcebook

Sustainable Transport: A Sourcebook for Policy-Makers in Developing Cities

What is the Sourcebook?

This *Sourcebook* on Sustainable Urban Transport addresses the key areas of a sustainable transport policy framework for a developing city. The *Sourcebook* consists of more than 20 modules.

Who is it for?

The *Sourcebook* is intended for policy-makers in developing cities, and their advisors. This target audience is reflected in the content, which provides policy tools appropriate for application in a range of developing cities.

How is it supposed to be used?

The *Sourcebook* can be used in a number of ways. It should be kept in one location, and the different modules provided to officials involved in urban transport. The *Sourcebook* can be easily adapted to fit a formal short course training event, or can serve as a guide for developing a curriculum or other training program in the area of urban transport. GTZ is elaborating training packages for selected modules, being available since October 2004.

What are some of the key features?

The key features of the *Sourcebook* include:

- A practical orientation, focusing on best practices in planning and regulation and, where possible, successful experience in developing cities.
- Contributors are leading experts in their fields.
- An attractive and easy-to-read, colour layout.
- Non-technical language (to the extent possible), with technical terms explained.
- Updates via the Internet.

How do I get a copy?

Please visit http://www.sutp.org or http://www.gtz.de/transport for details on how to order a copy. The *Sourcebook* is not sold for profit. Any charges imposed are only to cover the cost of printing and distribution. You may also order via transport@gtz.de.

Comments or feedback?

We would welcome any of your comments or suggestions, on any aspect of the *Sourcebook*, by e-mail to transport@gtz.de, or by surface mail to:

Manfred Breithaupt
GTZ, Division 44
P. O. Box 5180
65726 Eschborn
Germany

Further modules and resources

Further modules are anticipated in the areas of *Financing Urban Transport* and *Benchmarking*. Additional resources are being developed, and an Urban Transport Photo CD-ROM is available.

Modules and contributors

Sourcebook Overview and Cross-cutting Issues of Urban Transport (GTZ)

Institutional and policy orientation

1a. *The Role of Transport in Urban Development Policy* (Enrique Peñalosa)
1b. *Urban Transport Institutions* (Richard Meakin)
1c. *Private Sector Participation in Urban Transport Infrastructure Provision* (Christopher Zegras, MIT)
1d. *Economic Instruments* (Manfred Breithaupt, GTZ)
1e. *Raising Public Awareness about Sustainable Urban Transport* (Karl Fjellstrom, GTZ)

Land use planning and demand management

2a. *Land Use Planning and Urban Transport* (Rudolf Petersen, Wuppertal Institute)
2b. *Mobility Management* (Todd Litman, VTPI)

Transit, walking and cycling

3a. *Mass Transit Options* (Lloyd Wright, University College London; Karl Fjellstrom, GTZ)
3b. *Bus Rapid Transit* (Lloyd Wright, University College London)
3c. *Bus Regulation & Planning* (Richard Meakin)
3d. *Preserving and Expanding the Role of Non-motorised Transport* (Walter Hook, ITDP)
3e. *Car-Free Development* (Lloyd Wright, University College London)

Vehicles and fuels

4a. *Cleaner Fuels and Vehicle Technologies* (Michael Walsh; Reinhard Kolke, Umweltbundesamt – UBA)
4b. *Inspection & Maintenance and Roadworthiness* (Reinhard Kolke, UBA)
4c. *Two- and Three-Wheelers* (Jitendra Shah, World Bank; N.V. Iyer, Bajaj Auto)
4d. *Natural Gas Vehicles* (MVV InnoTec)
4e. *Intelligent Transport Systems* (Phil Sayeg, TRA; Phil Charles, University of Queensland)
4f. *EcoDriving* (VTL; Manfred Breithaupt, Oliver Eberz, GTZ)

Environmental and health impacts

5a. *Air Quality Management* (Dietrich Schwela, World Health Organization)
5b. *Urban Road Safety* (Jacqueline Lacroix, DVR; David Silcock, GRSP)
5c. *Noise and its Abatement* (Civic Exchange Hong Kong; GTZ; UBA)

Resources

6. *Resources for Policy-makers* (GTZ)

Module 3e

Car-Free Development

About the author

Lloyd Wright is currently conducting transport planning research as a Gakushin Fellow at Osaka University. Mr. Wright formerly directed the Latin American activities of the Institute for Transportation & Development Policy (ITDP). Additionally, Mr. Wright has worked with the International Institute for Energy Conservation (IIEC), the US Environmental Protection Agency (USEPA), the US Agency for International Development (USAID), the United Nations, and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) on transport and environmental issues. He was also previously a fellow with the US-Asia Environmental Partnership in Bangkok, Thailand. Mr. Wright is currently completing a PhD in Urban Transport Planning at University College London. He also possesses an MSc in Environmental Assessment from the London School of Economics, an MBA from Georgetown University, and a BSc in Engineering from the University of Washington.

Author:
Lloyd Wright (Gakushin Fellow)
Osaka University / University College London

Editor:
Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH
P. O. Box 5180
65726 Eschborn, Germany
http://www.gtz.de

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Manager:
Manfred Breithaupt

Editing:
Manfred Breithaupt

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Preface

"Imagination is more important than knowledge. Knowledge is limited. Imagination encircles the world."

—Albert Einstein (1879–1955)

Imagine streets filled with the chatter of children, neighbours, and friends. Imagine cities that are as much playgrounds as they are homes, shops, and offices. Imagine your neighbourhood as simultaneously a park, a garden, a work and education centre, and a holiday destination. Image a vibrant and economically-successful community. Imagine being able to walk or bicycle just about everywhere. Imagine places where the only noise is the human voice and the air is pure to the eyes and nose. And most of all, imagine a city with no cars.

For much of the world, such ideas are unimaginable. Our cities have long succumbed to motorised life. However, the imagination of a few visionary individuals has led to a reappraisal of what is possible. *Car-Free Development* encompasses a range of ideas that places humans before cars and stresses a new urban order based first on quality of life.

This *Car-Free Development* module attempts to summarise the myriad of activities and lessons learned to date from cities seeking an alternative to motorised development. There is no evidence to suggest that the internal combustion engine will be disappearing from the planet anytime soon. Despite concerns over global climate change and depleting fossil fuel stocks, the car is seemingly intricately embedded into modern life. However, a few cities and communities are demonstrating that life without the car is not as unimaginable as once thought.

The first part of *Car-Free Development* document sets out the current state of urban quality in developing-nation cities and notes the on-going trends. The second part defines many of the most common types of car-free development and provides an array of examples from both developed- and developing-nation cities. The third part provides an outline of the steps to plan and develop a car-free project. Part four continues the project development process by presenting some different design options. Part five then briefly outlines some of the different strategies for promoting a car-free project. Part six of the document describes how to evaluate the impacts from such projects. Finally, a listing of car-free reference materials is also provided.

Car-Free Development is intended as a resource document for local government officials and political leaders. However, the contents also hold much relevance to non-governmental organisations, community-based groups, and concerned individuals. Without the active participation of citizen groups in this process, few car-free projects will be realisable.

This *Car-Free Development* module is part of a broader package of resources available to developing-nation decision-makers. However, the document is perhaps as relevant to developed nations as it is to the developing world. When it comes to public space and car-free environments, there are few places in the world that are truly *developed*.

Further, the wealthiest nations have a special responsibility with regard to global fuel security and the potential consequences of global climate change. Due to the geographic position of many developing nations, these countries will likely bear the brunt of extreme weather events. The developing world will thus likely be the victims of climate change rather than the perpetrators. Until emission reductions are achieved in the wealthiest of nations, meaningful emission stabilisation is not achievable anywhere.

The divisions of developed and developing, North and South, East and West, OECD and non-OECD, etc. are also overly-simplistic monikers that are not representative of a world with a spectrum of realities. These terms particularly provide few insights into best practice in urban design. To date, some of the world's best examples emanate from locales such as Bogotá (Colombia), Curitiba (Brazil), and Fez (Morocco). The *North* may have as much to learn from the *South* as vice versa.

Car-Free Development is very much a work in progress. The document is certainly not the last word in car-free possibilities, but it will hopefully stimulate creativity from local officials and professionals in developing new approaches to urban design. If the car is symbolic of the twentieth century, then it is hoped that the human being in public space will come to represent the twenty-first century.

Lloyd Wright
Osaka University / University College London

Acknowledgements

From the publication of Jane Jacobs' seminal work on the importance of public space *The Death and Life of Great American Cities* to the efforts of residents in Delft (The Netherlands) in creating the first *woonerf* (traffic-calmed street) to more recent efforts with car-free days and car-free housing, these concepts have benefited from at least four decades of advancement.

Jan Gehl's contribution to the success of Copenhagen over the past decades has set an important precedent which continues to influence other cities. Likewise, thanks to the creative efforts of former Mayor Jaime Lerner, Curitiba became an international urban success story beginning in the early 1970s. During the 1990s, the car-free movement benefited from the efforts of Eric Britton, who has since fostered discussion and information exchange through EcoPlan International and The Commons. During the late 1990s, former Mayor Enrique Peñalosa led the urban transformation of Bogotá, which has included the world's largest car-free day as well as the world's longest pedestrian corridor (17 kilometres). Today, Enrique Peñalosa continues as a worldwide ambassador for the promotion of more human urban forms.

The car-free movement also owes much to a small group of dedicated professionals who are working tirelessly to raise awareness of an alternative future. The World Carfree Network is an association of individuals and groups seeking to help catalyse car-free initiatives. The secretariat of the World Carfree Network has particularly played a role in coalescing attention to this issue.

Joel Crawford's book *Carfree Cities* represents an important new vision for cities to consider, and the periodic publication of the *Carfree Times* provides an invaluable information resource. Marcus Heller has also been instrumental in documenting car-free efforts in Germany and elsewhere. The new interest in car-free housing has been aided tremendously by individuals who have documented existing efforts. James Kushner and Jan Scheurer have been particularly prominent in this area. Further, the creative work of David Engwicht in street reclaiming has been an inspirational base for many aspiring cities. Todd Litman's Victoria Transport Policy Institute (VTPI) provides a wealth of information and insights on car-free development and related topics.

Ben Hamilton-Baillie in the UK and Hans Monderman in Holland are re-defining road design through their work on Shared Space. Likewise, individuals such as John Whitelegg and John Adams have been respected voices of reason calling for more rational approaches to transport policies and urban design. And in terms of making projects happen on the ground, Walter Hook, John Ernst, Karl Fjellstrom, Yaakov Garb, and the entire team at the Institute for Transportation & Development Policy (ITDP) have been a principal force in facilitating actual implementation in developing cities.

Other leading non-governmental organisations working on the topic of improved public space include Ecocity Builders, Living Streets, Project for Public Spaces, and Walk21 as well as Paul White and his team at Transportation Alternatives. Creative interventions from organisations such as Critical Mass, Reclaim the Streets, and Space Hijackers are helping to reshape conventional thinking on public space. In developing nations, several organisations are proving the effectiveness of thinking globally and acting locally: Biciacción (Ecuador), Ciudad Viva (Chile), Fundación Ciudad Humana (Colombia), Por el País Que Queremos (Colombia), Sustran-LAC (Latin America and the Caribbean), AALOCOM (Tanzania), Afribike (South Africa), Bicycle Empowerment Network (South Africa), FABIO (Uganda), Firefly Brigade (Philippines), Networks for Green Transport (South Korea), Pelangi (Indonesia), Sustran (Asia), and WBB Trust (Bangladesh).

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List of abbreviations

BRT	Bus rapid transit
CDC	Center for Disease Control
CFD	Car-free day
CO	Carbon monoxide
GEF	Global Environmental Facility
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Overseas Technical Assistance Agency)
GDP	Gross domestic product
ICT	Information and communications technologies
IEA	International Energy Agency
ITDP	Institute for Transportation & Development Policy
NMT	Non-Motorised Transport
NO_x	Nitrogen oxides
OECD	Organisation for Economic Co-operation and Development
PM	Particulate matter
PPS	Project for Public Spaces
SO_x	Sulphur oxides
SUTP	Sustainable Urban Transport Project
TDM	Transportation Demand Management
TOD	Transit-Oriented Development
TRB	Transportation Research Board
UNCFD	United Nations Car-Free Day programme
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USAID	United States Agency for International Development
VOCs	Volatile organic compounds
VTPI	Victoria Transport Policy Institute
WBCSD	World Business Council for Sustainable Development
WHO	World Health Organization
WRI	World Resources Institute
WTO	World Trade Organisation

1. The car society

I'm not sure…about automobiles… With all their speed forward they may be a step backward in civilization—that is, in spiritual civilization. It may be that they will not add to the beauty of the world, nor to the life of men's souls. I am not sure. But automobiles have come, and they bring a greater change in our life than most of us suspect. They are here, and almost all outward things are going to be different because of what they bring. They are going to alter war, and they are going to alter peace. I think men's minds are going to be changed in subtle ways because of automobiles; just how, though, I could hardly guess. But you can't have the immense outward changes that they will cause without some inward ones, and it may be that…the spiritual alteration will be bad for us. Perhaps, ten or twenty years from now, if we can see the inward change in men by that time, I shouldn't be able to defend the gasoline engine, but would have to agree…that automobiles 'had no business to be invented'.

—Eugene, from Booth Tarkington's *The Magnificent Ambersons*, 1918

Fig. 1
The promise of the automobile society has left many behind.
Photo by Lloyd Wright

At some point during the previous century, our streets and communities were lost. Instead of being places of human interaction, they became places for operating and storing metal machines. The change happened somewhat gradually over a period of decades. It was a trade-off many made willingly. The car provided unprecedented mobility, and it seemed to fit with visions of modernity and progress. It also supported economic interests selling vehicles and fuels, which were seemingly fundamental parts of the modern economy. The car came to symbolise power, virility, freedom, and status.

And yet, some now question whether we are a better society for becoming so car dependent. As the car has become ubiquitous in most parts of the world, the sights and sounds of children playing in the street and neighbours happily socialising have receded. Those who cannot drive, such as the very young, the elderly, the poor, and the physically disabled, have become isolated (Figure 1). Dependence on petroleum products has threatened national security and has dramatically shaped foreign policy and even war. Exhaust emissions impair health and threaten our climatic system. Road accidents have become a leading cause of death and injury. From all of this, can we really conclude that we are a happier society for becoming fully motorised?

This document suggests how cities and communities can move towards an alternative development path that is not so inherently dependent on motorised transport. *Car-free development* is a term given to a range of options that offer the opportunity for economic, environmental, and social advancement without dependence on motorised vehicles. The examples presented here are particularly relevant to developing cities, which have not yet become fully motorised. Such cities also possess fairly high population densities situated in mixed-use neighbourhoods. An opportunity exists for such cities to potentially leap-frog over car dependence into a new paradigm for transport and urban design, a paradigm which emphasises quality of life first.

Fig. 2
An advertisement on a bus shelter in Johannesburg (South Africa).
Photo by Lloyd Wright

1.1 Trends

"A man who beyond the age of 26 finds himself on a bus can count himself as a failure."
—Margaret Thatcher, former UK Prime minister

"If you think the U.S. has stood still, who built the largest shopping centre in the world?"
—Richard Nixon, former US President

1.1.1 Background

The planet will soon reach a milestone of being resident to over one billion motorised vehicles. While developing cities have historically lagged behind in terms of private motorisation, the trends now point toward unprecedented growth. Unfortunately, few of these cities are well prepared for the historic changes underway.

Development is closely related to movement. To undertake commercial exchange, access public services, or engage in recreation and entertainment, society relies upon the ability to move persons, goods, or information from one location to another. The concepts of exchange and movement can be viewed as core elements in defining a city:

> "Cities are an invention to maximize exchange opportunities and to minimize travel. These exchanges may be exchanges of goods, friendship, knowledge, culture, work, education or emotional and spiritual support…Cities are a deliberate concentration of these exchange opportunities in order to increase both the diversity and accessibility of exchange opportunities…The role of transport is to help maximise exchange" (Engwicht, 1999, p. 19).

Thus, mobility and accessibility are intertwined with development. And yet, paradoxically, transport conditions tend to worsen as economic development increases:

> "While sanitation, health, education and employment tend to improve through economic development, transport problems tend to worsen" (Peñalosa, 2003).

In the cities of the developing world, increased private motorisation is tending to decrease exchange and accessibility. As developing cities replicate the mass motorisation as implemented in OECD nations, the streets and lives of the residents are simply being overwhelmed.

Bangkok, which in Thai (Krungtheep) translates to the "City of Angels", was once known as the "Venice of the East" with its plentiful canals and beautiful temples. Today, the canals have largely been paved over, flyovers dominate

Fig. 3
Despite significant investments in car-based infrastructure, Bangkok has yet to see any appreciable reductions in congestion.
Photo by Karl Fjellstrom

the streets, and the drone of traffic never stops (Figure 3). While a huge investment has been made in elevated roadways, the condition of footpaths has been virtually ignored. Walking the streets in Bangkok has become an assault upon one's senses. In Dhaka, cycle rickshaws are being banned from the streets in order to make room for the 5% of the population with automobiles. In Beijing, five ring roads have been constructed and officials are hoping to build another five. In Mexico City, breathing the air is equivalent to smoking two packs of cigarettes a day. In São Paulo, the term "rush-hour" has become "rush-day" with traffic jams likely at almost all hours. Much the same can be said of Buenos Aires, Santiago, Lagos, Cairo, Mumbai, Shanghai, Jakarta, and just about any other urban conglomeration in the developing world. Motorisation continues unabated.

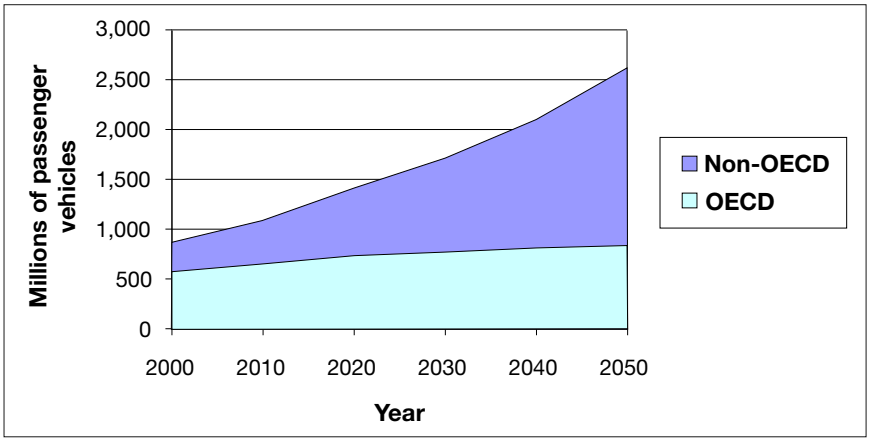
However, developing cities still have a choice to make. With existing shares of travel still predominately made by walking, cycling, or public transport, these cities can work to preserve their inherent strengths. For those developing cities with strong leadership, a new transport paradigm, emphasising car-free development and quality of life, is still quite possible.

1.1.2 Vehicle ownership

The International Energy Agency (IEA) has compiled a comprehensive set of spreadsheet analyses projecting transport trends between the year 2000 and 2050 (IEA/SMP, 2004). The reference case from the IEA spreadsheet lays out the expected business-as-usual scenario. Figure 4 shows the expected trends in vehicle ownership levels. There are two striking features of Figure 4. First, despite the existing saturation of vehicle ownership in countries like the US, growth in ownership in these countries is expected to continue through 2050. Second, the rate of growth in developing countries is significant, resulting in the number of developing-nation vehicles surpassing the number of vehicles in the OECD by 2030. Currently, there are approximately 982 million passenger vehicles worldwide; by 2050 this figure is projected to be 2.6 billion (IEA/SMP, 2004).[1]

[1] *Passenger vehicles* include cars, motorcycles, three-wheelers, mini-buses, and buses. This value does not include freight vehicles, train carriages, water transport, or air transport.

Fig. 4
Vehicle ownership by region.
Source: IEA/SMP, 2004



The growth in motorised vehicle ownership has largely followed trends in per capita income. Dargay and Gately (1999) show that in the per capita income range of US$2,000 to US$5,000 vehicle purchases jump sharply. Other factors affecting vehicle ownership growth are population growth, urbanisation levels, importation regulations, and the quality of alternative transport services. Several major developing nations are now entering the development zone of rapid motorisation.

It may be argued that vehicle ownership is not the central problem. The focus of a successful urban strategy should be reducing vehicle usage and not ownership. However, ownership, emissions, and congestion are in fact closely correlated for several reasons. First, approximately one-third of a vehicle's lifetime emissions stem from the upstream manufacturing process of the vehicle.[2] Second, once a vehicle is purchased, the convenience of use tends to induce additional travel (Gilbert, 2000).

1.1.3 Vehicle usage

"The pedestrian remains the largest single obstacle to free traffic movement."

—Los Angeles planning report (Engwicht, 1993)

Vehicle usage trends have thus largely followed ownership trends. Figure 5 provides a projection of vehicle usage levels through 2050. Like vehicle ownership, vehicle usage is expected to grow for both OECD and non-OECD countries, with the highest growth rates in the developing world. The continued growth of vehicle usage in the already heavily-travelled developed world has prompted the notion of 'hypermobility' in which excessive mobility undermines the social fabric (Adams, 2000).

It has been hoped that information and telecommunications technologies (ICT) will eventually reduce the need for physical travel. Telecommuting and online shopping offer the promise of eliminating many existing trips. However, "predictions of the effects of greater use of the Internet, of e-commerce, and of teleworking vary considerably," and thus it is still too early to conclude that any travel substitution is taking place (DETR, 2000). The evidence to date suggests that telecommuters may actually end up undertaking more travel since there is a tendency to conduct more household errands in suburban locations in which the distances between shops is greater (Mokhtarian, 1998). The spreading of such errand shopping trips to non-peak times may also act to undermine the viability of public transport options which depend upon peak volumes (Hjorthol, 2002). Additionally, there is no clear evidence that internet shopping reduces freight distances as one may encourage a greater number of long-distance household deliveries of single items. From the perspective of the developing cities, the issue may be somewhat moot. The existing digital divide means that if ICT does help to reduce physical travel, the developing world is not likely to reap the benefits anytime soon.

The increased usage of motorised vehicles in developing nations is a particular concern due to the types of vehicles being deployed. In the developing world, ownership has tended to arrive by way of highly polluting, used vehicles. In countries such as Peru, the lifting of used vehicle import restrictions resulted in 70% of the annual growth in vehicle fleet from older, used vehicles (Zegras, 1998). In the wake of the recent military

[2] This value is based upon vehicles in Western Europe. The value is slightly less in North America where lifetime kilometres travelled per vehicle are higher (Gilbert, 2000).

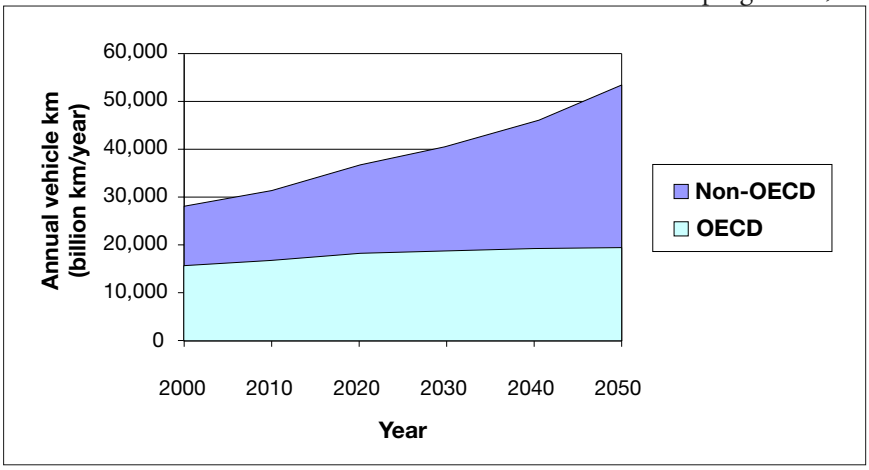


Fig. 5
Vehicle usage by region (vehicle-kilometres travelled).
Source: IEA/SMP, 2004

Fig. 6
With low-cost motorcycles flooding developing city markets, quality of life has suffered.
Photo by Karl Fjellstrom
(GTZ photo CD on urban transport)

actions in Iraq, the US-led coalition lifted the previous prohibition on the import of used vehicles (Sustainable Transport, 2004). As a result, Iraq was flooded with thousands of used vehicles within months of the coalition's actions. An older vehicle fleet in conjunction with poor maintenance practices and limited vehicle testing can mean that the impacts of motorisation on developing nations are many times worse than an equal level of motorisation in a developed nation. The narrower, historical streets found in many developing cities also means that even low levels of traffic can translate into heavy congestion.

In Asia and parts of Africa, the first progression from non-motorised travel is often towards two-wheel motorised vehicles such as scooters and motorcycles. Two-wheel motorised vehicles offer several advantages to the user, including: "lower capital and operating costs than automobiles, coupled with lower levels of real purchasing power; superiority in time and door-to-door convenience relative to autos in congestion; superiority to an often deteriorating public transport system" (WBCSD, 2001, p. 4–6). In cities such as Hanoi and Ho Chi Minh City in Vietnam, two-wheel motorised vehicles are replacing bicycle as the most common travel mode (Figure 6). In Hanoi, motorcycles represent approximately 75% of the total motorised fleet (Gwilliam, 2003). Unfortunately, such vehicles create a host of negative externalities, particularly when the vehicle quality is left uncontrolled. Two-stroke motors are still permitted in many Asian nations, despite the fact that these motors produce substantially more contaminants than improved four-stroke models (Shah and Iyer, 2003).

> "In New Delhi, for example, 45% of particulate emissions and two-thirds of unburned hydrocarbon emissions in the transport sector are estimated to come from two- and three-wheelers powered by two-stroke engines. These are estimated to emit more than 10 times the amount of fine particulate matter per vehicle-km than a modern car…" (Gwilliam, 2003, p. 205).

In recent years, low-cost motorcycles manufactured in China are flooding the streets of cities in Asia and beyond. In Laos, a new motorcycle currently costs approximately US$500 while a functional used model may only cost half this amount. Thus, even in countries of modest family incomes, a motorcycle is within financial reach. For this reason, the mode share of motorcycles in Vientiane, the capital city, is now nearly 60%.

In much of the developing world, though, mode share is ultimately heading towards four-wheel motorised vehicles. The combination of rising incomes, poor public transit services, and lowered import restrictions all means that the developing world stands on the cusp of an explosion in private vehicle ownership.

1.1.4 China and India

"Experience is a wonderful thing. It enables you to recognize a mistake when you make it again."

—"12 useful things to learn before the age of 40"

Few regions of the world epitomise the concerns over the global consequences of mass motorisation as Asia, and particularly the nations of China and India. At present, vehicle ownership levels are less than two vehicles per 1000 inhabitants. In comparison, the United States has 769 vehicles per 1000 inhabitants while the average for Western European is approximately 430 vehicles per 1000 inhabitants (Whitelegg and Haq, 2003). In 2004, China's annual growth in vehicle ownership reached 75% (Economist, 2005). China's motorisation rate has gained another boost with the country's admission into the World Trade Organization (WTO). Tariff protection for automobiles is currently as high as 80%, but by 2006, China's WTO commitments require that such tariffs must be reduced to 25% (Hook, 2002).

While countries such as China and India are starting from relatively low ownership levels, both are entering the income zone of heightened vehicle purchasing (Figure 7). If China was to reach an ownership level equal to that of the US, the global vehicle fleet would grow by approximately 1 billion. If India was included in this scenario, then another 740 million vehicles would be added to the global fleet. Even at European ownership levels, China is still adding nearly 550 million vehicles. The automobile is officially touted as a symbol of progress and modernity for both China and India. Ultimately, the policy may deflect investment from more pressing development needs. Chinese government surveys indicate that families are likely to be prepared to spend two years of income for a car (Gakenheimer, 1999).

Fig. 7
As vehicle ownership and usage explodes in China and South Asia, the local and global environment will undoubtedly suffer.
Photo by Karl Fjellstrom

The trends in car ownership are spurring a spending-spree on road-based infrastructure as well. At the end of 2004, China had 34,000 kilometres of motorways, more than double the 2000 figure; just 17 years ago, the nation had no motorways. China is planning to again double the length of its motorways by 2020 (Economist, 2005). China is effectively attempting to replicate 80 years of US-styled motorisation in the span of just a few decades.

In cities such as Shanghai and Guangzhou the promotion of local automobile manufacturing is resulting in a discernible lack of emphasis on bicycles. In Shanghai mode share has gone from 33% in 1995 to 27% in 2000; in Guangzhou mode share has fallen from 33% in 1995 to less than 20% in 2002 (Hook, 2002). The impact on air quality has been profound (Figure 8). Shanghai officials, though, have become alarmed at the extreme growth rate of cars in the city, and have implemented a system to ration vehicle registration. A monthly auction system has been in place for several years. Nevertheless, the permitted number of registrations is simply being increased on a regular basis. Even as the auction price becomes quite costly, even by developed-nation standards, there does not seem to be any slowing in the demand:

> "The profusion of cars has launched a new cultural revolution, transforming Chinese life and society in ways that bear surprising resemblance to what happened in America 50 years ago… In Shanghai the bridges and tunnels crossing the Huangpu River are so congested that a cab ride from one side to the other can be an hour-long ordeal" (Chandler, 2003).

The rise of the car culture has prompted Shanghai to build a state-of-the-art Formula One race track in the city. The US$320 million facility essentially serves the single Formula One race each year and otherwise

sits idle (Economist, 2005). It is nevertheless a monument to national aspirations.

Many major Chinese cities are also actively discouraging bicycle use through priority measures for automobiles and through the neglect of non-motorised infrastructure. A few Chinese cities have actually even banned bicycles from large sections of the urban area. The capital, Beijing, has also followed this trend:

> "In Beijing, non-motorised vehicles are increasingly being squeezed by motorised vehicle parking in physically segregated non-motorised vehicle lanes and the reallocation of space in wide non-motorised vehicle lanes to through motorised vehicle traffic. On the Second Ring Road, the outside half of the non-motorised vehicle lane has been reassigned to motorised vehicles and the nearside half is used by buses and taxis. Non-motorised vehicle parking at work is increasingly being moved to distant inconvenient locations to provide more convenient space for motorised vehicle parking. A recent high-profile closure in Beijing of a commercial street at Xidan to non-motorised vehicles epitomizes current practice" (World Bank, 2001, p. 134).

Despite government efforts to prioritise industrial policy towards automobile manufacturing, the bicycle industry still employs a greater number of persons. The sector also generates over US$1 billion a year in foreign exchange earnings (Hook, 2002). In 2001, of the 97 million bicycles manufactured worldwide, 51 million (53%) were manufactured in China. This production level represented a milestone by being "perhaps the first time ever that one nation has supplied more than half of global output" (Worldwatch, 2003). Unfortunately, the vast majority of this production, nearly 70%, is destined not for domestic use but rather for export (Worldwatch, 2003). Thus, despite the significant economic, social and environmental factors supporting continued bicycle use in China, official policy is solidly behind an emphasis on private motorised vehicles.

Fig. 8
Air quality in Shanghai on a normal day.
Photo by Manfred Breithaupt
(GTZ photo CD on urban transport)

1.2 Impacts

The disadvantages involved in pulling lots of black sticky slime from out of the ground where it had been safely hidden out of harm's way, turning it into tar to cover the land with, smoke to fill the air with and pouring the rest into the sea, all seemed to outweigh the advantages of being able to get more quickly from one place to another—particularly when the place you arrived at had probably become, as a result of this, very similar to the place you had left, i.e., covered with tar, full of smoke and short of fish.

—Douglas Adams, The Restaurant at the End of the Universe, 1980

Air quality
Vehicle emissions harm human health and the natural environment

Noise and vibration
Noise affects productivity and health

Accidents
Each year 1.2 million lives are lost due to vehicle accidents

Global climate change
Vehicles are responsible for roughly 25% of fossil-based CO_2 emissions

Natural habitats
Roadways disrupt habitats and open areas to exploitation

Waste disposal
The disposal of vehicles and vehicle parts contribute to landfill problems

Congestion
Time lost in congestion affects overall productivity

Energy security
Dependence on petrol-based mobility affects national security

Economic efficiency
Financial capital consumed by car expenditures reduces capital for other investments

Severance
Roadways sever communities and inhibit social interactions

Visual intrusion
Cars, roads, and parking areas all detract from a city's beauty

Loss of living space
Roads and parking consume large amounts of urban space

Fig. 9
The impacts of increasing motorisation.
Source: Adapted from European Commission (2005) and Litman (2005a)

The impacts of the car society are readily evident. From the air that we breathe to the form of our cities to the structure of our economy, motorised vehicles have shaped virtually all aspects of modern living. Yet, it may be the very ubiquity of the car's impact that sometimes shields it from heightened scrutiny. The perceived indispensability of the automobile means that many tend to overlook its undesirable consequences.

The negative impacts of motorisation are well documented (Litman, 2005a; USEPA, 1999; USEPA, 1996; and Delucchi, 1996). Figure 9 outlines the most common problems associated with increasing motorisation. Despite the freedom and mobility seemingly provided by the car, the various problems of pollution, noise, accidents, severance, and congestion have undermined its overall contribution to society. Car-free options hold the potential to simultaneously address each one of these impacts. It is this characteristic that has helped to spur renewed attention to car-free development.

1.2.1 Air quality and noise

Despite over 100 years of technological refinement, emissions from a vehicle's tailpipe remain a serious health concern. Air pollutants from transport are linked to a litany of serious ailments, most notably respiratory illnesses and cardiovascular disease. Epidemiological studies have directly linked transport-related contaminants to asthma, bronchitis, heart attacks, and

strokes (Dockery and Pope, 1994). A survey of studies shows that the number of deaths from outdoor air pollution ranges from 200,000 to 570,000 annual deaths globally (WRI, 1998). In addition to premature mortality, there are also other economic costs resulting from pollutant-induced illness. Hospital admissions, lost work days, discomfort, and stress are just a few of these impacts.

Vehicles account for about 30% of nitrogen oxide (NO_x) emissions, 50% of hydrocarbons (HC), 60% of lead, and 60% of carbon monoxide (CO). In city centres the values rise to 95% for CO and up to 70% for NO_x (WHO, 2000). Vehicles also emit air toxics, including benzene and formaldehyde, which can be carcinogenic even in small quantities (McGranahan and Murray, 2003). Another group of emission products called volatile organic compounds (VOCs) can combine in the atmosphere with NO_x to form ground-level ozone (O_3). Ground level ozone is also commonly known as photochemical "smog" and is associated with a host of pulmonary illnesses and the brown haze that permeates car-dependent cities.

In developed nations, the emissions resulting from this increased fuel usage has to a certain extent been mitigated by advanced engine technologies and cleaner-burning fuels. With cleaner technologies, the 1990s saw a stabilisation of air pollution levels for criteria pollutants such as carbon monoxide (CO), particulate matter (PM), nitrogen oxides (NO_x), sulphur oxides (SO_x), and volatile organic compounds (VOCs). However, this stabilisation of total emissions may be short-lived as increasing motorisation, even in OECD nations, can work to overwhelm the benefits of improved tailpipe technologies and cleaner fuels (OECD and EMCT, 1995). The trend towards even larger vehicles, such as sport utility vehicles (SUVs), has meant that average fuel efficiency is actually decreasing in some parts of the world. In 1988, the US average fuel economy for new vehicles stood at 25.9 miles per gallon (11.0 km/litre). By 2002, this value had dropped to 24.0 miles per gallon (10.2 km/litre) (USEPA, 2003). A leading environmental organisation notes that "Nearly a century ago, Ford's Model T got 25 miles to the gallon (10.6 km/litre). Today, Ford's cars and trucks average 22.6 miles per gallon (9.6 km/litre), and the Explorer (SUV model) gets just 16 miles per gallon (6.8 km/litre)" (Sierra Club, 2003).

Fig. 10
Children suffer from Jakarta's deteriorating air quality.
Photo from the Swisscontact 2002 photo competition (GTZ photo CD on urban transport)

In the developing world, no stabilisation of emission levels is in sight anytime soon (Figure 10). The dramatic increase in car ownership and usage in China and India has overwhelmed any modest improvements in emission technologies. WRI (1999) conducted a ranking of the cities with the most polluted ambient air. The ten cities with the world's highest emission concentrations all reside in the developing world (Box 1).

Box 1: World air pollution rankings

Most unhealthful ambient air quality[3]:

1. Mexico City (Mexico)
2. Kolkata (India)
3. Delhi (India)
4. Mumbai (India)
5. Beijing (China)
6. Tehran (Iran)
7. Shanghai (China)
8. Sao Paulo (Brazil)
9. Tianjin (China)
10. Rio de Janeiro (Brazil)

[3] The ranking only examined cities with a population greater than 9 million inhabitants. Ranking is a weighted-average of peak concentrations of three different pollutant types: 1. Total suspended particles (TSP); 2. Nitrogen dioxide (NO_2); and 3. Sulphur dioxide (SO_2). The study also weighted the ranking by the projected impacts on children.

Source: WRI, 1999

The situation in developing nations is particularly affected by poor fuel quality, poor maintenance and inspection of vehicles, a lack of emission standards, a lack of enforcement, and an older vehicle fleet. Leaded fuels have long been banned elsewhere, but they still predominate in Africa and parts of Asia.

Noise is also a growing concern from both the perspectives of health and economic productivity. Noise from vehicle operation, horns, and car alarms can all bring negative health consequences. The World Health Organization (WHO) has documented the most common problems associated with sustained and/or excessive noise levels (WHO, 2005):

- "Pain and hearing fatigue
- Hearing impairment including tinnitus
- Annoyance
- Interferences with social behaviour (aggressiveness, protest and helplessness)
- Interference with speech communication
- Sleep disturbance and all its consequences on a long and short term basis
- Cardiovascular effects
- Hormonal responses (stress hormones) and their possible consequences on human metabolism (nutrition) and immune system
- Performance at work and/or school decrements."

Sustained exposure to noise has been associated with reduced cognitive development and classroom performance of children (Evans and Maxwell, 1997). Even seemingly harmless background noise, such as traffic and car alarms, has been indicted for its impact on the ability to concentrate. In turn, these lapses in concentration carry with them implications for worker productivity and child development.

Fig. 11
In 2003, an unprecedented "hurricane" in the southern hemisphere, the first off the coast of Brazil's Catarina state, has prompted concerns about changing climatic patterns.
Photo courtesy of the National Aeronautic and Space Administration (NASA)

1.2.2 Climate change

Emission control technologies have to an extent slowed the growth of health-related vehicle emissions in developed nations. However, the same cannot be said of greenhouse gas emissions. Greenhouse gas emissions, particularly carbon dioxide (CO_2), have grown at unprecedented rates. Such emissions are linked to the entrapment of heat within the atmosphere, and thus giving rise to concerns over global climate change (Figure 11). While debates linger on over the shape of climate policy, the world's leading climate scientists have established a "discernible" link between human activity and climate impacts (IPCC, 2001). The direct link between climate change and any particular extreme weather event is not known. However, more frequent and more powerful hurricanes and typhoons, extreme temperatures, and drought are consistent with projections from climate change models. The devastation wrought in 2005 by hurricane Katrina in New Orleans and the gulf coast may unfortunately not be a singular occurrence.

Global concentrations of CO_2 now stand at approximately 368 parts per million (ppm), an increase of 31% from pre-industrial levels of 280 ppm (IPCC, 2001). In terms of carbon dioxide, which accounts for 95% of the transport sector's greenhouse gas emissions, transportation is the fastest growing end-use sector (Greene and Schafer, 2003).

> "In 1999 … the transport sector was the source of approximately 24% of global energy-related carbon dioxide emissions. This represents an absolute increase of 1017 million tonnes of carbon dioxide and a share gain of 2.4% since 1990. Worldwide, emissions of carbon dioxide from the transport sector are projected to grow at the rate of 2.5% each year through 2020. The growth rates of transport sector carbon emissions in the developing world and in economies in transition are projected to be even higher—4.0% per year and 3.3% per year, respectively" (OECD and IEA, 2001).

Given the trends noted in vehicle ownership and usage it is not surprising that transport greenhouse gas emissions are projected to follow a similar pattern of rapid growth (IEA/SMP, 2004). However, despite such trends and growing concerns over climate change, the transport sector has largely been left out of mitigation strategies to date. The promise of alternative fuels, such as hydrogen (fuel cells), biofuels, or natural gas, is unlikely to make a meaningful contribution to greenhouse gas emission reductions over short or medium terms (Wright and Fulton, forthcoming) in a cost-effective manner. Unfortunately, more effective solutions, such as public transport improvements, non-motorised options, and car-restraint measures, are far from taking centre stage in climate mitigation efforts.

1.2.3 Congestion and economic efficiency

The smooth and timely movement of goods and people is a significant determinant in productivity and overall economic efficiency. Cities inundated with heavy vehicle congestion are effectively leaving part of their potential domestic product on the roadway. The cumulative financial impacts of traffic delays can be staggering. In the US, traffic congestions costs the economy an estimated of US$63.1 billion each year, principally due to the value of passenger time and wasted fuel (Texas Transportation Institute, 2005). Congestion tends to also worsen other externality impacts such as the quantity of air pollutants.

Developing cities are often unprepared for the sharp rise in private vehicle usage. As a result, average travel speeds can be significantly less than wealthier cities (Table 1), even though vehicle ownership is still relatively low in the developing world.

The loss of worker productivity and the inefficiencies from late or missed deliveries of goods and services due to congestion can be a significant cost to a society. The World Bank estimates that traffic congestion in Bangkok reduces the gross domestic product (GDP) of Thailand by 6% (Willoughby, 2000).

1.2.4 Accidents

The motorisation of the developing world has brought with it near pandemic proportions of death and injury from accidents. With both vehicle and driver standards below developed-nation norms, the impacts of motorisation in developing nations has been relatively quite severe. The World Health Organization (WHO) lists road accidents as the leading cause of accidental death world-wide, with an estimated 1.2 million persons killed in road accidents and another 50 million injured in 2001 (Table 2).

Table 1: Average travel speeds by mode in 1990 (km/h)

City	Car (km/h)	Bus (km/h)
Bangkok	13.1	9.0
Jakarta	23.6	14.6
Kuala Lumpur	29.4	16.3
Manila	25.5	15.5
Sydney	37.0	19.0
Brussels	37.9	19.1
London	30.2	19.0
Paris	25.7	19.3
Chicago	45.0	17.9
Los Angeles	45.0	19.9
New York	38.3	18.8

Source: Newman and Kenworthy (1999)

The global accident statistics also point towards an alarming disproportionate share of fatalities and injuries from automobile accidents occurring in developing nations. Low-income nations incur 80 times more traffic fatalities per vehicle than high-income nations (World Bank, 1996).

Table 2: Incidence of death by cause for selected categories (2001)

Cause of death	Estimated number of deaths in 2001
HIV/AIDS	2,866,000
Diarrhoeal diseases	2,001,000
Tuberculosis	1,644,000
Road accidents	1,194,000
Malaria	1,124,000
Measles	745,000
Breast cancer	479,000
Alzheimer's disease	368,000
Tetanus	282,000
War	230,000
Meningitis	173,000

Source: WHO (2002)

1.2.5 Obesity

Dependence on motorised vehicles in conjunction with an unhealthy fast-food diet has produced a near world-wide pandemic of obesity. With car travel replacing even short walking trips in many parts of the world, a sedentary culture has emerged in which exercise is rarely undertaken.

In some states of the US, over 25% of the population is considered "obese[4]" (CDC, 2005) (Figure 12). In such areas a staggering 10% of the population in some states are suffering from weight-related diseases such as type II diabetes (Mokdad *et al.*, 2001). Through a study of over 12,000 US households, a correlation has been established between urban densities and levels of obesity (Frank, 2003). Family members in lower density, suburbanised areas showed a markedly higher tendency to suffer from obesity than their counterparts in more walkable, higher-density areas.

The developing world is surprisingly not far behind in the obesity race. In a survey of Beijing residents, the Beijing Centre for Disease Control and Prevention uncovered the following troubling results (Xinhua, 2005):

- 32% of Beijing residents suffer from coronary heart disease, hypertension, or obesity
- 47% of the population rarely or never undertook exercise
- 18% of all secondary students qualify as obese.

Data from Mexico likewise confirms that the battle of the bulge is being lost in just about all corners of the world. During the past decade, there has been a 158% increase in obesity levels with 28% of Mexican women and 19% of Mexican men being defined as "obese" (Maharaj, 2003).

1.2.6 Energy security

Under the current energy economy, being a car-dependent society implies being a fossil fuel-dependent society. Unfortunately, as a non-renewable resource, fossil fuel stocks are being depleted at faster and faster rates. However, given the relative size of the transport sector and the resulting consumption of petrol, any move away from fossil fuels will carry with it significant economic and political implications.

In 1956, a Shell geophysicist by the name of M. King Hubbert generated projections for the eventual peak of US oil production by the 1970s. The projections proved to be largely correct. Subsequent use of the Hubbert Curve has shown that world oil production is now at or near its peak as well. Rising demand from nations such as China and India in conjunction with an eventual decline in production will most likely imply continued price instability. The impacts are not just limited to commodity prices. Access to dwindling resources can shape foreign policy and even provoke violence between nations.

[4] "obese" is defined here as being overweight by 13.6 kilograms or more (CDC, 2005).

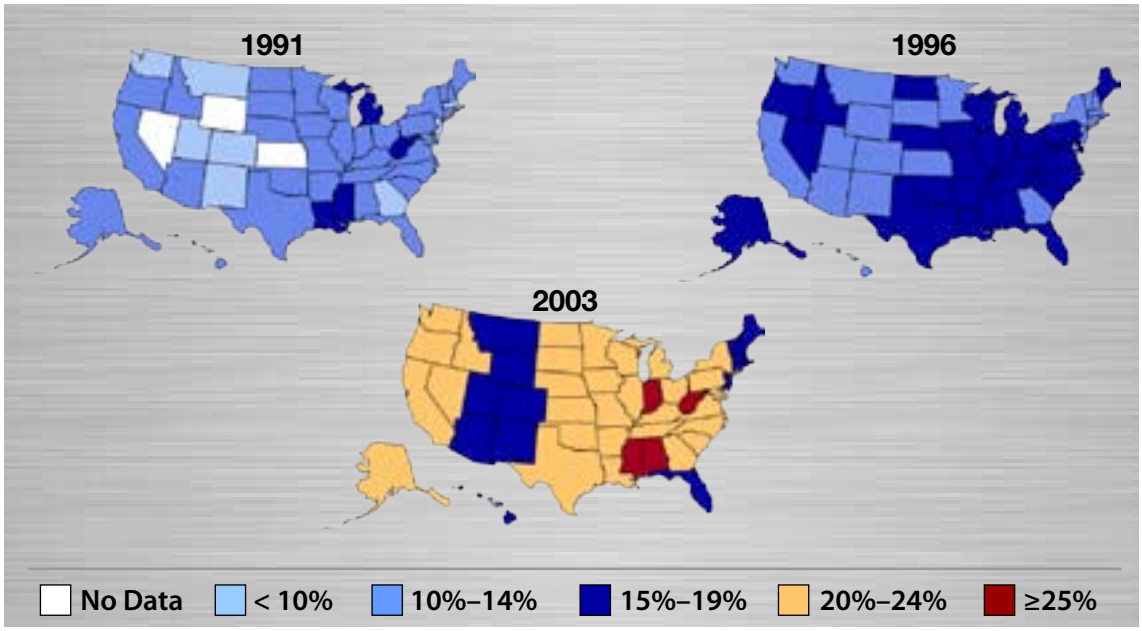


Fig. 12
Obesity trends in the US
Percentage of population considered "obese" (≥13.6 kilograms overweight)
Source: CDC, 2005

As of mid-2005, a combination of events, including war, political instability, climate-induced production problems, and increased demand from newly developing nations, have conspired to push petrol prices to new heights. As national and household expenditures for petrol increase, other types of expenditures run the risk of being displaced. A nation's increased spending on oil imports may well translate into less spending on social development in such areas as education, nutrition, and healthcare.

Of course, one nation's imports are another nation's exports. Nations producing petroleum products will reap a windfall from the heightened world price levels, albeit as long as production stocks permit. However, increased oil revenues have not always produced the expected results. There is some evidence to suggest that oil wealth has acted to fuel corruption, poor governance, and overall inequity in many nations. In such cases, oil revenues have done little to increase the well-being of the average citizen. The Chairman of Transparency International, Peter Eigen, notes that (Transparency International, 2005):

> "Corruption robs countries of their potential. As the Corruption Perceptions Index 2004 shows, oil-rich Angola, Azerbaijan, Chad, Ecuador, Indonesia, Iran, Iraq, Kazakhstan, Libya, Nigeria, Russia, Sudan, Venezuela and Yemen all have extremely low scores. In these countries, public contracting in the oil sector is plagued by revenues vanishing into the pockets of western oil executives, middlemen and local officials."

Economic potential is also being severely hampered by the tendency for high subsidisation of petrol prices in developing nations, and especially in oil producing nations. Metschies (2005) has collected retail petrol price data for most nations. The highly-subsidised petrol prices in nations such as Indonesia, Nigeria, and Malaysia all represents a significant loss of national income. Government expenditures on subsidies ultimately diminish spending on more pressing social needs. However, the rapid increase in oil prices may force nations to reconsider policies. Such a transformation is wrought with potential political and social upheaval; modest petrol price increases in Bangladesh,

Fig. 13
As fossil fuel stocks decline, the search for new production sites intensifies.
Photo from "Useful Photo Images" photo CD

Ecuador, Indonesia, Malaysia, Nigeria, and Yemen have produced violent protests from transport operators and the general public.

China has historically been an exporter of oil products, but by the early 1990s the nation had become a net importer. The growth of China's vehicle industry is contributing to the current strain on world commodity markets for steel and other resource imports (Goodman, 2004):

> "This as much as anything defines these times in the global economy: The world needs more freighters because China's growth is tying up much of the fleet. But the shipyards can't get the steel they need, because there aren't enough ships to move the ore to the steel plants."

Since many oil producing nations are non-democratic states, the in-flow of oil revenues may also allow unpopular regimes to extend their grip on power. Thus, car dependency may tend to undermine world human rights efforts, democracy building, and even the war on terrorism.

Fig. 14, 15, and 16
Urban expressways leave their mark on communities.
1. A roadway cuts through a low-income community in Caracas
Photo by Caracas Urban Think Tank
2. The "Segundo Piso" elevated roadway changes community life in Mexico City
Photo courtesy of Reforma newspaper (Mexico)
3. The "Costanera Norte" expressway being constructed in Santiago's Mapocho River
Photo courtesy of Ciudad Viva

1.2.7 Severance

Severance refers to the disruption of community interactions due to a physical barrier such as a roadway. When a roadway cuts through a community, neighbours are physically and psychologically separated from one another. The mere act of attempting to cross the street can become an act of endurance and futility. Noise and emission levels also increase making any outdoor activity an unpleasant experience. The visual intrusion of a large concrete structure jutting through a community can be overwhelming for residents. The results are quite predictable: Social activity is curtailed, stress levels rise, and property values drop precipitously. The large urban roadway projects in cities such as Caracas (Venezuela) and Mexico City (Mexico) are prime examples of the effects of severance (Figures 14 and 15).

At the same time, such roadways often do little to mitigate traffic conditions. The additional tarmac tends to only induce more vehicles onto the streets and encourages sprawl-type development farther from the city centre. For these reasons, Enrique Peñalosa, the former mayor of Bogotá, has famously stated that "there are two effective ways of destroying a city: One is with a nuclear weapon, the other is with elevated roads" (Peñalosa, 2004).

Severance is not just limited to human populations as the natural environment can also suffer. The city of Santiago (Chile) has taken the quest for roadway expansion to a new extreme. When faced with limited options for roadway alignments, the city decided to place the Costanera Norte expressway in a river bed (Figure 16). By replacing parts of the Mapocho River with the expressway, the city officials made a grave concession to the priority of motorists over local communities and the city's natural environment.

1.3 Pedestrian conditions in developing cities

The car is so deeply immersed in our culture as an ideological 'being' that it replaces human beings in people's minds. It is like a powerful fetishism. When I was waiting at the crossing with a friend in Sao Paulo I decided to test how this phenomenon had also affected his perception. There were several automobiles, buses and trucks around us and I asked him: 'What is coming from there? You have three guesses.' He said: 'Well, a car!' I said: 'No, take your second guess.' He looked and said: 'A vehicle.' I said: 'No, and now you have your last chance.' And he answered, angry with me: 'An automobile.' I still wonder when he will realize that what was coming was a person, inside a metal case, and that there is no reason whatsoever for that person in the role of a car driver to have priority over us standing on the sidewalk.

—Eduardo Vasconcellos, 2001, p. 157

Fig. 17
A pedestrian makes for a lonely figure attempting to cross an inhospitable urban street in Panama City (Panama).
Photo by Lloyd Wright

While the trends indicate continued growth for private motorised vehicles, another type of trend is implied for non-motorised options (walking and bicycling) and public transport. These modes are being discarded as soon as persons have the economic capacity to switch to motorised vehicles. This exodus is not without reason. For residents of the developing world mobility is not an easy proposition. Daily travel can be quite long, uncomfortable and unsafe. Footpaths are either not maintained or are non-existent.

> "Despite its economic importance to the poor, both as a mode of transport and a source of income, and its environmental advantages, the potential of non-motorized transport is often unmobilized or even positively suppressed… As a consequence non-motorized transport becomes less safe, less convenient and less attractive, making the forecast decline of NMT a self fulfilling prophesy" (World Bank, 2001, p. 131).

If pedestrian infrastructure is of poor quality, then motorisation can be the mode of choice even for very short distances. The developing-nation pedestrian runs a gauntlet of challenges each day, many of which contribute directly to the high injury and fatality rates witnessed in these countries. These challenges include the following:

- Complete lack of pedestrian pavements
- Poor quality of pavements, often dirt or mud
- No physical separation from high levels of traffic and from high-speed traffic
- Extreme levels of noise and air pollution
- Lack of infrastructure to permit crossing of street
- Obstructed pavements due to illegal (or legal) car parking, poor design, uncollected rubbish, etc.
- No protection from harsh climatic conditions
- Lack of pedestrian support infrastructure such as street lighting
- Pedestrian overcrowding due to narrow or below-capacity pavements

- High levels of robbery, assault and other crime befalling pedestrians.

Adapted from Vasconcellos (2001, p. 113) and Hass-Klau et al., (1999, p. 105)

The complete lack of formal pedestrian pavements in developing nations is relatively common. Hook (2003, p. 1–2) notes that: "Over 60% of the roads in Jakarta, for example, have no sidewalks, and those that exist are heavily obstructed by telephone poles, trees, construction materials, trash, and open sewer and drainage ditches." Likewise, in African cities, poor districts will rarely be provided with pedestrian infrastructure, even though virtually all of the population of such areas do not own a motorised vehicle (see Figure 18).

Crossing a street can be particularly difficult in developing-nation cities due to a lack of formal crossings. In some instances pedestrian overpasses or underpasses are provided, but pedestrians often eschew such infrastructure due to reasons of safety and convenience (Figure 19). Pedestrian overpasses and underpasses in developing-nation cities are often either filled with informal merchants or inherently dangerous from a crime and safety standpoint. Darkened underpasses put pedestrians at particular risk to criminal elements. Not surprisingly, many developing-nation residents choose to take their chances crossing through the chaotic and dangerous maze of traffic. Vasconcellos (2001, p. 114) also notes that even when crossings

Fig. 18

Just a few kilometres from the site of the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg (South Africa), the township of Alexandra goes without sidewalks.

Photo by Lloyd Wright

Fig. 19

Pedestrians in Dhaka (Bangladesh) have few options for crossing the street.

Photo by Karl Fjellstrom

are provided, they rarely give priority to the pedestrian:

> "Crossing facilities are also inadequate; zebra crossings are rare, and signals rarely consider pedestrian needs; in such cases, pedestrians are seen as something that might be 'stacked' until some gap is available in the traffic stream: 'second class citizens' have to wait until first class ones exert their rights to use roads."

The poor pedestrian conditions in developing-nation cities can result in pedestrian trip distances that are considerably longer than those endured by motorised vehicles. Hook (2000) documents how sidewalk barriers and other detours in Surabaya (Indonesia) result in substantially longer journeys for pedestrians:

> "…pedestrian barricades and one way streets have been used to facilitate long distance motorised trips but which simultaneously impose huge detours for short distance cycling and pedestrian trips. People wishing

> to cross a main shopping street often find it easier to take a taxi two kilometres than to walk across the street. In Surabaya, the World Bank estimated that these measures generate an additional daily 7000 kilometres of needless vehicle traffic."

The poor pedestrian conditions are not just due to neglect. In some instances municipalities perpetrate direct aggression against non-motorised users. In Manila, the government devised a "Wet Rag Campaign" to discourage pedestrians from straying off the footpath and onto the roadway. Any pedestrian found doing so would be struck by a wet rag hanging from a municipal van (Fjellstrom, 2005). The measure was finally abandoned after having been found to violate international human rights laws. In many Malaysian cities, the penalties for pedestrians using unmarked crossings will greatly exceed penalties for motor vehicle violations. For example, in the city of Kuantan the first illegal street crossing is a penalty of RM 1,000 (US$250) or up to three months in prison. A second violation will mean a penalty of RM 2,000 (US$500) and/or six months in prison (Fjellstrom, 2005). However, given the relatively poor crossing options, many must take the risk. In Dhaka, police will humiliate pedestrians who cross illegally by forcing them to do knee bends while holding their ears (Fjellstrom, 2005). These tactics are justified in the name of public safety, but are perhaps actually more a manifestation of the inferior position pedestrians hold in society.

1.4 Equity

At first it may appear that pedestrian space is a frivolous issue in a developing country; but the privations of low income people are not really felt during working hours—it is during leisure hours that the differences are felt. While higher income people have cars, clubs, country houses, theatres, restaurants and vacations, for the poor, public space is the only alternative to television. Parks, plazas, pedestrian streets and sidewalks are essential for social justice. High quality sidewalks are the most basic element of respect for human dignity, and of consideration for society's vulnerable members such as the poor, the elderly and children.

—Enrique Peñalosa, former Mayor of Bogotá (Peñalosa, 2003)

Fig. 20
Pedestrian infrastructure in many developing cities, such as Bangkok, is far from adequate.
Photo by Carlos Pardo

It is ironic that walking, the most fundamental means of transport, is often the most neglected from a transport planning and municipal investment standpoint. In much of the developing world, though, walking remains one of the principal forms of mobility, especially within low-income sectors. Improving pedestrian conditions helps to prioritise a mode that serves a society on an equitable basis. The creation of car-free environments is one of the best means to restore more equitable conditions for all members of society.

Today's conditions in developing cities present a harsh lesson in inequality. As the wealthy enjoy the principal benefits of private motorisation in terms of speed and status, the poor receive the lowest-quality mobility options, in terms of space, costs, convenience, comfort, and risks. While few of the very poor may own motorised transport themselves, at the same time they receive the brunt of the negative impacts of motorisation.

Of the high numbers of transport-related fatalities in developing nations, a high percentage of these deaths are not motorists but rather pedestrians (Table 3). It is the most vulnerable members of society who bear the consequences (Figure 21). While low-income residents are the most exposed to high pedestrian fatality rates, "middle and upper sectors often travel by car and park close to their destinations, minimizing their exposure as pedestrians" (Vasconcellos, 2001, p. 208). Low-income housing is often located near busy roadways and informal workers often ply their goods amidst dense traffic (Figure 22). Such areas typically receive the highest concentrations of air contaminants and the resultant negative impacts on human health.

Table 3: Pedestrian fatalities as a percentage of total traffic fatalities

Region	Pedestrian fatalities (per cent of total)
Europe, United States	20%
Latin America	60%
Africa	45%
Middle East	51%
Asia	42%

Source: Guitink and Flora (1995)

The most vulnerable groups are frequently those with weaker immune systems, which include "infants, the elderly, and those suffering from chronic respiratory conditions including asthma, bronchitis, or emphysema" (WHO, 2000). In developing-nation cities air pollution causes an estimated 50 million cases of chronic coughing in children under the age of 14 years (WRI, 1998).

The distribution of wealth in developing nations translates directly into the amount of mobility a person has available and the quality of the transport experience. "In places as diverse as Santiago, Chile, and Jakarta, Indonesia, higher-income residents make 30% more trips than lower-income residents" (WBCSD, 2001, p. 4–3). Low-income residents also often spend a higher percentage of their income on transport than higher-income groups. This situation is due to the lower-disposable income of these groups, the captive nature of their transport

Fig. 21
The global pandemic of vehicle accidents too often claims the most vulnerable members of society as its victims.
Photo by Transportation Alternatives

Fig. 22
Informal vendors working on the street receive exceedingly high intakes of contaminants, as shown here in Quito (Ecuador).
Photo by Lloyd Wright

options, and the longer distances that low-income groups must often travel to reach central business districts:

> "A study of low income households in Temeke, 8 kilometres from the center of Dar es Salaam, estimated that households spent between 10 and 30% of their income on transport, with an average of 25%. And the upper bound was very income constrained, many low income earners in the formal sector claiming that they could only afford public transport in the period immediately after being paid. Later in the week they walked." (World Bank, 2001, p. 27)

Comfort and convenience in travel is also largely a matter of one's economic status. In Mexico City, approximately 20% of the commuters spend more than three hours travelling each day, and 10% spend more than five hours travelling (Schwela and Zali, 1999). The end result can be a choice between home and the street: "Many of the 'street people' of south Asia and Africa indeed have homes; it is just that they are unable to reach them—because of the cost and/or time involved—between work days" (WBCSD, 2001, p. 4–2).

Municipal budget priorities are quite often ill-attuned to the mobility needs of the majority. Although non-motorised trips and public transport trips are the predominate options for most residents of developing cities, municipal investments are mostly focussed upon the

Fig. 23 and 24
A comparison of investment priorities: Kuala Lumpur's high-technology traffic control centre and a typical footpath in the city.
Photos by Lloyd Wright

continued provision of infrastructure for the car-driving minority. From 1990 through 1998, the city of Jakarta (Indonesia) directed 88% of its urban transport budget to roads even though only 12% of the population had access to a private vehicle (Cervero, 2002). In 2005, the city of Kuala Lumpur completed work on a 400-million ringgit (US$100 million) traffic control centre, employing the latest in camera technologies and software. At the same time, the city allows many footpaths to be essentially used as parking facilities for cars and motorcycles (Figures 23 and 24). How is it possible that city officials can successfully develop and manage a complex traffic control system but are not able to manage a basic footpath? The answer perhaps lies in political will and resource priorities.

Fig. 25 and 26
Transport infrastructure and services in developing nations too often fail to consider special user groups such as women, children, the elderly, and the physically disabled.
Photo by Lloyd Wright

The transport inequities experienced in developing-nation cities are most acutely experienced by groups that are least able to cope with the difficulties (Figures 25 and 26). Gender and age inequities create mobility challenges for large parts of the population. Women face specific restrictions on movement due to the nature of their activities in many developing-nation cities. Activities such as child-care, household management, and informal sector employment "require women to make more and shorter trips than men, more trips at off-peak hours and off the main routes, and engage in more complicated multi-leg trips, all of which tend to make their movements relatively expensive to provide for by public transport, and hence highly priced or poorly supplied" (World Bank, 2001). "When 700,000 squatters resettled on the periphery of Delhi, female employment fell by 27%" due to the limited transport options available (Cervero,

2002). Women may also be more susceptible to insecurity related to travelling alone or by way of public transport, which may force them to depend upon more expensive alternatives or to forgo all but the most vital trips.

The insecure and uncomfortable nature of public transport also creates physical hardship for these groups as well as those who are physically disabled. The World Bank (2001, p. 28) notes that "in most countries, over 10% of the population has some form of physical disability imposing serious disadvantage both in terms of mobility and safety." Unlike developed-nation cities, the cities of lower-income nations do not make widespread use of ramped curbs, low-floor buses, or pedestrian signalling.

By comparison, while developing-nation planners have often forgotten pedestrian convenience, the efficiency of travel for the wealthier groups who travel by automobile or airplane can be quite good. "In some countries it now takes as long for people to walk from their homes to the nearest bus stop as it takes to fly from Sao Paulo to Rio de Janeiro (Hook, 2003, p. 2)." The continued lack of investment in this area suggests that conditions are not likely to improve, particularly in the face of rapid motorisation.

1.5 'Leap-frogging'

The newly motorising countries can see what a mess the North has made and how inefficient are its very large investments in a transport system that fails to deliver health, social equity and regional equity. It is possible for a newly motorising country to leapfrog the last 40 years of European and the last 70 years of North American transport development and move directly into a sustainable strategy that genuinely conserves resources, reduces pollution and pays great attention to the poorest when disbursing scarce cash.

—John Whitelegg, 1997, p. 220

For developing-nation cities, the major portion of the decisions to emulate western auto dependency or craft an alternative urban transport strategy will likely set over the course of the next decades. Cities in the early stages of large-scale infrastructure development have a unique opportunity to choose an efficient pathway. Since major investments in road-based infrastructure are relatively irreversible over the medium term, decisions made by developing-nation officials today will likely determine the shape and direction of their future urban form. Technological leap-frogging refers to a process in which developing countries can bypass intermediate development steps and progress directly to more advanced technological options. With regard to urban transport, this process could infer a move directly to more sustainable transport options rather than committing to a predominantly auto-based urban form.

The evolutionary path ahead for developing-nation cities may be akin to a sort of hierarchy of needs for urban mobility. At the base of the hierarchy are long, difficult trips made principally by foot to access water, food supplies, and other essentials. As incomes and services allow, residents can also make basic trips through paratransit providers. These mini-bus vehicles, while often poorly maintained and driven in a dangerous manner, connect communities not served by other options. As incomes rise further, private motorised vehicles become an option, especially lower-cost two-wheeled vehicles such as scooters and motorcycles. Later, imported used automobiles provide an outlet for latent demand for western car culture. Eventually, the diminished quality of life that occurs from the resulting congestion, pollution, and social tension leads a city to consider more sustainable alternatives. In reality, few developed-nation cities can claim to primarily conduct transport planning through quality of life considerations. Thus, the top tier of the hierarchy may resemble more a broad objective rather than a fully realisable urban form. This evolutionary perspective assumes that quality of life considerations will only be addressed after severe problems force change. Figure 27 outlines this process.

This process assumes that all countries will have to endure severe levels of congestion, contamination and other negative externalities prior to being able to cater to quality of life concerns. In this model, motorisation is a necessary part of achieving

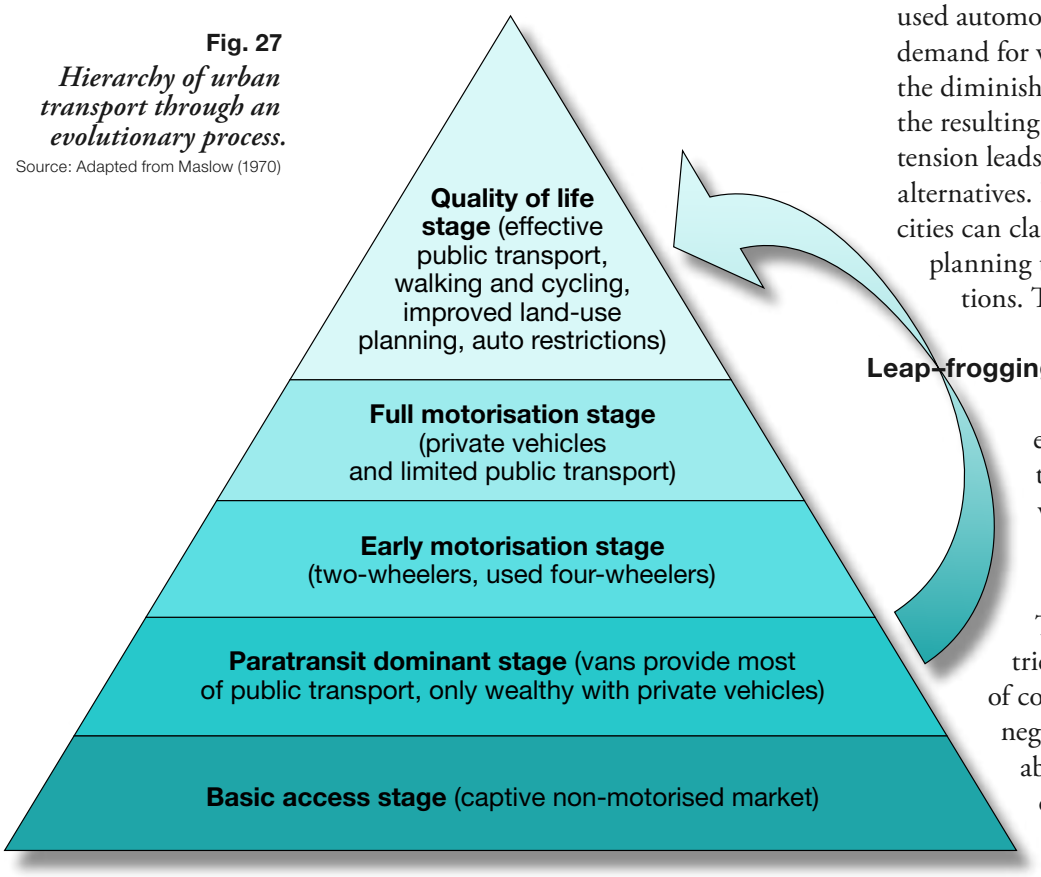


Fig. 27
Hierarchy of urban transport through an evolutionary process.
Source: Adapted from Maslow (1970)

economic development. Vasconcellos (2001, p. 283) confirms this ingrained belief with the following observation:

> "When faced with increasing accident figures in developing countries, some experts mention the developed countries' experience, saying that accident rates will 'gradually reduce' as motorization increases. This cynical thinking means that developing countries have to pass through the problem until 'time' takes care of it. It is implicit that motorization is a good in itself and that thousands of people will have to die, get injured or disabled, until the situation comes to a 'normal statistical level'."

Conversely, technological leap-frogging suggests that it may be possible for developing nations to move directly towards higher quality public transport and non-motorised infrastructure since motorisation levels are still relatively low. Further, many developing-nation cities do not yet have a set urban transport infrastructure that precludes priority measures to public transport and pedestrians. Table 4 presents a sampling of mode share data from various developing cities.

In addition to a high usage of public transit and non-motorised options, developing cities also typically possess a fairly high-density, mixed use design pattern. The challenge for these cities is merely to improve and modernise their transport systems in order to preserve the market share of the existing sustainable modes. A few developing cities, such as Bogotá and Curitiba, may be moving in this direction towards greater sustainability. However, for most of the developing world, the trend is that of China, in which rapid motorisation is the primary objective.

Transport policy decisions made today in developing nations will have profound ramifications on any possible attempt to control global concerns such as greenhouse gas emissions. These policies will also in part determine the extent to which other key developmental objectives, such as health levels, economic efficiency, and overall quality of life, are realised in developing cities. Once policies are orientated towards motorisation, it will be difficult to return to more sustainable options at a later time. As the developed world has discovered, moving commuters away from cars to public transport and non-motorised options is quite difficult and costly.

Table 4: Mode share of urban transport in selected developing cities

	Mode share (percentage of daily trips)			
City	**Non-motorised transport**	**Public transport**	**Private motorised vehicles**	**Other**
Bamako, Mali (1984)	63	12	26	0
Havana, Cuba (1998)	57	27	6	11
Hanoi, Vietnam (1995)	54	4	42	0
Ouagadougou, Burkina Faso (1994)	52	3	45	0
Cairo, Egypt (1998)	36	47	17	0
Sao Paulo, Brazil (1997)	35	33	31	1
Santiago, Chile (1991)	20	56	16	9
Bogotá, Colombia (2000)	15	71	12	2

Sources: Vasconcellos (2001), WBCSD (2001)

2. Defining car-free development

What if we fail to stop the erosion of cities by automobiles?… In that case, we… will hardly need to ponder a mystery that has troubled men for millennia: What is the purpose of life? For us, the answer will be clear, established and for all practical purposes indisputable: The purpose of life is to produce and consume automobiles.

—Jane Jacobs, 1961

The car-free movement is in many ways at its nascent stages of development. However, as concerns over energy security and quality of life become ever greater, interest in car-free concepts is likely to grow. This section traces the early history of this movement as well as provides an overview of the experiments to date in car-free living.

Fig. 28
A vehicle restriction device that was employed in ancient Pompeii.
Photo by Lloyd Wright

2.1 History of car-free development

Until the late nineteenth century, all cities were car-free. However, attempts to limit the types of transport modes in cities dates back to the Roman Empire when restrictions on horse-drawn carts and the resulting noise were imposed on many central districts. "Wheeled traffic was not allowed during the daytime in the streets of Rome. This regulation was extended under Claudius to all Italian towns and Marcus Aurelius extended it further to every city in the Empire without regard to its own municipal status" (Hass-Klau *et al.*, 1999). Figure 28 is an example of a mode restriction mechanism that was once employed in Pompeii (Italy).

Newman and Kenworthy (1999) suggest that a city's mobility characteristics have evolved with each new dominant technology. From the time cities first appeared some 10,000 years ago until the mid-nineteenth century, the "walking city" best described the nature of urban structures. City form during this period was characterised by high densities, mixed land use, and narrow streets that allowed access principally by pedestrian means. Around 1860, the appearance of the first trains allowed for city expansions along rail corridors and thus giving rise to the "transit city". Finally, around 1930 the "automobile city" came into being along with the ensuing lower-density suburbanisation and longer-distance travel between home and workplaces. Newman and Kenworthy (1999) note that "the reality of most cities today is that they contain some elements of all three city types, as distinguished by their different patterns of transportation and density."

The modern concept of car-free development owes its creation to research in the 1960s and 1970s that highlighted the high social and environmental costs of uncontrolled automobile

Table 5: Historical chronogram of modern car-free development

Date	Location	Description
1961	New York	Publication of "The Death and Life of Great American Cities" by Jane Jacobs
1962	Copenhagen	First street pedestrianised in the city centre
1968	Delft	Community-led traffic calming project (woonerf) takes place
1972	Delft	First official woonerf project is launched
Jan.–Febr. 1974	Switzerland	In response to the oil crisis of the early 1970s, four Car-Free Sundays are organised in Switzerland
1991	New York	First international conference on Auto-Free Cities, organised by Transportation Alternatives
25 March 1992	Amsterdam	Non-binding referendum is passed by 52% of voters to make Amsterdam a car-free city
25 Sept. 1992	San Francisco	A grassroots effort is launched by groups of bicyclists to reclaim city streets; the movement, known as Critical Mass, spreads to many other cities
1992	Ottawa	Auto-Free Ottawa newsletter launched
March 1994	Amsterdam	Car-free city network launched by the European Commission and Eurocities
October 1994	Toledo	"Thursday: Car-Free Day" proposal and work plan present at Accessible Cities Congress
14 May 1995	London	The first "Reclaim the Street" event is staged; idea of citizens occupying streets continues to be repeated in UK and elsewhere
1996	Copenhagen	Copenhagen Declaration issued by European government groups to recognise the importance of forming a Car-Free Cities network
June 1996	Reykjavik	City organises its first Car-Free Day
June 1996	Bath	First Car-Free Day held in the UK
1997	UK	The UK's Environmental Transport Association (ETA) organises the first of three Car-Free Days in several UK cities
1997	La Rochelle	First Car-Free Day held in France
1997	Amsterdam	Car-Free Times journal launched
1998	Germany	National car-free mobility event held ("Mobil ohne Auto")
22 Sept. 1998	France	First national Car-Free Day held in France with 34 cities participating ("En ville, sans ma voiture?")
19 Sept. 1999	Netherlands	National Car-Free Sunday held in The Netherlands
22 Sept. 1999	France and Italy	Second annual Car-Free Day held in France and the first annual Car-Free Day held in Italy with over 90 Italian cities participating
February 2000	Bogotá	Bogotá holds the world's largest Car-Free Day event across an entire city of 7.2 million inhabitants ("sin mi carro en Bogotá")
2000	Italy	Several Italian cities participate in a national Car-Free Sunday event during the first Sunday of four consecutive months
22 Sept. 2000	Europe	First pan-European Car-Free Day held
29 Oct. 2000	Bogotá	Through a public referendum, 63% of voters approve an annual Car-Free Day
19 April 2001	USA	Car-free events held across the USA during national "Earth Day"
22 Sept. 2001	Worldwide	Over 1000 cities in a total of 33 countries participate in the International Car-Free Day

Adapted from UNCFD (2005a)

usage. Table 5 outlines a historical chronogram of some of the events contributing to car-free development during the previous 40 years. A seminal and inspirational work in this area was the writing of Jane Jacobs in describing the character of New York streets. Jacobs astutely observed that the urban planning profession had somehow missed the essence of effective public space (Jacobs, 1961, p. 16):

> "In city after city, precisely the wrong areas, in the light of planning theory, are decaying. Less noticed, but equally significant, in city after city the wrong areas, in the light of planning theory, are refusing to decay."

Jacobs was one of the first to observe the role of public space and especially of the pedestrian in defining the actual dynamic of a city (Jacobs, 1961):

> "Streets and their sidewalks, the main public places of a city, are its more vital organs. Think of a city and what comes to mind? Its streets. If a city's streets look interesting, the city looks interesting; if they look dull, the city looks dull" (p. 39).

> "Sidewalk width is invariably sacrificed for vehicular width, partly because city sidewalks are conventionally considered to be purely space for pedestrian travel and access to buildings, and go unrecognized and unrespected as the uniquely vital and irreplaceable organs of city safety, public life, and child-rearing that they are" (p. 97–98).

Fig. 29
In the early 1960s, Copenhagen began a process of pedestrianising much of its central core.
Photo by Lloyd Wright

At approximately the same time, the city of Copenhagen began its transformation with the pedestrianisation of its historical core (Figure 29). A few years later, a group of frustrated residents in Delft (The Netherlands) took matters into their own hands by creating the "woonerf", which effectively launched modern traffic-calming techniques. Shortly thereafter, the world experienced the first significant oil shock in which prices dramatically rose in the early 1970s. In some countries, such as Switzerland, car-free events were launched as a response. In Holland, Germany, and other parts of Western Europe, innovative city councils and concerned citizens worked to pedestrianise central shopping streets and calm traffic in residential areas. However, these measures were typically local in nature and thus did not inhibit growing car ownership and use. In North America, despite a temporary period of improved fuel economy for vehicles, little else changed (Figure 30). During the 1980s, some resistance to highway construction emerged in specific locales, but growth in car ownership and usage continued.

It was not again until the 1990s that significant attention to reducing the reach of motorised vehicles re-emerged. In this instance, environmental concerns and quality of life began to play a central role. The spectre of climate change, health impacts from smog, and intractable congestion on the roadways all created the conditions for renewed interest in car-free options. Again, much of the most recent ef-

Fig. 30
Sprawl, the sport utility vehicle (SUV), and high fuel consumption remain the defining features of transport in the US.
Photo by Lloyd Wright

fort has come from a few leading individuals and organisations. The car-free movement has largely emanated from grassroots efforts and activist-based events. In 1992, a group of cyclists in San Francisco (US) staged the first "critical mass" ride. These rides, in which swarms of cyclists descend on a city's streets, became common worldwide. Likewise, in the mid-1990s, the "Reclaim the Streets" movement in the UK indicated that there existed a large segment of the population that truly valued better public space.

The 1990s also represent a period in which the mainstream of transport planning began to accept the notion of *induced traffic*. The empirical evidence was unequivocal over a rather counter-intuitive result: ***Additional road construction results in more traffic congestion***. Induced traffic essentially implies that a city cannot *build* its way out of the problem. While additional road construction may lead to a temporary reduction in traffic levels, this free road space eventually attracts additional traffic, especially when there is latent demand for private vehicle usage. Interestingly, the research suggests the process works in reverse as well. Evidence from bridge and street closings in the UK and the US indicates that a reduction in road capacity actually reduces overall traffic levels, even accounting for potential traffic transfers to other areas (Goodwin *et al.*, 1998). This disappearance of traffic, known as "traffic degeneration", gives one of the strongest indications to the viability of implementing car-free interventions.

The new millennium has brought a surge in car-free activities. The movement has gained credibility at the governmental and international level with Car-Free Day programmes from the European Union and the United Nations. Further, the efforts of visionary leaders in Bogotá (Colombia) and Curitiba (Brazil) have now proven that a city does not need to be wealthy to create a high-quality human environment (Figures 31 and 32).

At the same time, the Sport Utility Vehicle (SUV) has become firmly established in North America, and has contributed to a steady decrease in vehicle fuel economy there since 1998. The rise of mass motorisation in countries like China and India also casts a worrying shadow over global energy security and the global environment.

Fig. 31 and 32
Visionary mayors in Bogotá (top photo) and in Curitiba (bottom photo) have created very high-quality urban environments without requiring large financial investments.
Top photo by Shreya Gadepalli.
Bottom photo by Charles Wright

Today's reality is a massive tide of motorisation against which the nascent car-free movement has yet to slow in any substantial way. Certainly much has been learned in the last few years about the alternatives to car dependence. Whether the political will exists across a broader array of cities and national governments is a question still to be answered.

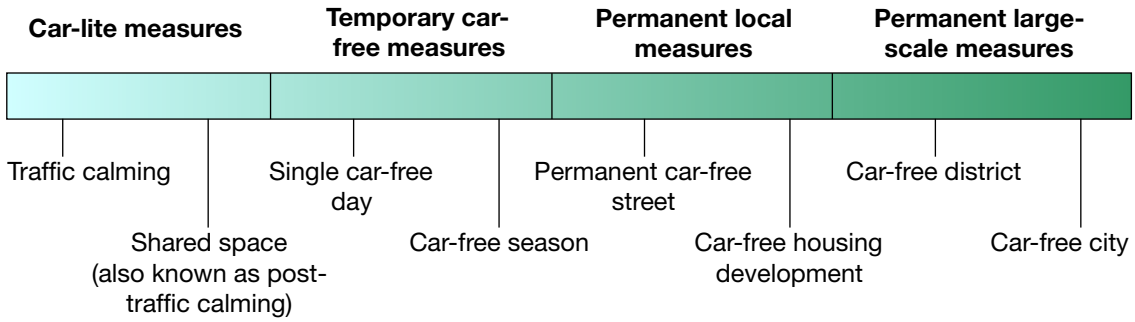
2.2 Car-free terms

"I number it among my blessings that my father had no car…This meant that all these distant objects could be visited just enough to clothe them with memories, and not impossible desires, while yet they remained ordinarily as inaccessible as the Moon. The deadly power of rushing about wherever I pleased had not been given to me. I measured distances by the standard of man, man walking on his two feet, not by the standard of the internal combustion engine. I had not been allowed to deflower the very idea of distance; in return I possessed 'infinite riches' in what would have been to a motorist 'a little room'."

—C.S. Lewis, "Surprised by Joy" (1956)

The term "car-free" can encompass a range of different restrictions on motor vehicle use. Vehicle restrictions can be pictured as a spectrum of possibilities from limited demonstrations to long-term absolute bans. Figure 33 illustrates this range of possibilities.

Fig. 33
The car-free spectrum



On the one side of this spectrum are areas that discourage vehicle use without an absolute ban. Such areas are sometimes termed "traffic-calmed" areas or even "car-lite" areas. In this case, cities and communities permit full motorised vehicle access but deter unfettered use and speeds through road design. On the other side of the spectrum are cities and communities that completely prohibit motorised vehicles.[5] In between a traffic-calmed area and a completely car-free city is a range of other possibilities that vary by both the spatial and temporal nature of the vehicle restriction. Rather than encompassing the entire surface of a city, a motorised vehicle ban may be limited to a particular district or precinct. Vehicle restrictions may also vary by the time of day, day of week, and even the season of the year. Box 2 provides definitions for some of the common terms used to describe car-free areas. Figure 34 provides a matrix showing a sampling of the diversity in existing car-free efforts.

[5] *Motorised vehicles* here do not include some personal mobility devices such as electric wheel chairs for the physically disabled. However, scooters, golf carts, and Segways would be considered motorised vehicles that would probably not be allowed in a strict car-free environment.

Box 2: Car-free terms

Car-free city – Motorised vehicles are banned from all parts of the cities, with only a few possible exceptions such as emergency vehicles.

Car-free shopping street – Pedestrianised mall which focuses upon commercial activity; motorised deliveries may still be allowed during off-peak hours.

Transit mall – A car-free shopping street that permits access by public transport vehicles.

Car-free historical centre – Historical area which bans motorised vehicles.

Car-free housing – Residential area restricting motorised vehicles and, in some cases, restricting the ownership of motorised vehicles.

Home zone – Term used to describe a residential area in which street design discourages the use of motorised vehicles.

Car-free day – Special day providing an experiment with car-free living; vehicles may be banned from the entire city or just in selected zones.

Car-free lifestyle – Term used to describe persons who individually choose to live without the use of motorised vehicles, even if they live in a car-dependent area.

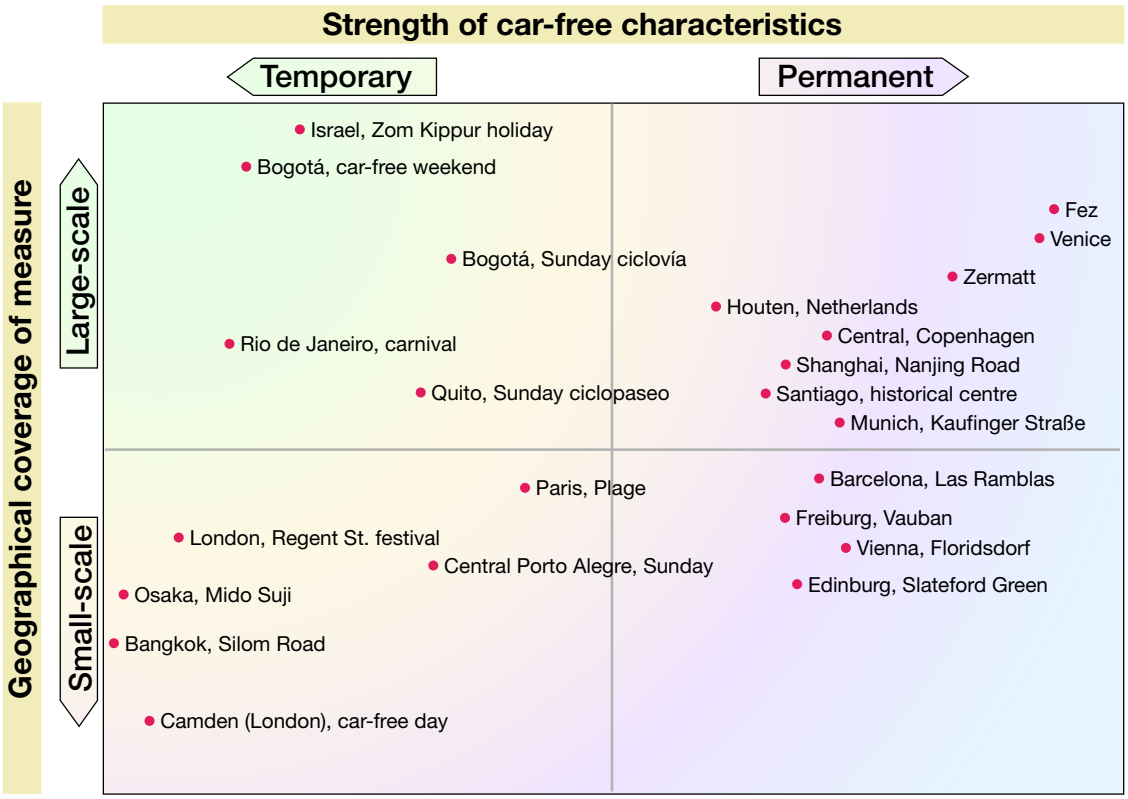


Fig. 34
The car-free matrix [6]

[6] Not all car-free areas are represented in this graphic. The matrix merely shows relative comparisons between sample areas.

The distinctions between *car-free cities*, *car-free housing*, *car-free shopping streets*, *car-free historical centres*, and *Car-Free Days* will be observed in this document. The terms *car-free areas* and *car-free development* will be utilised as a general concept to encompass the broader spectrum of car-free possibilities.

2.2.1 Car-free city

shall be telling this with a sigh
somewhere ages and ages hence:
two roads diverged in a wood, and i-
i took the one less traveled by,
and that has made all the difference.

—Robert Frost (1874–1963)

In the absolute case, a *car-free city* would imply the complete absence of any motorised vehicle travel at all times. Cities that are completely free of any motorised vehicle transport are quite rare. Venice (Italy) and the medina of Fez (Morocco) are probably the closest of any major urban areas to the true meaning of a car-free city. The central area of Fez most likely hosts the world's highest car-free population in a single concentrated area with approximately 156,000 inhabitants (Carfree Times, 2002).

Even within cities that are almost completely car free, there are times when exceptions are permitted, such as the use of emergency vehicles. There are also many examples of cities that permit small electric vehicles to assist with the movement of goods and the transit of the elderly or disabled persons (e.g., Zermatt, Switzerland). In general, though, the term "car-free city" represents the deepest manifestation of the concepts presented in this document.

The historical portion of Venice (Italy) is perhaps the best known of cities that are predominantly car free (Figure 35). In Venice's case this aversion to the automobile is due to its unique geography and the need to retain historical character. Likewise, other historical and resort cities such as Louvain la Neuve (Belgium), Capri (Italy), and Zermatt (Switzerland) are essentially car free within city boundaries. Venice, Capri, and Zermatt are also notable as locations with some of the world's highest residential property values, and thus indicating that car-free locations can in fact bolster economic value. Venice's popularity has to a degree undermined its character as a vibrant, living city. Venice has become such a choice of second homes for the wealthy that the effective full-time population

Fig. 35
Venice represents perhaps the most noted example of a car-free city.
Photo by Joel Crawford

has been reduced. Many of the homes are now only occupied during weekends or during certain parts of the year.

There also exist several smaller island cities that are also largely car free (Wikipedia, 2005a). These island cities include Capri, Landau (Hong Kong), Gulangyu (China), Buyukada (Turkey), and Fire Island (US). A description of Buyukada, one of Turkey's Princess Islands, is given in Box 3. Island cities have largely retained a car-free nature due to the following factors:

- Difficulty of developing car-based infrastructure within the given topography
- Relative inaccessibility of the locales
- Existing densities and short distances between key destinations
- Local customs and preferences.

Most car-free cities have another characteristic in common. Virtually all these cities are noted tourist destinations. A car-free city is a highly attractive environment for people wishing to escape the stressful atmosphere of their home cities. A car-free strategy for a city may thus be appropriate for urban areas that are seeking to position themselves as a tourist destination. In fact, although Santa Barbara (US) is far from being a car-free city, local businesses market themselves as offering a "car-free" holiday (Figure 36).

Hass-Klau *et al.*, (1999, p. 113) note that many other cities are giving serious consideration to the car-free option:

> "Whereas traditionally pedestrianisation was seen as excluding cars from the main

Fig. 36
Santa Barbara (US) specially markets holidays in which persons can take a break from motorised vehicles (Car Free Santa Barbara, 2005).

Box 3: Princess Islands, Turkey

By Yaakov Garb, ITDP

The nine Princess Islands, lie in the Sea of Marmara, just south of Istanbul. Three are uninhabited, one is private, and the others are home to small communities, totaling a population of 17,000 people that swells to a quarter of a million during the summer months. Buyukada, the main island, has 8,000 year-round residents, but at least ten times that in the summers. Government and privately operated ferries as well as catamarans arrive frequently. It is 40 or 50 minutes from the heart of Istanbul, an easy commute.

Fig. 37
Rush hour on Buyukada Island.
Photo by Yaakov Garb

As one steps off the ferries, one begins to notice Buyukada's subtle secret: it and the other islands forgot to motorise. The first car appeared in Istanbul in 1911. It was difficult to transport cars to the islands, and the inhabitants were not much interested in them. Somewhere along the way, this leaning solidified into custom and law. The system of horse-drawn carriages that had operated for well over a hundred years remained Buyukada's main form of transportation, and at some point bicycles grew in number as well. Today the island remains mostly free of motorised vehicles. In the winter, a 17-seater minibus takes children to school. And there are some service vehicles: two police vans, a handful of municipality vans, seven fire engines, a truck for emptying septic tanks, another for cleaning the streets, and some forest service pick-up trucks.

The cleanliness of the air and the quiet of Buyukada are striking. As society has become so accustomed to a constant background of motorised noise, its absence is startling. Imagine a bustling central transit station that is quiet and fume-free, or a musical evening held on a terrace just a few meters from a main street. What also strikes one about Buyukada is the spaciousness of the streets once stripped of parked and moving vehicles. After a few days where nothing happens faster than a person can run, the occasional police vehicle is a jarring experience.

Much small freight is managed by bicycle and horse carriage. Larger items can be moved, with written permission, by vehicles brought in by the ferry for this purpose, on a one-time basis, or by one of the island's hauling services, that specializes in moving large loads, such as a piano, through horse and human power.

Perhaps one of the most remarkable things about this island that has quietly decided to let motorisation pass it by, is precisely how low-key and ordinary their approach is. The fact is not trumpeted to tourists; there are no loud declarations. Within sight of the metropolis of Istanbul, yet still serene, Buyukada demonstrates that a community can thrive and enhance its attractiveness by forgoing motorised transport almost entirely.

Fig. 38
Spot the obsolete technology.
Photo by Yaakov Garb

> shopping streets which had high pedestrian flows, pedestrianisation increasingly became part of an overall transport strategy not only for the town centre but for the city as a whole."

For some cities, creating a large-scale car-free area can be a strategic decision built upon a sound analysis of the economic, social, and quality-of-life advantages.

2.2.2 Car-lite areas

"A journey of a thousand miles begins with a single step."

—Lao-tzu (604 BC–531 BC)

For most cities and communities, the abandonment of motorised vehicles will not happen overnight. The political leadership required to transform a city in the manner of a Bogotá or a Curitiba is not a common trait amongst today's public officials. However, cities and communities may choose an intermediary step that at least begins to shift the balance in urban design away from the primacy of the automobile. Measures which restrict private vehicle movements and speeds are a basic step in this process.

Traffic calming

Historically, traffic calming measures have been seen as mechanisms to improve pedestrian safety and curb some of the negative impacts of motorisation. By making the streets take on characteristics of a yard or a park, motorists would be obliged to curb dangerous speeds. The idea was to use design features like trees, chicanes, and bumps to force motorists into acceptable behaviour. After the initial "woonerf" experiments in The Netherlands, the traffic calming concept quickly spread to Germany, where in 1976 the state of North-Rhine-Westphalia began a series of neighbourhood-based projects. In a short amount of time, the concept spread to Bavaria and then the whole of Germany.

Today, traffic calming consists of a multitude of design options, including speed humps, raised intersections, textured and coloured pavements, chicanes, neckdowns, and pedestrian islands. Box 4 provides summary definitions of each of the most common types of traffic calming measures.

The idea behind these design features is to give both physical and psychological priority to pedestrians. Traffic calming measures carry the advantage of being largely self-enforcing. Vehicles can only move at speeds that are physically possible based on the configuration of the inhibiting infrastructure.

However, whether traffic calming actually achieves a meaningful advantage to the

Box 4: Traffic calming measures

Speed humps – Rounded raised area across the vehicle lane with typical dimensions of 3–4 metres in length and 50–100 mm in height.

Speed table – Flat topped speed humps that are often constructed with brick or textured materials and are usually long enough for the wheel-base of a standard car to rest entirely on the flat surface

Raised sidewalks – These are speed tables outfitted with crosswalk markings and signage to channelise pedestrian crossings, providing pedestrians with a level crossing. Additionally, by raising the level of the crossing, pedestrians are more visible to approaching motorists.

Raised intersections – Flat raised areas that cover the entire area of the intersection, with ramps on all approaches and typically constructed of brick or other textured materials.

Realigned intersections – Changes in intersection alignment which converts a "T" shaped intersection with straight approaches into curving streets.

Textured and/or coloured pavements – Pavement materials are used to create a coloured or uneven surface for vehicles to traverse across an intersection, crossing, or even an entire city block.

Traffic circle – Raised islands in the centre of intersections, around which traffic circulates.

Chicanes – Curb extensions that alternate from one side of the street to the other, forming S-shaped curves.

Neckdowns – Curb extensions at intersections that reduce the distance required for a pedestrian to cross a street.

Chokers – Curb extensions at mid-block locations that narrow the street and widen the footpath area.

Pedestrian islands – A raised island located in the centre median area; also known as pedestrian refuges.

Traffic cells – A street enclosure that permits a direct link for a pedestrian or cyclist but force a longer trip by car.

Source: Adapted from Institute of Transportation Engineers, 2005

pedestrian is sometimes debated. Some measures, such as traffic circles, can make pedestrian crossings even more difficult. While speed tables and chokers will temporarily reduce vehicle speeds, motorists may compensate by accelerating rapidly between barriers, and thus increasing risks. The measures may also increase certain externalities such as noise from vehicles rapidly accelerating and decelerating as well as the noise of vehicles striking the raised surfaces of speed humps and speed tables. Rapid acceleration and deceleration also increases fuel use and the associated air emissions. Further, rather than producing a net reduction of traffic, these measures may simply represent a transfer of traffic to other streets where congestion and emissions could be even worse than before.

Further, it is not entirely clear if traffic calming measures are effective in moving cities towards more extensive vehicle restrictions and bans. If investment is made in accommodating the automobile, even in a restricted form, then it may be psychologically and financially difficult to justify a total ban at a later date.

Individuals will often promote traffic calming measures in their own neighbourhood but not elsewhere. Motorists will want the safety benefits for their own family but may object to slowing their commute across other communities.

However, another interpretation is that traffic calming may be a necessary first step in making residents realise that the streets are public space which do not belong exclusively to the automobile. Additionally, measures such as reducing the length of pedestrian crossings through neckdowns and pedestrian islands do appear to reduce injuries and deaths when compared to standard, unprotected crossings.

In some instances, communities have taken it upon themselves to construct their own form of traffic calming (Figure 39). The fact that such a step is necessary says much about the failure of local governments to firmly address the imbalance between vehicles and people.

Fig. 39
Residents in this neighbourhood of Accra, Ghana constructed their own speed bump in order to restrain motorists from risking the lives of their family members.
Photo by Paul White

Speed limits and enforcement cameras

Limiting vehicle speeds by law is fundamental to road safety. Speed is perhaps the most lethal contributor to accidents and injury from motor vehicles. An estimated 85% of pedestrians are killed when struck by a vehicle at 60 kilometres per hour. By comparison, 5% are killed when struck by a vehicle at 30 kilometres per hour (Limpert, 1994).

Thus, restricting automobile speeds to much slower speeds (30 kph) or the speed of a bicycle (20 kph) or even the speed of a light jog (10 kph) dramatically improves safety. Such speeds also encourage alternatives to private vehicles that can compete more equally on a basis of travel times.

However, while speed limits are a basic component of any road legal code, speed limits alone do not ensure a safe road environment. Speed limits alone also do not address many of the negative impacts stemming from the presence of motorised vehicles. These limitations are particularly true in developing-nation cities. To be effective, speed limits require both enforcement and a culture of traffic law compliance. Unfortunately, both of these characteristics are frequently missing from developing cities. The lack of resources available to traffic police in such cities make strict enforcement difficult.

Traffic cameras do offer a mechanism to create the conditions for better enforcement of traffic laws. Such cameras have been used with success in the UK to discourage various violations, including speeding and the running of red lights. As usage of enforcement cameras is becoming more common, the costs of the technology are falling and the cameras are increasingly an affordable option for developing cities. Despite such accolades, many motoring groups argue

that enforcement cameras are inherently unfair, suggesting that a traffic violation does not occur unless physically witnessed by actual traffic police. Some privacy groups also express concerns on how camera information is used. Despite these concerns, the number of cameras continues to increase and bring with them impressive improvements in road safety. However, cameras alone do not completely ensure safety and certainly do not mitigate many of the negative impacts from mass motorisation.

Shared space

One of the most innovative concepts in recent years has been the idea of "shared space", which is also known by several other names including "post-traffic calming", "second-generation traffic calming", "psychological traffic calming", and even "naked streets". In some respects "shared space" represents the antithesis to traffic calming, and yet, both share the ultimate goals of slower vehicle speeds and reduced accidents. With shared space, all physical differentiation between car space and pedestrian space is removed (Figure 40).

Fig. 40
The concept of "shared space" has successfully reduced traffic accidents in The Netherlands and elsewhere.
Photo by Hans Monderman

The origins of shared space are attributed to Hans Monderman of The Netherlands who has taken his designs to roadway intersections of such Dutch cities as Drachten and Oosterwolde. In a short amount of time, these concepts have made their way to a variety of other locations including Christianfield in Denmark, Wiltshire and Suffolk in the UK, and West Palm Beach in the US. In each case, improvements in safety have been recorded.

In many ways, the idea of shared space seems counter-intuitive: "Build roads that seem dangerous, and they'll be safer" (McNichol, 2004). The idea is that the lack of signage and road markings increases the uncertainty for motorists, who will then be more cautious within an undefined road environment. Through intrigue and uncertainty motorists become more engaged in their surroundings (Engwicht, 1999). A monotonous roadway with high dosages of signage and markings increases speeds and lowers driver awareness, which is a combination inviting accidents. Monderman makes this point with (McNichol, 2004):

> "A wide road with a lot of signs is telling a story. It's saying, go ahead, don't worry, go as fast as you want, there's no need to pay attention to your surroundings. And that's a very dangerous message."

In an area of shared space, neither pedestrians nor motorists have explicit signage to dictate who has priority. People must resort to eye contact and other forms of subtle communication to navigate the roadway. The end result is that motorists instinctively reduce speeds in order to engage in this subtle communication process.

The extent to which shared space is applicable to larger cities and to developing cities is not yet known. While the lack of signage results in greater caution from motorists in The Netherlands, it is not clear if the same success would be achieved on the streets of Lagos, Jakarta, or São Paulo. Additionally, as traffic volumes increase the lack of signalling may eventually reach a critical point in which gridlock prevails. Further, simply explaining the shared space concept to traditional road engineers and planners can be challenging. Nevertheless, shared space represents an innovative approach that will likely receive increasing attention.

Home Zones

In the UK, an analogous approach to shared space is known as "home zones". A home zone is a residential street in which traffic calming and/or shared space techniques are used to restrict vehicle speeds and movements. Home zones may also feature traffic cells in which roads are partially closed to outside traffic (Figure 41).

Home zones also represent an integrated approach featuring community involvement in the decision process. The Northmoor neighbourhood in Manchester has been the sight of one of the initial successes with home zones. The Northmoor project benefited from the support of both the local council as well civic organisations and the community itself. A street party served as the initiation of the resident-led design process (Figure 42). While the end result is not entirely car free, the textured surfaces and the presence of street furniture make for a highly people-friendly environment (Figure 43).

Smart growth development

"Smart growth" is a concept developed by progressive planners, architects, and social scientists in the US to encourage the development of more human-friendly communities. Smart growth stems from the New Urbanist Movement of the 1990s, which has sought to counter sprawl through mixed use, higher density development (Calthorpe, 1993 and Katz, 1994). The principal objectives behind smart growth include (Smart Growth Network, 2005):

- Create range of housing opportunities and choices
- Create walkable neighbourhoods
- Encourage community and stakeholder collaboration
- Foster distinctive, attractive communities with a strong sense of place
- Make development decisions predictable, fair and cost effective
- Mix land uses
- Preserve open space, farmland, natural beauty and critical environmental areas
- Provide a variety of transportation choices
- Strengthen and direct development towards existing communities
- Take advantage of compact building design.

Smart growth is in many ways quite similar to the UK Home Zone with an emphasis on calming traffic but not necessarily eliminating motorised vehicles. Since a complete banning of vehicles from community projects is difficult in the US context, smart growth advocates assume that car-lite development is a more realistic course of action.

Other types of car-lite areas

A car-lite area may also be defined by the type of vehicles permitted. Some areas may limit car use to only local residents. In other instances, car taxis may also be permitted. While such

Fig. 41
This home zone in London (Borough of Camden) restricts car access into an area near a school.
Photo by Lloyd Wright

Fig. 42 and 43
The Northmoor home zone in Manchester (UK) has been successful in creating a highly people-friendly environment.
Photos by the Northmoor Urban Arts Project

areas are not car free, they do represent a potential reduction in the volume of motorised traffic. Such restricted access areas also can act as buffer regions that help provide a safe transition from car-free zones to car-dependent areas. This premise also holds for areas implementing traffic calming measures.

Paris (France) has announced an ambitious plan to close major portions of the city centre to motorised vehicles by the year 2012. Only residents, buses, delivery vans, and emergency vehicles will be allowed to enter a 5.6 square kilometre zone on the Right Bank that includes the Louvre, the Ópera, the Marais, Les Halles and the Ile de la Cité (Michaelson, 2005). While this plan is not strictly car free, it will represent a substantive improvement to the quality of Paris' urban environment.

Areas which do not prohibit vehicles but strictly limit parking may also be considered car-lite (Figure 44). The banning of all on-street parking can be the start of returning a community to its residents. The lack of parking provision is an effective incentive to encourage residents and visitors to seek transport alternatives. A visually car-free street can also help send a psychological message to everyone that children, pedestrians, cyclists, and other non-motorised users have priority. Of course, streets free of on-street parking but still allowing car travel possess many of the other undesirable features of automobile use, including safety risks.

Fig. 44
In cities such as Takayama (Japan), the banning of on-street parking at least reduces the visual intrusion caused by parked cars.
Photo by Lloyd Wright

As noted, car-lite areas can be seen as part of an evolutionary approach to car-free development. The political reality for some cities may necessitate a phased approach to car-free designs in which traffic calming, shared space, or home zones are the first phase.

2.2.3 Car-free days and car-free events

Car-free areas can also be defined by the temporal nature of the measures. Areas can be car-free during designated hours of the day or during designated days of the year. "Car-free days" are a limited one-day experiment in banning motorised vehicles from street access. A Car-Free Day can encompass an entire metropolitan area or be conducted on a neighbourhood basis. Car-free days are typically undertaken annually on a week-day to demonstrate the viability of alternatives during a normal work day. However, some cities, have implemented permanent Car-Free Days that occur each weekend on a particular street or in a particular neighbourhood. There are also seasonal events, such as street closures during summer months, which allow residents to make the best use of an area based on seasonal climate patterns. Many festivals also necessitate a temporary car-free approach due to the nature of the event and the amount of people drawn to the area.

Car-free days

Car-free days are increasingly high profile events that can be useful in awakening a city and its residents to the possibilities of a different urban environment. The principal premise behind such days is the idea of creating a "pattern break" in which awareness of transport alternatives is promoted.

> "By creating a break in the normal pattern of behaviour, CFDs [Car-Free Days] can provide an opportunity for the citizens and the municipality to take a step back and reconsider the development path of the transport sector and whether it takes into account and meets the needs of all people…On an even broader scale, CFDs can serve to spark a dialogue about the future of the city and allow citizens to ask what exactly they envision their city to become in say, 20, 50, and 70 years" (UN-CFD, 2005b).

As noted in Table 5, since 1998 several international campaigns have been initiated to promote Car-Free Day activities. Western Europe has been a leader in the Car-Free Day movement with France launching the first major nationwide effort in 1998 with 34 cities participating. In the following year, over 90 Italian cities joined French cities in the event. In the year 2000, the European Commission's Environmental Directorate became a member of the supporting consortium and now provides funding to promote the concept of a pan-European Car-Free Day.

The day takes place on 22 September each year and varies in scope depending on the local circumstances. In some cases, the event may be just one street in one sector of a city. In other cases, there is a more expansive effort. The European Car-Free Day has also become known by the programme name of "In Town Without My Car!". Since 2002, the day is held in conjunction with the European Commission's "European Mobility Week", which is a week of related activities aimed at raising public awareness on sustainable transport and acting as a focal point for new local initiatives (Figure 45).

The date of 22 September is now recognised as the International Car-Free Day. While observed principally in Europe, other cities such as Bangkok (Thailand), Bogotá (Colombia), Jakarta (Indonesia), Taipei (Taiwan), and Toronto (Canada) have participated. Table 6 summarises the list of cities participating in the 2004 edition of the International Car-Free Day (European Mobility Week, 2005).

Fig. 45
The EU's "In Town Without My Car" programme is helping to raise the profile of car-free events worldwide.

Table 6: Participating and supporting cities, International Car-Free Day 2004

Country	Number of Participating Cities	Number of Supporting Cities
Albania	8	-
Argentina	-	1
Austria	197	-
Belgium	22	4
Brazil	59	8
Bulgaria	69	15
Canada	2	4
Colombia	3	-
Croatia	1	-
Cyprus	–	1
Czech Republic	25	7
Denmark	1	1
Estonia	1	1
Finland	15	2
France	33	3
Germany	27	21
Hungary	41	10
Iceland	7	-
Ireland	19	-
Italy	17	3
Japan	-	2
Latvia	1	4
Lithuania	18	-
Luxembourg	12	-
Malta	20	8
Moldova	1	-
Netherlands	-	20
Norway	1	3
Poland	109	-
Portugal	56	7
Romania	36	28
Serbia and Montenegro	6	-
Slovakia	1	1
Slovenia	18	3
Spain	211	1
Sweden	30	33
Switzerland	67	5
Taiwan	2	-
United Kingdom	10	42
Total	1,146	238

Source: Access (2005)

There are at least two other significant dates in which some municipalities elect to promote car-free activities. "Earth Day" is held each year on 22 April. The first Earth Day was held in the US in 1970. An organisation known as the Earth Day Network uses the Earth Day event as an opportunity to promote awareness of a range of ecological issues, including the impacts of motorised vehicles. The Earth Day Network encourages cities to mark the day with a pledge to supporting car-free experiments. In 2001, the Earth Day Network led efforts to hold the first Car-Free Days in the US. In 2002, car-free events were held on Earth Day in not just US cities but also in Amman (Jordan), Dushanbe (Tajikistan), Kathmandu (Nepal), Lomé (Togo), and Seoul (South Korea).

Additionally, "World Environment Day" is held each year on June 5th. The activities of this day are coordinated through the United Nations Environment Programme (UNEP). The United Nations' General Assembly established World Environment Day in 1972, which coincides with the establishment of UNEP. Car-free initiatives are sometimes one of the focus areas encouraged within the framework of World Environment Day.

Shenzhen (China) hosts its own "Green Action Day" in early June in conjunction with World Environment Day. Shenzhen's inaugurated its event in 2004 and intends to continue into the future. The event in 2005 resulted in an estimated 100,000 residents giving up their cars for the weekday commute (Xinhuanet, 2005). Shenzhen is a special economic zone in China, meaning that the city is a target of significant economic development. Thus, Shenzhen's experience represents a key example in one of the world's most rapidly motorising nations.

Fig. 46
Bogotá's weekly car-free event covers the entirety of a city with a population of 7 million inhabitants.
Photo by Lloyd Wright

Some cities have created their own day for car-free activities. The Peñalosa administration in Bogotá (1997–2000) chose the first Thursday of February as the target day. The Bogotá event has become the world's largest Car-Free Day by a single city since the private vehicle ban covers the entire expanse of the city, which has a population of approximately 7 million inhabitants (Figure 46). The Bogotá Car-Free Day has been legally codified through a referendum.

The largest Car-Free Day in terms of total area covered occurs each year in Israel during the Yom Kippur holiday. Virtually all of the country's 6.1 million residents refrain from motorised travel during this 24-hour (sundown to sundown) holiday (Figure 47).

Fig. 47
The Yom Kippur holiday is effectively a car-free day covering an entire nation.
Photo by Ron Wolf

In some instances, Car-Free Day events are practiced by a select group of organisations within a city. In July and November of 2002, Guatemala City (Guatemala) held Car-Free Days in which municipal officials and staff refrained from car use (Sustainable Transport, 2002). The city ultimately hopes to expand the participation of the Car-Free Day to a wider grouping of citizens and organisations.

In 2002, the United Nations Department for Economic and Social Affairs (UNDESA) launched an international initiative promoting Car-Free Days. The subsequent United Nations Car-Free Day (UNCFD) programme has sponsored regional workshops to broaden awareness of Car-Free Days as a tool for changing mobility patterns in cities. The first workshop took place during the third annual Car-Free Day in Bogotá in February 2002. Mayors and other officials from the Latin American region saw first-hand how a Car-Free Day can be successfully implemented and institutionalised. UNCFD's second event consisted of a practicum in Freemantle (Australia) and involved officials from across the Asian region.

Air quality emergencies

Car-free days may also be triggered when pollution levels reach a certain critical point. Italian cities have particularly adopted this technique to fight acute pollutant levels. In February 2005, the city of Vicenza (Italy) forbid motorised vehicles for a period of one week in order to clean the air of a persistent smog formation. Both Rome and Milan have imposed similar bans in the past, especially during periods of climatic inversions when there is little wind to clean the air. Central Rome and Milan along with Bergamo, Como, Brescia and Sempione have legalised a "Green Sunday" event in which motorised vehicles are prohibited from 10:00 to 16:00. However, the restriction does have one rather Italian peculiarity to it. In addition to the expected exemptions granted to emergency vehicles, medical staff, and diplomats, citizens travelling to football matches may also obtain circulation permits to drive.

Interestingly, other cities, such as Hong Kong, Los Angeles, Mexico City, and Santiago have similar air quality warnings (Figure 48). However, in the case of these cities, vulnerable humans (such as the young, the old, and those with asthma) are recommended to stay indoors while cars are still permitted to operate.

Fig. 48
During winter months, Santiago's unique geography means that pollutants entrapped in the basin creating extreme air quality problems.
Photo courtesy of the GTZ's photo CD on urban transport

Arguments for and against Car-Free Days

Can one day change a city? For supporters of Car-Free Days, the event represents a break from a daily pattern that favours motorised living. The day provides a vision of what may eventually be possible on a larger scale. The day may also be the one opportunity some have to experience public transit, cycling, or simply walking in the city. Having experienced the advantages of these modes, persons may then make a permanent change in their commuting habits.

For detractors of Car-Free Days, the event is a distraction from real improvement in the long-term direction of a city's mobility pattern. Some officials may in fact use the existence of a Car-Free Day as an excuse not to take more permanent actions.

> "Stop this one-day a year party, the so-called Car-Free Day, which has accomplished nothing more than being just that. It has been blatantly counter-productive and totally ineffective in US and Canadian cities, by encouraging tokenism and impeding progress towards a sustainable infrastructure. Our automobile-accommodating politicians have been only too eager to play this futile game and placate the naive and wistful into thinking they are making environmental progress

when no progress actually occurs. Car-Free Day has been a political excuse for hypocrisy and duplicitous excuse for taking no action" (Gary, 2003).

In 2000, Stockholm (Sweden) opted out of the European Car-Free Day event as public officials chided the long-term effectiveness of such events. The Deputy Mayor of Stockholm at that time typified this viewpoint with: "The environment won't be improved by one Car-Free Day, but [rather] from better public transportation…" (Brand, 2000).

Which of the two perspectives on Car-Free Days is the reality perhaps in part depends on the nature of the particular Car-Free Day. If the day encompasses major sections of a city and/or becomes established as a more frequent event, then the goals of more permanent change may be more realisable. If the day is quite limited in scope and intent, then certainly little progress is likely to be achieved.

Festivals

Street festivals typically necessitate the closing of streets, especially when entertainment and/or displays are involved. Likewise, the large number of people drawn to street festivals makes car use both dangerous and impractical. The street scenes witnessed during Carnival in Rio de Janeiro or Mardi Gras in New Orleans simply would not function if cars were permitted to dominate. These events also thrive on spontaneous personal interactions, conducted within an unrestricted public space. Parades are also another form of event requiring the prohibition of general traffic, although the floats employed within a parade will likely be motorised.

Some of the most famous festivals and parades include:

- Carnival, Latin America and especially in Brazil and Trinidad & Tobago
- Notting Hill Festival, London
- Regent Street Festival, London (Figure 49)
- Oktoberfest, Germany
- Macy's Parade, New York
- Rose Bowl Parade, Pasadena
- New Year's Eve, Worldwide (Figure 50).

Parades and street events are quite common when celebrating a national or local success. Winning a sporting championship such as the World Cup or an Olympic medal is a chance to embrace a collective moment of joy. Likewise, remembering the founding date of a city or nation is a shared source of pride. The street is the democratic realm where victories are best shared and defeats are best commiserated. These are moments that are likely to live in one's memories for a lifetime.

Fig. 49 and 50
The Regent Street Festival in London (left photo) and New Year's Eve in Quito (right photo) are examples of special events requiring a car-free environment.
Photos by Lloyd Wright

There is no question that such moments belong to people at arms length of one another rather than amongst a sea of automobiles.

Sporting events themselves can require street space. Running and bicycle races can require anything from a lane of traffic to entire roadways. The world's largest marathons, such as New York and London, may have more than 30,000 people participating. These events are frequently pushed to early morning hours, in part to mitigate traffic impacts and at times to avoid mid-day heat and sun. However, the value of these prestigious events is becoming increasingly recognised by public officials. Such events bring significant tourism and fame to a city, and thus again prove that the street's inherent value is far more than moving cars about.

The "street party" or "block party" is a more local version of the city festival. In this case, local residents may barricade street entrances to create a social atmosphere (Figure 51). The objective of such parties is often to allow street residents to get to know one another, something that may not be possible to do when streets and residences are separated by traffic. The UK city of Bristol has taken a lead role in promoting the street party concept. Over 25 such street parties have been held during the summer of 2005 in Bristol (Brown, 2005).

In most cases, street festivals and street parties require approval by local officials, including council members and the traffic police. This process will likely narrow the options of the party to times and areas that will minimise impacts on traffic. Thus, residential streets on weekends are the most common permitted conditions for street parties. Unlike many other municipalities, the Bristol City Council sees street parties as private neighbourhood events that warrant the closing of public streets. This designation avoids the need for costly Public Liability Insurance that would essentially make the event's costs prohibitive.

Fig. 51
Street parties break the psychological dominance of a motorised street, and such events also help to create a sense of community.
Photo by Five Roads Forum (Broughton Road, West Ealing, London)

Fig. 52
Markets are an effective mechanism for drawing residents into public space.
Photo by Lloyd Wright

Fig. 53
If vendor stalls are too closely stacked, then the market area may make walking difficult and detract from the urban environment.
Photo by Lloyd Wright

Fig. 54
Rio de Janeiro's Avenida Atlântica hosts a car-free day along its famed Copacabana Beach, drawing large crowds each week.
Photo by Manfred Breithaupt (GTZ photo CD on urban transport)

Markets

Markets are also a form of an event frequently resulting in street closures (Figure 52). Markets can be scheduled on either a daily, weekly, or even monthly basis. The initiation and management of markets can come from a range of sources, including vendor associations (such as farm growers associations), public companies, or the municipality. The low-cost of street vendor infrastructure (such as a stall or a table) means that markets provide easy entry for would-be entrepreneurs. As such, markets are an excellent employment generator. While sometimes associated with the "informal economy", markets can be a major source of formal income and trade. The importance of markets is particularly relevant in developing nations, where capital is scarce and access to more formal commercial centres is not a possibility for much of the population. The small-scale nature of street vendor stalls is attuned to the speed and movement of pedestrians. The intense commercial activity of many markets again strengthens the argument that car-free areas can be highly beneficial to commercial interests.

Kiosks are another form of street vending that can benefit from pedestrianisation. The high flow of pedestrians provides a concentration of customers for the street vendor. Of course, the control of kiosk development must carefully consider space requirements and pedestrian flows. Kiosks infringing upon pedestrian movement will ultimately erode the usefulness of the pedestrian corridor (Figure 53).

Fig. 55
The Paris Plage *brings sand and palm trees to those who choose to spend the summer in the city.*
Courtesy of Vincent Kauffmann, Earthworm France, 2003
http://www.earthworm.online.fr

Permanent and seasonal Car-Free Days

Car-free days can also become far more regular events than just a single day in April or September. A few cities have created permanent car-free events on a weekly basis. Cities such as Bogotá (Colombia), Montevideo (Uruguay), Porto Alegre (Brazil), Quito (Ecuador), and Rio de Janeiro (Brazil) all close certain city sections on weekend days. Bogotá closes 120 kilometres of urban arterial streets on Sundays. Each Sunday the city takes on a carnival atmosphere with as many as two million persons taking to the streets either walking, cycling, skating, or participating in community events. Quito closes its historical centre to traffic and becomes a focal point for families, tourists and those attending religious services. Porto Alegre's closing of its centre area on weekends is focused on markets and shopping. On Sundays, Rio de Janeiro closes Avenida Atlântica along the famous beach of Copacabana (Figure 54).

Since 2002, Paris (France) has created a car-free area during the summer months along the Seine River (Figure 55). Known as the Paris

Plage (Paris Beach), the area is decorated with palm trees and sand. As many as three million persons per week have visited the area, making it popular with both local residents and visitors. The area has added a swimming pool as well as sand boxes for castle building. The success of the Paris Plage has spawned similar efforts elsewhere. In 2004, London experimented with an improvised beach along the South Bank of the Thames, and the city is planning to develop a permanent summer beach area. Likewise in 2004, cities as diverse as Berlin (Germany), Rome (Italy), and Soweto (South Africa) initiated their own forms of urban beaches.

The weekend and seasonal events may in fact be a reasonable first step for many cities interested in car-free options. Sunday, for instance, is often the least trafficked day of the week, and thus avoids political concerns with motorised voters. By starting with a weekend day, a city can also gain valuable experience in managing and promoting a car-free event prior to committing to the more difficult task of a work day event.

Motivations for Car-Free Days

The previous examples reveal a great deal of diversity in terms of a city's reasons for pursuing a Car-Free Day event. In some cases there is a direct economic link to market activities and shopping (e.g., Porto Alegre). In other cases environmental objectives are the principal motivation (e.g., Shenzhen). There are also examples of Car-Free Days being an outgrowth of cultural or religious events (e.g., Israel). For other cities, car-free events are a mechanism towards greater social equality (e.g., Bogotá). In some instances, it is motivated by promotion of tourism and quality of life issues (e.g., Paris). Thus, car-free events are not just the outcome of a single policy objective. This observation permits the developers of car-free events to garner a wider spectrum of supporting organisations and political affiliations. In turn, this quorum of interests can lead to a stronger case for actual implementation.

2.2.4 Car-free shopping streets and entertainment streets

Shopping streets are perhaps the most common examples of car-free areas. Most cities in Asia, Europe, and Latin America have at least one commercial shopping street that bans vehicle traffic during parts of the day. Kaufingerstraße in Munich (Germany) and Nanjing Road in Shanghai (China) are host to the world's highest pedestrian volumes (Figure 56).

Car-free shopping streets typically do allow some exemptions from motorised vehicle restrictions. Shops may be given special delivery hours to bring in goods and products. Also, in some instances, public transport vehicles and even taxis can be permitted to share the road space with pedestrians. The integration of a pedestrian corridor with public transport is known as a "transit mall". Such integration provides residents with a high level of convenience and accessibility. However, the presence of public

Fig. 56
Nanjing Road in Shanghai is reported to record the highest pedestrian flows in the world.
Photo by ITDP

Fig. 57
Hofbahnstrasse in Zürich (Switzerland) brings together the mutually beneficial aspects of both pedestrianisation and public transport.
Photo by Joel Crawford

transport vehicles can dampen the quality of the pedestrian's experience, as evidenced by the overwhelming levels of public transport and taxi vehicles on London's Oxford Street. Nevertheless, there are also instances where the addition of public transport does not appreciably deter the quality of the public space, such as is the case in Zürich (Figure 57). In such cases, the volume of public transport vehicles is sufficiently low to retain the high-quality ambiance of the street environment.

Fig. 58
London's Covent Garden is a urban regeneration success story in part due to its pedestrianisation.
Photo by Lloyd Wright

Car-free centres are quite common in the older cities of Western Europe. During the 1960s and 1970s many Western European cities, particularly in Germany, undertook large pedestrianisation efforts. Munich's Kaufingerstraße is perhaps Europe's busiest pedestrianised shopping street with recorded volumes of over 15,000 pedestrians per hour and 200,000 pedestrians per day (Hass-Klau *et al.*, 1999). Additionally, the nearby Marienplatz is an excellent example of well-planned social exchange space with a lively atmosphere and supporting street furniture such as loose chairs and benches. Freiburg (Germany) is another best practice example, featuring car-free corridors of approximately eight kilometres in total length. By the end of the 1970s, Germany developed approximately 500 pedestrianised areas in 300 cities and towns (Hass-Klau, 1993).

Copenhagen's development of pedestrianised areas began in 1962 and has continued to grow. The central network of pedestrianised streets began with the Stroeget and now encompasses other key streets such as Vimmelskaflet, Vesterbrogade, Ostergade, Nyhavn, and Koebmagergade. During a typical summer's day, over 260,000 pedestrians take to this area (Gemzoe, 2001). While this number is reduced by approximately one-half in the winter months, the area still brings year-round benefits to the area merchants, relative to other areas.

London's Covent Garden is a well-known example of how pedestrianisation can lead to an area's regeneration (Figure 58). Prior to

pedestrianisation, the Covent Garden market area suffered from crime and urban decay. Today the area stands as one of London's premiere tourism destinations. Likewise, London's Carnaby Street is a high-profile example of how pedestrianisation can regenerate an area and provide a dramatic boost to retail shops. Other major car-free zones in Europe include the Baixa area in Lisbon (Portugal), Las Ramblas in Barcelona (Spain), the St. Germain area of Paris (France), and the central areas of Brugges (Belgium), Ghent (Belgium), Nürnberg (Germany), Obidos (Portugal), and Siena (Italy).

Car-free zones are also typical in many parts of the developing world. City centres in North Africa, Asia, and Latin America often quite naturally become car-free areas due to the narrow streets and human-scale form of the centres. Cities such as Buenos Aires (Argentina), Cartagena (Colombia), Curitiba (Brazil), Old Delhi (India), Santiago (Chile), São Paulo (Brazil), Santo Domingo (Dominican Republic), and Shanghai (China) have permanent car-free areas.

Analogous to the car-free shopping street is the car-free entertainment zone. Districts that host a range of cafes, restaurants, bars, gaming, and dance clubs are often car free, especially during the evening hours (Figure 59). In fact, a car-free area may be oriented towards shopping activities during the day and then convert to predominantly entertainment activities in the evening. Like commercial stores, entertainment establishments may be densely clustered and draw large crowds, and thus little space is available to accommodate customers arriving by private vehicle. Further, given that part of the attraction of entertainment areas is the interaction with other persons, the presence of the automobile diminishes the opportunity for social encounters.

2.2.5 Car-free historical centres

The historical cores of older cities in Asia, Latin America, and Europe are frequently pedestrianised in a similar manner to car-free shopping streets. In fact, historical centres often double as principal shopping areas as well. The ancient central streets of these cities make the automobile rather impractical, especially once any sizeable volumes of traffic are reached.

Fig. 59
Car-free entertainment zone in Seoul (South Korea).
Photo by Lloyd Wright

The pedestrianisation of historical centres helps cities attract tourism (Figure 60). Few tourists come to historical sites to experience intense traffic. At the same time, tourists generally also want to experience the real local flavour of a site rather than a sterile artificial rendition. Thus, historical centres that maintain an active street life within a car-free physical environment are best placed to attract tourism.

The prohibition of motorised vehicles in historical centres can be helpful in cities achieving status as World Heritage Sites under auspices of the United Nations Educational, Scientific and Cultural Organisation (UNESCO). Motorised vehicles are not just damaging to human health, but exhausts and vibrations can damage the

Fig. 60
Antigua (Guatemala) is one of several historical cities that have combined preservation with pedestrianisation.
Photo by Lloyd Wright

Table 7: UNESCO World Heritage Sites with car-free areas

Region	Cities with car-free historical centres that are UNESCO World Heritage Sites
Europe	Salzburg and Vienna (Austria); Brugge (Belgium); Prague (Czech Republic); Tallinn (Estonia); Lyon and Strasbourg (France); Potsdam (Germany); Venice, Siena, and Naples (Italy); Riga (Latvia); Vilnius (Lithuania); City of Luxembourg (Luxembourg); Evora (Portugal); Santiago de Compostela and Segovia (Spain)
Asia	Nara and Nikko (Japan)
North Africa	Islamic Cairo (Egypt); Medinas of Fez and Marrakech (Morocco)
Latin America	Antigua (Guatemala); Salvador and Sao Luis (Brazil); Cartagena (Colombia); Quito (Ecuador);

Source: Wikipedia (2005) and UNESCO (2005)

built environment, especially in the case of ancient historical centres. Further, the noise and presence of vehicles deter from the ambiance and reverence of important historical sites. There is thus a remarkable similarity between the list of cities with car-free historical centres and the list of UNESCO World Heritage Sites. Table 7 lists historical centres that are both car free and are World Heritage Sites.

Quito (Ecuador) actually hosts several different types of car-free activities within its historical centre, which is a World Heritage Site. Many of the streets are permanently pedestrianised. However, on Sundays all but a few principal streets are also closed to motorised vehicles. Additionally, twice a month the city holds a car-free event called the "Ciclopaseo" in which all streets in the historical core are closed. Thus, within the confines of its historical centre, Quito is able to represent an example of most major different types of car-free options (Figures 61, 62, and 63).

Fig. 61, 62, and 63
Quito's historical centre hosts various forms of car-free areas, including permanent street closings, Sunday street closings, and a bi-weekly bicycle event.
Photos by Lloyd Wright

2.2.6 Car-free housing

"Car-free housing" represents a new market-driven force in allowing consumers to choose a residential area without the dangers of motorisation. Such housing has become popular in Western Europe as a niche market for families and individuals wishing to improve quality of life through a car-free environment. The success of these developments has demonstrated that families are placing a discernible market value on neighbourhoods that permit children to play without fear of the noise, pollution and accidents generated by unrestricted car access.

Table 8 lists an assortment of housing projects that are promoted as being car free. Austria and Germany are generally considered the leaders in the development of such housing, based on the number of units constructed and the innovations employed in the development.

Car ownership restrictions

Car ownership and use restrictions vary amongst the projects listed in Table 7. All the projects discourage motorised vehicles in some form but some projects use stringent legal agreements

Table 8: Partial list of existing car-free housing projects

City, Country	Project name	No. of housing units	Characteristics
Vienna, Austria	Autofreie Mustersiedlung Floridsdorf	244	• Solar-energy generation • Urban agriculture • Resident planning in development • Purpose-built community centre • Integration with public transport and bicycle network • Integration of office space with residences
Vienna, Austria	Penzing - Sargfabrik	112	• Car-sharing on site • 0.1 parking spaces per housing unit provided at fringe
Copenhagen, Denmark	Christiania	1000 residents	• Integration between work places and residences • Attracts 1 million visitors per year • Extensive green space and water • Conversion of former military base
Bremen, Germany	Grünenstrasse	23	• Integration with bus and tram • Car sharing station nearby
Bremen, Germany	Beginnenhof	50	• Female-headed households only • 0.3 parking spaces per housing unit provided
Freiburg, Germany	Vauban	2000	• Integration with public transport and bicycle network • Integration of office space and retail shops • Solar-energy generation • 50% of residents own a vehicle, but are required to purchase a parking space at fringe of development
Hamburg, Germany	Barmbek-Saarlandstrasse	210	• 0.15 parking spaces provided per unit (for disabled people, car-sharing, and visitors) • 2 bicycle parking spaces per resident or 5 per household
Kassel, Germany	Christophstrasse	64	• Bus and streetcar stop nearby • 0.1 parking spaces provided per unit for visitors at fringe
München, Germany	Kolumbusplatz II	75	• Metro station nearby • On-site car sharing organisation
München, Germany	Riem	42	• Rehabilitation of former airport into a car-free city • 0.21 parking spaces per unit
Münster, Germany	Garternsiedlung Weissenburg	200	• Development on former military site • Socially-mixed project providing housing for lower-income families • Extensive green space
Nürnberg, Germany	Langwasser	900	• Integration with public transport • Large pedestrian area • Parking spaces at fringe
Tübingen, Germany	Stuttgarter Strasse, Französisches Viertel	2000 residents	• No parking provided • Converted military base • 40% of households own a vehicle in comparison to 80% of households in surrounding area
Amsterdam, Netherlands	GWL-terrein	600	• Regeneration of former water works • Purpose-built community centre • Integration with public transport and bicycle network • On-site car sharing • 110 parking spaces at the fringe
Edinburgh, UK	Slateford Green	251	• Only 12 of 251 households have a car • Long waiting list to gain housing • Regeneration of formally derelict site • Extensive gardens and green space • Integration with public transport and bicycle network • On-site car sharing
London, UK	BedZed (Hackbridge)	100	• 100% of energy supply for development from on-site renewable resources • Integration of work spaces and residential space • On-site sewage treatment • Charging points for electric vehicles
London, UK	Elephant & Castle	35	• Free membership for car sharing for the first year • Integration with on-site work spaces

Sources: Autofrei Wohen (2005), Kushner (2004a), Scheurer (2002)

Fig. 64
The Floridsdorf car-free housing project in Vienna combines an aesthetically-pleasing environment with mixed-use planning to deliver a high-quality living experience.
Photo by James Kushner

to ensure compliance. The Vienna Floridsdorf project restricts car ownership as a legal requirement for obtaining tenancy. Despite this rather strict condition, tenancy in Floridsdorf is in high demand (Figure 64). The functionality of Floridsdorf is supported by strong local links with public transport and bicycle networks. Further, the area features mixed-use planning, which puts most essential shops and services within a comfortable walking distance. Near Floridsdorf is another car-free development known as "Compact City". The Compact City development includes a mechanism that helps to encourage mixed uses. In Compact City residences and shops/offices are rented together in order to ensure living and working activities are carried out within the community (Kushner, 2004a).

However, most other car-free housing is not as strict as Vienna in forbidding vehicle ownership. In other instances, such as in Amsterdam's Westpark project, ownership is allowed but parking must be secured from off-site locations. The Freiburg Vauban project does not exclude car owners, but such persons must agree to purchase an off-site parking space at the cost of €14,000 (US$16,800) (Figure 65). The term "optically car-free area" is sometimes applied to districts that ban motorised vehicles within its borders but do not restrict car ownership (Autofrei Wohnen, 2005). In such areas, there is little visual appearance of vehicles during the day. While the residents may not be strictly car free in their daily lives, there is no vehicle access into the core of the residential area.

Car-sharing clubs are another option for these types of communities to retain some aspects of personalised motorised travel. Car-sharing is similar to a car rental company in which persons may pay for occasional use of a vehicle. The Slateford Green development in Edinburgh includes an on-site car-sharing club (Figure 66). Of the 251 households in Slateford Green, only 12 possess their own car. By contrast, in Freiburg, despite the required payment of

Fig. 65
The purchase of a parking bay at a cost of €14,000 is required for residents of the Freiburg Vauban project.
Photo by James Kushner

Fig. 66
An on-site car-sharing programme at the Slateford Green project in Edinburgh provides motorised mobility for residents on an occasional basis.
Photo by James Kushner

€14,000 for a parking space, approximately 50% of the households own a car (Kushner, 2004a).

In the Bremen Beginnenhof project, there are just two seldom used car-sharing vehicles available to residents. When all residents ceased using cars, the management proceeded to provide transit passes. However, subsequently it was found that most residents had actually switched to walking or cycling instead of public transport. In the end, the management stopped issuing the transit passes and instead simply lowered the rent by an equal amount (Kushner, 2004b).

Most of the car-free housing projects do make provisions for access by emergency vehicles. Additionally, there is also frequently some nearby parking for visitors:

> "…it is common practice to include a limited number of parking spaces for shared vehicles, supplied by a commercial or in-house car sharing organisation. There is usually some provision made for visitors' cars and while it is aimed to maintain pedestrian-only internal access, it is normally possible to enter the neighbourhood for emergency vehicles or when carrying heavy items" (Scheurer, 2002).

The issue of parking, though, does represent one of the most significant barriers to implementing a car-free housing scheme. In many municipalities, existing development codes require a set ratio of parking spaces per housing unit. While the noted examples in Western Europe have overcome such restrictions, in some cases, the exemptions took considerable legal investments on behalf of the project developers. Further, the process of seeking such exemptions adds an element of risk from the standpoint of the project's timing. Vienna's leadership with car-free development stems in part due to city ordnances that in fact give preference to projects that place parking facilities at a distance from the project site. Vienna's policy requires a public transport stop to be at least as close as any parking facility.

Resident profiles

The rise of car-free living has necessitated a psychological change in how municipal officials view alternative housing schemes. The transformation from radical fringe groups to mainstream families seeking improved quality of life has helped to legitimise the idea of car-free housing projects.

> "Car-free living, it was believed, was the choice of fringe groups and had no place in the contemporary mainstream of society. Now suddenly proposals appeared that attempted to not only save the costs associated to developing parking facilities, but simultaneously create residential environments that would reflect the benefits of non-car ownership by being relatively sheltered from the noise, pollution, safety and land-grab impacts of automobile traffic. Or, in other words, making it exceptionally attractive to consolidate a lifestyle regarded as decidedly nonconformist. The struggle most stakeholders have had, and are still having to face when warming up to these ideas cannot be underestimated in a psychological sense" (Scheurer, 2002).

The mainstreaming of car-free housing is demonstrated through the significant commercial demand of projects such as Slateford Green in Edinburgh (Figure 67). The original price of the units has doubled since its opening to over £250,000, and even with this price, the housing units are largely unavailable with a long wait list confronting perspective buyers (Kushner, 2004a).

In other projects, housing ownership is sometimes limited to certain groups in order to achieve other social objectives. For example, the

Fig. 67
As evidenced by the Slateford Green housing project, architects can devote more space to gardens and children when not constrained by the needs of the automobile.
Photo by James Kushner

Bremen Beginnenhof project limits ownership to women-headed households only. In Vienna one car-free project attempts to better integrate immigrating Turkish families into Austrian society by requiring alternating units to be occupied by a Turkish family and then a native Austrian family (Kushner, 2004a).

Social objectives sometimes also factor into the location of the project. Car-free housing projects are often implemented in areas of urban regeneration. As the site of a former water works, the Amsterdam Westpark area was in significant decay prior to the car-free development. The Freiburg Vauban project stands on the site of a former military base, and the formerly car-free Stadthaus Schlump project in Hamburg led to the preservation of a historically important hospital building (Scheurer, 2002).

Another common quality of most car-free communities is the relative openness of community members and the degree of public participation in the operation of the community. As noted by the research of Scheurer (2002), car-free community members often share common values in terms of environmental and social objectives and are likely to seek a high degree of social interaction between community members.

However, car-free housing projects not only attract socially- and environmentally-conscious families. Resort-like developments that target the wealthy have also featured car-free designs. Venice and Capri in Italy largely attract high-income buyers who are seeking a second home or a weekend refuge. Current greenfield projects in Dubai and Mexico principally target wealthier customers seeking a unique lifestyle.

In Loreto (Mexico) a car-free project known as "The Villages of Loreto Bay" is being marketed directly to overseas buyers seeking a retirement home or a second home in the sun. The project is a joint initiative of the Mexican tourism agency, FONATUR, and a Canadian not-for-profit organisation called the Trust for Sustainable Development. The Loreto project calls for the construction of 6,000 homes with a total investment of US$1 billion (The Villages of Loreto Bay, 2005). The design follows from the "New Urbanism" concepts that have been developed by progressive planning professionals in the US.

Dubai (United Arab Emirates) has been the location of several urban infrastructure projects that often seem to defy normal budgetary limits. In a similarly ambitious fashion, a car-free housing project is being developed on man-made islands off the coast of Dubai. The project, known as "The World", features a series of islands that together will form the shape of a world map (Figure 68). The project envisions various end uses for the properties, including resorts, golf courses, and homes.

The Mexico and Dubai projects may contribute to the wider acceptance of car-free living by targeting individuals who have the means to live a largely car-dependent lifestyle but choose not to do so. These projects also represent an encouraging market-led indication of support. However, neither of these projects will likely result in net environmental benefits. The residents in the Loreto project will largely commute to the site by aircraft from countries such as the US. The Dubai project will be serviced by petrol-powered boats. Further, the disruption of the natural seabed from the creation of human-made islands in Dubai is likely to also diminish the overall environmental performance of the project.

Fig. 68
Dubai is ambitiously building a car-free development based on a series human-made islands in the shape of the world map (The World, 2005).

Design features and construction costs

Buyers of car-free housing tend to also be well disposed towards other progressive design features. Car-free housing projects frequently utilise renewable energy technologies, such as biomass or solar energy, for their electricity

needs. High-levels of recycling, water conservation, rainwater collection, and community food gardening are common in the projects. The BEDZed (Beddington Zero Energy Development) project near London places environmental sustainability at the centre of its marketing strategy. BEDZed strives to be "the first large-scale carbon neutral community" (BEDZed, 2005). Much of the electricity utilised is produced either from the many photovoltaic panels lining the homes or from an on-site combined heat and power unit that is fuelled by local biomass inputs. BEDZed also makes extensive use of energy-efficiency technologies such as the use of "super-insulation" and triple-glazed windows. Passive solar techniques are employed in the design by facing the homes to the south.

Since car-free housing projects can reduce costs through the avoidance of specific infrastructure (e.g., roadways and parking facilities), capital can be freed up to invest in other features such as energy-efficiency and water conservation measures. In turn, these additions can reduce the long-term operating cost of the homes.

The savings in construction costs can also be applied in other ways. Such savings could simply reflect a lower purchase price of the home. Alternatively, in place of a garage, the developer could decide upon providing a larger living space at the same cost. The avoided costs of catering to car-based infrastructure provide car-free developments with additional flexibility in home design. Further, since the municipality saves costs in terms of providing services to car-free areas, this savings could even be passed along as a reduction in property taxes.

Car-free housing versus gated communities

At first glance, car-free housing may bear some resemblance to "gated communities", especially resort-like projects in Mexico and Dubai. However, gated communities typically permit motorised vehicles but restrict access to local residents and those with official business in the community. The result is a relatively traffic calmed area that supposedly provides greater security from crime and other outside disturbances. The traffic calmed area does provide a potentially improved environment for children to play, provided the reduced traffic does not result in higher speeds for the remaining vehicles. Gated communities will tend to exacerbate social differences by essentially segregating the public from the private enclave. Gated communities may create the illusion of security at the expense of a social environment. This lack of community socialisation is a notable difference between gated communities and the typical car-free project.

2.2.7 Car-free lifestyles

"We must be the change we wish to see."

—Mahatma Gandhi (1869–1948)

Car-free qualities can also be attributed to individuals. The idea of a "car-free lifestyle" is supported by a growing number of families and individuals across a range of cities and countries. Personal motivations for undertaking a car-free lifestyle vary, but such individuals frequently cite environmental concerns, safety and health reasons, as well as political and even spiritual beliefs as factors. Such individuals are essentially creating new markets for car-free housing and pushing local officials to offer car-free zones within city centres. The power of the internet allows such individuals to form virtual communities in which support is provided and experiences are shared. Section 7 of this document includes a list of internet discussion groups interested in car-free lifestyles.

These individuals represent market leaders who may slowly soften resistance to car-free concepts and future demonstrations. The person bicycling in Los Angeles or walking to work in Houston may seem like futile efforts amongst such car dominance, but such persons serve as a daily reminder of what could be possible.

2.2.8 Other types of car-free areas

Despite the global dominance of car culture, there are actually many areas of public and private space that are typically car free. Parks, reserves, and waterways are also typically car free in nature. Such "car-free open spaces" are sometimes quite important in creating green corridors in a city, and thus allowing a more effective pedestrian and bicycle network. A "greenbelt" is a site of reserved open space around an urban area. This open space is designed to act as a barrier against sprawl. The

Fig. 69, 70, 71, and 72
Transforming waterfronts through car-free re-development projects:
1. Osaka's Dotonburi;
2. Buenos Aires' Puerto Madero;
3. London's South Bank;
4. Singapore's Boat Quay.
Photos by Lloyd Wright

development of riverfronts into attractive public space is increasingly an option that cities are pursuing. Car-free waterfronts in cities as diverse as Brisbane (Australia), Buenos Aires (Argentina), Guayaquil (Ecuador), London (UK), Osaka (Japan), San Antonio (US), Tokyo (Japan), and Singapore have all become major attractions (Figures 69–72).

Of course, the primacy of the automobile in everyday life has meant that even green areas are not entirely off-limits to motorisation. New York's Central Park holds iconic status as well as serving as the city's lungs, playground, and entertainment stage. The park is also host to several vehicular lanes that help motorists negotiate cross-town travel. The resulting traffic congestion on the park's Loop Drive does much to diminish usability for joggers, families, and visitors for as much as 12 prime hours per day. A campaign led by Transportation Alternatives, a local non-governmental organisation, has helped to impose some restrictions on vehicle use. However, many feel that an outright ban would be more appropriate for the world's most famous park (Transportation Alternatives, 2005).

Most buildings are car free due to the nature of their structure, but there can be exemptions, such as electric vehicles used at airports and

within large industrial plants. It is also sometimes noted that the largest car-free populations in the world are located in prisons and correctional facilities (Kushner, 2004a). In this regard, the US actually possesses the world's largest car-free population with 2.1 million persons confined to car-free status (Reuters, 2005).

University campuses are sometimes nearly car-free environments with vehicle entry often limited to just delivery vehicles. Universities may be a unique opportunity for supporters of car-free areas to launch initiatives.

In a similar manner, some private firms are encouraging car-free activities amongst its staff. Toyota Motor Company became frustrated by the three-kilometre traffic jam that occurred each morning in front of its Toyota City (Japan) manufacturing facility. The congestion took an hour to clear up each morning and contributed to start-up delays, worker stress, and lost productivity. Since February 2003, Toyota has offered a free shuttle service to nearby train stations. By July 2003, over 2,000 employees joined the car-free commute programme by switching to public transport (Japan Today, 2003).

Ironically, shopping malls are also car free, at least within the confines of their interior space. However, this space is typically private space and is generally unavailable to public functions beyond commercial exchange. Further, the shopping mall has also contributed greatly to car dependence. These centres are typically surrounded by large areas of free parking, which is both an aesthetic liability to the surrounding area as well as an inducement for additional car travel. "Big box" commercial centres are frequently located at peripheral areas of cities where land prices are lowest. The malls are thus typically only accessible by private vehicles, which must travel further because of the peripheral location. Further, out-of-town shopping malls also undermine the viability of more accessible in-town shopping. The lower prices offered by out-of-town centres may force closures of centrally-located shops that have much higher rental costs. Some efforts are being made, though, to encourage large retailers, such as Ikea, Tesco, Wal-Mart, and Carrefour, to seek out brown field sites located in more central areas. It is notable that the creator of the modern day shopping mall, Victor Gruen, later disparaged the impact such malls had on land-use and urban vitality (Gruen, 1964 in Crawford, 2000).

Fig. 73
Ironically, the Main Street at Disney World is modeled after a car-free American town centre that largely does not exist.
Photo by Enrique Peñalosa

Many theme parks and some resort areas may also be car free. However, theme parks, like shopping malls, are typically located in peripheral areas and depend upon guests to arrive by private vehicle. It is notable, and perhaps ironic, that Disneyland's car-free "Main Street" is presented as a nostalgic representation of a US town centre (Figure 73).

3. Project development

We are now faced with the fact, my friends, that tomorrow is today. We are confronted with the fierce urgency of now. In this unfolding conundrum of life and history, there is such a thing as being too late. Procrastination is still the thief of time. Life often leaves us standing bare, naked, and dejected with a lost opportunity. The tide in the affairs of men does not remain at the flood; it ebbs. We may cry out desperately for time to pause in her passage, but time is adamant to every plea and rushes on. Over the bleached bones and jumbled residues of numerous civilizations are written the pathetic words, 'Too late'. There is an invisible book of life that faithfully records our vigilance or our neglect… We must move past indecision to action.

—Martin Luther King, 4 April 1967, "A Time to Break Silence"

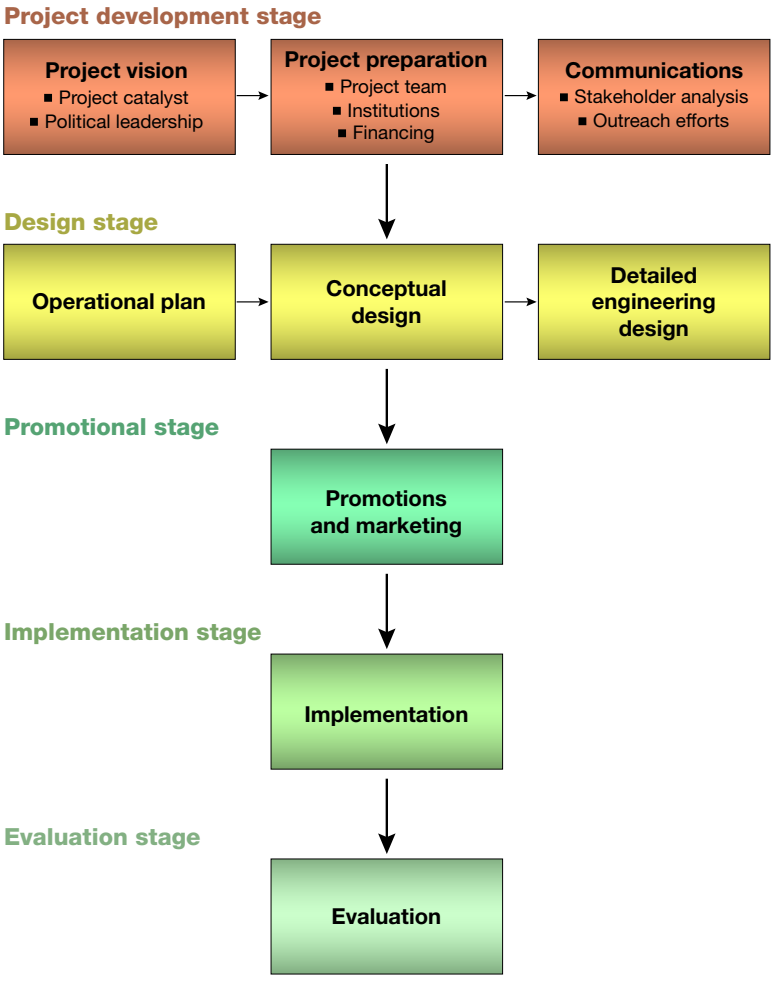
This section and the remaining sections all present an outline of how to move a car-free concept towards actual implementation. These sections discuss five principal project steps (Figure 74):

1. Project initiation and development
2. Design
3. Car-free promotion
4. Implementation
5. Project evaluation.

The Lyon Protocol on "The Design and Implementation of Large Car-Free Districts in Existing Cities" also provides a useful checklist of relevant project development stages (Carfree.com, 2005). Box 5 summarises a few of the key points from the 1997 Protocol.

Given that car-free projects range from a single street on a single day to permanent district-wide efforts, any generalisation of the implementation process risks over-simplification. However, the following sections attempt to provide a starting basis for city officials and citizens wishing to consider a car-free project.

Fig. 74
Illustration of car-free development process



Box 5: The Lyon Protocol

The Design and Implementation of Car-Free Cities

The Lyon Protocol for the Design and Implementation of Car-Free Cities was first developed and presented during the "Towards Car-Free Cities" conference in Lyon (France) in October 1997.

Summary of the Protocol:

1. ***Identify interested parties***
   Early in the process identify every interest group affected by the changes under consideration both inside and outside the affected areas.
2. ***Gather necessary data***
   Gather detailed information on existing conditions in the proposed car-free district and the metropolitan area as a whole, including transport patterns, economic activity, and demographic data.
3. ***Develop preliminary concept***
   Develop a preliminary concept, including the boundaries of the car-free area, transport changes, and measures to ease the transition.
4. ***Media***
   Enlist the media to help publicize the proposal and develop interest by those who would be affected by the changes.
5. ***Political leadership***
   Engage governmental authorities from the beginning of the work.
6. ***Phasing***
   The transition to a car-free district requires the gradual implementation of a coherent set of measures that work together.
7. ***Design charrette***
   When the process is well advanced, hold a week-long design charette to allow all interested parties an opportunity to participate directly in the planning of the changes.
8. ***Implementation***
   Using the results from the design charrette, the project team should be have the necessary consensus to proceed towards full implementation.

A complete version of the Lyon Protocol can be downloaded from the following web site http://www.carfree.com/lyon_protocol.htm.

3.1 Project leadership

"Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed it is the only thing that ever has."

—Margaret Mead (1901–1978)

3.1.1 Project catalyst

Any new initiative must start with an idea. The idea may arise from a simple desire to do better. The current state of the urban environment, health levels, and child-play opportunities can all be motivating factors. As idea builds upon idea, a vision begins to take shape. From this basis, a concerned individual or group of persons will begin formulating ways of how such a vision could be achieved.

The catalyst for these ideas may be a mayor, governor, or other high-ranking public official. However, more often than not, the starting point for a new urban concept is found amongst ordinary citizens and citizen groups. The genealogy of most leading car-free initiatives today go back to a pivotal person or group of persons who simply would not accept the status quo. These are persons who strongly believed that the streets of our cities belong to people and not cars.

The inspiration for such a catalytic person or persons may come from a variety of sources. A visit to another city or community may provide insights into alternatives. Cities like Amsterdam, Barcelona, Bogotá, Copenhagen, Curitiba, Fez, Freiburg, Seoul, and Venice provide glimpses

Fig. 75
Thousands of international visitors have now experienced the magic and exuberance of Bogotá.
Photo by Lloyd Wright

Fig. 76
For cities interested in car-free experiments, there is an array of well-qualified NGOs to make the process easier.

into what is possible with public space (Figure 75). A walk in any of these cities may produce the reaction: Why can't my city be more like this? Thousands of international visitors have now experienced Bogotá's urban transformation. In part due to such visits, cities such as Cape Town (South Africa), Dakar (Senegal), Dar es Salaam (Tanzania), Guatemala City (Guatemala), Jakarta (Indonesia), Lima (Perú), and Santiago (Chile) have embarked on similar types of sustainable transport initiatives.

In lieu of a direct visit, a photo or video may stimulate similar reactions. Likewise, inspiration may stem from reading a book or article by leading proponents of more human urban space. The defining moment of change may also come from tragedy. In many cases, only in the aftermath of a terrible accident do we begin to sense that the status quo is not acceptable. It may be only in a reaction to accidents, congestion, and loss of quality of life that cities begin to seek out a better way. Whatever the source of inspiration, though, the main intent is to seek a profound change in how the city functions, particularly with respect to the overwhelming impact of uncontrolled usage of private vehicles.

In order to make one voice into many, concerned individuals may form civil society groups that will devise a specific strategy. Likewise, existing local non-governmental organisations are often adept in helping to develop a project support campaign (Figure 76). The bi-weekly "Ciclopaseo" in Quito actually owes it existence to one such NGO called Biciacción ("Bicycle Action"). A small team of dedicated supporters within Biciacción successfully convinced the municipality to experiment with a Car-Free Day. Biciacción's staff actually provided much of the organisational and logistical support in order to overcome the doubts of the municipality. Since its simple beginnings, Quito's Sunday

Fig. 77
Through the leadership of Biciacción, a local NGO, Quito now has a regular car-free event.
Photo by Lloyd Wright

Fig. 78, 79, 80, and 81
Mayors who took the chance and transformed cities for the better. From left to right: Enrique Peñalosa of Bogotá, Myung-bak Lee of Seoul, Kleist Sykes of Dar es Salaam, and Jaime Lerner of Curitiba.
Photos courtesy of Por el País que Queremos, Seoul Municipality, Dar es Salaam Mayor's Office, and the Jaime Lerner Institute

Ciclopaseo has become a highly popular part of the city's landscape (Figure 77).

3.1.2 Political leadership

At some point, the car-free vision will need to enter the political mainstream in order to move towards ultimate implementation. With political will, anything is possible. Without it, the challenge is orders of magnitude greater.

Thus, the search for a political champion of the idea becomes paramount. Naturally, the more senior the political figure leading the cause, the more likely the official's influence can lead to action (Figures 78 through 81). Thus, mayors and governors are the most important political champions to win over. In some developing cities, support from national ministry officials may also be necessary for project approval. The role of national officials may be particularly required in capital cities.

In many instances, a mayor or governor will simply not have the necessary background on transport or urban planning issues to grapple with the car-free concept. In such cases, the official will not likely have confidence with such a seemingly far-reaching proposal. Political officials will be averse to risk with key constituencies, such as car owners, unless the issue is a core part of their platform.

Further, mayors and governors are busy individuals juggling an array of issues and interests. The amount of time these officials can devout to a studied consideration of the car-free concept is limited. For this reason, it may be more effective to target the top advisors of the mayor or governor. Such individuals may be able to give the idea greater attention, and then subsequently they would be in a position to make a trusted recommendation to the top political official.

However, even in the absence of support at the highest levels, a strategy to begin influencing officials at lower levels may still merit effort. Fortunately, there are many other starting points within the city's political and institutional environment. Deputy mayors, deputy governors, and councillors are also relevant positions from which a car-free project can be launched. Amongst such officials it may be more likely to find a specialist with a background in architecture, environmental issues, urban planning, or other related field. In such cases, the learning curve for joining the car-free cause will likely be less.

Another useful starting point can be unelected officials holding key positions within municipal institutions. Directors and staff within departments of planning, public works, environment, health, sports and recreation, and transportation all will likely play a role in any eventual project. Without the support of such officials and staff, institutional inertia can delay and weaken implementation. Further, these officials often have a direct relationship with top elected officials. During their daily or weekly briefings with elected officials, a discussion of car-free concepts can help reverse any doubts. A concept being supported by both citizen's groups and departmental directors will stand a better chance of approval by a mayor than a project being pursued by just one outside group.

The best strategy is actually to approach all relevant officials, both elected and unelected, who may be influential with a car-free initiative.

Even if an official is unlikely to become an overt supporter of a car-free project, eliminating the threat of overt opposition is equally important. Thus, an initial pre-emptory session with the potential opposition can be vital to reducing any strongly-negative repercussions. Much care must be given to the manner in which the issue is presented to any given audience. In fact, the key points to be stressed will likely vary from one official to another given their different starting points and initial understanding of car-free initiatives.

The political environment of just a small city can be bewildering to even a seasoned insider. Negotiating the corridors of power is fraught with complications usually beyond the reach and understanding of a small non-governmental organisation (NGO). Thus, seeking the guidance and assistance of larger NGOs or experienced lobbyists can be a useful step.

One common and rather unfortunate complication is the existence of opposing political parties in key positions overseeing the project. For example, if the local government control is held by one political party while the regional or national government is held by another party, then cooperation may be lacking in making the project a reality. While local government will typically have direct implementation responsibility, approval from the national government could be required for either budgetary or legal reasons.

The duration of the political administration's time in office is also another key factor to consider. If a mayor or governor has only a short time remaining prior to an election, then such officials may be reluctant to embark upon any bold initiative. The risk of alienating any potential voting groups can over-ride any political boost that a project announcement could entail. Further, once an incumbent takes a strongly favourable position on a car-free initiative, this position may imply an equal and opposite reaction from the opposition candidates. It is undesirable to have a candidate running for office by taking a stridently negative position on car-free development. Should the opposition candidate be successful in gaining office, then there may be little chance of reversing his or her position over the course of the political term.

For these reasons, catching a political official at the earliest stages of their time in office provides the best chance for achieving commitment to implementation. Along these lines, it may be effective to introduce the car-free concept even prior to officials taking office. Providing information to staff within the major political parties can be a worthwhile investment of time and effort. Identifying potential future leaders and establishing a mentoring relationship with them can be equally useful. Alternatively, individuals within a car-free citizens group may take it upon themselves to seek public office and eventually pursue the idea as an elected official.

What happens when no political support is forthcoming? Even when the political establishment universally shows a lack of interest to car-free development, there are still tools at the disposal of citizen groups to pursue an initiative. These options include promotional events that provide outreach and education to the general public as well as direct action events that combine education with the reclamation of the streets. In some instances, neighbourhoods may take matters in their own hands (and do so legally) by implementing simple psychological measures to begin taking back their streets.

3.2 Institutional and legal issues

"It is difficult to get a man to understand something when his salary depends upon his not understanding it."

—Upton Sinclair (1878–1968)

3.2.1 Institutional management

Assuming that favourable political leadership is taken on a car-free initiative, the mayor or other political leader should establish a project steering committee and a project team to oversee its development. The steering committee will oversee the general direction of the initiative while the project team will manage the day-to-day activities of planning and implementation.

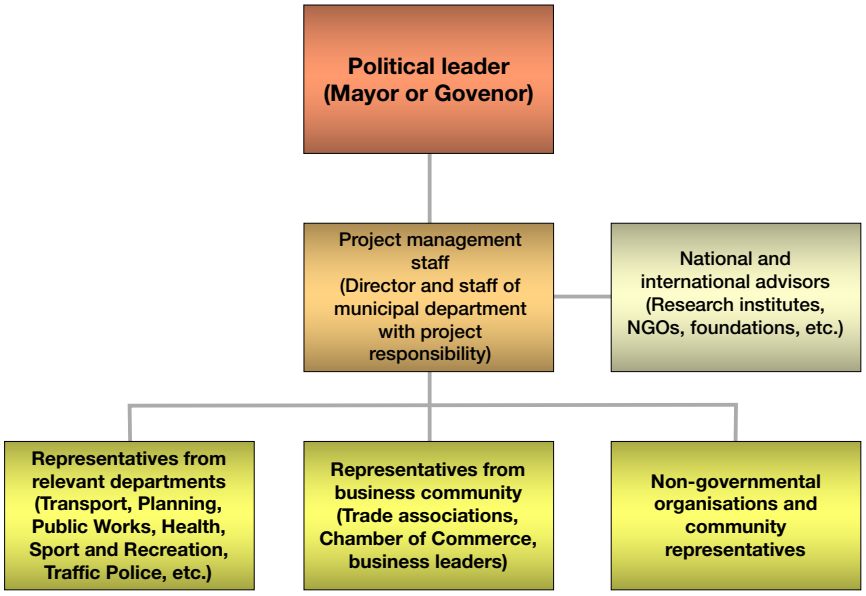
Steering committee

Ideally, the chairperson of the steering committee will be the mayor or other top political official. The political leader's continued involvement in the initiative ensures that the car-free project remains a priority. Successful initiatives in cities like Bogotá and Curitiba benefited from leaders who remained intimately involved in the process through weekly or even daily briefings. The mayor's direct involvement helps maintain the momentum towards implementation. Otherwise, staff and resources can easily become expropriated to other purposes.

The other members of the project steering committee should include all departments and agencies with a role in the initiative. These entities may include: planning department, transport department, public works department, health department, environment department, sports and recreation department, and traffic police. Additionally, civil society and private sector groups should also be represented within the steering committee to ensure that a full range of views are included in the process. These other members could include environmental NGOs, community organisations, local foundations, chamber of commerce, trade associations, and possibly international project partners. Figure 82 provides a sample structure of how such a committee might be organised.

At the outset all committee members should agree to an overall vision statement and a list of specific objectives. The formalisation of a vision statement and set of objectives will ensure that all participants will start from a shared point of view. For example, the statement and objectives would clearly cite the development of a car-free zone as a principal goal. With this goal clearly stated, there will be less chance of some stakeholders questioning the project's merit as the initiative progresses.

Fig. 82: Sample management structure for a car-free project



The committee should also formally decide upon rules of discussion and how decisions are to be made. It is possible the committee will largely fulfil an advisory role to the mayor who will have the final decision-making authority. However, the more inclusive the decision-making, the more ownership each of the committee members will assume over the project. Ideally, decisions will be reached within a framework and spirit of consensus and cooperation.

Fig. 83
A qualified in-house staff working in conjunction with international consultants has helped Dar es Salaam to quickly become a leader in sustainable transport.
Photo courtesy of Enrique Peñalosa

Fig. 84
A crime in progress: Street-side eating is technically against the law in Japan.
Photo by Lloyd Wright

Project team

The members of the project team should be full-time staff dedicated to the effort. A car-free project, whether a Car-Free Sunday event or a permanent pedestrianisation, is not a trivial initiative. It is not likely to be successful if only one or two persons are assigned to develop and organise the event while also managing other full-time tasks. The planning of a car-free event will vary depending on the project's scope and the complexity of the local conditions. A weekly Car-Free Sunday event will likely require anywhere from 4 to 9 months of planning. A permanent street conversion can take anywhere from 12 to 18 months of planning effort.

The size of the project team is directly related to the complexity and nature of the project. Some of the common types of skills and positions required include:

- Project management specialist
- Urban planner
- Urban architect
- Design specialist
- Information technology specialist
- Civil engineer
- Legal and contract specialist
- Marketing and promotions professional.

At least two to three persons should be dedicated full-time to the project to ensure there is sufficient support. For some positions, though, such as the legal and contract specialist, only occasional support will be required.

The question also arises whether to contract the project to outside consultants or utilise in-house professionals. The answer to this depends greatly on the skills and the experience of in-house staff. To maximise the sharing of lessons learned from other projects, some inclusion of consulting specialists may be advisable (Figure 83). Persons who have participated in pedestrianisation or Car-Free Sunday projects elsewhere can help municipalities from needlessly reinventing the wheel. However, an over-reliance on outside consultants can be unhealthy in terms of internal capacity building and in terms of including local knowledge. If the project is successful, a skilled in-house staff will then be in a position to replicate the concept in other parts of the city or in other nearby municipalities.

3.2.2 Institutional responsibility

Car-free initiatives have the somewhat unfortunate habit of falling between the institutional cracks of municipal governments. Pedestrian space is often administrated quite differently than vehicular streets. While transport departments oversee many aspects of street management, pedestrian paths frequently are the responsibility of another entity (such as council offices, planning departments, or public works). However, a car-free street or a car-free district represents a different scale of pedestrian infrastructure. At this magnitude of pedestrianisation, there may be uncertainty or even strong institutional disagreements over which entity has ownership of the project.

The mayor or other political leader will need to clarify the institutional responsibilities at the project's outset. The inclusion of all relevant agencies within the steering committee will help to mitigate institutional conflicts. However, only through a clear delineation of responsibility will there be certainty in implementation.

3.2.3 Legal issues

The conversion of a street to either a temporary or permanent car-free area may require some changes in the existing legal code. Residents may be legally barred from certain activities (e.g., walking, skating, napping) based on

the street's current legal designation. In many cases, local ordnances require a minimum number of vehicle parking spaces for any housing development. Such a requirement defeats the premise of a car-free proposal. Thus, obtaining an exemption from such regulations and laws is a fundamental step. More ambitiously, a better solution would be the elimination of these types of ordnances in the first place. Kushner (2004b) has outlined many of the issues involved in negotiating the legal complexities of a car-free project.

Changes in zoning laws may also be necessary for similar reasons. The conversion of street and/or pedestrian space for use with outdoor cafes, kiosks, and child play facilities may be prohibited. For example, to this day, outdoor cafes are illegal by national law in Japan due to safety concerns raised at the time automobiles were first introduced (Kitahara, 2005) (Figure 84).

Codifying the practice of a regular Car-Free Day also provides protection against later political administrations rescinding the measure. In 1976, the Car-Free Sunday event in Bogotá was established through a legal decree. The annual car-free week day event in Bogotá was in fact legalised through a public referendum. On 29 October 2000, 63% of the voters in Bogotá approved a referendum to make the first Thursday of every February a Car-Free Day. An additional referendum measure calling for a daily six-hour ban on private vehicles during peak travel times also passed with 51% approval. The daily car ban was set to begin in 2015, which is the expected completion date of the full network of the city's mass transit system known as TransMilenio. However, the result for the daily six-hour car ban was nullified by a judicial panel due to a technicality. Nevertheless, the permanent February Car-Free Day remains in place and cannot be nullified without another public referendum.

3.3 Stakeholders

"And it should be realised that taking the initiative in introducing a new form…is very difficult and dangerous, and unlikely to succeed. The reason is that all those who profit from the old order will be opposed to the innovator, whereas all those who might benefit from the new order are, at best, tepid supporters of him."

—Niccolo Machiavelli (1469–1527)

For the average suburbanite in a highly-motorised country, the idea of car-free living seems beyond the realm of possibility. For such persons, conducting a modern, normal life would be unthinkable without motorised access to work, school, shopping, and public services.

However, a car-free district or even a car-free city is more feasible than this initial reaction implies. Simple solutions to travel, freight delivery, and public services all are within the reach of most communities and especially to developing-nation cities, where an existing non-motorised sector is quite strong. Car-free living should not be portrayed as a noble sacrifice. Instead, car-free communities can bring an individual or family all the benefits of our modern world but without the negative consequences of motorisation. A car-free city should enhance and not diminish quality of life.

This section examines each of the major stakeholders in a car-free initiative and discusses their likely concerns and reactions to a car-free proposal.

3.3.1 Stakeholder analysis

A car-free initiative, even a limited Sunday event, will affect people's lives and change how many view the city. Given this potential impact, it is recommended that the project team develops a full stakeholder analysis identifying all relevant groups, organisations, and agencies.

Table 9 lists the various stakeholders potentially affected by a car-free event. This table also notes the types of responses frequently given by each organisation to car-free initiatives. Actual responses by these types of stakeholders will clearly depend upon the local context.

A stakeholder analysis as briefly given in Table 9 can be quite useful in predicting the reactions from each group, especially those groups who may oppose the project. By understanding the

Table 9: Car-free stakeholders and expected project position

Stakeholder	Possible position
Municipal departments	
Department of Planning	Frequently supportive of non-motorised concepts but the reaction will vary by individual predisposition
Department of Transport	Variable response with some staff supporting project while others will see it as a threat to car-based lifestyles
Department of Public Works	Civil engineers may be unaccustomed to this type of project; some will prefer projects with large road infrastructure
Department of Health	Likely to be highly supportive of measures that reduce accident victims and encourage physical exercise
Department of Environment	Likely to be highly supportive of measures that reduce air contamination and noise
Department of Sports and Recreation	Likely to be highly supportive of measures that encourage physical exercise
Department of Commerce/ Economic Affairs	Concern will be expressed over economic impacts, but likely to be persuadable if given sufficient evidence
Traffic police	Sometimes un-supportive of car-free projects and can fail to properly enforce; may see car-free areas as a loss of power
Private Sector	
Chamber of Commerce	A mixed reaction: concern over the economic impacts, but also supportive of improved urban environment
Petrol stations, car wash facilities, car repair shops	Strongly opposed to any initiatives that will reduce or cause inconvenience to their clientele
Car dealerships	Opposed to any initiatives that may contribute to a reduction in vehicle ownership
Insurance industry	Highly supportive of measures that reduce accidents and improve overall health
Retail shops	Concern will be expressed over impacts on sales
Landlords	Will be positive if there is strong indication that land values will increase
Hotels, restaurants, and tourist-oriented businesses	Generally positive if a strong case can be made for an increase in foot traffic and in-street usage
Telecommunications, water, and sewer companies	Will be quite concerned about accessing and servicing their infrastructure; will seek exemptions for their vehicles
Large industrial and business complexes	Concerns will be expressed over access for employees and over delivery of goods
Public services	
Schools and universities	Generally positive over any increase in safety for students but will be concerned about access; research staff can help to plan project and document its impacts
Hospitals	Supportive of reduction in accidents but will be concerned about access for emergency vehicles
Civil Society	
Environmental NGOs	Highly supportive of measures that reduce pollution and noise
Child-development NGOs	Highly supportive of measures that promote improved child play opportunities
Community-based organisations	Highly supportive of measures to improve safety and the aesthetic quality of street
International NGOs and foundations	Highly supportive of cities creating best practice examples with potential for replication elsewhere
User groups	
Car owners	Concerned about access and usage of personal vehicle
Public transport users	Generally supportive and especially so if car-free project is accompanied by priority lanes for buses
Pedestrians and cyclists	Highly supportive of new priority infrastructure
Children	Highly supportive of car-free play space
Physically disabled	Supportive if car-free measures are accompanied by better access for the disabled (ramps, raised strips, etc.)

likely reaction, strategies can be devised to allay fears and address principal objections. The given reaction of any particular stakeholder will depend greatly on how the car-free project is initially presented. Like many other aspects of life, the first impression is the one that tends to be the most memorable.

The stakeholder analysis can be thought of as a checklist of likely project beneficiaries and project detractors. The beneficiaries should be targeted and enlisted in supporting the effort. For the detractors, different strategies should be devised to engage constructively. The right marketing strategy can help to dissipate the strongest of objections.

3.3.2 Stakeholder objections to car-free development

Understanding the basis of stakeholder objections to car-free development is the beginning of a transformation process in public attitudes. Recognition of such objections permits developers to devise strategies for addressing such concerns.

Box 6 lists actual reasons that have been used to oppose car-free projects. The purpose of this list is not to give credence to car-free detractors or to discourage current supporters. For virtually every issue mentioned in Box 6, it is possible to refute the assertion or devise a solution. For example, there is considerable evidence showing

Box 6: List of objections sometimes given against Car-Free Development

Economic concerns

1. It will not be possible to deliver goods to shops or businesses in a timely fashion
2. The modern economy depends on vehicle sales, road construction, and the petroleum industry for jobs and income
3. Time is economically too valuable to be lost by non-motorised travel
4. I have already made a personal investment in an expensive car; to give up my vehicle will mean incurring a loss of personal wealth
5. Current infrastructure is built around the car; it is too expensive to change how our cities are designed
6. Tourists will stop visiting a city if they cannot travel about by car

Convenience

7. It will be too difficult to transport groceries and other household goods
8. Children will not be able to easily travel to school
9. Mothers will be highly inconvenienced without a vehicle to carry children or to carry out other household chores
10. Climatic conditions make non-motorised travel impractical (too hot, too cold, too much rain)
11. There are no viable alternatives to the car where I live
12. Persons are too busy with their lives to opt for slower means of travel

Health and well-being

13. Lives will be lost due to the lack of access for emergency vehicles
14. Many persons lack the physical fitness to walk or bicycle extensively
15. Many persons do not know how to bicycle
16. Disabled persons will be lose access completely without motorised travel
17. Walking and cycling is simply too dangerous
18. Lives will be lost because public transport is a target of terrorism
19. I sleep better with background noise from vehicles

Status and freedom

20. My car is a representation of my status in society
21. Car-free development is an attack on liberty and personal freedom
22. Car-free living is something other people should do in order to reduce traffic congestion, but it is not for me
23. Persons do not like change of any type and this is an extreme change in lifestyle for most persons
24. Persons like to feel a sensation of speed, which only motorised vehicles can give
25. The importance and status of a city is related to the car; a car-free city is decidedly backward and anti-modern
26. Walking and cycling is only for the poor
27. Walking is only for children and those too old to drive

Environmental and social

28. Cars give life to the street and prevent crime
29. I will lose touch many friends if I cannot use a car to visit them
30. The problems with cars (pollution, climate change, noise, congestion, etc.) are overstated

Fig. 85 and 86
The most successful commercial trading streets are frequently pedestrianised shopping streets, as evidenced by these examples from Avenida Florida in Buenos Aires (left photo) and the Shinjuku district in Tokyo (right photo).
Photos by Lloyd Wright

the economic benefits and job creation from car-free initiatives. Concerns over rain and temperature extremes can be partially addressed through design and seasonal planning.

Car-free development is a new concept that will undoubtedly be riddled by misunderstanding. Turning detractors into supporters will likely be a principal activity of project promoters until the concept is more widely recognised. For any supporter of a car-free project, it is vital to look closely at Box 6 in order to formulate replies to these typical objections. One will never gain the support of 100% of the population. There are very few, if any, issues that would ever gain such wide-spread support. However, being prepared with targeted replies can potentially help win over a sufficient number of persons to make a project a reality.

Additionally, much can be learned from engaging stridently opposing views. The car-free movement will likely be strengthened by understanding the views of those who disagree with aspects of its premise. Engaging a wide spectrum of actors and opinions provokes the "cognitive dissonance" that Eric Britton regards as essential to ultimately stimulating change (Britton, 2005):

> "Then there is the matter of 'cognitive dissonance' as a learning device… The idea is to create a purposeful, rich imbalance of views and positions within a shared forum, and then let them rip. The first consequence is usually (if you get it right) to remove 'comfort zones', which occur when people tend to adopt thoughts or beliefs so as to minimize the amount of dissonance (conflict) between cognitions (people present)."

Britton's idea of removing "comfort zones" is particularly relevant in the case of car-free development. The comfort zone of auto-dependency is evident in most cities today. Recognising the negative attributes of auto-dependency is a difficult but essential step in gaining consideration for alternative urban designs.

3.3.3 Shop owners and retailers

Shop owners and retailers are amongst the first groups requiring reassurance upon initiation of a car-free project. The idea of possibly losing their car-based clientele is clearly a major concern for shops. Retailers also typically voice strong concerns about the viability of delivery services within a car-free area. There exists strong evidence to suggest that retailing can flourish in such areas. However, communicating and convincing the retail community requires a concerted outreach effort.

Turnover and sales in car-free areas

If retailers feel their livelihood is at stake, then a rather strong negative reaction can be expected. The views and concerns of the retail community are to be taken quite seriously. Given the sector's influence with policy-makers, opposition may seriously damage any chances of project implementation.

The retail performance of pedestrianised areas, though, is generally quite positive. Table 10 summarises findings from studies analysing impacts on shop sales and property values. The experience to date suggests the increased foot traffic drawn to a pedestrian zone is a definitive benefit to retailing (Figures 85 and 86). Clearly,

Table 10: Summary of economic impact studies

Study	Years of study	Location	Survey size	Results
Deutscher Industrie- und Handelstag (DIHT)[6] (1979)	Various	233 local authorities in Germany	Businesses in 331 pedestrianised areas	***Turnover*** % of firms with turnover increases inside of area: 83% % of firms with turnover increases outside of area: 24%
Hass-Klau (1988)	Various	Hameln, Göttingen, Freiburg (Germany)	777 retailers	***Opinion survey*** % of retailers with a positive view of pedestrianisation Freiburg: 71% Göttingen: 74% Hameln: 85%
Transport and Environment Studies (TEST) (1987)	1987	London (UK)	Retailers on Neal Street, Covent Garden	***Turnover*** 60% of survey respondents claimed higher turnovers
Wiggins (1993)	1992	Leicester (UK)	Shops on 29 street sections	***Shop vacancy rates*** Car-free area: 3.1% vacancy Low vehicle flow area (up to 200 vehicles/h): 6.4% vacancy Medium vehicle flow area (200–500 vehicles/h): 10.4% vacancy High vehicle flow area (over 500 vehicles/h): 15.1% vacancy
Edward Erdman Research (1989)	1987–1988	14 UK towns	Various street sections	***Increase in rental prices*** (in prime shopping sites) Vehicular street: 19.7% Pedestrianised street: 42.5%
DoE and The Association of Town Centre Mangement (1997)	1996	Coventry (UK)	Sample of retailers in town centre	***Increase in sales levels*** 40% ***Increase in foot traffic*** 25%
Local Government Commission (2001)	1997	Lodi (US)	Survey of pedestrian improvement area	***Increase in new businesses*** 60 new businesses ***Decrease in vacancy rate*** From 18% to 6% ***Increase in sales tax revenues*** 30%
Local Government Commission (2001)	1998	West Palm Beach (US)	Survey of pedestrian improvement area	***Increase in property values*** 1993: US$10–US$40 per sq. foot 1998: US$50–US$100 per sq. foot

Source: Adapted from Hass-Klau (1993), Local Government Commission (2001), Cabe Space (2004)

[6] German Industry and Commerce Association

the actual results are closely tied to the quality of the project. A poorly planned and implemented pedestrian project can certainly result in less impressive economic results. However, the results in Table 10 suggest that retailers can be one of the major winners from a car-free project. As noted by Hass-Klau (1993, p. 30), retailers typically become the greatest champions of extending a car-free area:

> "It seems to be a law of nature that retailers will resist the implementation of pedestrianization and traffic calming; this may be because they do not yet have information networks from which they can learn about other towns' experiences. However, they virtually never campaign for the abandonment of a scheme once it has come into operation. It is notable that, once a scheme has been put in place, traders are often the main people to voice a desire to extend its boundaries or period of operation."

Jan Gehl relates a similar story regarding Copenhagen's experience with pedestrianisation (Walljasper, 2005):

> "The pedestrian zone was popular from the first day…and downtown business leaders eventually took credit for a plan they once adamantly opposed."

Fig. 87
Delivery by hand carts can frequently satisfy the majority of the delivery needs within a car-free area, as shown here in Buenos Aires.
Photo by Lloyd Wright

Various strategies can be employed to win over the retail sector. The relatively simple infrastructure and low-cost of a car-free initiative means that such projects carry a high-degree of potential reversibility. If results are unsatisfactory, then the car restriction measures can be easily terminated. This reversibility actually presents both an opportunity and a threat. Clearly, presenting a temporary test period to businesses can help relieve concerns over the project. Jaime Lerner, the former mayor of Curitiba, utilised this approach in obtaining shop owner support for a pedestrian street. The shop owners were told that they could decide upon the permanence of the pedestrian street after a trial period of a few months. In the case of Curitiba, this risky proposition proved successful since the business community warmly endorsed the project's continuation after witnessing the initial results.

Fig. 88
For delivery companies like DHL, the use of non-motorised vehicles makes for a cost-effective option.
Photo courtesy of ITDP

However, not all projects can guarantee an immediate return as was achieved in Curitiba. The true economic value of a pedestrian project may not become fully evident until after a settling-in period, which may take from one to two years (Hass-Klau, 1993). A transition period may be required as residents become more aware and accustomed to the new street amenities.

Hass-Klau (1993) also points out that in many cases the results from the Table 10 surveys may actually be skewed downwards. Complaining shops may be more likely to complete questionnaires while more successful shop-owners may feel less motivated to respond. Hass-Klau notes that while both retail turnover and profit levels are often considerably improved after pedestrianisation, the profit levels are typically less improved than turnover. Potential explanations for this phenomenon are:

- Rent levels may increase after pedestrianisation, representing an added cost to some shop-owners and a financial benefit to landlords;
- In some cities, the shops must contribute to the costs of pedestrianisation; and,
- Due to the increased value of the area, property taxes may rise.

Another common concern is that a pedestrian area will result in a redistribution of retail turnover. While the shops along the pedestrian zone may benefit, shops in other areas may suffer a downturn due to customer preferences for the new zone.

Besides retail shops other types of commercial interests can benefit from car-free projects. Hotels and restaurants can gain from both the increased pedestrian turnover and the increased aesthetic value of the area. The development of outdoor eating areas also seems to present an opportunity to attract new customers.

Of course, a few types of businesses will be negatively affected by the development of pedestrian areas. Auto-related businesses such as petrol stations and auto repair shops may be affected if the street infrastructure encourages a shift away from motorised travel. More severely, these businesses would obviously become non-viable if located on a pedestrianised street. Parking garages would likewise become non-functional within a car-free zone, but can prosper if located at the fringe of the area.

In summary, the experience to date indicates that pedestrianised areas are an overall benefit to shop-owners and the general local economy. However, this finding is not necessarily believed by affected firms at the outset of a project. Thus, marketing the car-free concept to the retail sector requires must attention and effort.

Deliveries

Perhaps the most frequently heard argument against car-free development relates to the issue of goods delivery. If a private motorised vehicle is not an option, how will food and other necessities be delivered to the home? How will businesses receive their inputs and ship their product?

The immediate answer is to look at cities that are already largely car free. Somehow cities such as Venice, Zermatt, and the medina of Fez function quite well without the presence of automobiles. In fact, if somehow automobiles were squeezed into the streets of these cities, it is probably more likely that the ensuing gridlock would inhibit and not help product delivery. In these cities as well as pedestrian streets around the world, deliveries are made by an array of options, including:

- Non-motorised vehicles, such as hand carts and work bikes (Figures 87 and 88)
- Off-hour deliveries with larger vehicles
- Use of delivery services in place of personal pick-up.

Knustler (in Crawford, 2000, p. 13–14) notes that even in circumstances of a highly-dense city, non-motorised delivery is hardly an insurmountable issue:

> "I grew up on the east side of Manhattan, in a neighborhood of fifteen to thirty story apartment buildings, about as dense as it gets in the urban western world. Everybody who lived there needed groceries and the overwhelming majority depended on small grocers, butchers, and bakers who distributed their stuff by means of bicycles with large cargo bins. For all this tremendous volume of business, there was never any sense of the street being overwhelmed by delivery bikes. Far from it, they just blended into the background of the normal streetscape."

There are clearly times when an exceptionally large item may require some additional assistance. For example, the delivery of large home appliances (e.g., refrigerator, washer and dryer) and other large items (e.g., piano) are not without their challenges. However, it should be noted that such deliveries are relatively rare. The average lifespan of a refrigerator ranges from 12 to 20 years, depending on product quality and local preferences. On the occasion that such deliveries are required some motorised support could be one option. "Car-free" islands such as the Princess Islands (Turkey) and Landau Island (Hong Kong) possess motorised carts that may be rented out whenever the movement of exceptionally large or bulky items is required. Further, in many instances large, non-motorised carts in conjunction with pulley systems are capable of moving these types of items. It should be noted that even the largest of human-made objects, such as the stones for the Egyptian pyramids, have been moved without the assistance of motorisation.

3.3.4 Macroeconomic impacts

A potential downfall in shop revenues is not the only economic fear from car-free development. At a broader level, many fear the impact on jobs, income, and the very effectiveness of a modern economy. Behind this concern lies an assumption regarding the car industry's contribution to economic well-being. Local and national governments often strive to attract local investment from automobile manufacturers based on the belief that the economic and direct employment benefits are quite significant.

At first glance, it would indeed appear that the purchase and consumption of motorised vehicles is an irreplaceable pillar of today's economy. The following list outlines some of the employment activities associated with the use of motorised vehicles:

- Input materials to infrastructure development
- Road construction
- Input materials for vehicles
- Vehicle manufacturing
- Vehicle delivery and distribution
- Vehicle sales
- Petroleum exploration and extraction
- Petrol delivery and distribution
- Petrol sales
- Vehicle repairs and maintenance
- Vehicle scrappage.

Fig. 89
Due to the high material input requirements and use of automation in manufacturing, auto manufacturing is not necessarily a highly efficient generator of employment.
Photo from "Useful Photo Images" photo CD

A more basic issue, though, is whether such investments produce more employment and economic gain than alternative uses of the capital. This section examines the evidence to date on this question.

Automobile manufacturing

It is frequently asserted that the advantages from motorised mobility "have made possible our present globalised economy" (WBCSD, 2001, p. 1–6). Various studies link these processes to positive economic gains, especially in the context of the burgeoning developing-nation markets and where existing infrastructure is limited (Ravallion, 1990; Ling and Zhongyi, 1996; and Keddeman, 1997).

However, the efficacy of an auto-centred economy may not be as impressive when compared to alternative uses of the same investment. Much of modern day infrastructure development and vehicle manufacturing is highly capital intensive. Mechanisation of the manufacturing processes means that firms have greatly succeeded in improving quality and reliability as well as minimising labour costs (Figure 89). When measured on the basis of employment generated per input investment, vehicle manufacturing is actually not as labour-intensive as many other sectors.

Table 11: Regional economic impacts of US $1 Million investment

Category US$1 million invest	Increase in income	Increase in jobs
Automobile investment	$307,000	8.4
Non-automotive consumer expenditures	$526,000	17.0
Transit investment	$1,200,000	62.2

Source: Miller *et al.*, (1999) in Litman (2005b)

A 1999 Texas (USA) study evaluated the regional economic activity and employment generated from expenditures on automobile use, transit use, and general consumer expenditures (Miller *et al.*, 1999 in Litman, 2005b). By far, the greatest income and employment benefits stemmed from the investments in public transit (Table 11).

A similar type of study conducted in British Columbia (Canada) also indicated that public transit outperformed other types of transport investments in terms of job creation (BCTB, 1996 in Litman, 2005b). Table 12 summarises these results.

Table 12: Jobs Created in British Columbia by Transportation Expenditures

US$1 million expenditure on	Full Time Jobs Created
Petroleum	4.5
General Automobile Expenses	7.5
Public Transit	21.4

Source: BCTB (1996) in Litman (2005b)

Thus, pursuing economic development through vehicle manufacturing and vehicle usage may not be the best use of resources. Litman (2005b) notes that:

> "Even in Germany, a major vehicle exporter, a less automobile-oriented transportation system would provide a net increase in national employment (Ebinger *et al.*, 1998). A comprehensive economic evaluation model found similar results at an international scale (ASTRA, 2000). This indicates that policies which reduce consumer expenditures on motor vehicles and fuel tend to increase employment and business activity, particularly in regions that import petroleum."

Infrastructure construction

In a similar manner to auto manufacturing, road infrastructure has been regarded as both an effective employment generator as well as a general prerequisite for economic success. However, Banister and Berechman (2000, p. 3) note that:

> "The belief that public investment in infrastructure will generate economic growth has often

been used as a justification for the allocation of resources to the transport sector. Much of the road-building programme in developed and developing countries has been promoted on these grounds, yet the arguments seem far from clear."

Dittmar (1999) found that motorway investments create only about one job per US$1.5 million in government expenditures, compared with US$5,000 to US$30,000 for other government programmes. Like auto manufacturing, roadway infrastructure today largely involves low employment input in relation to the larger investment in machinery.

Whether road construction projects are the best use of funding from the myriad of other investment options is debatable. Somewhat predictably, feasibility studies on road infrastructure development virtually always return a verdict that the project is "feasible". However, Litman (2003, p. 7–6) stresses that alternative transport investments to road building should always be considered:

"Even if highway expenditures increase economic productivity, they are not necessarily the best investment… Investments in alternative modes and management strategies that encourage more efficient use of existing road capacity tend to provide more economic benefit than expanding existing highways to reduce congestion. One major study found that economic growth rates are higher in regions with more diverse, less automobile dependent transportation systems (Kenworthy *et al.*, 1997)."

Car-free employment impacts

The smaller-scale nature of car-free infrastructure can actually lend itself well to more labour-intensive construction techniques. While roadway construction is predicated upon the use of large machinery (Figure 90), the development of public space typically relies upon a more artisan and labour-intensive approach. Thus, pedestrianisation and other car-free initiatives will likely generate a higher labour component for the given investment input (Figure 91).

Further, the manufacturing and operation of non-motorised vehicles can provide substantial employment:

Fig. 90
Most of the investment for major roadway construction, as shown here in Midrand (South Africa), goes towards machinery and materials rather than employment.
Photo by Lloyd Wright

- Cycle rickshaws in India provide an estimated 6 to 9 million jobs (AITD, 1996)
- Cycle rickshaws in Dhaka (Bangladesh) employ between 300,000 and 500,000 persons directly (Figure 92)
- Non-motorised taxis in Sri Lanka employ 300,000 direct jobs (DFID, 2002)
- More persons in China are employed in bicycle fabrication than in automobile manufacturing (Hook, 2002).

When compared to automobile manufacturing, the fabrication of such non-motorised vehicles relies upon relatively low material inputs and higher labour inputs per investment.

Finally, the operation of a car-free area also carries with it potential additional employment.

Fig. 91
Most of the investment for pedestrianisation projects, as shown here in Bogotá, typically goes towards employment.
Photo by Lloyd Wright

Fig. 92
In many parts of South Asia, bicycle taxis represent a major generator of employment.
Photo by Karl Fjellstrom

Wright and Montezuma (2004) documented the employment benefits emanating from the weekly Car-Free Sunday event in Bogotá. This research noted the employment gained with vendors working along the car-free corridors and with the staff managing the event. A typical Sunday event in Bogotá involves approximately 2,500 support staff (Table 13). Of these, roughly 1,900 are student volunteers who are completing their national service requirements.

Through a survey in 2004, a total 1,517 vendor kiosks were counted along the 120 kilometres of Bogotá's Car-Free Sunday event. The total employment in the kiosks was estimated at 2,033, an average of 1.34 employees per kiosk. The kiosks hosted a range of services and entrepreneurial activities, including food and beverage, bicycle repair and accessories, and consumer goods (Figure 93). These results were then compared to automobile-related employment along the same corridors (Table 14). A total of 70 establishments catering to motorised vehicles were identified along the corridors (Figure 94). In total, these automobile-related businesses generate employment for an estimated 274 persons, which is just 13% of the employment generated during a Car-Free Sunday.

Table 13: Management staff for the Bogotá "ciclovía"

Position	Number of employees
General coordinator	1
Supervisors	5
Route managers	22
Ciclovía guardians	165
Aerobics point managers	12
Aerobics instructors	42
Maintenance helpers	24
Social service volunteers	1,900
Police assistants	300
Professional traffic agents	30
Emergency service professionals	5
Total	2,506

Source: Wright and Montezuma (2004)

Fig. 93
The many informal vendors and kiosks along the Bogotá's Sunday "Ciclovía" clearly demonstrates the importance of the event for all citizens.
Photo by Lloyd Wright

The comparison between the two employment figures is quite dramatic. The car-free event provides 7.4 times the amount of private sector employment as automobile-related businesses do along the same corridor. This figure becomes 16.5 times automobile-related employment if the municipal management functions are included. Further surveys indicated that for many of the informal vendors, the Sunday event was their only household income. Thus, Bogotá's experience indicates that the small-scale nature of car-free events can offer an environment hospitable to vital employment opportunities for at-risk social groups.

3.3.5 Public services

Another common concern with car-free areas relates to access for public services, especially fire engines, police vehicles, and ambulances.

Emergency vehicles

For patients with serious trauma or those in cardiac arrest, the smallest delay in receiving

treatment can be life-threatening. Thus, even in many "car-free" areas, emergency vehicles are awarded an exemption from vehicle restraints. Given the relative rarity of ambulance use, though, this type of exemption does little to change the overall nature of a car-free area.

In some car-free districts, though, street widths may be too narrow to allow standard ambulances. In these cases, and in cases where ambulances are restricted for other reasons, there are still options for accommodating rapid medical treatment. Smaller ambulance vehicles (such as specially-fitted bicycles and motorbikes) are one possibility. If population densities are sufficient, the design of a car-free quarter could include local medical offices. Thus, medical professionals would be within a short distance from any household.

Motorised fire and police vehicles are sometimes suggested as exemptions based on similar rationale. The police and fire brigade must respond rapidly to many types of life-threatening situations. The consequences of delay outweigh the desire to have a completely car-free environment. While there is certainly a case to be made on the side of motorised fire and police vehicles, there are also alternative options to consider. Many police forces are now operating effectively relying at least partially upon bicycles. In fact, in densely populated communities, police on bicycles can often negotiate streets more quickly than police in motorised vehicles. Further, the decentralisation of police and fire services into local sites offer the opportunity for such services to respond without reliance upon vehicles. Thus, like medical care, locating fire and police services within dense communities can obviate the need for large numbers of vehicles.

Many of the same arguments, although less convincingly, are made for other public services, such as water, sewer, trash collection, and electricity.

Fig. 94
The employment generated from automobile-related businesses along the Bogotá "Ciclovía" is only a fraction of the employment created by the car-free Sunday event.
Photo by Lloyd Wright

However, in these cases, ample options exist for servicing such infrastructure without the need for large motorised vehicles (Figure 95). Personnel can be deployed with packaged service kits that can either be carried or moved through the use of hand carts. Naturally, there may be exceptional times when motorised vehicles may be necessary or at least highly convenient for certain actions. Again, small exemptions can be adequately handled without compromising the overall premise of the car-free area.

Traffic police

In many developing cities, the traffic police are perhaps the most reluctant to openly support

Fig. 95
Using work bikes for trash collection in Johannesburg (South Africa).
Photo by Lloyd Wright

Table 14: Automobile-related businesses along the "ciclovía"

Type of business	Number of businesses along the "ciclovía"	Average number of employees per business
Service station (petrol only)	13	5.7
Service station (full services)	6	4.1
Auto repair shop	9	3.4
Car washing facility	17	4.7
Vehicle renting or sales	25	2.6

Source: Wright and Montezuma (2004)

Fig. 96
Bangkok police face an immensely hostile, stressful, and contaminated work place; car-free areas can thus be a win for the traffic police as well.
Photo by Karl Fjellstrom
(GTZ photo CD on urban transport)

car-free initiatives. Such initiatives may be seen as either more work for the police or conversely as a threat to their main activity, which is ensuring the smooth flow of traffic. However, there are also selling points that will certainly benefit the traffic police. Ensuring the smooth flow of bicycles and pedestrians is likely to be far less stressful and personally dangerous to police than standing in a busy intersection of cars. Further, the reduced on-street pollution from working in a car-free area will have significant health benefits to the police as well as reduce personal injury risks (Figure 96). Demonstrating that pedestrianisation will actually lead to reduced traffic overall and not just a re-concentration of traffic elsewhere will also be a priority for the police. Finally, a bit of marketing can be done to show that pedestrianisation does not represent a loss of importance to the traffic police. Images showing police duties in this new environment and the level of sophistication of car-free designs can greatly assist in diminishing their concerns.

Fig. 97
The presence of a single vehicle in the Chinatown pedestrian zone of Kuala Lumpur completely changes the experience for the pedestrian.
Photo by Lloyd Wright

3.3.6 Local residents

The conversion of an existing area into a car-free zone can be fraught with difficult political decisions. Rarely will 100% of the local residents favour such a conversion. There will invariably be individuals who wish to retain the use of motorised vehicles for their personal use. Thus, in some instances, existing residents have been given special exemptions. The proposed car restrictions in central Paris will exempt local residents. Likewise, the congestion charging scheme in London has given a 90% discount to residents living within the charging zone.

Unlike the exemptions for public services, though, the exemption for residents is a far greater dilution of the car-free concept. In such cases, the area may be as car-intensive as any other sector of the city. The exemption of residents essentially erodes the entire basis and intention of developing a car-free area. Even just a few vehicles penetrating the "car-free" zone can dramatically alter the pedestrian's experience (Figure 97).

Further, the large number of residential vehicles can make enforcement quite difficult, unless a costly electronic entrance system is employed. Thus, in such instances, it is perhaps preferable to make a brave political decision and disallow residential exemptions. As Crawford notes (2000, p. 227), this seemingly draconian policy could be amicably resolved through the market:

> "If there is broad support for the conversion, then the few who decide to move away should have no difficulty arranging the profitable sale of their residences: if the planning work has been done correctly, more people will want to move into the area than will want to leave."

Nevertheless, it is recognised that any type of property expropriation is a difficult issue for any municipality to undertake.

3.4 Participatory processes

"To try to force the people to embrace something that is believed to be good and glorious but which they do not actually want—even though they may be expected to like it when they experience its results—is the very hallmark of anti-democratic belief."

—J.A. Schumpeter, 1961

Change imposed from the top down will likely meet with resistance regardless of a project's merit. Change supported from the bottom up is unlikely to be resisted regardless of attitudes at the top. If a car-free project is going to be truly accepted and sustained, then strong community support is fundamental. The power of citizens taking ownership over their own community cannot be underestimated.

Unfortunately, this valuable resource is sometimes forgotten in planning processes that may focus more on planning and design "experts" than the average person. When it comes to developing and designing a car-free street, there are few better experts than the persons living on that particular street. While the design and construction of elevated roads and overpasses require extensive technical expertise and vast sums of investment, car-free development is far more inviting to public participation.

Virtually everyone has an opinion on how to improve their neighbourhood. A car-free project can be a catalyst for a host of local area changes that will revitalise a community. Further, given the impact on property values, most people will take any transformation of their community with a great deal of economic self-interest. People are also inherently proud of where they live and will take an active role if given the opportunity.

The challenge of making public participation work lies in the initial organisation and the effort made in personal outreach. As evidenced by the research of Appleyard (1981), car-dependent communities have often lost their sociability. Neighbours may not know one another as few venture out upon the streets.

Creative participatory techniques, though, can be used to reverse the years of stilted community interaction (Figure 98). Home zone projects in the UK have regularly made use of

Fig. 98
Public participation process in Manila (Philippines) for a project supported by USAID.
Photo by John Ernst

street parties to invigorate interest in projects as well as solicit ideas and suggestions. The street party itself also serves as its own best-practice demonstration of the car-free concept. Another option is to install a community idea board where residents are allowed to post ideas as well as view the opinions of others (Figure 99). If resources are available, a full community survey is perhaps the most effective mechanism to ensure all residents have an opportunity to voice an opinion. Personal interviews present the opportunity to discuss the project with neighbours

Fig. 99
Under the administration of Mayor Antanas Mockus, Bogotá utilised community "ideas boards" to helps citizens express their opinions.
Photo by Lloyd Wright

Fig. 100
A model of one design concept helps residents of Manchester's Northmoor home zone gain insights into the project.
Photo by Ian Finlay Architects

in a one-on-one basis. Individual questions and concerns can be readily addressed. Likewise, interviews also provide the best means to gather detailed feedback on the proposed scheme.

More cost-effective means to collect such inputs is through community meetings at a central location such as a school or community centre. The challenge of such meetings is to attract a sufficiently wide enough representation of the community. Due to the lack of community coherence and the difficulty in scheduling, such community sessions sometimes only attract those fervently in favour or opposed to the project.

Fig. 101
A design maquette during the Towards Carfree Cities Conference in Budapest.
Photo by Joel Crawford

In reality, project developers are not relegated to any one public participation technique. Multiple techniques can be employed at different stages to solicit the widest participation possible. Interviews and personal survey techniques may work well at the early stages in order to ensure all residents (or at least a representative sample) are approached. This initial approach can then stimulate interest in further participation. Once residents feel they have both an interest in the project and feel they have a voice in the process, then there is a much better chance of sustained participation.

As the project progresses, design charrettes in which actual street configurations are discussed may be appropriate. A design maquette, or model building exercise, may then be appropriate to actually develop a 3-dimensional sense of the project. The use of models and illustrations are particularly effective in providing a visual focal point for discussions (Figures 100 and

Fig. 102 and 103
Today's software packages put the power of design imagination into the hands of all.
Images courtesy of Fundación Ciudad Humana

101). Simple software tools, such as AutoCad and Photoshop, can facilitate hands-on design inputs from residents. Advanced photographic editing software (for still images), as well as 3-dimensional modelling programmes (for videos and walk-through tours), allow residents to get a strong visual sense of the project (Figures 102 and 103).

Community-based meetings should be well organised with a definitive agenda that is clear to all. At the same time, enough flexibility should be employed in order to allow a free-flowing discussion to the extent possible. However, as desirable as a pure consensus based process is, there will unlikely be 100% agreement on all points. Thus, a written copy of all comments should be noted to maintain an official record. A studied review of the comments can allow solutions to be developed that will hopefully be acceptable to the widest range of residents. Further, meeting minutes and project updates should be periodically distributed to residents, and especially to residents who have been unable to attend the community meetings and design charettes.

Public participation may seem to be a time consuming and difficult process. However, the benefits of community ownership and acceptance of a project far outweigh the challenges involved.

3.5 Financing a car-free project

"It costs $10 million to construct a single highway flyover. The beneficiaries of this flyover will be quite mixed, but concentrated among wealthy motorists. This same $10 million could buy 150,000 good quality bicycles, or cut the price in half for 300,000 bicycles. It would also buy 100,000 modernized cycle rickshaws, creating 100,000 jobs. Why should the general taxpayers subsidize one and not the other? Put another way, you could give every man, woman, and child in Senegal a bike for $500,000,000, roughly the cost of 10 kilometres of metro, or one major highway."

—Walter Hook and John Howe, 2004, p. 70

Financing a car-free initiative is rarely if ever a major obstacle to implementation. The relatively simple nature of a car-free project implies only modest planning, infrastructure, and management costs. A car-free conversion may in fact be less costly than the annual maintenance of a car-based roadway.

Nevertheless, some developing-city municipalities have limited budgets even for the relatively modest cost of a car-free project. This section first describes the types of costs involved in a car-free project, and then provides some suggestions on financing a project (if project financing is required at all).

3.5.1 Car-free project costs

Table 15 outlines the types of costs involved with both temporary and permanent car-free projects.

Fig. 104
Bangkok's car-free event came to a premature end due to the lack of political will to continue.
Photo by John Ernst

Table 15: Cost categories for car-free projects

Type of car-free project	Cost category	Frequency of cost
Temporary car-free event	Planning and design costs (including public participation process)	Single cost event
	Legal costs	Single cost event
	Infrastructure (temporary signage and removable barriers)	Single cost event (but requiring eventual replacement/maintenance)
	Promotional costs	Higher initial costs with some on-going costs
	Management costs (set-up teams, supervisors, police, first aid, etc.)	On-going costs
	Event costs such as aerobics instructors, entertainers, films, etc. (optional)	On-going costs
	Clean-up costs	On-going costs
	Evaluation costs	Periodic
Permanent car-free conversion	Planning and design (including public participation process)	Single cost event
	Infrastructure costs (street furniture, possible new street surface and street lighting, signage, and permanent barriers at entrance)	Single cost event
	Property acquisition (if necessary)	Single cost event
	Promotional costs	Higher initial costs with some on-going costs
	Management (event scheduling, policing, etc.)	On-going
	Maintenance of infrastructure	On-going
	Evaluation costs	Periodic

Table 15 represents project costs in their totality without comparing costs to existing usages. For example, the cost of policing and street management may not be significantly different than those costs being incurred currently on a car-based street. Further, many of the costs may actually be lower for a car-free street. For example, the lower wear and tear on a car-free street means that maintenance costs (such as re-paving) will be less frequent.

The modest requirements of a car-free street should enable the project to be financially sustainable. However, Bangkok actually terminated its Car-Free Sunday event on Silom Road largely for cost reasons. In 2001, Bangkok began a weekly closing of Silom Road, which is located in the commercial centre of the city (Figure 104). An extensive promotional campaign, including advertisements in television, radio, and newspapers, accompanied the project. Further, the car-free event involved an overall theme, known as the "7 Wonders @ Silom" in which different themes were presented through displays and entertainment. These themes included "Green World", "Dance", "Music", and "Happy New Year". The Sunday events were regularly drawing as many as 150,000 people (Laosirihongthong and

Table 16: Cost of Bangkok's expensive car-free events (year 2001)

Cost item	Cost in baht (and US$)
Planning and preparation activities	20 million baht (US$500,000)
Advertising (television, radio, and newspapers)	7 million baht (US$175,000)
Management fee to professional street organizers	3 million baht (US$75,000)
Traffic management and project evaluation	3 million baht (US$75,000)
Total	33 million baht (US$825,000)

Source: Laosirihongthong and Pattaramunikul, 2004

Fig. 105
Tokyo's Ginza is a highly-popular weekend event that uses relatively low-cost street furniture to create a simple yet enjoyable environment.
Photo by Lloyd Wright

Pattaramunikul, 2004). Unfortunately, the extravagance of the event investment eventually undermined the entire project. Table 16 summarises the costs of the seven special events held during the Car-Free Sundays on Silom Road. The seven events came to a total of US$825,000. Ultimately, this expense forced the termination of the weekly street closings, which were enjoyed by such a wide segment of the population.

By contrast, Tokyo's Ginza district manages a weekly street closing on both Saturday and Sunday with little additional costs to the city. Instead simple barriers are placed at street intersections and some simple street furniture is added (benches, tables, and chairs). Police personnel largely conduct this activity as part of their normal duties. Despite this modest investment, the Ginza event is extremely popular and draws large crowds each weekend (Figure 105).

Thus, Bangkok possibly needlessly created an overly complex and overly expensive design that was not sustainable in the long term. Cities such as Tokyo and Bogotá host weekly events that have become a permanent fixture for the population. As the implementation of a weekly car-free event becomes routine, costs are eventually reduced to quite modest levels.

3.5.2 Car-free financing

To the extent municipalities require any additional funding for holding a car-free event or for developing a permanent car-free street, there are many potential sources of funding. Costs can be divided into three distinct categories for fund-raising efforts:

1. Planning and development costs
2. Infrastructure costs
3. Management costs.

Table 17 outlines possible revenue sources for each of these major cost categories.

3.5.3 Planning and development

The amount of revenues for planning depends on the scope and nature of the project. If the project is relatively modest and does not require the use of outside consultants, then most costs

Table 17: Potential revenue sources for car-free projects

Cost category	Potential revenue sources
Planning and development	• Existing departmental budgets • Regional and national governmental budgets • International bi-lateral agencies • Global Environment Facility (GEF) • International organisations (e.g., UNDP, UNEP, and World Bank) • Regional development banks (e.g., ADB, IADB, AfDB) • Private foundations
Infrastructure	• Local tax revenues • Regional and national governmental budgets • International development banks
Management	• Existing departmental budgets • Commercial advertising • Private sector sponsorship • Congestion charging, roadway tolls, and parking fees • Commercial property development

can be absorbed within existing staffing budgets. In some cases, though, the nature of the project and/or the desire to incorporate outside experiences implies the procurement of consulting professionals. However, in comparison to roadway projects for cars, the planning and engineering requirements of a car-free project are not extravagant. Thus, existing budgets provided by general tax revenues may be sufficient.

Additionally, regional and national governmental entities may be able to financially contribute to the project, particularly if the project represents a national best practice that will act to influence other cities. For the same reason, international donor agencies may also contribute to the planning of the project, especially if the project holds replication potential. Bi-lateral agencies, such as the Swedish International Development Agency (Sida) and the US Agency for International Development (USAID), may contribute funding to the development stage of the project. Other agencies, such as the German Technical Agency (GTZ), may be able to contribute technical assistance through the provision of international experts.

Another international funding source, the Global Environment Facility (GEF), has been created to help catalyse projects that result in reductions of greenhouse gas emissions. Car-free projects would thus likely qualify. In fact, GEF projects in cities such as Santiago, Lima, Mexico City, and Manila have project components that include the promotion of non-motorised transport. The size of a GEF grant depends on the type of application and the nature of the project. GEF funding mechanisms include:

1. Small Grants Programme
   (funds of less than US$50,000)
2. Small and Medium Sized Enterprise Programme
3. Project Preparation and Development Facility (PDF)
   - PDF Block A
     (up to US$25,000 for project preparation)
   - PDF Block B
     (up to US$350,000 for project preparation)
   - PDF Block C
     (up to US$1 million for project preparation)
4. Medium-Sized Projects
   (up to US$1 million for project)
5. Full-Sized Projects
   (large grants of sometimes over US$10 million).

3.5.4 Infrastructure

To the extent infrastructure upgrades are required within the project, financing for car-free infrastructure can follow the same list of options as other types of transport infrastructure (albeit with a significantly lower overall cost). Local and national financing sources for infrastructure are a logical first line of consideration. However, international sources, such as regional development banks and the World Bank, are also possibilities.

3.5.5 Management

Finally, the management and maintenance of a car-free project perhaps involves the greatest diversity in terms of potential funding sources.

Fig. 106 and 107
Advertising revenues help finance the car-free Sunday events in Bogotá and Quito.
Photos by Lloyd Wright

In most cases, existing local and/or national governmental budgets will be sufficient to support the modest costs involved.

However, partnerships with the private sector are also an option. The Sunday car-free event in Bogotá has received approximately half of its on-going support from an insurance company. Since the car-free event promotes health and a reduction in vehicle accidents, the insurance industry often sees such events as a sound business investment. Commercial sponsorship in moderation can be a useful financing source, provided that the commercial message does not begin to visually overwhelm the event. Cities such as Bogotá and Quito have permitted some commercial signboards during the car-free event in order to help defray costs (Figures 106 and 107).

The revenues from charging schemes that are designed to discourage car use may be an appropriate mechanism for financing car-free activities. Demand management tools such as congestion charging, roadway tolls, and parking fees all help instil the right set of incentives to support the viability of car-free development. Tying these revenues directly to the on-going management and maintenance of a car-free project can provide a sustainable revenue stream.

3.6 Implementation issues

"You see things as they are and you ask why. But I dream of things that never were and I ask why not."

—George Bernard Shaw (1856–1950)

Few decisions in the project development process will generate more debate than the choice of project location and the initial project size. An overly-ambitious initial project may result in less than satisfactory results. An unsuccessful first phase may dampen the possibilities for any future attempts. However, an overly-cautious initial phase may produce little in tangible benefits, and thus likewise damage the future prospects of car-free projects.

3.6.1 Project location

The identification of the appropriate community or commercial street for a car-free demonstration involves a range of considerations, including:

- Local support from residents and shop owners
- Ease of implementation from a topological and infrastructure standpoint
- Current travel patterns and traffic levels
- Likely cost of project
- Potential for project replication elsewhere
- Overall likelihood of success.

Communities with low levels of existing car ownership could be a logical target in terms of greater ease of implementation. However, a more prominent display in an area of high vehicle use will be a more powerful demonstration. Further, since vehicle ownership can be related to income, the choice of areas with few cars can raise questions over equity. Such a demonstration may suggest that car-free designs are only for the poor. This message clearly runs counter to the general intent and philosophy of well-designed car-free efforts. To realise the true potential of a car-free event, especially in terms of pollution and congestion reduction, the focus should be on car-dependent areas to the extent possible.

3.6.2 Project size

The area covered by a car-free initiative is closely related to the project's impact and effectiveness. However, size can also be related to the complexity of the project, with wide-area applications requiring greater planning, investment,

Fig. 108
Camden borough (London) holds an annual car-free event spanning just a few blocks. As the sign in the photo suggests, such small-scale events may just be a "diversion" from more serious car-free efforts.
Photo by Lloyd Wright

and management. In general, cities should opt for initial experiments of the greatest size that can be effectively implemented.

Many car-free events held on the International Car-Free Day (22 September) are fairly small endeavours. In many cases, these events only cover a single city block (Figure 108). The limited nature of this approach likely will do little to raise city-wide awareness of car-free options. In fact, only the residents located on the car-free block may be aware of its existence.

Ideally, the Car-Free Day should cover enough distance to at least allow for an interesting bicycle trip. The distance should also be sufficient to encourage at least some mode shifting to occur for local trips (e.g., work, shopping, school). Thus, some strategic analysis connecting residential areas or major public transport stations to shopping streets would be appropriate.

3.6.3 Operating days and hours

The scheduling of car-free options is another major decision in the process that will underpin the success of the area. The longer the car-free period, the more likely the area or event will enter into the mental framework of the citizenry.

In the case of a permanent car-free area, hours for exemptions vary significantly between different projects. The periods may range from a 24-hour ban on all motorised vehicles (with the possible exception of emergency vehicles) to a large window of permitted motorised access. Obviously, to truly instil the car-free concept in an area, something more than a token few hours of closure is required. To firmly instil the car-free idea, vehicle restrictions during both periods of day-time shopping and evening promenades are preferred. If motorised delivery periods are required or are a compromise to nervous businesses, then the deliveries are best scheduled during late evening and/or early morning hours. Resident access is more complicated since in it tends to be a wider range of hours (or even unrestricted hours of access). Even occasional access to vehicles can do much to dampen the atmosphere of a car-free area. A single vehicle can greatly reduce the "care-free" nature of the area since users will suddenly need to become more aware of their movements and safety.

The shop hours on a car-free street will influence usage patterns. If shops close early, then there may be little night-time activity on the street, which can decrease the sense of safety and security in the area. Without the activity generated from cafes and shops, residents and visitors will be less likely to engage in promenading. Curitiba has created its version of the "24-hour Street" in order to stimulate longer hours of street activity (Figure 109). On this street shops with 24-hour operations are encouraged. Thus, a person always knows where one can go for food, reading materials, internet, and other services.

For temporary car-free events, the choice of days and operating hours is determined by a host of considerations, including the intent of the event and many local cultural factors. Dates are sometimes pre-determined if the car-free event revolves around a holiday or sporting event. The decision to host a car-free weekday versus a car-free weekend is closely tied to the objectives and intent of the event. If the objective is to firmly demonstrate the viability of alternatives to motorised commuting, then a weekday is the more logical choice. However, as has been noted, a weekday car-free event requires more preparation and an overall review of the suitability of alternative transport modes.

By contrast, a car-free weekend event is an appropriate choice for cities at the earliest stages of its car-free ambitions. While car-free weekend events tend to be more recreational in nature, these events do represent a lower-risk laboratory for experimentation. In many (but not all) cultures, Sunday tends to be the day of lowest traffic intensity and thus represents perhaps the easiest starting point. Saturdays can sometimes be difficult given market activity. There are certainly non-motorised alternatives to delivering and carrying products to and from markets, but the amount of required preparation and awareness-building can be akin to a weekday event. Holidays and evenings are also possibilities that should be considered. In addition to its weekday event in February and weekly Sunday event, Bogotá also hosts an evening car-free spectacle during the Christmas holiday period. An estimated three million of the city's residents (nearly half the population) take to the streets in this nocturnal version in order to be a part of the festivities (Figure 110).

The operating hours for a weekend event vary greatly by culture. Since weekends tend to be days of recreation and exercise for many, an early start for joggers, cyclists, and families would ideally be accommodated. The duration of the event can depend on local custom regarding promenading and weekend activities. In Latin American cities, such as Bogotá and Quito, the Car-Free Sunday event terminates in early- to mid-afternoon largely because the local custom is to spend the afternoon meal with one's family. The schedule will also be

Fig. 109
Curitiba's "24-hour street" helps to extend social activity on the streets into the evening hours.
Photo by Vera deVera

Fig. 110
The nocturnal car-free event in Bogotá takes place during the holiday season.
Photo by Lloyd Wright

dependent on the availability of support staff. If only a single shift of support staff is available, then perhaps only an eight-hour period is viable. However, the staggering of staff hours is a simple solution to allow a longer car-free event.

3.6.4 Permanent or temporary

It has already been noted that the starting point for many cities may be a temporary car-free event. A Car-Free Sunday event involves fewer design and management complications than a full-fledged permanent conversion. The experience gained from a Sunday event can be invaluable in terms of properly implementing a larger scheme. The choice of a temporary or permanent measure can be compared to changing a city by "evolution" or by "revolution".

The idea behind a Car-Free Sunday may be to slowly build confidence for a more expansive effort. In this sense, the hope is that an evolutionary process will be initiated in which the city will move towards more significant car-free measures in the future. Since citizens are not surrendering their motorised lifestyle on a permanent basis, there will likely be far less opposition.

Copenhagen implemented its permanent pedestrianisation of its centre over the course of several decades. As Jan Gehl notes, this incremental approach reduced the risk of popular rejection (Walsjasper, 2005):

> "One key to the success of Copenhagen's efforts is that they have been implemented gradually over 40 years. Drastic changes all at once provoke overreactions."

If Copenhagen had pedestrianised more streets simultaneously, the reaction from shop-owners and residents could have meant a reversal of the policy. An incremental approach allows citizens to become accustomed to pedestrianisation without major upheavals in lifestyles. The subsequent popularity of the initial experiments in Copenhagen has meant that more dramatic proposals now can be presented without a significant risk of public rejection.

In the case of cities with highly charismatic and ambitious political figures, a more "revolutionary" approach may be possible. Given a leader's limited time in office and the demands of other issues, political leadership and enthusiasm for car-free development can be rather fleeting commodities. Once political momentum and attention is turned to other issues, then the window of opportunity for a car-free project may close. Re-election is never a guarantee, and in some cases, such as Bogotá, re-election is prohibited by law. If a dynamic and progressive mayor arrives in office, the official has perhaps only three to five years available for project delivery. Jaime Lerner of Curitiba, Enrique Peñalosa of Bogotá, and Myung-bak Lee of Seoul delivered transformational change with significant projects within their limited time in office. If any of these leaders had taken a more cautious approach, then these cities and the car-free movement would have missed a rare opportunity.

Of course, change through a revolutionary approach is a higher-risk proposition. Enrique Peñalosa was nearly impeached for enforcing parking restrictions on pedestrian paths. A more cautious political figure would have perhaps chosen a more modest approach. However, for political officials who truly believe in higher-quality public space, today may well be the right time for bold initiatives.

3.6.5 Greenfield site versus existing community

A city or an organisation intent on a car-free initiative may well ponder whether to construct the project within an existing community or whether to construct the project in an undeveloped site (e.g., a greenfield site). The question of greenfield development versus an existing community carries with it many implications for the nature and impact of a car-free project.

A greenfield project may seem more straightforward since one is beginning with essentially a blank page. If existing street designs and local preferences are tailored around the car, then any conversion will likely involve compromises. Exceptions regarding vehicle use will invariably be sought. The existing land uses (commercial, residential, education, etc.) may not be ideal in terms of complete car-free access. By contrast, a greenfield site can be designed around ideal car-free conditions at the outset, utilising a car-free reference design in its purest form.

However, for the very same reasons, a greenfield project may have limitations with regard to wider replication. Entire populations are not likely to be moved to greenfield sites any time soon. The reality of our urban world today means that existing communities will somehow need to be adapted towards more sustainable forms. Greenfield experiments may not lend too many insights into how this conversion process will take place.

Greenfield projects also frequently seem to lack the intangibilities that bring life to a city's streets. New town development in Japan has produced some very high-quality examples from a design standpoint. Projects in Oyumino (Chiba City) and Tama New Town present intriguing glimpses of at least a partially car-free lifestyle. However, such locations sometimes seem to be almost artificial re-creations of an actual community. Without a historical reference, the sense of place is often missing. Certainly such developments may well develop such intangibles and achieve a lively street scene, but the creation of real community can be a generational process.

Greenfield sites may also involve environmental compromises that undermine the gains otherwise achieved through car-free development. A greenfield site may imply the destruction of natural habitats and existing green space. The disruption of such natural areas can be quite counter to the environmental objectives of the car-free area. Further, since greenfield sites are almost by definition located outside of the metropolitan centre, the development can actually encourage more car travel rather than less. Accessing work, school, or entertainment in the city centre will likely involve long-distance travel. While this travel may be achievable by public transport, it can also mean an inevitable increase in motorisation. Residents may be able to live a car-free lifestyle within the confines of their community, but most major destinations may reside farther a field. Creating an entirely self-contained economy within a new greenfield project is possible but not always immediately realisable.

A greenfield housing project called Mata de Sesimbra has been given development rights within an existing national park in Portugal, in an area south of Lisbon. This project, though, is helping to rehabilitate land that was previously mined. Revenues from housing sales will be dedicated to park rehabilitation and establishing a local economy based on eco-tourism. In addition to impressive green housing characteristics such as energy efficiency, the design calls for most internal trips to be conducted by non-motorised means (Figure 111). However, even if just a small percentage of the planned 30,000 residents commute into Lisbon by motorised vehicle, then many of the environmental benefits of the project will be compromised. This is a sensitive issue that developers must weigh against the other benefits of such a project.

Fig. 111
An image of the planned greenfield project in Mata de Sesimbra.
Image courtesy of BioRegional and WWF

An alternative to greenfield development is the use of "brownfield" land. Brownfield sites are created from the reclamation of former industrial properties in or near the urban core of a metropolitan area. Brownfield development represents the opportunity for a dual environmental gain. An industrial site and its inherent residues are cleaned while simultaneously producing an example of sustainable living. Obviously, a successful brownfield initiative is dependent on the ability to rehabilitate the property to levels for safe human habitation. This type of development is also dependent on the availability of such properties. While brownfield sites are fairly common in Eastern European cities (Hook and Garb, 2002), the availability of such rehabilitation opportunities may be limited elsewhere.

Fig. 112
If the only alternative for transit on the car-free day looks like this micro-bus in Santo Domingo (Dominican Republic), then the public's overall impression of the car-free day will likely not be positive.
Photo by Lloyd Wright

In reality, projects involving greenfield sites and existing communities are both likely to be needed to make a car-free future possible. Greenfield projects permit the full implementation of new designs and concepts. Projects within existing communities provide insights into how car-free development can be retrofitted into our current cities. Alone, neither greenfield sites nor existing communities may produce the full range of lessons required to prove the potential of car-free development. Until car-free projects encompass a wider variety of income groups, urban forms, cultures, and lifestyles, the sector could remain an isolated niche. Experiments in a wide-range of scenarios can help legitimise car-free development as a mainstream option.

3.6.6 Provision of alternatives

The provision of effective alternatives, such as additional public transport services, can help avoid political backlashes from angry motorists. The principal idea of a car-free event is to encourage residents to try sustainable options such as public transport and non-motorised modes. If the quality of these alternatives are lacking in terms of comfort and delivery, then the event will only harden future resistance to change. Positive car-free events typically not only address the provision of alternative modes but also succeed in creating a carnival atmosphere that leaves residents with a feeling that something quite special has occurred. The ensuing goodwill can easily counter the perceived political risks, but clearly careful planning and execution can be the principal determinant in achieving success.

Fig. 113
Police presence in the historical centre of Quito helps ensure a safe and secure car-free event.
Photo by Lloyd Wright

Thus, a city must first take stock of the alternatives available during the proposed car-free period. This process also requires some knowledge of existing travel patterns and the number of persons travelling in a given corridor. Some of the relevant questions to be answered include:

- How many persons currently using private motorised vehicles will need to identify alternatives for the car-free event?
- What is the capacity of existing alternatives (such as public transport) to absorb this number of persons?
- Is the quality of the various alternatives sufficient to provide a positive demonstration?

If the alternatives to the car imply a crowded and unpleasant bus ride, then the car-free event may actually do more harm than good (Figure 112). The car-free event may be the one day when a person uses an alternative to the car. If the quality of this experience is poor, then the experiment may well serve only to reconfirm previous negative inclinations to public transport and non-motorised transport.

Further, since many motorists may not know public transport schedules, bicycle routes, or even how to use such options, information outreach and support will be fundamental to the viability of alternatives. Ideally, outreach staff would be available to provide personal mobility profiles for interested persons. Based on where persons live and work, the outreach staff can make suggestions on transit and non-motorised routes. The staff could be made available through strategically located information kiosks prior to the event and/or through a

Fig. 114 and 115
A Guangzhou pedestrian crossing with and without street lighting.
Photos by Michael King

toll-free telephone number. A less cost intensive information resource could be a web site providing much of the same information. However, given the sometimes low internet connectivity of developing cities, kiosks and other direct outreach techniques may be more effective.

3.6.7 Safety and security

Safety and security issues often override other mode decision factors, especially when determining the suitability of walking trips for children and other susceptible groups. Safety for pedestrians is most frequently related to the separation and protection from motorised vehicles. On the whole, a car-free area is safer and more secure than a typical car-dependent area. Without the size and velocity of motorised vehicles dominating the streets, the risk of injury and death from accidents has been nearly eliminated.

Security is related to design features that avoid the creation of indefensible spaces in which poor sight lines mean that pedestrians can be susceptible to attack or robbery. Such security risks are particularly a concern at night, and especially if street lighting is poor.

The evidence to date suggests that security also tends to improve in the wake of car-free measures. On 24 April 1993 London's financial district was rocked by a terrorist bombing that destroyed the NatWest Tower and damaged the surrounding area. In response, the City of London limited vehicle access, creating its famous "ring of steel" to protect the area. The car restrictions in combination with security cameras produced a nearly 50 percent reduction in overall crime (City of London Police, 1996). It appeared that without a motorised vehicle, many crimes were far less viable. Bogotá likewise experienced dramatic reductions in crime levels following the various sustainable transport initiatives undertaken in the late 1990s (Wright and Montezuma, 2004).

Despite these benefits, car-free developers must still pay attention to safety and security issues. If a car-free area attracts a mix of both pedestrians and cyclists, there still exists the potential for accidents given the relative speed differences of the two modes. Thus, mitigation measures, such as informational campaigns and even physical segregation, are issues to consider.

There are also security issues relatively unique to car-free areas. While overall crime is generally reduced, opportunities for some crimes, such as pick-pocketing, may increase. Further, the users of a car-free area have a different set of

Fig. 116
The state of a car-free street in the historical centre of Caracas.
Photo by Lloyd Wright

Fig. 117 and 118
Clean-up takes place both during and after the Midosuji car-free event in Osaka, although it would be preferable to use non-motorised means entirely for such tasks.
Photos courtesy of Osaka City Municipal Government

expectations than users of car-dependent areas. The prevalence of children and families in car-free areas means that a higher degree of security is demanded. Thus, special techniques such as community policing may be appropriate. The physical presence of police officers in a car-free area sends an important message to prospective users (Figure 113). The personal nature of a car-free area actually provides an opportunity for police and other public officials to gain a more direct and positive relationship with the citizenry.

Street lighting that caters directly for pedestrians, rather than indirect lighting intended primarily for motorists, is also basic to both safety and security (Figures 114 and 115). Appropriate lighting levels will determine whether an area is usable during evening hours. Likewise, measures such as security cameras and emergency call boxes contribute to a more secure environment. Perhaps the best defence against crime and insecurity, though, is what Jane Jacobs had called the "eyes on the street" (Jacobs, 1961, p. 41). A quality car-free environment will encourage a sufficient number of persons on the street to make an area to a large extent self-policing. The creation of a community spirit encourages shop-owners and residents to develop a subtle social contract in which all look after one another.

3.6.8 Maintenance

The maintenance and upkeep of a car-free area is closely related to its continued popularity and usage by the public. Car-based infrastructure does not suffer from this relationship. Regardless of the aesthetic appearance of a road way, motorists will generally continue to utilise the infrastructure as a means of travel. By contrast, parents may not permit their children to play in an unsightly area, even if it is traffic free. Playgrounds located either under or beside busy highways often are devoid of users. The noise and fumes from traffic make parents think twice about permitting their children access to such areas. Likewise, shoppers may elect to stroll through a different retail mall if a city centre becomes undesirable (Figure 116). Benches and other infrastructure will not be used if not kept clean.

A Car-Free Day will likely require a cleaning team to move through the area either during or shortly after the event. If the residual effect of a car-free event is rubbish, broken street fixtures, and/or graffiti, then support for continuation will falter. Local businesses will see the event as more of a detriment than benefit.

Fortunately, maintenance of pedestrian areas and car-free events is not a difficult or costly endeavour. Existing municipal cleaning and maintenance staff will frequently be sufficient to handle the care of a pedestrian street. However, car-free events that draw large crowds may require the employment of a special cleaning team. Figures 117 and 118 show the post-event cleaning activity for Osaka's annual street festival on its Midosuji corridor.

4. Design

A good city is like a good party, people don't want to leave early.

—Jan Gehl (Walljasper, 2005)

Fig. 119
A street's design elements can help create a highly dynamic street culture.
Photo by Lloyd Wright

There is more to walking than just walking. A car-free development creates a social environment that can stimulate a whole new relationship between a citizenry and the street. The "sociability" of the street becomes as important, or even more important, than any singular purpose on just transport.

While walking appears to be a relatively low-technology option, the appropriate supporting infrastructure can actually require a good deal of technical sophistication. Ensuring a safe, effective, useful, and enjoyable pedestrian experience involves a significant planning and design effort. The texture of the walking surface, dimensions of walking area, surface colours, climate control measures, street legibility, cleanliness, lighting, landscaping, routing design, ramps and crossings, amenity infrastructure, and other design factors all require a rigorous understanding of customer needs, local conditions, and the available options.

The right combination of design and policy can create a car-free environment that allows a wholly functioning modern city. Issues such as the delivery of goods and access for public services should be addressed early in the design process. Otherwise, the economic and functional viability of an area can become compromised. Subtle design features can determine whether an area creates an effective environment in terms of both its sociability and its functionality. In turn, these features underpin the ultimate economic viability of the area.

4.1 Social streets

"Walking is not just transportation. One of the key factors in understanding the complexity of areas for walking is that there is much more to walking than walking. Pedestrians change from walking to standing or sitting without notice and they have no parking problems when stopping, staying or sitting down for awhile. It is all the things you tend to do, but did not plan to do, while you walk, that makes walking such a pleasure…"

—Jan Gemzoe, 2001, p. 20

A successful car-free area rarely happens by chance. Hass-Klau *et al.,* (1999, p. 129) notes that increasing pedestrian mode share and street social life involves a range of factors:

> "…it is a difficult and complex job to create social life successfully in town centres when it is not already there. Any artificial design formula is prone to failure if the urban space and the culture of the town itself is not understood. Many towns bring in design consultants to change the town centres according to the latest street furniture fashions. This could be the first step to an artificial centre. It is not enough to pedestrianise a few streets, even most of the town centre streets. The design of pedestrianisation is also not decisive, although it will aesthetically improve the town centre. What seems to be important is the right kind of mixture of traffic restraint, cultural and commercial aspects."

Quality infrastructure, an effective promotional programme, and appropriate supporting policies all provide a basis for greater pedestrian activity. Copenhagen's experience shows that if one builds it, the public will come. Prior to the opening of the city's first pedestrian street in 1962, Copenhagen had very little pedestrian street life. As the network of pedestrianised areas developed over the past 40 years, the number of people engaged in social activities in the city centre increased 3.5 times. With each expansion of the pedestrian-only streets, even higher numbers of residents have joined in outdoor social activities. "Every time Copenhagen has added another 14 m^2 for pedestrian use, a new person has come along and settled in to enjoy the city" (Gemzoe, 2001, p. 24). Copenhagen also provides a dramatic example of how a "pedestrian culture" can be learned. The city now has a new culture of evening promenading that did not exist prior to the pedestrianisation.

Fig. 120
In a car-free area, the street is not just a piece of urban infrastructure. It is a place for conversation, relaxation, thinking, playing, physical exercise, entertainment, and romance; in other words, a place for life.
Photo by Lloyd Wright

A major difference between pedestrian paths (e.g., sidewalks) and car-free areas is that while the former is predominantly concerned with movement (or mobility), the latter stresses even higher levels of social exchange (sociability). Car-free areas are thus not just designed to provide for the maximum movement of pedestrians, but to also help in creating an environment that encourages and enriches personal interactions (Figure 120).

Appleyard's research (1981) in San Francisco was one of the first major studies to capture how the urban transport environment affected social interactions. Appleyard examined social interactions on streets with different traffic levels: light traffic (2,000 vehicles per day) and heavy traffic (16,000 vehicles per day). On the streets with heavy traffic there were approximately three times fewer social interactions between neighbours. The research showed a pronounced severance effect in which neighbours on opposite sides of the heavy traffic street particularly had little social contact.

Gehl (1987) noted that there are three types of activities that take place in outdoor public spaces:

1. Necessary activities
2. Optional activities
3. Social activities.

If the quality of the space was poor, then it is likely that only necessary activities will take place, and thus the full potential of an area goes unrealised. Several authors have noted that there are often subtle design differences affecting the sociability of a pedestrian space. Hass-Klau *et al.,* (1999, p. 128) particularly stressed the following qualities as fundamental to a successful social space:

- "To have space for watching, sitting, doing things
- Plenty of chairs, benches and informal possibilities to sit and relax and to watch something (other people, water, even cars) (Figure 121)
- To be able to participate in an activity which is already taking place (sitting, standing around, eating together where other people are already eating)
- Looking at something, for instance shop displays, statues, fountains, markets
- Sunshine and protection from wind".

Crowhust-Lennard and Lennard (1995) also developed a descriptive set of qualities that are indicative of successful social spaces:

- Provide safe and easy access for everybody in the community
- Attract frequent and regular use by the local residents
- Help people feel significant and support their self esteem
- Reinforce the sense of belonging
- Increase awareness and enjoyment of the present moment
- Encourage curiosity and interest in the urban environment
- Frame meaningful and memorable experiences
- Orientate people and facilitate differentiated activities
- Make it possible for a variety of people to feel at home in the space
- Amplify channels for direct interpersonal communication.

Fig. 121
The right design can make for a highly social environment.
Photo by Lloyd Wright

These qualities particularly highlight the importance of how good design can help create a sense of place. However, Hass-Klau *et al.,* (1999, p. 31) also note that "Good design…may under some circumstances not create any social life at all." The community's personal affinity for a place is complex in nature, and may be more influenced by historical, cultural, and local factors than by solely design features. In fact,

Fig. 122
Nice but bland designs may win architectural awards. However, such designs may not stimulate street life.
Photo by Lloyd Wright

Table 18: Infrastructure improvement measures for pedestrian areas

Category	Measure
Art	Sculptures Chalk drawings on pedestrian areas and on street area Banners, streamers, balloons, flags hanging from posts
Aesthetics	Entryway over street introducing the community Water fountains Water channels Tent-like structure over street and pedestrian area Special tiling of pavement area Stepping stones Patterns in pavement Trees, flowers, and other vegetation Community notice board Commemorative plaques, historical markings, monuments
Commerce	Markets for food and goods Outdoor cafes Bike maintenance shop on street
Public services	Public restrooms
Street furniture/ infrastructure	Benches and other permanent seating Loose chairs Bollards, moveable and permanent Bicycle parking facilities Street lighting Street signage

over-design of pedestrian areas can have the opposite effect as originally intended (Figure 122). The prevalence of international chain stores on shopping streets has stifled the local character that often makes a place special to its residents. Whyte (1988) underscores this point with:

> "…too many pedestrian malls and redone streets are over-designed. There is too much unified signage, too many award-winning light standards—too much good taste in general, or the pretension of it, and since many designers have the same good taste, the result is a bland conformity."

Thus, designers must be careful not to turn every new regeneration opportunity into a sort of Disneyland. The bland conformity noted by Whyte can be best avoided by incorporating the local context fully into the design. Every town and every street has its own story to tell and its own unique history. Capturing this local legacy within public space ensures that no two spaces should ever be a copy of another. Of course, it should be also noted that for most cities and towns, the prevailing problem is not the over-design of public space. Rather, for the most part, walking and quality public space are largely forgotten elements from the overall investment and planning priorities of the city.

Fig. 123–126
(Clockwise from upper left) 1. Cobblestones create the right historical setting in Colonia (Uruguay), but can create walking difficulties for many. 2. A wooden deck in Yokohama (Japan) relates the pedestrian way to its origins as a rail line. 3. Patterned tiles in Putrajaya (Malaysia) brings a richness to the walkway. 4. Street tiles can even tell a story, as evidenced by these tiles in Japan.
Photos by Lloyd Wright

4.2 Design features

"Calling out around the world:
Are you ready for the brand new beat?'
This is an invitation across the nation,
a chance for folks to meet,
There'll be laughing,
singing, and music swinging,
Dancing in the streets."

—Martha and the Vandellas, 1962

Table 18 provides a list of example measures that help to improve pedestrian facilities. These features are tools by which planners and architects can add variety and intrigue to the street environment. The choice of features will set the mood of a street and greatly affect how the citizenry makes use of its public space.

4.2.1 Surface materials

The choice of surface materials should reflect the likely use of an area as well as other characteristics including climate, topography, and local preferences. The surface material will also depend on the product availability from the local market. Locally-sourced materials are typically superior in terms of cost and overall environmental sustainability.

The colour of the surface will impact comfort levels for users. Dark surfaces will tend to absorb heat more than lighter surfaces, and thus black or other dark colours may not be appropriate for hot climates. While white and light-coloured surfaces absorb less heat, the light reflected from these colours can create eye strain from glare. Thus, the choice of colours must be well-attuned to the local climate.

The surface texture is of primary importance in terms of making the walkway useful to all residents. A perfectly smooth surface may produce the greatest ease in terms of walking, but such surfaces can be dangerously slippery under rainy conditions. At the other extreme, rough surfaces may produce better traction but can create difficulties for cyclists, the physically disabled, and parents with strollers. Cobblestones are frequently used in historical areas in order to recreate a city's original form, but this choice does involve some tradeoffs with accessibility for some. The ideal surface material combines aesthetic considerations in conjunction with functionality. Additional considerations include the wear and long-term ease of maintenance of the surface. Figures 123 through 126 illustrate a few of the options for surface materials available to designers.

Fig. 127
A planter, as shown here in Caracas (Venezuela), can be both aesthetically pleasing and provide a semi-permanent barrier to vehicle entry.
Photo by Lloyd Wright

Fig. 128
Simple, lightweight barriers help officials efficiently set-up the Ginza car-free weekend in Tokyo.
Photo by Lloyd Wright

Fig. 129
An electronically controlled, card activated bollard provides both flexibility and solid deterrence.

4.2.2 Bollards and barriers

Protecting a car-free area from motorised intrusions is fundamental to the credibility of the project. Even the occasional presence of motorised vehicles represents a safety concern for unsuspecting pedestrians as well as destroys the very ambiance that makes car-free areas special.

In some cultures, no protective barrier is required. Signage may be sufficient to dissuade any vehicles from entering during prohibited periods. However, in other cultures, especially where enforcement is not strong, restrictive infrastructure may be necessary. There are also further complications in locales with high levels of motorcycle usage. The width of a motorcycle makes for easy avoidance of a bollard system. However, devising a strategy against motorcycles can create difficulties for bicycles, which are generally permitted within a car-free area. Thus, in the case of cities with many motorcycles, some enforcement plan will also likely be part of the strategy in addition to any physical restraints.

The type of barrier device will vary depending on the nature of the car-free area. Obviously, temporary car-free events will require moveable barriers while a permanent area permits a more substantive barrier. Aesthetics should also be a consideration, particularly since these devices may be one's first impression at the entrance to the car-free area. In some cases vegetation can make for a pleasant introduction to the area (Figure 127). A tree, plant, or flower arrangement within a planter often falls into the category of a semi-permanent barrier, one which can be moved but only with some difficulty.

Temporary car-free events frequently make use of readily moveable devices that are both lightweight and low-cost (Figure 128). These easily transferable barriers permit municipal staff and police to set-up the car-free event in a rapid and efficient manner. These barriers also allow fairly rapid removal in cases of needed access by emergency vehicles. Such barriers, though, may not be appropriate in circumstances where motorists are likely to simply move the devices on their own.

An electronic bollard system provides the flexibility of moveable systems but with the security

Fig. 130
The right combination of seating, vegetation, and lively atmosphere are ingredients for a successful public place, as shown here in Stockholm (Sweden).
Photo by Lloyd Wright

Fig. 131
A bench is not simply a bench in Osaka (Japan); it is also a work of art.
Photo by Lloyd Wright

Fig. 132 and 133
Informal seating can be as important as formal seating.
Photos by Lloyd Wright

of a permanent barrier (Figure 129). These bollards can be either card activated or remotely controlled. Access cards can be distributed to shop owners, delivery companies, emergency vehicles, bicycle taxis, and any others who may have permission to access the area with a vehicle. These systems are relatively commonly used in Western Europe. However, whether these systems are cost competitive for developing-nation cities depends much on local circumstances and product availability.

4.2.3 Seating

Allowing seating along pedestrian streets sends a strong message about a street's sociability. Benches and chairs tell residents that a street is intended for more than just individual mobility. The location of seating is a significant determinant in its usefulness. Locating seating or other urban furniture along a busy roadway is unlikely to attract users. On the other hand, placing seating in places to maximise social interactions and 'people watching' will tend to become self-reinforcing. A popular area will likely be a magnet for even more people. A bench's proximity to water or vegetation often provides the right environment to attract usage (Figure 130).

The design of the seating will also be a major determinant in usability. Is the seating attractive and comfortable? Does the seating allow persons with disabilities easy access? Is the size right to accommodate both individuals and groups? Thus, colour, shape, and size can all affect seating usage patterns (Figure 131).

Informal seating can sometimes be as important to designers and planners as formal seating. Persons may take to sitting on the pavement or a bollard or a curb (Figures 132 and 133). Such instances may speak to the need for additional seating in an area. However, such examples may merely indicate that an area has psychologically

Fig. 134 and 135
Low-cost covered walkways in Panama City (left photo) and Bangkok (right photo) provide vital protection from the elements and add aesthetic value.
Photos by Lloyd Wright

been adapted as a living room by its residents. In this sense, informal seating can be a highly positive development in an area. The existence of informal seating, though, does speak to the need of keeping all surfaces of public space as clean as possible.

Loose chairs have the advantage of allowing citizens to control their own environment. It is said that viewing the location of chairs following a social gathering provides insights into the type of interaction that took place. Loose chairs allow a person or group of persons to determine many of the parameters of their own personal space.

Fig. 136
This veranda in Takayama (Japan) provides pedestrians with the option of either a covered or non-covered walkway.
Photo by Lloyd Wright

Fig. 137
This fully covered walkway in Berlin (Germany) provides full-time protection but at the same time still retains an openness to the outdoors.
Photo by Lloyd Wright

However, the functionality of loose chairs in any particular environment depends on local culture and local conditions. In some instances, theft represents a potentially insurmountable obstacle. Working in tandem with local shop and cafe owners may be one potential solution to help police the longevity of the street furniture.

4.2.4 Covered walkways

The climatic conditions in many developing nations are typically not hospitable to pedestrians. The hot and humid nature of many cities in the south means that low-cost climate protection measures, such as covered walkways, can improve conditions appreciably. The right surface coating and the colour of the surface material can also contribute to a degree of temperature mitigation. Unfortunately, investments in such low-cost measures are frequently not considered.

Covering walkways can substantially reduce the temperature experienced by the pedestrian. Planting shade trees along a walkway is a common approach that can provide economical protection from the sun. Vine-type plants within a lattice structure can be even more effective in terms of total coverage since such plants can be tightly layered (Figures 134 and 135). Both trees and lattice structures also provide some protection from rain as well. The type of tree or plant utilised is a major decision that will affect the quality of the protective covering, overall maintenance costs, and long-term durability. Vegetation that is indigenous to the local area is typically preferred since it will better match local climatic conditions. In some cases, non-indigenous vegetation, such as eucalyptus trees, may require large amounts of water and thus harm competing plants as well as strain local water supplies. Non-indigenous species can also affect indigenous flora and fauna through the introduction of predator interactions. Indigenous plants and wildlife may have little defence against newly introduced species.

The characteristics of a trees root structure is also a major consideration. If the root structure runs horizontally along the street surface, then the surface material may eventually buckle from the pressure of the roots. Thus, in urban areas, tree and plant species with root structures that grow vertically may be more practical.

Fig. 138, 139, and 140
The form of a street light is only limited by the designer's creativity. The examples show here are from Colonia (Uruguay), Takayama (Japan), and Nagoya (Japan).
Photos by Lloyd Wright

Besides natural covers, walkways with built structures can also be an option to consider in some cases. Verandas have been utilised in many cities as a mechanism to provide protective cover from the elements (Figure 136). In many instances, verandas are integrated into historical street designs. More recently, some cities have taken to using modern materials in order to cover pedestrian areas, especially on shopping streets. Translucent materials can be effective in mitigating rain and heat while simultaneously permitting natural light into an area (Figure 137). The height of any street covering is important in terms of retaining an airy feel to the area. Low ceilings will tend to create a claustrophobic feel to the street as well as limit good air flow.

Outdoor cafes typically require some form of coverage for customers in order to realistically operate across a sufficient number of hours, especially in areas with strong sun or seasonal rains. However, cafes are effectively served by table umbrellas, which help retain a strong connection between the table and the environment. The provision of blankets to customers helps cafes in Nordic countries to extend operating times into non-summer months and evenings. Gas heating can also be an option, but of course, the amount of energy consumed greatly undermines the environmental sustainability of the site.

While covering or partially covering walkways can be an effective measure in many areas with extreme climates, there are also arguments to be made for keeping walkways as natural as possible. Separating pedestrians from the urban environment can tend to make a public space seem more artificial. The presence of sun, sky, natural air, and vegetation is one difference between urban space and a shopping mall, and thus the objective should be to keep the car-free area as natural as possible. At the same time, it is recognised that to compete with enclosed commercial centres, urban areas with extreme climatic conditions may find it necessary to consider mitigating design options.

4.2.5 Street lighting

Street lighting is frequently associated with issues of safety and security. Women and other vulnerable users of public space may stay away from an area at night if security is a major concern. Lighting is one mechanism to reduce such risks. For this reason, the luminosity and the coverage of the lighted area are important design factors.

Street lights also have an important aesthetic function. The support structures for lights can have significant visual impacts on the street environment. If the street light structures overwhelm its environment, then the structures can reduce the functionality of the street. For this reason, some cities choose street lighting designs that are fairly subtle in nature. However, cities sometimes choose lighting designs that reflect a particular street style such as historical, modern, contemporary, or humorous (Figures 138, 139, and 140).

Fig. 141
A map and information post helps orientate visitors as well as boosts the marketing image of the event.
Photo courtesy of the Mayor's Office of Paris

Like all forms of street furniture, the design of the lighting system should include a consideration of future maintenance and longevity.

4.2.6 Street legibility

A street's visual appearance says much about its usability. If a street appears cluttered and unclear, then the street's desirability as a destination is reduced. Street legibility refers to the clarity of the street environment in terms of colours, placement of street furniture, and use of signage.

In many parts of the developing world, uncontrolled commercial advertisements overwhelm the street environment. Large and obtrusive signage tends to detract from the street's natural ambiance and make users feel unwelcome. Thus, some standards on signage can help avoid a visual cluttering of public space.

Street signage offering information about distances and points of interest are as important to pedestrians as they are to motorists. Maps and information can be particularly useful for temporary events since residents will only have a brief period to become accustomed to the car-free area. The Paris Plage event thus utilises signage to direct visitors about the area as well as to inform persons of upcoming activities, such as concerts and films (Figure 141).

Unfortunately, signage for the pedestrian is often poorly displayed or lacking altogether (Figure 142). Signage that indicates the existence of a car-free area or of a child play street may help raise awareness of these areas (Figure 143), and in areas permitting some car use, such signage can be an important warning to motorists. Poorly maintained pedestrian signage sends a message telling residents that the pedestrian is unimportant. Signage appropriate at the motorist level may be irrelevant at the pedestrian level. For example, motorists tend to think in terms of kilometres (or miles) while a pedestrian is more attuned to distances in metres (or feet). In

Fig. 142
This sign in Caracas reflects poorly upon the car-free area.
Photo by Lloyd Wright

Fig. 143
Signage indicates the car-free nature of Oyumino (Chiba City, Japan).
Photo by Lloyd Wright

Fig. 144
Signage in Kobe (Japan) giving distances at the human scale.
Photo by Lloyd Wright

Fig. 145 and 146
The many faces of public art: Butterflies in Bogotá (left photo) and World Cup cows in Stockholm (right photo).
Photos by Lloyd Wright

comparison to signage for motorists, signage for pedestrians will tend to be more closely spaced since possible changes in direction are more frequent in a pedestrian environment (Figure 144).

While some car-free signage may be relevant in terms of providing key information, there are those who argue that less signage is actually better. In many instances, signage may be unnecessary since the message may be readily obvious. Like obtrusive commercial signage, official signage can also detract from the clarity and beauty of an area. The premise behind "shared space" is that intelligent, simple design may be the best strategy for creating a safe street environment. In many instances, the message of the signage is so readily obvious that there does not seem to be any value added to the sign's message. Extensive sign posting is just another means to reduce a motorist's level of uncertainty and may therefore create a false sense of security.

The task of the planner and designer is to find a balance between providing vital information in a clear and attractive manner without becoming overly obtrusive upon the urban environment.

4.2.7 Public art

Art in its variety of forms can be a source of both inspiration and introspection. Public art is unique in its ability to bring these messages to the broadest possible audience. Instead of being sequestered behind museum walls, public art creates spontaneous interactions between the artist and the public. A person may not set out to engage an art form on the street, but the chance meeting can prove highly beneficial to the health of a city and its citizens.

The selection of the art form and its location are dependent on a range of factors, with local preferences being perhaps the most important. In some instances, the municipality selects an artist and the ultimate product is entirely driven by the artist's creativity. In other instances, a committee of citizens may direct the thematic nature and purpose of the art. An artist is then selected to meet these requirements. Public art can take on a range of conceptual intents including humour, historical representation, abstraction, and contemporary themes (Figures 145 and 146). Art is unlikely to be interpreted the same by any two persons. A successful art piece may conjure highly different emotions from different members of the viewing public.

Art is not only interpreted differently but it can also be used differently by certain persons. For example, public art may double as a play object for children or it may act as a place of rest for others. This expropriation of street furniture

Fig. 147
Children transforming art into a playground (Berlin).
Photo by Lloyd Wright

Fig. 148
The entrance gateway to Yokohama's Chinatown creates an iconic image for the community.
Photo by Lloyd Wright

for unintended purposes can be considered a healthy phenomenon (Figure 147). A place does not actually become a "place" until it is used in a way different from its original purpose (Engwicht, 1999). A successful public space creates opportunities for spontaneous exchange.

4.2.8 Community gateways

A gateway or archway can act to announce a new district in a way that helps to define the community. The placement of a gateway at the entrance can help draw special attention to a car-free area (Figure 148).

The choice of a gateway's style says much about the nature of the particular community. With an array of design options available to the community, gateways essentially represent another form of public art. The selection of a gateway style and artist can follow similar processes for developing public art. Since gateways have community-wide ramifications, a widely inclusive participatory process is appropriate.

4.2.9 Water

The role of water in public space is too often forgotten. In fact, cities today have largely long buried the streams, ponds, and waterways that once defined the local environment. The replacement of water with concrete means that one of a city's most valuable resources is essentially being forfeited.

However, this oversight is being corrected in many cities that are rediscovering their past. Cities such as Berkeley (USA), Bogotá, and Seoul (South Korea) are demolishing the concrete infrastructure that had erased the presence of a historical waterway (Figures 149 and 150). Once upon a time the Cheonggyecheon stream was a defining part of Seoul's environment. This waterway in fact was one of the reasons that Seoul was selected as the capital of the Joseon Dynasty in 1394. Unfortunately, in the face of modernisation, the waterway was covered in 1961 to provide better access for private cars. By 1968 an elevated expressway provided another layer of concrete erasing the memory of the waterway. The Cheonggyecheon project now restores 5.8 kilometres of waterway and historical pedestrian bridges, creates extensive green space, and promotes public art installations.

Fig. 149 and 150
The Cheonggyecheon restoration project in Seoul represents one of the most dramatic urban transformations yet to be undertaken.
Images courtesy of Seoul Metropolitan Government.

Fig. 151
A series of fountains in London makes for a child's paradise.
Photo by Lloyd Wright

In other cities as well, transport infrastructure has too often separated a city from its physical and historical legacy. For much of the twentieth century, waterfronts were unfortunately seen as ideal locations for the construction of expressways. However, there are a few cities where this process is being reversed. In the US, cities such as Portland, San Francisco, and Milwaukee have demolished roadways to reconnect these cities with their waterfront. The ability of a roadway to sever the physical and psychological connection between the residents and their waterfront cannot be underestimated. The difficulty in crossing such a barrier in combination with the resulting noise and contamination means that a city is forfeiting an important economic asset. Water represents a significant economic attraction in terms of tourism and other business opportunities. Based upon a study by the Seoul Development Institute (2003), the Cheonggyecheon restoration project will produce economic benefits of between 8 trillion and 23 trillion won (US$8 billion to US$23 billion) and create 113,000 new jobs.

At the street level, the development of canals, channels, fountains, and basins likewise represents an opportunity to re-instil a city's sense of community. Water can actually serve a wide variety of roles. A body of water can provide a contemplative focal point for residents. The calming sight and sound of water can invoke a sense of serenity. Water can also serve as an art form through its visual presentation. In some instances, water displays are combined with light and music to entertain the passer-by. Water can also represent a source of fun and merriment, especially for children (Figure 151). Like other aspects of street furniture, water helps to create diversity in the urban environment. This diversity helps to represent a pattern break that engages the eye to help stimulate a citizen's attachment to the city.

Water also provides several public services. Besides the provision of drinking water, infrastructure is required to prevent local flooding in times of heavy rain. Many former streams reside as storm drains underneath the vehicle tarmac. Resurrecting the visibility of these streams maintains this drainage function while at the same time providing a valuable public amenity. Cities such as Bogotá and Berkeley (US) have unearthed forgotten streams to re-connect the urban environment with the natural environment.

In the warm climates of developing-nation cities, water may also be utilised to provide relief from extreme temperatures. Cities in Asia are increasingly making use of mist sprayers to refresh citizens making use of public space (Figure 152).

Fig. 152
Mist spraying devices, such as this example in Aichi (Japan), are an economical solution for making public life more comfortable in cities with hot summer temperatures.
Photo by Lloyd Wright

4.3 Integration infrastructure

"Every time I see an adult on a bicycle, I no longer despair for the future of the human race."

—H.G. Wells (1866–1946)

A car-free area does not imply that walking is the only form of permitted mobility. The bicycle is typically envisioned as a primary option within such areas. There also exist "car-free" areas in which public transport is fully permitted. There are even instances where taxi vehicles may be allowed to an extent.

Further, at some point, the car-free world gives way to the car-dependent world, and thus some provisions for interaction between the two areas must be devised. For example, parking facilities for visitors should be strategically located to provide convenience and integration without deterring from the quality of the car-free experience.

4.3.1 Bicycles

Accommodating bicycle usage in the car-free environment should be a top design priority. The bicycle is an ideal non-polluting vehicle to ease travel beyond distances convenient by foot. Cities that excel with car-free areas, such as Amsterdam, Copenhagen, Bogotá, and Curitiba, also have exceptional bicycle networks. The two concepts are mutually reinforcing (Figure 153).

In a recent survey by the BBC, the humble bicycle was voted the most important invention of the past century (BBC, 2005). Recent advances with work bikes (bicycles with trailers) as well as human-electric hybrid vehicles means that such vehicles can begin to be functionally competitive with cars for many applications (Figure 154). Of course, the use of electric assists both increases vehicle costs as well as reduces the overall environmental performance. However, a well-designed car-free environment in conjunction with bicycle use means that residents can access most day-to-day needs quite easily.

Cycle way infrastructure can take a variety of forms depending on local circumstances. The options can include fully segregated cycle ways as well as examples of cycle ways integrated within the roadway or pedestrian path. In developing cities, the proper width of the cycle way should accommodate the myriad of work bikes that are utilised for both informal vending and cargo loads.

However, given the difference in speed between bicycles and pedestrians some caution must be involved in handling the non-motorised mix within denser communities. Just as cars have the ability to overwhelm cyclists from the streets, cyclists can potentially create similar problems for pedestrians.

Thus, in zones with dense pedestrian movement, cyclists may be requested to dismount from their bikes and walk through the area. In other instances, separation of the two modes may be a solution. The colouration of the cycle way surface is one high-profile technique used to differentiate bicycle space. There are also various other mechanisms for physically segregating the lane.

Fig. 153
Bicycle parking in the Dotonburi district of Osaka is well-integrated with the pedestrian zone.
Photo by Lloyd Wright

Fig. 154
A human-electric hybrid vehicle on display in Aichi (Japan).
Photo by Lloyd Wright

Fig. 155 and 156
In Tokyo's Asakusa district (left photo), shared space between cyclists and pedestrians permits flexible access for both modes. In Bogotá (right photo), segregated cycle ways provide rapid mobility for cyclists.
Left photo by Lloyd Wright
Right photo courtesy of Bogotá City Hill

However, the "shared space" concept introduced in section two of this module encourages a peaceful co-existence of the different modes. In such instances, people will tend to simply use common sense to share street space. In most Japanese cities, car-free shopping streets permit a mix of both pedestrians and cyclists (Figure 155). This mix seems to function quite naturally without the need for any restrictive measures on cyclists. However, it is also recognised that within car-free areas, some segregated cycle ways may be appropriate (Figure 156), especially when cyclists are commuting across an area and can benefit from reduced spatial conflicts with pedestrians.

Additionally, bicycles require other types of supporting infrastructure to be fully utilised by the public. Bicycle parking stations within a car-free area is quite important in realising the full usability of the bicycle. Parking facilities at major destinations, such as offices, schools, commercial centres, etc., help to make bicycle usage more convenient. The types of bicycle parking facilities vary considerably, depending on costs, the space available, and the degree of theft risk experienced in an area.

Rent-a-bike facilities can be particularly useful for casual users. Cities in Denmark, France, Germany, The Netherlands, and the US all host different rent-a-bike schemes to encourage non-motorised travel. One of the most well-known examples is the "Free City-Bike" programme of Copenhagen. Uniquely designed bicycles are distributed throughout Copenhagen at special bicycle rental stations. A person only needs to insert a 20 DKr coin (US$3.30) to gain access to a bicycle. Upon returning the bicycle at any station, the coin is fully returned to the user. If the bicycle is parked away from a bicycle station, then anyone can return it and collect the 20 DKr coin. The brightly painted advertisements on the bicycles helps to pay for maintenance (Figure 157). While bicycle theft had plagued many of the initial attempts at city-bike programmes, modern technology in combination with simple design changes has largely eliminated this concern. The Copenhagen bicycles are fitted with a chip to permit GPS-based tracking. Further, the shape and size of the bicycle components are unique to the City-Bike and thus rendering theft of components to be ineffective (Poulsen and Mozer, 2005).

Fig. 157
Copenhagen's "City Bikes" provide free mobility to residents and visitors.
Photo by Lloyd Wright

Fig. 158
Bogotá's Alameda Jimenez integrates a pedestrian zone with an exclusive busway.
Photo by Carlos Pardo

Fig. 159
In its historical centre, Quito utilises barriers to guide pedestrians along the busway.
Photo by Lloyd Wright

The provision of shower and wash-up facilities for cyclists can also be an important infrastructure component, especially for cities with warm climates. Persons arriving at the office by bicycle will likely wish to freshen-up before proceeding to work.

4.3.2 Public transport

Public transport and pedestrian zones are actually two mutually dependent concepts. In order to be financially viable, public transport depends upon a high volume of customers. Pedestrian zones are ideal feeders into the transit system due to the high densities permitted in such areas. Likewise, public transport supports pedestrian zones by allowing access without the need for the private vehicle. Public transport essentially frees up a considerable amount of urban space that would otherwise be required to move an equal number of persons by private vehicle. The consumption of large amounts of urban space for vehicles is precisely the reason most cities are not able to devote more space to car-free usage.

The successful development of bus rapid transit (BRT) systems has brought the power of mass transit to a whole new set of developing cities, including Bogotá, Curitiba, Jakarta, Quito, and São Paulo. BRT is a low-cost mass transit option that emulates the amenity features of rail-based systems but at a fraction of the cost (Wright, 2004). Combining a car-free initiative in conjunction with a BRT project creates a mutually-supporting package that provides a definitive alternative to growing motorisation.

As noted earlier, the "transit mall" is a design that permits public transport access through a designated car-free area (Figure 158). However, surface transit vehicles must take extra precaution in such areas to avoid accidents with pedestrians and cyclists. Since car-free areas allow greater pedestrian freedom of movement, people will tend to be less aware of the occasional transit vehicle. Thus, the speed of surface transit vehicles (bus or rail) must be sufficiently reduced to allow for adequate reaction time.

Grade-separated transit through such areas is an option that avoids these risks. However, the cost of grade-separation (elevated rail or subway systems) is often somewhat prohibitive for developing-nation cities. Another alternative is to close cross-street access for pedestrians. In the historical centre of Quito (Ecuador), barriers prevent pedestrians from entering into some areas of the BRT system (Figure 159). In this case, pedestrians can only cross at designated crossings. However, the restriction on pedestrian movements within a car-free area is a controversial topic. Such restrictions tend to be in conflict with the main premise of such areas, namely the freedom of movement for all.

Whether separation between public transport and the pedestrian area is required most likely depends upon the volume of persons being moved by the transport system. If the public transport vehicles are operating on headways (i.e., frequencies) of just a few minutes, then separation may be the realistic option. On the other hand, if volumes are much lighter than this, then a shared space arrangement, in which transit and pedestrians share the same space, may be appropriate and safe.

Fig. 160
Lipscani Street in the historical core of Bucharest (Romania) is technically a car-free street since it does not allow motorised vehicle movement during the day. However, the median of the "car-free street" is used as an all-day car park.
Photo by Lloyd Wright

Fig. 161
Taxis act as a feeder service to the car-free area in Kuala Lumpur's Chinatown.
Photo courtesy of City Hall Kuala Lumpur

4.3.3 Parking

"Ample cheap and free parking is a significant way in which motorists are subsidized. Real estate values in urban areas are costly, yet motorists are allowed to use up to 100 square feet of public space for the storage of their vehicles. What reserves the side of the street to be used for the sole purpose of parking cars? Could one use the space for storage instead? To put a trampoline, maybe? Could one open up a futon in a parking space and sleep overnight? What privileges car owners to eat up such valuable urban space, when others pay hundreds of dollars for apartments hardly bigger than a parking space?"

—Philip Goff, 1997

Parking is a relevant issue for some car-free shopping streets and car-free housing projects. Shop owners may insist on access options for clientele arriving by private vehicle. In such instances, parking facilities will likely be provided at the outer fringes of the car-free zone. Vehicle owners will then walk to the centre, or they will arrive via public transport from the parking area.

Car-free housing projects that permit car ownership will likely need to develop parking areas just outside the housing development. Likewise, some parking provision is typically made for visitors to the area.

Fig. 162
Bicycle taxis are the ideal feeder service to car-free areas since such vehicles can deliver customers directly to their destination.
Photo (Berlin) by Lloyd Wright

The key to successful parking in both these instances is insuring that the parking facility does not deter from the car-free experience inside the car-free zone (Figure 160). The chosen location should ensure that noise from vehicles, either from operation or through car alarms, does not penetrate the car-free area. Further, the access points for vehicles should be sufficiently clear of any areas frequented by children or other vulnerable persons. People living and/or working in a car-free area may be less attuned to the risks of vehicles. The transition zone from the car-free world to the car-dependent world can thus be a high-risk area requiring special design attention.

4.3.4 Taxis

Taxi vehicles can be an appropriate feeder service into a car-free area. This is especially true for residents approaching from areas without sufficient population density for cost-effective public transport services. Like public transport, taxi services and car-free areas can actually operate to mutual benefit. The taxi services bring customers into the area and thus support the zone's financial viability. The pedestrian zone provides a concentration of customers for taxi operators and thus helps to simultaneously increase revenues and reduce costs (Figure 161). Formal taxi stations at the fringe of car-free areas reduce the need for taxis to needlessly travel the city in search of customers. Instead, a continual flow of customers from a popular car-free area means that taxi operators do not need to consume petrol for this purpose. This scenario is a win for residents, shop-owners, and the taxi operators. Likewise, the community at large also wins from the reduced traffic congestion, noise, and air emissions.

An increasingly popular option to consider is modern bicycle taxis, which can provide a zero-pollution and zero-noise option for accessing a car-free area. Bicycle taxis have enjoyed a renaissance with new applications in cities such as Berlin, Kyoto, Nagoya, New York, Paris, and Tokyo (Figures 162). The added advantage of the bicycle taxi is their compatibility with the car-free concept, and thus allowing access to destinations within the car-fee area.

4.4 Interface with architecture and land-use

"Many people have never experienced a magical place, and they are the poorer for it…Magical places are characterized by human scale, rich detail, beautiful setting, harmonious sounds, and evocative scents. They require an appreciative public to come alive: people involve themselves in the magic, helping to sustain it…We should take up the creation of magic as a shared civic responsibility. To leave a magical place for future generations is admirable. To do so without thought of profit is noble. Few of the places we have built in the 20th century are ever magical, and many are downright repulsive. If we bring this magic back into our lives, we will be happier people. The task lies within our grasp: we need but the will to achieve it."

—Joel Crawford, 2000

4.4.1 Building design and car-free areas

Good design starts with a customer, the person on the street. Everything else, the street, the buildings, and the larger urban form should be moulded to this customer's needs and wants. A building's architecture should be the last component designed after a thorough examination of the street's usage patterns (Soholt, 2004).

Unfortunately, many city centres today are not based on this premise. Instead, a developer will construct an office tower that does not communicate with the street. Sterile, unfriendly walls create a chasm between the building and the street environment. Mirrored windows tell strolling pedestrians that they are not welcome. There is little intrigue or novelty to the streets lining the rows of many modern office blocks.

Many designers and architects are now trying to reverse such practices and create a more friendly and human-oriented interface between building architecture and the street. Buildings that envelope the street to form the shape of living rooms can make citizens feel welcome and comfortable in their surroundings (Figure 163). Small-sized plazas help give the street environment a feeling of intimacy. Ensuring that green space is always just a short distance away ensures a healthy connection between the city and nature. Authors such as Alexander (2002) and Gehl (1987 and 1996) have done much to document design

concepts that begin to restore a focus on human usage of the urban environment.

Building heights also influence the perceived human friendliness of an area. While high-rise development does deliver the type of densities favouring urban dynamism, there are sometimes trade-offs in terms of aesthetics and sociability. Crawford (2000) uses the concept of floor-area ratio (FAR) as a mechanism to compare different configurations. The following equation provides the basis for calculation of an area's FAR:

Floor-area ratio (FAR) = Plot ratio x Number of stories

Plot ratio = Proportion of property taken by building(s)

Table 19 provides a comparison of different FAR values.

Table 19: Comparison of floor-area ratios (FAR)

City or Community type	Floor-area ratio (FAR)
Hong Kong	3.73
Central Venice	2.69
Single-family housing	0.23

Source: Crawford (2000)

Crawford (2000) recommends a FAR of 1.5, which, for example, could be achieved by placing a four-story building on 37.5% of a site's total area. Crawford also notes that promoting buildings with fewer floors can eliminate the need for elevators. The cost and amount of space consumed by an elevator can free up significant resources, especially in the context of the developing-nation city.

While much of this type of discussion is directed towards to car-free development on greenfield sites, architectural design is still relevant for car-free conversions in existing communities. The existing urban form of many developing cities, especially in Africa and Asia, already house medium- or high-density populations within relatively low-rise development. Thus, such communities may be well-positioned for conversion to effective car-free designs.

It should also be noted that it is difficult to make generalisations on the appropriateness of particular design patterns given the diversity

Fig. 163
Enclosed spaces and plazas can create an intimate and intriguing environment.
Photo by Lloyd Wright

of urban forms and architectural styles. Cities such as Buenos Aires and Paris are able to create intriguing street environments with architecture that is moderately high-rise in nature. The dynamism propagated by Manhattan's ultra high-rise configurations is a defining aspect of the city, and certainly something that few would want to change. By contrast, the charm and intimacy created in lower-rise cities such as the historical centres of Latin American cities and many Italian cities likewise holds much promise for those designing a car-free future. In each case, the history and cultural preferences of the particular city are the guiding factors. Design that tries to over-ride local history and local preferences is bound to fail. A car-free project should compliment and build upon local considerations while at the same time seek to create a more sustainable urban form.

4.4.2 Land-use and car-free areas

Land-use refers to the manner in which urban form is shaped through policy actions and consumer preferences. Land-use is often best characterised by what is known as the "3Ds": Density, diversity, and design. If developed through a mutually-supporting package of measures, the 3Ds can be the basis of creating a viable car-free environment.

Fig. 164
This example of mixed-use planning in Brighton (UK) places housing units over ground-floor shops.
Photo by Lloyd Wright

Areas with medium- and high-density populations provide a critical mass of inhabitants to support shops and public services without requiring access by motorised vehicles. In low-density areas, customers must be drawn from a wider area in order for commercial centres to reach financial viability. The car becomes a necessity to cross such distances. Higher-density communities can provide a sufficient customer base within a walking distance. For this reason, a fortuitous circle of relationships exist between urban density, vehicle ownership, energy use, and vehicle emissions. Newman and Kenworthy (1989) were among the first to recognise the relationship between urban density and energy use. Low-density cities demonstrate a significantly higher degree of auto-dependency.

Diversity refers to creating a mix of uses within a local area. By combining residential and commercial uses into a single area, the number of trips and the length of travel are both reduced. People are able to meet most of their daily needs without resorting to motorised means. Further, people are able to link multiple tasks (shopping, school, social visits, etc.) into a single trip rather than travelling separately over long distances for each task (Figure 164). Litman underscores this point with the following recommendation for car-free areas (Litman, 2004):

> "Encourage the development of diverse pedestrian-oriented activities that attract a broad

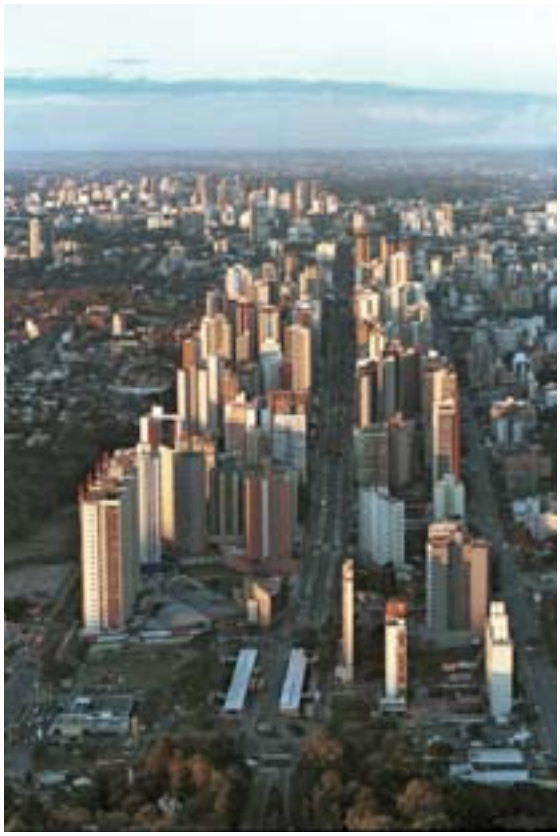


Fig. 165 and 166
Curitiba's land-use success is based on policies such as densification around transit corridors (left photo) and applications like the "Citizenship Street" (right photo).
Left photo courtesy of the Municipality of Curitiba
Right photo by Vera deVera

range of customers and clients, including retail and commercial services, housing and employment. Apartments and offices can often be located over shops."

Transit-oriented development (TOD) is another mechanism used to encourage higher-density, mixed-use areas. TOD projects will create development nodes around public transport stations. The higher-density development at the stations helps to reduce trips while simultaneously providing rapid connectivity to other parts of the city. In many instances, property values around stations and TOD sites tend to be higher, reflecting the greater value people place on quality access.

Curitiba has successfully concentrated housing, offices, and key public services around the city's bus rapid transit system. Through zoning ordnances, the city only permits high-rise development along the public transport corridor (Figure 165). Further, the municipality has created "Citizenship Streets" in which public services such as health care, counselling, employment services, gymnasiums, and libraries are located together along with shopping in order to create a convenient single destination for area residents (Figure 166). The Citizenship Streets are fully pedestrianised and are typically located near one of the city's public transport nodes.

Densification around transit stations provides many benefits to the municipality beyond just the reduction of traffic. Delivering public services to denser developments is far less costly than delivering the same services to sprawl locations. A sampling of cost data from municipalities in the US state of Kentucky showed an order of magnitude difference in service delivery costs. For example, in one dataset, the cost of providing core public services (police, fire, roads, schools, sewer, and solid waste) to a concentrated area was US$88 per residence. By contrast, the delivery of the same services to a sprawl location was US$1,222 (Berger, 2001).

Policies and investments that support higher-density, mixed-use development will help to prepare communities for car-free options. Once a community builds a critical mass of residents and key destinations, dependence on motorised vehicles can largely be curtailed.

4.5 Designing for street conversions

"The future is only limited by our imagination–and that is child's play."

—David Engwicht, 1999

There is a story about two economists that is used as a lesson on the efficiency of the open market:

"Two economists are walking down the street. The first one looks down and exclaims, 'There is a $20 bill on the ground.' The other one turns to him and says, 'That's impossible. If it were there, someone would have picked it up already'."

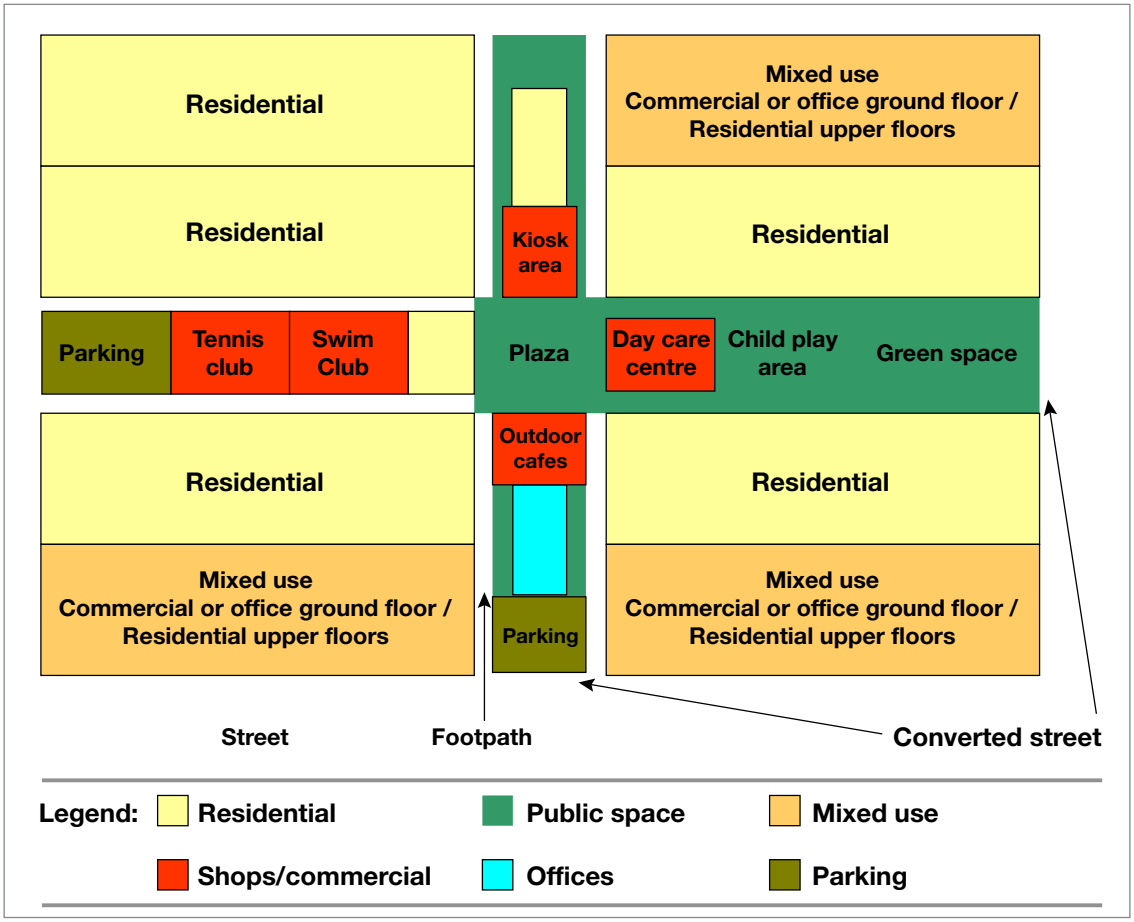
This story implies that the market will react to profitable opportunities as quickly as they arise. If such a golden opportunity really exists, why has someone not already seized upon it? Of course, someone will always have to be the first, but given the number of entrepreneurs in the world, the odds are very low for any one individual (Harvard Business School, 2005).

But what if the ground itself is the $20 bill? What if residents saw their streets for something other than storing and moving vehicles (Figure 167)? The street itself has an inherent value based on local property markets. In the city centre or a desirable residential area, each square metre of space can in fact be quite valuable.

For the most part, the street is assumed to be untouchable real estate that exists outside of common property markets. However, what if a community agrees to close its streets to traffic

Fig. 167
Beautiful architecture… a shame about all the metal boxes stored out front.
Photo by Lloyd Wright

Fig. 168: Sample design for a street conversion



and is granted municipal approval? At this stage, a whole reshaping of the street environment is possible. The street could be become a park, a plaza, a play area, a sports field, a swimming pool, a community centre, plots of urban agriculture, or a combination of all of these. The addition of such amenities would quite likely have a highly positive effect on property values.

Street conversions could be particularly relevant in developed nations where current urban densities are often too low to support economically-viable public transport. Converting street space into a mix of green space, residential space, and small retail shops could conceivably be a solution to the long-term sustainability of lower-density communities. Although some experimentation of this type is beginning to occur in Western Europe, popular support and political will to apply street conversions is still lacking.

In developing cities, the political challenges to gaining resident approval to such a scheme can be less daunting than in wealthier cities. The lower vehicle ownership levels in developing cities allow more flexibility with such approaches. Households without cars may be particularly keen for this type of transformation. However, these cities do face challenges in financing such a conversion. Simply closing a street is not necessarily a costly endeavour, but adding a range of amenity features such as park and play areas can require some capital expenditures. A combination of financial resources from the local government and the residents may be possible, but in some developing cities other resources may be required.

An alternative financing scheme could involve a sort of "grand bargain" with private sector developers. In this scenario, private developers are given property rights to portions of the street in exchange for financing the entire street conversion. Thus, some of the street space would be converted to residential and/or commercial uses while other portions would remain as purely public space. An illustration of this type of street conversion is given in Figure 168.

Fig. 169 and 170
Many developing cities, such as Vientiane (Laos), have limited street infrastructure. A street conversion can be the ideal time to make upgrades.
Photos by Lloyd Wright

This figure illustrates just one possible design scenario; the actual usage pattern would depend on local circumstances and resident preferences. In this example, some parking is included at the fringe of the car-free area in order to cater to visitors and/or car-sharing schemes.

In order to reduce visual obstruction of views from current residences, the new street development would likely have to be ground-level activities. Thus, businesses like day care centres (crèches), small shop kiosks, outdoor cafes, and sports clubs could all be quite appropriate. The addition of some residential densification would also improve the viability of shops in the area as well as entice improved public transport services.

This sort of public-private exchange is not without some sacrifices. Portions of previous street space have become private holdings, although this impact may be somewhat mitigated by making the property a long-term lease rather than a permanent transfer of ownership. Additionally, the amount of space being privatised would be of similar value to the cost of upgrading the remaining public space. Likewise, residents could gain value through a range of simultaneous infrastructure improvements. In many developing-nation cities, communities lack storm drains and properly functioning sewer systems (Figure 169). Providing such infrastructure could be tasked to the private developer. The project could also be an opportunity to put unsightly power and telephone lines underground (Figure 170), or the project could be used to acquire high-speed telecommunications access.

Street conversions represent one of the most exciting new opportunities within the car-free movement. For developing cities, the conversions can be an impetus to speed delivery of badly needed infrastructure. Street conversions may yet prove that there are still some $20 bills on the ground.

4.6 Designing for special needs

"If we can build a successful city for children we will have a successful city for all people."

—Enrique Peñalosa,
former mayor of Bogotá, Colombia

Most cities today are built around the needs of the private vehicle and not people. The size and structure of roadways are designed to meet the requirements of vehicles. Likewise, the parking requirements of vehicles can largely shape the design of both streets and buildings. Accommodating the private vehicle has meant making adjustments in where and how people live.

Alternatively, urban design could be approached from an entirely different perspective. What if streets were designed around people, and specifically around the most vulnerable of users? By approaching streets from the perspective of a child, the form of a city would most likely be pleasant for everyone. Child-led design will also tend to favour car-free environments.

Children are particularly susceptible to the negative impacts of motorisation. The developing bodies of children are sensitive to pollutants. Children living near major roadways are linked to higher levels of leukaemia and other cancers. Curb-side emissions from car tailpipes can be quite concentrated and can particularly affect "walking children and children in strollers who are generally closer to tailpipes" (Gilbert and O'Brien, 2005, p. 14).

The lack of opportunities for walking and outdoor play in car-dominated cities is also an increasing worry for children. Childhood obesity has been linked to lifestyle changes brought on by reduced opportunities to play and by more time spent on sedentary indoor activities. Spontaneous, unstructured play helps strengthen a child's long-term social skills. Permanent car-free areas provide a ready-made environment for such play opportunities on a daily basis. Temporary events, such as Car-Free Sundays, bring value to children as well by providing a forum for physical exercise and community socialisation (Figure 171). Further, such events may provide a rare opportunity for all family members to participate together in a public activity.

The Institute for Sustainable Transport in Canada has developed a set of guidelines for land-use and transport plans that are child friendly. Box 7 summarises some of these recommendations.

In response to concerns over child travel, the concept of "Safe Routes to School" has been created in order to provide safe access for children. Under such schemes, children are relegated to pathways safely cordoned off from contact with vehicles. Alternatively, children are herded into a "Walking School Bus" in which large groups of children are chaperoned by adults on their walk to school. While these efforts are commendable in their intent on reducing accidents, such interventions can send the following sort of message: "Cars have such precedence in our lives that the behaviour of children must be adapted to accommodate vehicles first."

For this reason, the inventor of the "Walking School Bus", David Engwicht, has suggested that a better response may be to adapt the automobile to children rather than the other way around. Instead of "safe routes to school", children really seek something more adventurous and interesting. Engwicht has thus developed a new concept known as "Adventure Trails" in which children are given a wider remit in options for school travel (Engwicht, 2004). The idea of "Adventure Trails" fits well with the notion of car-free areas since children clearly have more freedom within such areas.

Likewise, designing a space with attention to the needs of other vulnerable groups (such as the elderly, the hearing impaired, the sight impaired, and the physically disabled) can ensure an improved space for everyone. Removing unnecessary grade separations and curbs reduces risks for all groups. The provision of ramps is not only beneficial to persons in wheelchairs but likewise helps mothers with strollers and anyone moving goods by carts. A simple raised pavement marker with colouration can mean all the difference to sight impaired persons wishing to access an area (Figure 172).

Box 7: Guidelines for child-friendly land-use and transport planning

- In transport and land-use planning, the needs of children and youth should receive as much priority as the needs of people of other ages and the requirements of business.
- Within each municipality designate a staff member (and perhaps also a council member) as responsible for bringing a children's perspective to transport and land-use planning issues.
- As may be appropriate, establish or adapt one or more forums for children and youth to provide input as to the application of these guidelines.
- Identify where children and youth want to go or need to go and, to the extent possible, provide ways of getting there by foot.
- Explore pedestrian routes used or to be used by children to ensure that they are as usable and safe for them as possible.
- For older children and youth, ensure that destinations which are too far for walking are no more than a bicycle ride away.
- For younger children, ensure that sidewalks are suitable for their tricycles and bicycles.
- At destinations, provide secure, convenient bicycle parking.
- Ensure that every part of a transit system is safe and welcoming to a child, and affordable.
- Avoid transfers by routing vehicles where children want to and need to go; make transfers easy where necessary.
- Keep fares for children low, so as to encourage their use of transit systems, with or without supervision.
- Examine every aspect of the system from the perspective of a parent with a child in a stroller, and make adjustments to meet such a traveller's needs.
- Take all possible steps to reduce amounts of road traffic generally.

Source: Gilbert and O'Brien, 2005

Fig. 171
Quito's Sunday car-free event provides exercise and family interaction for children.
Photo by Carolina Juna

Fig. 172
Raised pavement markers provide invaluable guidance to sight-impaired persons.
Photo by Lloyd Wright

5. Promotion

First they ignore you, then they laugh at you, then they fight you, then you win.

—Mahatma Gandhi (1869–1948)

Car-free projects are not just about the "hardware" of a new street. It is the "software" of communicating the new urban form to residents that will ultimately determine whether a project succeeds. Investing in the communication and promotion of the new area can be as important as any design or physical aspect of the project.

Fig. 173
In Buenos Aires, the street is the perfect place for a tango.
Photo by Lloyd Wright

Cities such as Copenhagen have shown that if a city builds a people-friendly environment, then the residents will indeed take advantage of it. However, cities can do much to further encourage the development of a new street culture. Car-free projects may require several months before becoming fully known amongst the local population. Years may even pass before residents firmly establish new usage patterns. This initiation period is particularly important for cities without an existing street culture.

This section outlines techniques for marketing a car-free area as well as offering specific suggestions on promotional activities.

5.1 Marketing

"You cannot solve a problem with the same mindset that created it."

—Albert Einstein (1879–1955)

The marketing of a car-free project refers to an informational and educational process by which the benefits and use options of an area becomes known to the wider public audience. A successful marketing campaign does not happen by accident. Instead, a concerted marketing strategy is devised to promote the car-free concept across a range of audiences, including those stakeholders who may not be initially supportive of the project. The ultimate object is to gain the overall acceptance for car-free development and to encourage public usage of the areas.

The marketing strategy will be composed of several different elements including the development of:

- An institutional image
- Campaigns tailored to specific audiences
- Specific marketing products (advertisements, models, images, etc.).

The marketing process may start through a segmentation of the targeted audiences. This segmentation process is quite similar to the stakeholder analysis discussed earlier in this document. There will be some information that is appropriate at the broadest level of audiences while in other instances, individual groups, such as motorists and shop owners, should be targeted with highly specific messages.

Fig. 174, 175, and 176
The logos and slogans used in cities such as Quito, Bogotá, and Paris give the car-free events a unique identity.
Photos of Quito and Bogotá by Lloyd Wright
Paris photo courtesy of the Mayor's Office of Paris

Understanding the demographics of the relevant population and existing attitudes towards car-free development is fundamental to developing an effective marketing campaign. Marketing professionals will frequently make use of "focus groups" to better understand the inherent concerns and impressions of the specific audience. Focus groups involve interview sessions with a representative sampling of the targeted audience. During this process, different campaign approaches can be tested upon the participants. Their reactions will help to identify which messages and which promotional tools work best in achieving greater support for car-free objectives.

The development of an institutional image refers to creating the right combination of logos, slogans, and colours to represent the event or project. Developers of car-free events, such as a Car-Free Sunday, will likely utilise an institutional image for promotional reasons. However, projects involving car-free housing and permanent car-free conversions may also benefit from creating a tangible identity.

The words "car-free" may or may not be the right selling point; much depends on the local context and the targeted market. While the words "car-free" are perhaps the most direct and accurate description of such projects, for many these words may represent more of a denial of a resource rather than a particular benefit. Thus, other terms such as "child-friendly" or "clean communities" may be more effective in attracting a favourable response from prospective residents. The International Bicycle Fund (IBF)

Fig. 177
This iconic poster of Copenhagen used the quality of the city's public space as a central theme.
Drawing by Danish artist Viggo Vagnby in 1959

has utilised a good bit of creativity to develop a list of alternative names for such events (IBF, 2005); a few sample names from this list include:

- City Revival Day
- Clean Air Day
- Green Travel Day
- Safe Streets Day
- See Your City Day
- Urban Community Day.

These alternative names all help to conjure up a particular benefit from a car-free event. The right name will reflect the type of theme that residents most highly value.

Likewise, the choice of a logo involves consideration of an image that best inspires interest in resident participation. A well-designed logo should be sufficiently memorable that citizens will readily associate the image to the event. The logo can take upon a range of forms, such as images from: the natural environment, street environment, cartoon figures, abstract figures, and popular culture. Figures 174, 175, and 176 provide examples of logos for existing car-free events.

The logo, event image, and the slogan can also be integrated within the overall marketing strategy for a city. Many cities have successfully created internationally-recognisable marketing images as a means to encourage tourism and investment. The quality of a city's public space is often a major selling point in terms of city marketing (Figures 177).

An array of media outlets is available to project promoters, including: Television, radio, newspapers, flyers, community bulletin boards, and web sites. There are also an array of other distribution means, such as posters, t-shirts, and buttons. In some cases, car-free merchandising can even represent a potentially lucrative revenue source. However, any commercialisation of the concept must be handled carefully. A proliferation of posters, buttons, and other paraphernalia may simply end up as more trash on the street, a state of affairs clearly counter to the environmental objectives of the project.

Each media option involves a different cost and a different impact. Television is perhaps the most significant in terms of reaching large numbers, but the costs can frequently be prohibitive. However, since events such as Car-Free Sundays are typically developed by municipal governments, airtime at a reduced or zero-cost may be possible through public service announcements. Automobile manufacturers are the largest spenders of product advertising in the world. In 2001, five of the top ten advertisers were auto related (Wentz, 2002). Thus, it may be quite appropriate for municipalities to target public service time on television as a modest counter-weight to the advertisement blitz that most consumers are subjected to.

The municipality of Bogotá successfully launched a series of high-profile television advertisements for its cycle ways in the late 1990s. The advertisements were professionally produced and distributed through local television networks. Each advertisement cleverly displayed a small vignette on how the cycle way changed a person's life. In one case a man is seen bicycling to work and in the next scene his doctor is at a loss to explain his surprising improvement in fitness and health. In another ad, a steady stream of bicycles is seen passing by cars caught in a traffic jam. Such clever story

lines can be quite effective in opening citizen awareness to car-free alternatives.

Even if the project successfully gains prime media access through public service announcements, achieving actual behavioural change will likely still necessitate interactions at the personal and community levels. The media can raise awareness, but an additional degree of interaction is typically required to achieve actual change. Door-to-door campaigning and community sessions are time-consuming endeavours, but quite valuable in communicating the benefits of a new urban form.

Children are prominent stakeholders in any car-free project due to their importance as reasons for supporting car-free designs in the first place. Involving schools and children in the promotional efforts can be another outlet in any marketing programme. Winning over young scholars may be one of the best ways to ultimately convince parents of the attributes of car-free events and car-free areas. Thus, working with school districts to adapt some aspects of car-free benefits and car-free design into educational curricula can be quite useful. Further, encouraging student involvement through drawing competitions and other campaigns helps to raise the project's profile and popularity (Figure 178).

Fig. 178
A drawing contest during the 2001 car-free day in Surabaya (Indonesia).
Photo by Reinhard Kolke
(GTZ photo CD on urban transport)

From a marketing standpoint, few relationships are more important than the relationship with the main media outlets. Developing a press kit that targets messages to journalists will greatly determine the extent to which the project is covered by the news media. A succinct press release along with photos and images should be sent to all journalists who cover topics such as environment, health, public space, transport, and local governance. Although the project team should include a communications point person, all project staff should be well-prepared for journalist questions and requests. The development of an FAQ (Frequently Asked Questions) document can help staff deliver factually correct and consistent responses to typical questions.

5.2 Promotional events

"The Matrix is a system, Neo. That system is our enemy. But when you're inside, you look around, what do you see? Business men, teachers, lawyers, carpenters: the very minds of the people we are trying to save. But until we do, these people are still a part of that system… You have to understand, most of these people are not ready to be unplugged. And many of them are so inert, so hopelessly dependent on the system that they will fight to protect it."

—Morpheus in "The Matrix" (1999)

In much of the world today, city streets are not friendly places. Rather, the public realm is a place to be avoided due to fears of safety, health, and security. Children are receding from play in public places and neighbours are increasingly strangers to one another. Against this backdrop, even the best car-free area can not be expected to deliver instant sociability to the street. Thus, promotional events are an important component of the marketing effort, especially during the initial start-up period. Entertainment, cultural shows, and sporting events all offer enticements for people to experience a different side of their city. Table 20 lists some of the promotional options available to cities seeking to enliven their streets.

Table 20: Examples of promotional events

Activity type	Event
Commerce	• Food markets • Goods markets
Leisure activities	• Game boards in pedestrian area • Game tables in pedestrian area • Aerobics classes • Street sports (table tennis, tennis, football, basketball, golf, cricket, etc.) • Street games
Events/ Performance	• Street parties • Concerts • Theatre • Opera • Film screenings • Art exhibits • Showing of films and sporting events on large screens • Street musicians • Street performers • Fashion shows
Informational	• Bicycle maintenance clinics • Bicycle riding lessons and demonstrations • Health and nutrition workshops

5.2.1 Activism

The use of public space is often a highly-charged issue related to public policies, equity, and even human rights. Reclaiming the rights of citizens to choose the form of their public space is an issue directly tied to any eventual adoption of car-free concepts. Thus, it is not surprising that advocacy groups are often at the leading edge of promoting more equitable use of public space. While authorities sometimes view such groups as a subversive threat to public order, in fact most of these groups represent a healthy democratisation of public space decision-making.

Citizens in other cities, including developing cities, may wish to make note of the techniques utilised by these groups. The enthusiasm and creativity shown by activist organisations is the very sort of citizen involvement that can ultimately catalyse real change at the street level.

Critical Mass

On a September day in 1992 in San Francisco, a new movement was born through the actions of a few concerned cyclists. The birth of the "Critical Mass" movement resulted in an unleashing of citizen-based activism that continues to help push forward the car-free agenda. A Critical Mass ride consists of bicyclists riding through a city, often during the busiest times of the daily commute. The ensuing gridlock created is intended as a reminder that cyclists and pedestrians are part of the transportation mix as well and that municipal leaders need to also cater to the needs of these groups. A Critical Mass maxim asserts that "We do not cause traffic, we ARE traffic".

Critical Mass is not actually a formal organisation. Rather it is a permeable meeting point for like-minded citizens. The organisation does not have any formal secretariat or legal registration. This unique informal structuring also prevents officials from directly curtailing its existence and from persecuting any "official" members.

The concept of Critical Mass has spread to cities in virtually all parts of the world with large events having been held in over 300 cities worldwide including London (UK), New York (USA), Paris (France), Johannesburg (South Africa) (Figure 179), Manila (Philippines), Melbourne (Australia), Mexico City (Mexico), and Santiago (Chile) (Critical Mass, 2003).

While such events are predominantly peaceful, in some cases, acts of violence have erupted between cyclists, motorists and police. During the 2004 convention of the Republican Party in New York, the police used the opportunity to clamp down on Critical Mass activities. Widespread arrests of Critical Mass participants have led to legal and human rights challenges over police actions. Initial court cases have upheld the basic rights of Critical Mass participants, but the harsh actions of police in New York and other cities have continued.

Fig. 179
Critical Mass in action on the streets of Johannesburg.
Photo by Lloyd Wright

Reclaim the Streets

The "Reclaim the Streets" movement emanates from a similar philosophical belief as the Critical Mass rides. In the case of Reclaim the Streets, a loose-knit group of activists and citizens descend simultaneously upon a street, converting it into a large street party (Figures 180 and 181). The idea is to raise awareness that the streets are a public asset and not just the private domain of motor vehicles.

The first Reclaim the Streets event took place in London's Camden Town in May 1995. In rather dramatic fashion, two vehicles feigned an accident in the central intersection of Camden. The two motorists subsequently staged a heated argument that culminated in each taking a sledgehammer to the other's vehicle. At this moment, hundreds of participants streamed forward from side-streets and the nearby underground station. The ensuing street party lasted an entire afternoon. Other events have included the dumping of sand on a London motorway which then acted as a pseudo beach and sandbox for family fun and play. Subsequently, Reclaim the Streets events have taken place in other UK cities as well as Berlin (Germany), Brussels (Belgium), Sydney (Australia), and Wellington (New Zealand) (Reclaim the Streets, 2003).

Space Hijackers

More recently, "Space Hijackers" has proven that there is no limit to the creativity that can be applied to the cause of public space. Space Hijackers is a grassroots movement spawned in London in 1999. The group's young roots include art students, architects, and even skateboarders. With this eclectic background, the group's out-of-the-box thinking has produced some extraordinary events that have frequently captured the attention of the news media. The group is perhaps best known for its "Circle Line Parties" in which groups of people

Fig. 180 and 181
Reclaim the Street events have demonstrated that there exists a groundswell of citizens who are ready to take action on public space.
Photos courtesy of Reclaim the Streets (http://www.reclaimthestreets.net)

Fig. 182
The Circle Line parties of Space Hijackers have become renowned as a creative way of making public transport a socialising affair.
Photo courtesy of Space Hijackers

simultaneously converge on London subway cars to hold a party replete with music, beverages, and dancing (Figure 182).

Like Critical Mass and Reclaim the Streets, Space Hijackers is an informal association of like-minded activists rather than a formally registered organisation. Its permeable and non-hierarchical structure gives Space Hijackers the flexibility to grow and adapt to a variety of circumstances and opportunities. Also, as is the case with other such organisations, the lack of a formal structure avoids any unwanted legal attention from the authorities. Members of Space Hijackers are known as "agents" and strive to keep a fairly underground persona in order to retain their edge as an activist organisation.

A few examples of Space Hijacker actions to date include:

- Cricket challenge matches in London's financial district and in front of Parliament
- "Mobile discos" in which organisers bring music to a street or square and encourage people to dance (Figure 183)
- "Raaaa!" event in which people dress up as wild animals and growl at people in sports utility vehicles (SUVs) (Figure 184)
- Using car parking spaces as offices
- Placement of home-made artwork in the restrooms of shops and fast-food outlets.

The Space Hijacker concept is also spreading fast with chapters already operating in New York and Singapore in addition to London. In virtually every case, Space Hijackers have shown exceptional creativity in challenging the conventional thinking with regard to public space. Participation in the events is not limited to simply the core membership of the organisation. Through the power of the internet and word of mouth, hundreds of individuals unrelated to the organisation often participate. The impromptu parties on the London subway system have grown to the point where multiple train sets are being besieged by party-goers. In many cases, the events attract accidental participants who just happen to be in the vicinity of the action. For the cricket matches, Space Hijacker agents entered a pub in London's financial district and issued a challenge to those present to take up a game. Many professionals in suits and ties happily obliged and subsequently played until the late hours of the evening.

Fig. 183 and 184
During "Mobile Disco" events (left photo), Space Hijackers bring music to the street and encourage everyone to join in dancing. SUVs are not the most practical vehicle in a city centre (right photo). Assuming that SUV owners must be looking for a safari, Space Hijackers hold a "Raaaa!" event in London's Chelsea district by dressing up as wild animals and roaring at passing SUVs.
Photos courtesy of Space Hijackers

Through its creative approach, Space Hijackers are re-defining how collective-action organisations operate (Space Hijackers, 2005a):

> "The aim of our organisation is to provide a space where likeminded troublemakers can meet and develop projects together. Rather than the Space Hijackers being a specific group of people, it is hoping to become a space for the production of ideas and events initiated by a range of people. In this way hopefully we can grow and spread whilst still maintaining a fairly permeable and non-hierarchical structure. Hopefully this will enable us to remain big and small at the same time."

Space Hijacker events are effective in creating a sort of urban fraternity of persons who would otherwise only be strangers. Such bottom-up mobilisations can contribute to ultimately achieving the tipping point in which car-free concepts enter the mainstream consciousness. While this elusive goal is still far from being realised, the growth of these activist events is a positive sign.

Flash Mob

In the summer of 2003, a rather unusual public gathering in New York launched a phenomenon that rather quickly was being replicated around the world. A Flash Mob "is when a crowd converges at a specific time and place, usually organised through the internet, to participate in apparent random acts and then dissipate once complete" (Wikipedia, 2005b).

The initial mob actions have tended to be oriented towards a sort of performance art. The first successful Flash Mob took place on 19 June 2003 in Macy's department store (New York). Approximately 150 people were drawn together by emails and word of mouth to gather at precisely 7:27 pm in the rug section of the store. Once there, the crowd gathered around a large Persian rug and began to deliberate on whether to make the purchase. When asked by store personnel of their interest, persons replied that they all lived together in a communal warehouse and that they were in the market for a "Love Rug". In fact, until that moment, virtually none of these participants had ever met. A few minutes later, the crowd dispersed (without the rug). Since this initial event, some of the subsequent Flash Mob activities have included:

- At Times Square in New York, 400 people gather in front of a dinosaur display in a "Toys R Us" store; as a giant mechanical dinosaur roars, the crowd falls to their knees moaning and waving their arms in worship
- In Central Park, a mob gathered to tweet like birds and crow like roosters
- At a sofa store on Tottenham Court Road in London, a Flash Mob gathered by way of mobile text messaging and proceeded to all simultaneously fawn over one particular sofa model
- In Berlin, in front of the US Embassy, people gathered to make a champagne toast to a fictional person called "Natasha"
- In San Francisco (US), hundreds of people gathered on a street to simultaneously spin around like children
- In Birmingham (UK), a flash mob gathered at an Oxfam charity shop where they proceeded to remove articles of clothing and donate them to the shop, while at the same time singing the Red Hot Chili Pepper song "Give it Away"
- In Rome (Italy), hundreds assembled at a bookstore to ask for a non-existent title.

The phenomenon has spread to developing nations as well through events in such cities as Mumbai (India) and São Paulo (Brazil). In Mumbai, police officials have since warned that any such public gathering of five persons or more would require prior official approval.

Opinions are somewhat divided as to whether Flash Mobs contribute to street life and the cause of improved public space. For the most part, flash mob activities have had little to no policy motivation. The events are somewhat more akin to pranks rather than actions anchored in any sort of political consciousness. One of the Space Hijacker spokespersons has commented that (Space Hijackers, 2005a):

> "The Flash Mob phenomenon is rather like Space Hijacking or Critical Mass but with the politics taken out to make it easily consumable and mass appealing. It seems a real waste to gather everyone together just because you can cause a load of trouble or fun, then all disperse."

However, Flash Mobs at a very basic level may help people make social connections, and thus can be seen to play some role in the socialisation

of streets. As a form of entertainment, Flash Mobs may be useful in adding to a society's overall sense of playfulness.

Further, some Flash Mob events do show promise as a possible conduit for a more substantive expression. The mob donations at the Oxfam charity shop in Birmingham is one such example. Additionally, youths in the UK have taken to a new art form known as "Mobile Clubbing". Mobile Clubbing involves a group of individuals arriving simultaneously at a public place such as a train station. Each person carries their own personal music device with a earpiece. As a group these persons then begin to simultaneously dance to the different music playing in their ears. People dance individually or together or even in the form of a conga line (Figure 185 and 186).

The concept was developed by musical artist Ben Cummings and his friend Emma Davis of London. The events provide a healthy outlet for citizens to express themselves in public space.

Equally creative are the various urban "Pillow Fight Clubs" that have emerged since the advent of the Flash Mob concept. The Pillow Fights involve people arriving at a square or street with a pillow hidden amongst their clothes or belongings. At an agreed upon time, the pillows are removed and the participants begin good-natured combat (Figures 187). Like the original Flash Mob, Mobile Clubbing and Pillow Fight Clubs have successfully translated itself to many other cities, especially in North America and Europe.

There is a misplaced impression that these events only attract teenage youths. However, across the spectrum of the various activist organisations and events, the wide range of ages and backgrounds involved is impressive (Figures 188 and 189). Emma Davis notes that (West, 2004):

> "We have had families turning up at events. We have had older people and we have had suits but everyone has fun and there is no trouble."

This diversity of participants may help underpin a sustained existence for organisations such as Reclaim the Streets and Space Hijackers.

The founder of Flash Mobs is a somewhat anonymous figure only known by the name of "Bill". In a news article interview, "Bill" acknowledged that the initial emphasis of Flash Mobs was primarily on mindless fun (Bemis, 2003). However, he also notes that such events have an important social dimension in terms of people undertaking a shared experience. Further, "Bill" has grown to recognise the potential of Flash Mobs to change how public space is perceived (Bemis, 2003):

Fig. 185 and 186
For "Mobile Clubbing", all one needs is a personal music device and an interesting public setting. Mobile clubbers at London's Euston Station (left photo) and at Paddington Station (right photo).
Left photo by Peter Burnett (http://www.image-studio.co.uk)
Right photo by David Hoffman (http://www.hoffmanphotos.com)

Fig. 187
Urban "Pillow Fights" are a good way to bring out the inner child in everyone.
Photo by David Hoffman (http://www.hoffmanphotos.com)

"And the more I did them, the more I realized the mobs actually did have a deeply political value. The nature of public space in America today has changed. It's shopping malls, large chain stores, that kind of thing. The presumption is that you're going to purchase something, but once you try to express yourself in any other way, suddenly you're trespassing. New York City is blessed with a bunch of real public spaces, but at this point, if you're young in America, chances are you have grown up without authentic public space."

Flash Mob's success may also say something about how the internet and telecommunications

Fig. 188 and 189
A mix of backgrounds and ages participate in urban Pillow Fights and Mobile Clubbing.
Left photo by Adam Giles
Right photo by Peter Burnett (http://www.image-studio.co.uk)

Fig. 190
A Critical Mass participant being placed under arrest in New York.
Photo by Dani Simons

technology can be used to the benefit of the car-free movement. Through the power of the internet, Flash Mob's founder notes that the future of these interventions can indeed have a useful political agenda (Bemis, 2003):

> "The way I've come to think of the flash mobs is that it was an experiment in using e-mail to bring strangers together in a collective action directed toward simple politics. In these specific cases, people choosing fun. My hope is that someone will take the premises that made flash mobs so popular, and they will become tools in the tool kits of people who want to do art projects, or want to do political projects."

Leveraging the power of information and communications technologies (ICT) may prove to be pivotal in citizen-led efforts to reclaim public space. While the Flash Mob concept has waned somewhat since its publicised debut in 2003, the concept lives on through related events, such as Mobile Clubbing and Pillow Fight Clubs.

Responses to activist actions

In many cases, local authorities and police agencies have sought to counter the actions of groups such as Critical Mass, Reclaim the Streets, and Space Hijackers through arrests and aggression. For the most part, the activists involved in these activities stress a strictly peaceful approach to their projects.

Nevertheless, the Critical Mass rides have suffered from a surge in violence and aggression between participants, motorists, and local officials. During the 2004 convention of the Republican Party in New York, the police used the opportunity to clamp down on Critical Mass activities. During the convention, the police arrested and seized the bicycles of 264 participants (Colwell, 2005). Subsequently, for the one-year period beginning in August 2004, the police have arrested and seized bicycles of another 518 persons (Figure 190). The legal basis for these arrests is still unclear given that riding a bicycle on New York streets is technically not illegal. However, the police actions are having an impact. The potentially intentional slow handling of these cases has meant that many individuals have lost access to their bicycles for over a year.

The arrests of Critical Mass participants have led to legal and human rights challenges over police actions. An international campaign is underway to convince New York city officials to change their approach to Critical Mass (World Carfree Network, 2005). The campaign is also seeking to have the impounded bicycles released back to their owners. Initial court cases have upheld the basic rights of Critical Mass participants, but the harsh actions of the police have continued.

In the case of Space Hijackers, official responses have varied from amusement and general perplexity to obstruction (Box 8). The variety of responses perhaps stems from each individual police officer making his or her own judgement decision as to how to react. There is clearly a sense of uncertainty from local officials on how best to respond to these creative projects. Space Hijacker representatives see this process as being healthy for both official organisations and the public (Space Hijackers, 2005a):

> "I do find it amusing that the authorities clamp down on a lot of our projects, but it is certainly not unexpected. I think a lot of what we do is pushing the laws of acceptable behaviour until we discover where the line of the law actually lays. Then attempting to push this line back,

Box 8: A dialogue with the London police

The following is an excerpt from the web site of Space Hijackers, relating their experience with the London police during a Mobile Disco event. In this case, Space Hijackers had taken their music box to Old Compton Street, a part of London's Soho district. Being one of the more liberal parts of the city and having a semi-pedestrianised space, Space Hijackers thought their street dancing would find favour there, and they were correct:

"Almost as soon as the sound system was switched on, we had people joining in to dance with us. Shop keepers came out of their shops, girls and boys put down their bags and a street party was started! One girl pulled a football out of her bag and a game of keepie-up was started with shop keepers, dancers, bin men and passers-by all joining in. Everyone was happy, people had stopped in the street to dance or just watch, and for a long time there was no Police presence! Then they came, one car, one van, and about fifteen Policemen and women (over reaction?) came to close down our party" (Space Hijackers, 2005b).

Police official: "You are disrupting the local businesses."

Space Hijacker: "Erm, they are dancing with us."

Police official: "We don't mind, you just have to stay on the pavement."

Space Hijacker: "Okay then."

Police official: "You have to leave."

Space Hijacker: "But we are on the pavement."

Police official: "It doesn't matter. It's not the dancing, it's the football."

Space Hijacker: "She has left."

Police official: "I know but you can't play football here."

Space Hijacker: "We don't have a football."

Police official: "You have to leave anyway."

Space Hijacker: "Why?"

Police official: "Because, footballs are dangerous."

Space Hijacker: "We don't have a football."

Police official: "I realise that, but you have to leave."

And so ended the Mobile Disco (Space Hijackers, 2005b).

> or highlight the overbearing presence of it. In some ways the police and authorities do us a service by representing the government and giving us a body to ridicule and question. I think we hope that eventually a lot of the questions we raise will filter through to mainstream thinking and affect the way that these bodies work."

A question for many public officials is whether activist projects represent an opportunity or some type of threat to public order. The appropriate responses from police and other officials depends on the situation and the local context. The novelty of the approaches and events make it difficult for officials to devise a precise policy. The immediate reaction is often to prohibit or obstruct such unusual behaviour.

Upon reflection, though, many of the same authorities may find that such groups are actually serving a highly useful purpose for the betterment of the city. By challenging ingrained biases into how public space is used, these groups are doing much to open new possibilities for cities. While there are appropriately legal limitations to what groups or individuals may do in public space, by showing some flexibility, public officials may find that these events can have a positive side.

Fig. 191
"Vegetarians make better lovers!" is the message from PETA's street action in Rome. Such eye-catching advocacy can be help make public space more interesting for all.
Photo by Alessandro Bianchi, courtesy of Reuters News Service

Democratising public space

Direct action in public space is not just unique to Critical Mass, Reclaim the Streets, and Space Hijackers. A variety of other organisations with different political objectives have made use of similar techniques. Groups such as Greenpeace and People for the Ethical Treatment of Animals (PETA) have likewise used the public forum to creatively articulate their points of view (Figure 191). Whether one agrees with the objectives of such organisations is perhaps not as important as the principle of a democratised public space.

In Hyde Park (London), Speaker's Corner gives a public forum for anyone to speak on any particular topic. In Johannesburg (South Africa), Graffiti Wall provides a visual forum for anyone wishing to artistically express themselves. Anyone can legally paint their own graffiti on the wall. Graffiti Wall has not only been successful in terms of public expression, but its existence helps to curb unwanted graffiti in other parts of the city.

All of these examples illustrate how creative use of public space can be a quite healthy phenomenon. By bringing political debate directly to the street, these groups are actually helping to alter how the citizenry views public space.

Private sector uses of public space

The inventiveness of Flash Mobs has not been lost amongst the corporate world. Firms are making use of a concept known as "guerrilla marketing" in which actors play out scenes in public space to draw attention to a particular product (Figure 192). A health club in New York sent out models in scant clothing onto the street in order to demonstrate the benefits of exercise. State officials in Minnesota (US) wished to demonstrate the benefits of vacationing in their state; on a Chicago sidewalk, they placed fishing gear and a rowboat while two outdoorsmen pretended to fish.

Fig. 192
Advertisers use a bit of creativity during the Sunday car-free event in Bogotá. Such private use of public space can be a controversial issue.
Photo by Lloyd Wright

Such commercial use of public space is a controversial practice. The expropriation of the public realm for commercial purposes can discourage public use of the areas as well as be visually damaging. In 2001, the company IBM spray painted the words "Peace, Love and Linux" on San Francisco streets. The firm was subsequently levied a fine of US$120,000 for defacing public property. Likewise, Microsoft was fined for blanketing Manhattan with promotional stickers, which could not be easily removed (Crawford, 2004).

Some corporate uses of public space, though, may provide some public benefit in terms of entertainment. The singer Avril Lavigne has utilised Flash Mob techniques in giving unscheduled performances at shopping malls in order to promote her newest releases. In 2004, the music group "U2" gave an unannounced concert beside the Brooklyn Bridge in New York, and in 1987 the group filmed a live video on top of a liquor store in Los Angeles.

Nevertheless, any private expropriation of public space is a controversial matter that cities should scrutinise closely before awarding event approval.

5.2.2 Community-based actions

Communities overwhelmed by traffic, noise, and pollution do not always have the luxury of waiting for an inspired political leader to come along. Quality of life should not be some ephemeral concept set aside for another day. The urgency of local conditions may require citizens to develop their own means for reclaiming their streets.

Street parties, festivals, and parades are all event options for the temporary procurement of public space. These events help to develop a sense of community as well as possibly setting the stage for future more permanent conversions of the street.

Fig. 193
Banners and artwork in Aichi (Japan) are effective measures for psychologically giving preference to pedestrians without technically taking away space from motorised vehicles.
Photo by Lloyd Wright

Fig. 194
Wedding photos in London's Piccadilly Square, sharing a personal moment in a public place can be quite rewarding.
Photo by Lloyd Wright

While citizens may not have the legal authority to directly take away road space from motorised vehicles, there are nevertheless other subtle mechanisms for affecting change. "Psychological reclaiming" is a term given to techniques that help to change the perception of a street's usage (Engwicht, 1999). Psychological measures may include hanging banners and other artwork above a street, placing chairs on pedestrian areas, or writing poetry on pavement stones (Figure 193). Holding personal events, such as birthdays, weddings, and anniversaries, in public space is another form of psychological reclaiming. Sharing a personal event in this manner can be enriching to all (Figure 194). As noted by Engwicht (1999):

> "Psychological reclaiming reinstates the lost social, cultural, and economic functions of the street. This can be done without taking one square inch of roadway away from cars. Physical reclaiming takes back some of the physical roadspace and converts this to exchange space" (Engwicht, 1999, p. 87).

In some neighbourhoods, residents have taken to placing tables and chairs alongside roads to help re-establish the balance between humans and vehicles (Figure 195). In other instances, groups have set up temporary "offices" in city centre parking spaces. By paying the parking meter and occupying the space, these groups are making a statement about how current policies often give preferential treatment to cars over people (Figures 196 and 197).

The idea behind these measures is to psychologically establish the presence of people in the local environment. In the case of car-lite areas, these simple measures of psychological reclaiming can lead to lower vehicle speeds and greater driver

Fig. 195
Placing chairs and tables on or near streets is another effective psychological measure to regain public space.
Photo courtesy of Five Roads Forum (Broughton Road, West Ealing, London)

Fig. 196 and 197
Space Hijackers turn a parking space in the financial district of London into a makeshift office. A simple mechanism to raise awareness of how we use and perceive public space.
Photos courtesy of Space Hijackers

care in interacting with pedestrians. Engwicht encourages children to happily wave at passing motorists in order to "tame" speeding behaviour (Engwicht, 2005). Through such actions, motorists become engaged and intrigued with the neighbourhood, resulting in a momentary lapse in their otherwise normal pursuit of speed. This engagement improves street safety by making motorists more attuned to their surroundings.

Psychological reclaiming will not immediately result in a car-free area. However, these measures may begin to prepare an area for full pedestrianisation at a later date. Perhaps most importantly, these actions send a message to political leaders that citizens really do care about the quality of their street environment.

Fig. 198
A chess match on London's Regent Street draws players and spectators alike.
Photo by Lloyd Wright

5.2.3 Games and exercise

Exercise, play, and sports do not just belong locked away in a park or a private club. In many developing-nation cities, proper game and sports facilities simply do not exist. The street is the only available venue for physical exercise. Thus, integrating sporting opportunities into urban design can be a highly practical decision in many cities.

The provision of street sports venues is beneficial from both health and social perspectives. As obesity rates continue to climb in both developed and developing nations, encouraging physical activity is a vital strategy to help contain rising health costs. Additionally, sporting events can draw people out onto the streets and encourage improved socialisation of public space. Unlike some events, such as art displays or concerts, games and sports tend to be more active than passive. The "active" nature of participation is fundamental to achieving an ultimate buy-in from the public to the new urban form.

Chess and other street games

Chess and other street games are well suited to the urban environment. The amount of space required for such activities is relatively small, and the infrastructure is fairly simple and low cost. These games can be effective in attracting members of the public who would not normally become involved in other street activities. By offering a wide range of activities and events, a city is best positioned to encourage the widest degree of public participation in outdoor life.

Games are unique in offering intellectual engagement on the street and thus can be seen through their educational benefits. Some games also offer a moderate amount of light exercise for participants, and thus in many instances the games are appropriate for providing activity to seniors.

Game-based infrastructure can take the form of either the more traditional tabletop variety or in fact be part of the street surface (Figure 198). The choice in part depends on the game as well as the degree to which spectators can be accommodated. Board games such as chess or checkers can be played in either setting while activities such as bacci ball require a larger street surface.

A table-based game provides a more intimate environment for the players, and thus can enhance a player's ability to concentrate. However, a small table limits the extent to which large numbers of spectators can observe the proceedings. By comparison, utilising a wider street surface for the game makes for a more vibrant visual scene and can provide sufficient space for many spectators. The use of a street surface area also encourages more player movement which helps to increase the amount of exercise undertaken.

Child play areas

Children are typically one of the primary target audiences for car-free development. The compromised safety of a car-dependent area has largely meant that families and children have long vacated public space. Unsupervised play outside the home is now a largely forgotten concept in much of the urban world.

Unfortunately, play opportunities and the supporting infrastructure for play are too often seen unaffordable luxuries, especially in developing-nation cities. However, even simple play infrastructure can pay significant dividends in terms of creating street life. Play areas can be a sure way of drawing others to the street. Creating a playful environment for children can produce a lively and engaging atmosphere for all residents.

Converting a street to car-free status creates considerable space for child play equipment. Unfortunately, municipalities are increasingly reluctant to provide play equipment due to liability issues. If the inevitable scrape turns into litigation against the city, the financial implications can be prohibitive. However, the extent to which financial liability stifles project development depends much on local legal codes. In some cases, the legal code can exempt the municipality from any injuries beyond recommended usage of the equipment.

Alternatively, elaborate play infrastructure may not be entirely necessary. Given the right circumstances, children can be quite skilled at allowing their imaginations to devise fun-filled play without costly equipment (Figure 199). Simple changes of surface texture, such as sand and grass, and soft play objects can provide the right environment without significant injury risks.

Some cities have actually turned to the children to get design ideas for their areas. The involvement of children in designing play areas helps to provide "expert" input as well as ensures local ownership over the project.

Fig. 199

Simple, outdoor play is fundamental to a child's development and does not need to be elaborate or costly, but it does require a safe street environment.

Photo courtesy of Transportation Alternatives

Fig. 200 and 201
Aerobic classes take over the streets of Bangkok and Quito.
Photos by Lloyd Wright

Aerobics

To counter the near world-wide pandemic of obesity, many city officials are now seeking means to reduce spiralling health care costs. Initiatives that encourage physical exercise are one set of simple, practical solutions.

Public aerobic classes are particularly relevant for developing-nation cities, where only a small minority of the population can afford health club memberships. Further, since pedestrian conditions in these cities often make walking quite difficult, there are few other opportunities for exercise. Recognising the benefits of a healthier population, cities such as Bangkok, Bogotá, and Quito have sponsored publicly-held classes (Figures 200 and 201). The classes take place during weekends and/or evenings, and typically occur on streets or parks. The street provides an ideal venue for aerobics, especially since the high visibility of the classes helps to attract others.

Urban golf

The sport of golf is more synonymous with artificial greenery and country settings than a busy city centre. However, "urban golf" is proving to be an entertaining and creative use of public space. The idea is to organise a full-fledged sporting event using the urban landscape as the venue. In the case of urban golf, a series of holes are configured around the existing urban space. In deference to public and private property, the normal golf ball is replaced by a softer leather ball and "holes" are

Fig. 202 and 203
Urban golf takes to the streets of London.
Left photo by Andrea Castanheira
Right photo by Michael Ye Chong

defined as manhole covers. Otherwise, the game is played exactly as normal golf.

The urban variety of the sport got its start with the invention of "crossgolf" in Germany in 1992. The sport has now become more formalised with the organisation of actual tournaments. In 2004, the Shoreditch Golf Club held its first urban golf tournament on the streets of London (Figures 202 and 203). Tournaments in a range of other cities are now being planned. Urban golf carries with it the potential to significantly widen the appeal of a sport that is sometimes more associated with the wealthiest segments of society. The developer of the London tournament, Jeremy Feakes, is an architect who sees urban golf as a mechanism to change how people view the urban environment (Feakes, 2005).

Not all events should or need to be officially sponsored by the municipality. Events that are organically developed by individuals or groups can be particularly healthy in terms of creating a new street culture. Spontaneous events are a healthy indication that a car-free area is being accepted by the general public.

Other sports

The street is not necessarily well-suited to all sporting events. Contact sports obviously can create injury risks for participants on asphalt and concrete surfaces. The close proximity of personal property (e.g., windows, artwork) can create conflicts and even legal liability issues for certain sports. However, sports such as basketball, football (i.e., soccer), baseball (or stickball), and volleyball can actually flourish in the streets and do much to increase street usage (Figure 204).

While basketball requires specific infrastructure (a backboard and rim), many of the other sports can be practiced with very little permanent infrastructure or necessity for street re-configuration. A well known practice in Bogotá is the "picadito", in which construction workers play soccer on the whole street, while sporadically stopping the game to allow cars to pass. Space Hijackers have organised both cricket matches and football on the streets of London. These events have helped to raise the profile of the group's activities.

Fig. 204
A test of football skills during the Surabaya (Indonesia) car-free day.
Photo by Karl Fjellstrom
(GTZ photo CD on urban transport)

In cases of formal street conversions to car-free areas, the replacement of asphalt surfaces with grass can be appropriate for encouraging sports and other play opportunities. Long-term protective infrastructure (e.g., screens) can be appropriate when windows and other nearby structures could be affected by the activity. Alternatively, as the case of urban golf demonstrates, the substitution of a hard ball for a softer one can largely mitigate any damage to property.

5.2.4 Entertainment events

Entertainment activities provide the sort of lively backdrop to bring street life to the forefront and instil a city with a sense of sociability. Entertainment activities include a range of both formal, organised events as well as simply setting the stage for impromptu performances. The formal and informal events can be mutually complementary by attracting a variety of interests.

Formal concerts in public space have a long history in venues such as New York's Central Park and London's Hyde Park. Concerts in public space typically do not employ an entry fee and thus open up access to the widest possible audience. In addition to concerts catering to popular music, opera and symphonic music have likewise proved popular in public venues. Such large-scale events bring with them

Fig. 205 and 206
BBC hosts "Flashmob Opera" events in rail stations, incorporating the public into the performance.
Photos courtesy of BBC

challenges both from a logistical and a financing standpoint. Crowd control and policing are significant implementation issues, requiring weeks if not months of proper planning.

The BBC has sponsored several "Flash Operas" in train stations and shopping areas in the UK (Figures 205 and 206). The operas even employ the services of passer-bys into their performances. The idea is to hopefully bring opera and other art forms to audiences who would otherwise never see such an event. These types of events also hold the promise of making the street compete with other solitary forms of entertainment, such as television.

Smaller, more intimate venues may prove to be a realistic first step for cities just at the initial stages of developing a street culture. Plazas, cafes, city centre streets, and residential streets all offer appropriate venues for smaller-scale concerts and other entertainment.

In addition to music performances, theatre, film, and even fashion are well-suited to these types of surroundings. The city of Buzios (Brazil) hosts a renowned annual film festival in its city streets and plazas. Film festivals can in fact be thematically tailored around themes of sustainable living. For example, the Bicycle Film Festival features only films with a bicycle theme, often including such titles as "The Bicycle Thief", "Beijing Bicycle", and "Breaking Away". This festival began in New York City but has now expanded to include events in Los Angeles, San Francisco, London, and Tokyo (Bicycle Film Festival, 2005). Likewise, many cities have utilised public space as a showcase for new clothing fashions (Figure 207).

Fig. 207
A fashion show takes centre stage at Osaka's 2004 car-free event on Midosuji Avenue.
Photo courtesy of the Osaka City Municipal Government

Outdoor cafes and restaurants represent an opportunity to gain private sector sponsorship of outdoor entertainment. These establishments have a logical vested interest in creating and sustaining a robust street life. Thus, many Brazilian municipalities, such as Salvador, São Luis, and Recife, work closely with private sector establishments to deliver engaging street performances.

Informal street performers are also an effective means to bring humour and entertainment to public space without the risks and overhead of staging a major concert or play. Through clever and creative acts street performers are providing an important public service by instilling a playful street atmosphere (Figures 208, 209, 210, and 211).

In some cities, street performers benefit from a long established history that helps to legitimise

Fig. 208, 209, 210, and 211

Street performers bring life to a city. Photos clockwise from top left: 1. Tokyo's Sunday event in Harajuku is never dull; 2. Performing artists take to the streets of Bangkok; 3. Belly dancing in London's Covent Garden; and 4. Entertainers in Buenos Aires.

Photos by Lloyd Wright

their continued activities. Street performing in London's Covent Garden dates back to the year 1662. Likewise, the Pompidou Centre in Paris has a long history of improvisational performances. In other instances, municipalities have tried to actively develop a street performing culture through various incentives. Street performers may be given market or financial incentives to ensure that entertainment is provided. Such support may just be temporary until such performances become established. Most performers will ultimately depend on donations from the public audience.

In some instances, local laws may need revision in order to permit performances or "busking" as it is sometimes known. Some municipalities may view buskers as an undesirable element to be persecuted rather than promoted. Again, though, such traditional views are being increasingly challenged as being counter to sociability objectives. Developing a vibrant and dynamic street environment means encouraging creative groups and individuals to see the street as their stage.

5.2.5 Art and photo exhibits

In addition to permanent public art displays, temporary exhibitions can be effective in enlivening the street landscape. The flexibility of exhibitions permits organisers to create an ever-changing street scene that can excite and

Fig. 212, 213, 214, and 215

Photos clockwise from top left: 1. In London, a poignant photo display of war and human rights violations; 2. Also in London, top models lend their image to a campaign against breast cancer; 3. In Bangkok, cartoon artists are given a public showing; and 4. In Buenos Aires, a photo exhibition documenting the city's rich history.

Photos by Lloyd Wright

surprise the passer-by. Many pedestrians may not seek out the exhibits, but the chance encounter can be particularly rewarding.

Photo exhibitions have become especially popular in recent years (Figures 212, 213, 214, and 215). Bogotá even hosts a regular photo museum that does not have an actual building site. Instead the Street Photo Museum lives only through street exhibitions.

The themes of photo exhibits can vary, including poignant and powerful images from scenes of war, human rights violations, and other injustices. The images serve to both inform and potentially motivate individuals to become more involved in the issues. Additionally, exhibits showing photos and images from a city's past can be effective in engaging citizens in the historical fabric of their city.

5.2.6 "Wired" streets

Information and communications technologies (ICT) have already reshaped the modern economy, and these technologies hold the potential to reshape spatial and travel patterns. Use of the internet and mobile telephones may lead to reductions in the number of trips and the length of trips taken.

Wireless technologies offer the chance to significantly change how we view leisure space and work space. The availability of internet connections through Wi-Fi technology allows the street to become an extended office or personal entertainment venue (Figure 216). To an extent, this phenomenon has already caught the attention of coffee shops. Such establishments entice customers by offering free wireless internet connectivity.

Cities are also beginning to realise the possibilities. With its proximity to Silicon Valley, San Francisco has taken a lead in promoting free wireless connections across the expanse of the city. Already, experiments are underway with free "hotspots" on the city's Castro and Fillmore Streets as well as the central Union Square (Kopytoff, 2005). The city is building upon private sector partnerships to realise the goal of city-wide wireless provision. Additionally, a non-profit organisation called SFLan is also working to introduce free Wi-Fi connections in parts of the city. Other cities in the

area, including Palo Alto and Half Moon Bay, have also implemented programmes providing free Wi-Fi services.

Clearly, the offering of free internet access in public spaces can be one mechanism to encourage people to take to the streets. However, given that internet and telecommunications technologies typically inspire individual rather than collective participation, the overall impact on sociability is unclear. A street full of persons absorbed in their own cyber-world is not an entirely socialising experience. Further, the sound of mobile telephones ringing and loud one-way conversations is already off-putting to those seeking a quieter street experience.

Nevertheless, despite these potential negatives, wired streets and street offices do offer the potential to encourage more people to participate in the urban environment. This in itself can be a positive step towards greater socialisation of public space.

Fig. 216
Wireless technology may bring about new types of uses for public space.
Photo by Lloyd Wright

6. Evaluation

In our every deliberation, we must consider the impact of our decisions on the next seven generations.

—Iroquois Nation Maxim

Fig. 217
A typical Sunday in Bogotá.
Photo by Lloyd Wright

The initial experiments in car-free living will undoubtedly come under considerable scrutiny. Will residents be able to carry-out daily tasks? Will deliveries be made in a timely manner? Will environmental improvements be realised? Will social interactions between community members improve? Will the area benefit economically?

Developing a framework to evaluate the effectiveness of car-free areas can help to objectively measure these types of issues. This information can help give additional communities the confidence to proceed with their own car-free initiatives.

6.1 Evaluation framework

"Progress…is an essential feature of all life. The whole point is to determine what constitutes progress…Hence the call for taking stock and finding a new orientation. The stock taking indicates that we are destroying our very basis of existence, and the reorientation is based on remembering what human life is really about."

—E.F. Schumacher, 1973, p. 289

6.1.1 Evaluation categories

Evaluating the quality of the existing street environment can be useful in determining potential areas of improvement. The evaluation process can help officials understand why some areas do not attract public interest while others prosper. Table 21 summarises a simplified methodology for evaluating the appropriateness of pedestrian infrastructure (Correnti *et al.*, 2002 and Litman, 2005c).

Aesthetic considerations help strengthen the public's opinion on walking as an option. A pleasant and even entertaining environment can foster a greater psychological affinity for walking, and thus lead to greater mode share. The use of colours, textures, art works, trees and plantings, water, etc. are all tools in creating the right pedestrian environment (Figure 218).

Comfort reflects the ease of use of pedestrian facilities and the ability to dissipate unpleasant outside disturbances such as vehicle noise and contaminants. Controlling climatic conditions can dramatically improve usability as excessive

Table 21: Evaluation framework for car-free projects

Category	Description
Affordability	The cost of car-free measures in comparison to more traditional transport investments can help with project justification.
Attractiveness	Attractiveness encompasses aesthetic design considerations as well as the ability of an area to affect pleasure, delight, interest and exploration.
Comfort	Factors considered by this category include weather protection, climate control, condition of walking surface, cleanliness, and protection from noise and air pollution.
Connectivity	Connectivity relates to how efficiently a pedestrian network permits users to reach destinations. An effective route structure permits timely access across an array of potential destinations.
Convenience	Walking convenience is affected by such attributes as pathway directness, grades, sidewalk ramp locations, and other qualities that make walking easier.
Legibility	The legibility of an area refers to the ease in understanding the street environment. The availability of maps and signage can help legibility.
Safety and security	Safety is largely determined by the ability to avoid pedestrian-vehicle conflicts; security is improved through good sight lines, street lighting, and police surveillance.
Sociability	The sociability of a street determines the extent to which the environment encourages residents to undertake social interactions.

Source: Adapted from Correnti *et al.*, 2002 and Litman, 2005c

heat or cold and rain will discourage pedestrian travel. Trees and plantings can also be effective tools in buffering pedestrians from motorised vehicles and other disturbances. Pedestrian comfort is also affected by the cleanliness of the walking environment, which is in part determined by the availability of trash receptacles, frequency of cleaning schedules, and enforcement of littering restrictions.

Walkway connectivity is determined by path directness and the presence of supporting infrastructure that eases access. The directness of routes can be measured by the detour factor, which is the actual trip distance per direct trip distance. A perfect grid system would yield a value of 1.4 while a pedestrian-friendly city such as Delft (The Netherlands) scores 1.2 (Hook, 2000). In some developing-nation cities, poorly designed street configurations for pedestrians can result in a detour factor of over 2.0 (Hook, 2000). Eliminating barriers and designing corridors to reduce pedestrian distances is fundamental to making car-free areas viable.

6.1.2 Street audits, scorecards, and rankings

A variety of tools exist to evaluate the quality of the street environment. Increasingly municipalities are turning to "street audits" in order to characterise the quality of their streets within a structured framework. A systematic collection of street audits permits municipalities and organisations to compare the pedestrian-friendliness across an entire city or even between cities. A structured scorecard can provide a logical framework for the audit.

Street audits can be particularly effective in gaining the attention of decision makers. City officials very much care how their street environments are rated in comparison to other locales. A low ranking reflects quite poorly

Fig. 218
Evaluating the quality of public space requires examining all the design components such as colours, textures, vegetation, seating, etc.
Photo by Lloyd Wright

Table 22: Streetscape section of Pedestrian-Friendliness Scorecard

IV. Streetscape		Points	Answer	Score
There are trees, flowers, etc. along the route	Foliage significantly enhances the route	2		
	Some trees and flowers along route	1		
	Few or no trees or flowers exist along route	0		
Trees or awnings provide sun protection	Pedestrian has plenty of protection from sun	2		
	Pedestrian has some protection from sun	1		
	Limited or no protection from sun	0		
The sidewalks are visually interesting	Sidewalks have visual appeal	2		
	Sidewalks have adequate visual interest	1		
	Sidewalks are uninteresting	0		
The walking environment is litter and graffiti free	The environment is very clean	2		
	The environment is adequately clean	1		
	The environment is unclean	0		
The walking environment is pleasant	The environment encourages walking	3		
	The environment is enjoyable	2		
	The environment is adequate	1		
	The environment deters pedestrians	0		
			Subtotal	

Source: Voorhees Transportation Policy Institute, 2005

upon any administration. Civic pride can thus be an effective emotion to parlay into action on improving street conditions.

Ranking systems will likely draw considerable media attention, and thus can form an effective part of efforts to market car-free options (Figure 219). Not surprisingly, the media coverage is most intense for both very high ranking and very low ranking cities. Thus, rankings may help to reinforce positive actions and may help to catalyse a response from poor performing cities.

Fig. 219
City rankings regularly grab headlines. Ranking pedestrian space can help motivate cities.

To date, several scorecards have been developed to evaluate the quality of pedestrian space (CDC, 2004; Voorhees Transportation Policy Institute, 2005; and Pedestrian and Bicycle Information Center, 2005). These scorecards typically inquire about a qualitative aspect of the pedestrian environment and ask the respondent to provide a numerical rating. Table 22 provides an example of one section of the "Pedestrian-Friendliness Scorecard" (Voorhees Transportation Policy Institute, 2005). Points are totalled from each sub-section of the scorecard to produce an overall performance rating.

6.1.3 User surveys

The ultimate measure of a car-free area's success probably resides with the people who use the area on a daily basis. Surveys may be one element of a public participation process that begins to encourage residents and merchants to think about the alternatives for their community (Figure 220). Virtually all members of a community will have an opinion on their public space. Providing a forum to articulate

Fig. 220
Members of the public are surveyed during the Osaka car-free event on the Midosuji corridor.
Photo courtesy of Osaka City Municipal Government

these views, such as through a survey, can begin to unleash resolve and creativity in achieving an alternative. In the UK, some cities enlist residents to actually conduct the street audit process (Living Streets, 2005).

Surveying local residents and shop owners on the quality of their public space thus serves two important purposes. First, such information provides a valuable data point for comparisons with other areas and for comparisons against future performance. Second, this information provides vital feedback on the effectiveness of particular measures and how the street environment can be improved. In this sense, local residents are the most important consultants that city officials can engage in the street transformation process.

6.2 Measuring the impacts

"Do not believe in anything simply because you have heard it. Do not believe simply because it has been handed down for many generations. Do not believe in anything simply because it is spoken and rumoured by many… Do not believe in anything merely on the authority of teachers, elders or wise men. Believe only after careful observations and analysis, and when you find that it agrees with reason and is conductive to the good and benefit of one and all, then accept it and live up to it."

—Buddha (560 BC–480 BC)

6.2.1 Economic, environmental, and social impacts

Enrique Peñalosa, the former mayor of Bogotá, has noted that perhaps the best measure of a city's development is the happiness and self-esteem of its citizens. While a body of knowledge on "happiness" exists in the field of psychology (e.g., Csikszentmihalyi, 1990), for city officials "defining happiness much less measuring it is quite difficult" (Peñalosa, 2002). Car-free projects are frequently promoted for their contribution to quality of life. Most people understand what is generally meant by happiness and quality of life, but putting these concepts into any quantitative framework is fraught with challenges.

Further, there are many special qualities of car-free living for which quantification probably should not even be attempted. It is often the subtle details of car-free living that people most value:

- Ability of children to play on street with no fear from vehicles
- Ability of children to walk independently on street (Figure 221)
- A good night's sleep with no background noise
- A chance encounter with a neighbour and an opportunity to chat (Figure 222)
- Fresh air
- The exercise from a daily walk
- The value of sitting in a public place to drink a coffee, read a book, or simply relax (Figure 223).

A resident's value of such benefits is perhaps best captured through qualitative surveys and observation.

Fig. 221, 222, and 223
Priceless...some benefits of car-free development are beyond monetary valuation. Photos from top: 1. A small child is able to walk unaccompanied in a car-free area of Kobe (Japan); 2. A group of women chatting in Putrajaya (Malaysia); and 3. A man sleeping in Berlin.
Photos by Lloyd Wright

However, there are key aspects of car-free projects that do lend themselves to measurement, and such measurement can be influential in the future attractiveness of car-free options to city officials and investors. A common framework for evaluating project effectiveness involves the three dimensions of sustainability: economic, environmental, and social. The idea is to make "sustainability" an integrative platform (World Bank, 1996):

> "To be effective…policy must satisfy three main requirements. First, it must ensure that a continuing capability exists to support an improved material standard of living. This corresponds to the concept of economic and financial sustainability. Second, it must generate the greatest possible improvement in the general quality of life, not merely an increase in traded goods. This relates to the concept of environmental and ecological sustainability. Third, the benefits that transport produces must be shared equitably by all sections of the community. This we term social sustainability."

These three dimensions are largely mutually reinforcing. If policies or projects are not economically and financially sustainable, then there is little replication potential to ensure sustainability across the environmental and social dimensions. Additionally, if policies or projects do not address the social needs of the very poor, then resulting social pressures can undermine the environmental and economic bases upon which society functions.

The spatial and temporal scope of the project evaluation should be sufficiently large to capture differences between the new car-free area and unaffected areas. As noted by Hass-Klau (1993), a car-free initiative may require a certain settling-in period before the benefits are fully known. Thus, choosing an appropriate measurement timeframe will influence the results. In most instances, it will be useful to collect baseline data before the car-free area is implemented. Likewise, understanding how both the car-free zone and surrounding zones perform will help make for more robust conclusions.

Economic impacts

The economic sustainability of a car-free project refers to the impacts on employment, shop sales, property values, and overall productivity. Some of the specific indicators for economic impacts are:

- Employment created during the project development and construction phase (Figure 224)
- Employment created from improved shop performance
- Changes in land use functions
- Changes in property and rental values
- Vacancy rates in area
- Shop turnover (Figure 225)
- Shop revenues and profit
- Changes in delivery costs
- Employee and owner satisfaction levels.

Fig. 224 and 225
Adding up the economic benefits of car-free development. On the left, employment generated from maintenance work in Magome (Japan). On the right, shops and cafes benefit from Brighton's (UK) street closings on weekends.
Photos by Lloyd Wright

Environmental and health impacts

The environmental performance of a car-free area is largely determined by the measurable reductions achieved in pollutant and noise levels. However, actual measurement of air and noise levels does require access to monitoring equipment that many developing cities are only beginning to employ. In some cases, a car-free project can be a platform to launch a broader environmental monitoring scheme.

While environmental monitoring of existing car-free projects is still in its early stages, initial results do look promising. Car-free days in Montreal have produced reductions of nearly 80% for both carbon monoxide (CO) and nitrogen oxides (NO_x). Noise levels during the 2004 Car-Free Day dropped from a normal average of 80 decibels (db) to just 50 decibels (Gazette, 2005).

Some of the specific indicators for environmental impacts are:

- Levels of local air pollutants (CO, NO_x, SO_x, PM, toxics, O_3)
- Reductions in emissions of greenhouse gases (CO_2, CH_4, N_2O)
- Noise levels
- Number of hospital admissions for respiratory illnesses
- Number of traffic fatalities and injuries.

Social impacts

Social sustainability refers to how a car-free initiative promotes greater social equity, encourages positive personal interactions, and reduces social ills such as crime. Some of the specific indicators for social impacts are:

- Use patterns of area by vulnerable groups, including women, children, elderly, the physically disabled, and low-income households (Figure 226)
- Number of personal interactions observed
- Level of physical fitness amongst the population, obesity levels, and general health levels
- Changes in crime levels.

6.2.2 Co-benefits

Unlike other solutions to increasing motorisation, car-free projects are unique for their ability to simultaneously address (and eliminate) a whole range of associated problems. Alternative fuels for vehicles may reduce emissions of some pollutants, but such fuels do nothing to reduce congestion, accidents, severance, and the other negative impacts of motorisation. Exhaust technologies may also stem the most intense emissions, but these technologies do not address petroleum usage or the many other issues of motorisation. Larger vehicles may do more to protect the vehicle's passengers but in turn create a whole new set of problems, including heightened safety risks for others.

Fig. 226
The environmental and social costs of car dependency are all too evident in cities like Jakarta.
Photo from the Swisscontact 2002 photo competition
(GTZ photo CD on urban transport)

Table 23: Comparing the impacts of car-free areas

Objective	Small Area	Large Area	Comments
Congestion reduction	0	2	Reduces automobile use.
Road & parking savings	1	2	Reduces automobile use.
Consumer savings	0	2	Reduces automobile costs, but increases other costs.
Transport choice	1	2	Reduces motorists' choice, but improves alternatives.
Road safety	1	2	Reduces automobile use.
Environmental protection	1	3	Reduces automobile use.
Efficient land use	1	2	Reduces automobile use, but may shift travel to other areas.
Community Livability	2	3	Reduces vehicle traffic impacts.

"Rating from 3 (very beneficial) to –3 (very harmful). A 0 indicates no impact or mixed impacts"

Source: Litman (2004)

For car-free options to truly compete against other development alternatives, recognition of the full set of "co-benefits" is essential. If just one impact variable is analysed, car-free measures may seem to be of marginal value. However, investment analyses that encompass a full set of advantages are likely to produce attractive cost-benefit results. Litman (2004) has devised a means to compare different solutions based on a full array of co-benefits (Table 23). This type of analysis can help build a case in favour of car-free development.

While public surveys routinely show widespread concern over pollution, noise, climate change, congestion, accidents, community cohesion, and energy security, such concerns have not coalesced around any tangible or effective solutions such as car-free living. For most people, car-free development appears as a well-meaning idea that is unrealistic given today's circumstances.

The biggest risk to the car-free movement remains its perception as an extreme or fringe concept unattached to the realities of life in the 21st century. Proponents of car-free development have much work ahead in making the case before society at large. Measuring the multiple benefits of existing initiatives and telling the car-free story in understandable terms are the principal tasks at hand.

7. Information resources

"And the end of all our exploring
Will be to arrive where we started
And know the place for the first time."
—T.S. Lewis, poet (1888–1965)

7.1 Web Sites

7.1.1 Key car-free sites and organisations

The following is a list (in alphabetical order) of ten key web sites and organisations that support car-free development.

1.) Autofrei Wohnen ("Car-free living")
http://www.autofrei-wohnen.de
This site was originally created to support the development of a car-free residential quarter in Berlin. However, the site also includes links to a wide variety of projects in Germany, Western Europe, and elsewhere. While some of the information is available only in German, there are also many useful documents and links in English.

2.) Carfree.com
http://www.carfree.com
This site has been developed by Joel Crawford, who also authored "Carfree Cities". The site contains much useful information on overall car-free issues as well as puts forward a specific vision for a car-free reference design. The "Carfree Times" newsletter provides a periodic update on carfree news.

3.) The Commons
http://www.ecoplan.org
http://www.WorldCarFreeDay.com
The Commons is an "Open Society Sustainability Initiative" developed by Eric Britton and EcoPlan International. The site provides extensive information and offers the opportunity for cities and individuals to exchange experiences. Some of the specific programmes housed at the site include: "The New Mobility Agenda", "Kyoto World Cities Challenge Initiative", and "World CarFree Days".

4.) Institute for Transportation & Development Policy (ITDP)
http://www.itdp.org
ITDP is a US-based NGO working exclusively on sustainable transport projects in developing nations. The organisation is frequently a useful partner in actual project implementation. ITDP's periodic newsletter and annual magazine provide regular updates of the latest initiatives being undertaken.

5.) International Car-Free Day Campaign
http://www.22september.org
This web site is the focal point for summarising activities related to the international Car-Free Day on 22 September. The site lists the cities involved and the types of activities that they have undertaken. Additionally, information resources related to the EU Mobility Week can also be found on this site.

6.) Living Streets
http://www.livingstreets.org.uk
Living Streets is a UK-based NGO supporting the cause of improved conditions for pedestrians. Living Streets publishes a periodic newsletter which is available electronically. Additionally, Living Streets hosts training courses and develops guidance publications on pedestrian issues.

7.) Project for Public Spaces
http://www.pps.org
The Project for Public Spaces (PPS) is a US-based NGO dedicated to improving the quality of public space in cities both in the US as well as globally. The web site offers guidance documents on creating better urban places. PPS also publishes a useful electronic newsletter that provides updates on projects and reviews of both best-practice and worst-practice examples.

8.) Sustainable Urban Transport Project (SUTP)
http://www.sutp.org
SUTP is an outreach initiative developed under GTZ's Environment and Infrastructure Division. SUTP's web site provides a wealth of information not only on non-motorised measures but also public transport, transportation demand management (TDM), and other aspects of sustainable transport for developing nations. SUTP staff and GTZ also provide direct technical assistance to cities.

9.) Victoria Transport Policy Institute (VTPI)
http://www.vtpi.org
The Victoria Transport Policy Institute hosts one of the most expansive and

informative web sites on sustainable transport issues. The site has been developed by Todd Litman and includes a "TDM Encyclopedia" that includes data and reports on a far-reaching number of sustainable transport topics. The site also includes a document directly on the topic of car-free cities.

10.) World Carfree Network
http://www.worldcarfree.net
The World Carfree Network has become a focal point for car-free information and inspiration. The network's annual conference, Towards Carfree Cities, brings together a wide array of individuals and organisations dedicated to this issue. The network also encourages new initiatives and provides technical support to the extent possible. Interested organisations can apply to join the network. Additionally, the periodic electronic newsletter of the network provides an update of world-wide activities.

7.1.2 Informational web sites

Auto-Free Life
http://www.autofreelife.info/index.shtml

Autofrei Wohnen ("Car-free living")
http://www.autofrei-wohnen.de

Bikes at Work
http://www.bikesatwork.com/carfree

Carfree.com
http://www.carfree.com

A Car-Free Homepage
http://home.earthlink.net/~jakre/carfree/index.html

Carfree Living
http://www.autofrei-wohnen.de/homeEngl.html

Carfree Universe
http://carfreeuniverse.org

The Commons (EcoPlan International)
http://www.WorldCarFreeDay.com

European Mobility Week
http://www.mobilityweek-europe.org

International Car-Free Day Campaign
http://www.22september.org

International Home Zones
http://www.homezones.org

Nottingham University
http://www.nottingham.ac.uk/sbe/planbiblios/bibs/sustrav/refs/ST25.html

Smart Growth Network
http://www.smartgrowth.org

Sustainable Urban Transport Project (SUTP)
http://www.sutp.org

United Nations Car-Free Days programme
http://www.uncfd.org

Victoria Transport Policy Institute (VTPI)
http://www.vtpi.org

Wikipedia listing of carfree places
http://en.wikipedia.org/wiki/List_of_carfree_places

7.1.3 Non-governmental organisations

African-based organisations

Afribike (South Africa)
http://www.afribike.org

Association for Advancing Low-Cost Mobility (AALOCOM) (Tanzania)
http://www.aalocom.or.tz/index.asp

Bicycle Empowerment Network (BEN) (Southern Africa)
http://www.benbikes.org.za

First African Bicycle Information Office (FABIO) (Uganda and sub-Saharan Africa)
http://www.jugendhilfe-ostafrika.de/fabiokon.htm

Asian-based organisations

Networks for Green Transport (South Korea)
http://www.greentransport.org

Pelangi (Indonesia)
http://www.pelangi.or.id

WBB Turst (Bangladesh)
http://www.wbbtrust.org

European-based organisations

CABE Space (UK)
http://www.cabespace.org.uk

Creative Spaces (UK)
http://www.creativespaces.org.uk

Home Zones News (Chidren's Play Council) (UK)
http://www.homezonenews.org.uk

Interface for Cycling Expertise (I-ce) (World-wide)
http://www.cycling.nl

Intermediate Technology Development Group (ITDG) (World-wide)
http://www.itdg.org

Living Streets (UK)
http://www.livingstreets.org.uk

Re-cycle (World-wide)
http://www.re-cycle.org

Sustrans (UK)
http://www.sustrans.org.uk

Swisscontact (World-wide)
http://www.swisscontact.org/english/pagesnav/frames.htm

Transport 2000 (UK)
http://www.transport2000.org.uk

Velomundial (World-wide)
http://www.velomondial.net

Walk21 (Europe and world-wide)
http://www.walk21.com

World Carfree Network (World-wide)
http://www.worldcarfree.net

Latin American-based organisations

Associación de Ciclistas Urbanas (ACU) (Buenos Aires, Argentina)
http://www.geocities.com/acubicicleta

Biciacción (Bicycle Action) (Quito, Ecuador)
http://www.cicloviasquito.org

Ciudad Viva (Living City) (Santiago, Chile)
http://www.ciudadviva.cl

Fundación Ciudad Humana (Human City Foundation) (Latin America)
http://www.ciudadhumana.org

Fundación por el País que Queremos (Foundation for the Country that We Want) (Colombia and world-wide)
http://www.porelpaisquequeremos.com

Instituto Jaime Lerner (Brazil and world-wide)
http://www.jaimelerner.com

Sustran LAC (Latin America and the Caribbean)
http://www.sustranlac.org

Transporte Ativo (Active Transport) (Brazil)
http://www.ta.org.br

North American-based organisations

Access Exchange International (World-wide)
http://www.globalride-sf.org

America Bikes (US)
http://www.americabikes.org

America Walks (US)
http://www.americawalks.org

Bikes Belong Coalition (US)
http://www.bikesbelong.org

Center for Neighborhood Technology (CNT) (US)
http://www.cnt.org

Centre for Sustainable Transportation (Canada)
http://www.cstctd.org/english/index.htm

Coalition of Appropriate Transportation (Pennsylvania, US)
http://www.car-free.org

Complete Streets (US)
http://www.completestreets.org

Congress for the New Urbanism (CNU) (US)
http://www.cnu.org

Context Sensitive Solutions (US)
http://www.contextsensitivesolutions.org

Earth Day Network (US and world-wide)
http://www.earthday.net

Ecocity Builders (US and world-wide)
http://www.ecocitybuilders.org

International Council for Local Environmental Initiatives (ICLEI) (World-wide)
http://www.iclei.org

International Making Cities Livable (US and world-wide)
http://www.livablecities.org

Institute for Transportation & Development Policy (ITDP) (Developing nations)
http://www.itdp.org

International Bicycle Fund (World-wide)
http://www.ibike.org

Livable Places (Los Angeles, US)
http://www.livableplaces.org

Living Cities (US)
http://www.livingcities.org

Local Government Association / Center for Livable Communities (US)
http://www.lgc.org/center

National Center for Bicycling & Walking (US)
http://www.bikewalk.org

Partners for Livable Communities (US)
http://www.livable.com

Pedals for Progress (World-wide)
http://www.p4p.org

Pedestrian and Bicycle Information Center (US)
http://www.pedbikeinfo.org

Perils for Pedestrians (US)
http://www.pedestrians.org

Project for Public Spaces (PPS)
(US and world-wide)
http://www.pps.org

Surface Transport Policy Project (US)
http://www.transact.org

Transportation Alternatives (New York, US)
http://www.transalt.org

Transportation for a Livable City (San Francisco, US)
http://www.livablecity.org

World Resources Institute (WRI) / Embarq
(Developing nations)
http://embarq.wri.org/es/index.aspx

7.1.4 Activist organisations

Bicitekas (Mexico City)
http://www.bicitekas.org

Critical Mass (World-wide)
http://www.critical-mass.org

Firefly Brigade (Philippines)
http://www.fireflybrigade.org

Flash Mob (World-wide)
http://www.flashmob.com
http://www.flashmob.co.uk

Mobile Clubbing (UK and World-wide)
http://www.mobile-clubbing.com

Movimiento Furiosos Ciclistas (Santiago)
http://www.furiosos.cl

Reclaim the Streets (World-wide)
http://www.reclaimthestreets.net
http://rts.gn.apc.org

Right of Way (US)
http://www.cars-suck.org

Space Hijackers (UK and World-wide)
http://www.spacehijackers.co.uk

7.1.5 City/country specific sites

Amsterdam, The Netherlands
(GWL-terrein car-free housing project)
http://www.gwl-terrein.nl

Amsterdam, The Netherlands
http://www.ocf.berkeley.edu/~britt/amsterdam.htm

Auto-Free Berlin
http://www.autofrei-wohnen.de/projectsberlin.html

Auto-Free New York
http://www.auto-free.org

Auto-Free Ottawa
http://afo.sandelman.ca

Auto-Free Orange County
http://www.auto-free.net

Bremen, Germany (Car-free housing project)
http://www.eaue.de/winuwd/56.htm

CarFree City USA
http://www.carfreecity.us

Carfree Day Canada
http://www.carfreeday.ca

Car-Free Development London
http://www.carfreehousing.org

Car-free housing in European Cities
(Jan Scheurer)
http://wwwistp.murdoch.edu.au/publications/projects/carfree/carfree.html

Car-free meetup groups in US cities
http://carfree.meetup.com

Dubai, United Arab Emirates
(Car-free resort development)
http://www.theworld.ae
http://www.thepalm.ae

Five Roads Forum (London)
http://www.fiveroadsforum.org

Freemantle, Australia
http://www.freonet.net.au/shed-your-car

Freiburg, Germany
(Vauban car-free housing project)
http://www.forum-vauban.de/index-en.shtml

London (BEDZed housing project)
http://www.bedzed.org.uk

Loreto, Mexico (Car-free resort living)
http://www.loretobay.com

Mata de Sesimbra, Portugal
(WWF and Bioregional development project)
http://www.bioregional.com/programme_projects/opl_prog/portugal/portugal_hmpge.htm

New York (Plan to create a transit mall along 42nd Street in New York)
http://www.vision42.org

Northmoor Home Zone (Manchester, UK)
http://www.northmoorhomezone.org.uk

San Francisco
http://www.bclu.org/carfreemonth

Santa Barbara, CA, USA (Car-free holiday site)
http://www.santabarbaracarfree.org

Seattle Car-Free Day
http://www.thinksmall.org

Ventura, CA, USA
http://autofreeventura.org

7.1.6 Private sector (consultants and products)

Colin Buchanan & Partners
http://www.cbuchanan.co.uk

Creative Communities International
http://www.lesstraffic.com/index.htm

Criterion Planners/Engineers
http://www.crit.com

Gehl Architects
http://www.gehlarchitects.dk

Hamilton-Baillie Associates
http://www.hamilton-baillie.co.uk

Intelligent Space
http://www.intelligentspace.com

LEBER, Planificación y Ingeniería, SA
http://www.leber.org

Nelson/Nygaard Consulting Associates
http://www.nelsonnygaard.com

Socialdata
http://www.socialdata.de/homee.php

TRL (Transportation Research Laboratory)
http://www.trl.co.uk

Twike (hybrid human-electric vehicles)
http://www.twike.com

Velomobile (human-powered vehicles)
http://www.velomobile.de

Velotaxi (bicycle taxis)
http://www.velotaxi.com

Walkable Communities, Inc.
http://www.walkable.org

Walkable Places
http://www.walkableplaces.com

Zimmer Gunsel Frasca Partnership
http://www.zgf.com

7.1.7 Web discussion groups

Car-Free
http://groups.yahoo.com/group/CarFree

Car-Free Cafe
http://groups.yahoo.com/group/CarFreeCafe

Car-Free Cities
http://groups.yahoo.com/group/carfree_cities

Home Zones
http://groups.yahoo.com/group/homezones-discuss-l

Innovación Urbana (Urban innovation)
http://groups.yahoo.com/group/Innovacionurbana

Kyoto 20/20
http://groups.yahoo.com/group/Kyoto2020

Sustran
http://list.jca.apc.org/manage/listinfo/sustran-discuss

World Transport
http://groups.yahoo.com/group/WorldTransport

7.1.8 Newsletters

"Carfree Times" – Carfree.com
http://www.carfree.com/cft/index.html

"Centerlines" – National Center for Bicycling & Walking
http://www.bikewalk.org/technical_assistance/resources_information/publications/centerlines.htm

"e-Bulletin" – Transportation Alternatives
http://www.transalt.org/press/askta/index.html

"Grist Magazine"
http://www.grist.org

"Making Places" – Project for Public Spaces
http://www.pps.org/info/getinvolved/making_places/?referrer=pps_getinvolved

"Planet Ark" – Reuters
http://www.planetark.com

"Smart Growth News" – Smart Growth Network
http://www.smartgrowth.org/news/default.asp

"Sustainable Transport" – Institute for Transportation & Development Policy
http://www.itdp.org/STe/index.html

Annual magazine:
http://www.itdp.org/ST/index.html

"World Carfree News" – World Carfree Network
http://www.worldcarfree.net/bulletin/

7.2 Funding organisations

7.2.1 Foundations

Alternative Gifts International
http://www.altgifts.org

Ashoka
http://www.ashoka.org

Blue Moon Fund
http://www.bluemoonfund.org

Charles Stewart Mott Foundation
http://www.mott.org

Codespa Foundation
http://www.codespa-asia.org

Cottonwood Foundation
http://www.cottonwoodfdn.org

David and Lucile Packard Foundation
http://www.packard.org

Earth Share
http://www.earthshare.org

Ford Foundation
http://www.fordfound.org

Global Greengrants Fund
http://www.greengrants.org

MacArthur Foundation
http://www.macfound.org

New Land Foundation
http://www.gm-unccd.org/FIELD/Foundations/NewLand/FR_Gr.htm

Oak Foundation
http://www.oakfnd.org

Rockefeller Foundation
http://www.rockfound.org

Rockefeller Brothers Foundation
http://www.rfb.org

Rockwood Foundation
http://www.rockwoodfund.org

Rose Foundation
http://www.rosefdn.org

Roy A. Hunt Foundation
http://www.rahuntfdn.org

Shell Foundation
http://www.shellfoundation.org

Soros Foundation
http://www.soros.org

Surdna Foundation
http://www.surdna.org

Tides Foundation
http://www.tides.org

Toyota Foundation
http://www.toyotafound.or.jp/etop.htm

Turner Foundation
http://www.turnerfoundation.org

United Nations Foundation
http://www.unfoundation.org

Wallace Global Fund
http://www.wgf.org

William and Flora Hewlett Foundation
http://www.hewlett.org

W.K. Kellogg Foundation
http://www.wkkf.org

Working Assets
http://www.workingassets.com/recipients.cfm

7.2.2 International organisations

African Development Bank (AfDB)
http://www.afdb.org

Asian Development Bank (ADB)
http://www.adb.org/Vehicle-Emissions/default.asp

Clean Air Initiative—Asia (CAI-Asia)
http://www.cleanairnet.org/caiasia

Clean Air Initiative—Latin America (CAI-LAC)
http://www.cleanairnet.org/cailac

Clean Air Initiative—Sub-Saharan Africa (CAI-SSA)
http://www.cleanairnet.org/caissa

Development Bank of Southern Africa (DBSA)
http://www.dbsa.org

East African Development Bank (EADB)
http://www.eadb.org

European Bank for Reconstruction and Development (EBRD)
http://www.ebrd.com

European Union
Directorate General VIII, Development
http://europa.eu.int/comm/development/index_en.htm

European Union
Directorate General XI, Environment
http://europa.eu.int/comm/environment/funding/intro_en.htm

European Union
Directorate General XVII, Energy and Transport
http://europa.eu.int/comm/energy_transport/en/prog_cut_en.html

Global Environment Facility (GEF)
http://www.gefweb.org

Inter-American Development Bank (IDB)
http://www.iadb.org

International Finance Corporation (IFC)
http://www.ifc.org

United Nations Centre for Regional Development (UNCRD)
http://www.uncrd.or.jp/env/est

United Nations Development Programme (UNDP)
http://www.undp.org

United Nations Environment Programme (UNEP)
http://www.unep.org

United Nations Human Settlement Programme (UN-Habitat)
http://www.unchs.org/programmes/sustainablecities

World Bank
http://www.worldbank.org/transport

World Health Organization
http://www.euro.who.int/healthy-cities

7.2.3 Bi-lateral agencies

Australian Agency for International Development (AusAID)
http://www.ausaid.gov.au

Austrian Development Agency (ADA)
http://www.ada.gv.at/view.php3?r_id=3042&LNG=de&version=

Belgium Development Cooperation (DGCD)
http://www.dgcd.be/en/index.html

Belgium Technical Cooperation (BTC)
http://www.btcctb.org/showpage.asp?iPageID=2&sLangCode=EN

Canadian International Cooperation Agency (CIDA)
http://www.acdi-cida.gc.ca

Danish Cooperation for Environment and Development (DANCED)
http://www.mst.dk/homepage

Danish Ministry of Foreign Affairs
http://www.um.dk/en/menu/DevelopmentPolicy/DanishDevelopmentPolicy

Development Cooperation Ireland (DCI)
http://www.dci.gov.ie

Dutch Ministry for Development Cooperation (DGIS)
http://www.minbuza.nl/default.asp?CMS_ITEM=MBZ257572

Finnish Ministry of Foreign Affairs, Development Cooperation (Global.Finland)
http://global.finland.fi/index.php?kieli=3

French Development Agency (AfD)
http://www.afd.fr/jahia/Jahia/lang/en/pid/1

French Ministry of Foreign Affairs
http://www.diplomatie.gouv.fr/thema/dossier.gb.asp?DOS=SOLIDARITYDEVEL

German Agency for Technical Cooperation (GTZ)
http://www.gtz.de/en

German Federal Ministry of Economic Cooperation and Development (BMZ)
http://www.bmz.de/de/english.html

Italian Ministry of Foreign Affairs
http://www.esteri.it/eng/index.asp?

Japanese International Cooperation Agency (JICA)
http://www.jica.go.jp/english

Japanese Bank for International Cooperation (JBIC)
http://www.jbic.go.jp/english/index.php

KfW Entwicklungsbank (German Development Bank)
http://www.kfw.de/EN

Lux Development (Luxembourg)
http://www.lux-development.lu/e/home.htm

New Zealand International Aid and Development Agency (NZAID)
http://www.nzaid.govt.nz

Norwegian Agency for Development Cooperation (NORAD)
http://www.norad.no/default.asp?V_ITEM_ID=1139&V_LANG_ID=0

Portuguese Institute for Development Support (IPAD)
http://www.ipad.mne.gov.pt

Spanish Agency for International Cooperation (AECI)
http://www.aeci.es/Default.htm

Swedish International Cooperation Agency (Sida)
http://www.sida.se/Sida/jsp/polopoly.jsp?d=107

Swiss Agency for Development and Cooperation (SDC)
http://www.sdc.admin.ch

UK Department for International Development (DFID)
http://www.dfid.gov.uk

US Agency for International Development (USAID)
http://www.usaid.gov/our_work/environment

7.3 Key texts and articles

Adams, J. (2000), *The social implications of hypermobility*. Paris: OECD.

Adams, J. (1995), *Risk*. London: UCL Press.

Alvord, K. (2000), *Divorce your car: Ending the love affair with the automobile*. Gabriola Island (Canada): New Society Publishers.

Appleyard, D. (1981), *Livable streets*. Berkeley: University of California Press.

Banister, D. (2005), *Unsustainable transport*. London: Routledge.

Banister, D. (ed.) (1998), *Transport policy and the environment*. London: E & FN Spon.

Barnett, J. (2003), *Redesigning cities: Principles, practice, implementation*. Washington: APA Planners Press.

Barton, H. (ed.) (2002), *Sustainable communities: The potential for eco-neighbourhoods*. London: Earthscan.

Beatley, T. (2000), *Green urbanism: Learning from European cities*. Washington: Island Press.

Bicycle Federation of America (1998), *Creating walkable communities*. Washington: Bicycle Federation of America.

Biddulph, M. (2001), *Home zones: A planning and design handbook*. Abingdon: Martson Book Services.

Brandes Gratz, R. (1998), *Cities back from the edge: New life for downtown*. New York: John Wiley.

Breheny, M. (1992), *Sustainable development and urban form*. London: Pion.

Breines, S. and Dean, W. (1974), *The pedestrian revolution: Streets without cars*. New York: Vintage Books.

Calthorpe, P. (1994), *The next American metropolis: Ecology, community and the American dream*. Princeton: Princeton Architectural Press.

Cervero, R. (1998), *The transit metropolis: A global inquiry*. Washington: Island Press.

Crawford, J. (2000), *Carfree cities*. Utrecht: International Books.

Crowhurst-Lennard, S. and Lennard, H. (1995), *Livable cities observed*. California: Gondolier Press.

Daly, H. (1973), *Towards a steady state economics*. New York: W. H. Freeman.

de Geus, M. (2003), *The end of over-consumption: Towards a lifestyle of moderation and self-restraint*. Utrecht: International Books.

Dimitriou, H. (ed.) (1990), *Transport planning for third world cities*. London: Routledge.

Ditmar, H. and Ohland, G. (2004), *The new transit town: Best practices in transit-oriented development*. Washington: Island Press.

Duany, A., Plater-Zyberk, E., and Speck, J. (2000), *Suburban nation: The rise of sprawl and the decline of the American dream*. New York: North Point Press.

Elkin, T., McLaren, D., and Hillman, M. (1991), *Reviving the city: Towards sustainable urban development*. London: Friends of the Earth.

Engwicht, D. (1999), *Street reclaiming: Creating livable streets and vibrant communities*. Gabriola Island (Canada): New Society Publishers.

Engwicht, D. (1993), *Reclaiming our cities & towns: Better living with less traffic*. Philadelphia: New Society Publishers.

European Commission (2005), *Reclaiming city streets for people: Chaos or quality of life?* Brussels: European Commission, Directorate-General for the Environment.

Flyvbjerg, B., Bruzelius, N., and Rothengatter, W. (2003), *Megaprojects and risk: An anatomy of ambition*. Cambridge: Cambridge University Press.

Gakenheimer, R. (1999), *Urban mobility in the developing world*. Transportation Research A, 33: 671-689.

Gehl, J. and Gemzoe, L. (1996), *Public space and public life.* Copenhagen: Royal Danish Academy of Fine Arts.

Gehl, J. (1987), *Life between buildings, using public space*. New York: Von Nostrand Reinhold Company.

Gemzoe, L. (2001), *Copenhagen on foot: Thirty years of planning & development*, World Transport Policy & Practice, 7(4): 19-27.

Gilbert, R., Stevenson, D., Girardet, H., and Stren, R. (1996), *Making cities work: The role of local authorities in the urban environment*. London: Earthscan.

Gilbert, R. and O'Brien, C. (2005), *Child- and youth-friendly land-use and transport planning guidelines*. Ontario: Centre for Sustainable Transportation.

Girardet, H. (1992), *The Gaia atlas of cities: New directions for sustainable urban living*. London: Doubleday.

GTZ (2003), *Sustainable transport sourcebook for policy makers in developing countries*. Eschorn: GTZ, http://www.sutp.org.

Gwilliam, K. (2003), *Urban transport in developing countries*. Transport Reviews, 23(2):197-216.

Hall, P. and Ward, C. (1998), *Sociable cities: The legacy of Ebenezer Howard*. Chichester: John Wiley.

Hardin, G. (1968), *The tragedy of the commons. Science*, 162(3859): 1243-1248, 13 December 1968.

Hass-Klau, C., Crampton, G., Dowland, C., and Nold, I. (1999), *Streets as living space: Helping public places play their proper role*. London: Landor Publishing.

Haughton, G. and Hunter, C. (1994), *Sustainable cities*. London: Jessica Kingsley.

Hillier, B. (1996), *Space is the machine*. Cambridge: Cambridge University Press.

Holtz Kay, J. (1997), *Asphalt nation: How the automobile took over America and how we can take it back*. New York: Crown Publishers.

Honachefsky, W. (2000), *Ecologically based municipal land use planning*. Boca Raton: Lewis Publishers.

Hook, W. (2003), *Preserving and expanding the role of non-motorised transport*. In GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit) (2003), *Sustainable transport: A sourcebook for policy-makers in developing cities*. Eschborn: GTZ, http://www.sutp.org.

Hook, W. and Howe, J. (2004) *Transport and the millennium development goals*. A Background Paper to the Task Force on Slum Dwellers of the Millennium Development Project, ITDP: New York.

Institute of Highway Incorporated Engineers (2002), *Home zone design guidelines*. http://www.ihie.org.uk/home_zone.html.

Jacobs, J. (1961), *The death and life of great American cities*. New York: Random House.

Katz, P. (1994), *The new urbanism: Toward an architecture of community*. New York: McGraw-Hill.

Kenworthy, J., Laube, F., Newman, P. and Barter, P. (1997), *Indicators of transport efficiency in 37 global cities*. Perth: Murdoch University.

Knustler, J. (1993), *The geography of nowhere: The rise and decline of America's man-made landscape*. New York: Simon & Schuster.

Kushner, J. (2004), *The post-automobile city: Legal mechanisms to establish the pedestrian-friendly city*. Durham: Carolina Academic Press.

Litman, T. (2005), *Evaluating non-motorised transport*. Web document, http://www.vtpi.org/tdm/tdm63.htm#_Toc28159022.

Litman, T. (2004), *Car-free planning*. Web document, http://www.vtpi.org/tdm/tdm6.htm.

Litman, T. (2003), *Mobility management*. In GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit) (2003), *Sustainable transport: A sourcebook for policy-makers in developing cities*. Eschborn: GTZ, http://www.sutp.org.

Litman, T., Blair, R., Demopoulos, B., Eddy, N., Fritzel, A., Laidlaw, D., Maddox, H., and Forster, K. (2003), *Pedestrian and bicycle planning: A guide to best practices*. Victoria, Canada: Victoria Transport Planning Institute (VTPI).

Lowe, M. (1990), *Alternatives to the automobile: Transport for liveable cities*. Washington: Worldwatch.

Newman, P. and Kenworthy, J. (1999), *Sustainability and cities: Overcoming automobile dependence*. Washington: Island Press.

Newman, P. and Kenworthy, J. (1989), *Cities and automobile dependence: An international sourcebook*. Aldershot, UK: Gower.

O'Meara, M. (1999), *Reinventing cities for people and the planet*. Washington: Worldwatch Institute.

Pearce, D., Maddison, D. Johansson, O., Calthrop, E., Litman, T. and Verhoef, E. (1996), *Blueprint for the true costs of road transport: Volume 5*. London: Earthscan.

Peñalosa, E. (2003), *The role of transport in urban development policy*. In GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit) (2003), Sustainable transport: *A sourcebook for policy-makers in developing cities*. Eschborn: GTZ, http://www.sutp.org.

Plowden, S. (1972), *Towns against traffic*. London: Deutsch.

Project for Public Spaces (2000), *How to turn a place around: A handbook for creating successful public spaces*. Project for Public Spaces: New York.

Pucher, J. and Dijkstra, L. (2003), *Promoting safe walking and cycling to improve public health: Lessons from The Netherlands and Germany*. American Journal of Public Health, 93(9): 1509-1516, September 2003.

Rabinovitch, J. and J. Leitmann (1992), *Environmental innovation and management in Curitiba, Brazil*. Urban Management Programme, Working Paper No. 1, Washington: World Bank.

Replogle, M. (1992), *Non-motorized vehicles in Asian cities*. World Bank technical paper number 162. Washington: World Bank.

Reutter, U. and Reutter, O. (1996b), *Car-free households: Who lives without an automobile today?* World Transport Policy and Practice, 2(4).

Richards, B. (2002), *Future transport in cities.* London: Spoon Press.

Safdie, M. (1997), *The city after the automobile: An architect's vision*. Boulder, US: Westview Press.

Scheurer, J. (1998), *Car-free housing in Europe: A new approach to sustainable residential development*. World Transport Policy & Practice, 4(3): 16-20.

Schumacher, E. (1973), *Small is beautiful: Economics as if people mattered*. New York: Harper & Row.

Shoup, D. (2005), *The high cost of free parking.* Washington: APA Planners Press.

Sperling, D. and Salon, D. (2002), *Transportation in developing countries: An overview of greenhouse gas emission reduction strategies*. Arlington (US): Pew Center on Global Climate Change.

Steuteville, R. and Langdon, P. (eds.) (2003), *New urbanism: Comprehensive report & best practices guide*. Ithaca, US: New Urban Publications.

Sussman, A. and Goode, R. (1980), *The magic of walking*. New York: Simon & Schuster.

Transport 2000 (1999), *Living Streets: A guide to cutting traffic and reclaiming street space,* London: Transport 2000. http://www.transport2000.org.uk/products/productsdetails.asp#ProductType_8

Transport 2000 (2002), *Taming the traffic factpack*. London: Transport 2000. http://www.transport2000.org.uk/products/productsdetails.asp#ProductType_8

Transportation Alternatives (2004), *Streets for people*. New York: Transportation Alternatives.

USEPA (United States Environmental Protection Agency) (1999), *Indicators of the environmental impacts of transportation*, EPA report number 230-R-99-001. Washington: USEPA.

Vasconcellos, E. (2001), *Urban transport, environment and equity: The case for developing countries*. London: Earthscan.

von Weizsacker, E., Lovins, A., and Lovins, L. (1997), *Factor four: Doubling wealth halving resource use: The new report to the Club of Rome*. London: Earthscan.

Whitelegg, J. and Haq, G. (2003), *The Earthscan reader on world transport policy and practice*. London: Earthscan.

Whitelegg, J. (1997), Critical mass: *Transport, environment and society in the twenty-first century*. London: Pluto Press.

Whyte, W. (1988), City: *Rediscovering the center*. London: Doubleday.

World Bank (2001), *Cities on the move: A World Bank urban transport strategy review*. Washington: World Bank.

World Bank (1996), *Sustainable transport: Priorities for policy reform*. Washington: World Bank.

WHO (World Health Organization) (2004): *World Report on Road Traffic Injury Prevention*. Geneva: WHO.

Wright, L. (2004), *Bus rapid transit planning guide*. Eschborn: GTZ, http://www.sutp.org.

Zielinski, S. and Laird, G. (1995), *Beyond the car: Essays on the auto culture*. Toronto: Steel Rail Press

Epilogue

The images and ideas presented in this document are intended to help inform interested cities about some alternatives to car-dependency. *Car-Free Development* is only a basic introduction to many of these concepts, and the entire field of car-free living is in many respects at its nascent stages. However, as more cities begin experimenting with human-oriented urban designs, the base of knowledge will undoubtedly evolve.

Despite the optimism stemming from the various car-free experiments to date, the reality of the trends towards motorisation is overwhelming. Auto-dependency is being reinforced everyday in cities and societies around the world, and growing rapidly in developing nations. A few isolated streets or communities with car-free designs mean relatively little against this tide of motorisation.

To make any substantive change in the overall picture implies a mindset transformation by consumers and political leaders. None of the design concepts presented will mean anything without the political will to implement. Moreover, this political support will unlikely materialise without a citizenry that is solidly in favour of car-free alternatives. Thus, it is appropriate to conclude this document with a final point on the importance of citizen involvement.

In ancient Athens, the idea of citizenship was formally embedded into culture and law. Upon entering the point of adulthood at the age of 17, a person was required to take an oath to the city in order to become a full citizen. The contents of this oath are given below. The oath's final line is a pledge to ultimately bequeath to future generations a city of even higher quality. This oath is perhaps as relevant today as it was 2,500 years ago.

"We will fight for the ideals and Sacred Things of the City both alone and with many.

We will revere and obey the City's laws, and will do our best to incite a like reverence and respect in those above us who are prone to annul them or set them at naught.

We will strive increasingly to quicken the public's sense of civic duty.

Thus in all these ways we will transmit this City, not only not less, but greater and more beautiful than it was transmitted to us."

—Athenian oath, 500 BC

References

Adams, J. (2000), *The social implications of hypermobility.* Paris: OECD.

Alexander, Christopher (2002), *The Nature of Order*. Berkeley: The Center for Environmental Structure.

Appleyard, D. (1981), *Livable streets*. Berkeley: University of California Press.

AITD (Asian Institute of Transport Development) (1997), *Indian planning search for a change*. New Delhi: AITD.

Autofrei Wohnen (2005), *Carfree living*. Web site accessed on 8 May 2005, http://www.autofrei-wohnen.de/Berlin/b-opticalcarfree.html.

ASTRA (2000), *Final report*, IWW. Karlsruhe: University of Karlsruhe.

Banister, D. and Berechman, J. (2000), *Transport investment and economic development*. London: UCL Press.

BBC (2005), *Bicycle chosen as best invention*. BBC, 5 May 2005, http://news.bbc.co.uk/1/hi/technology/4513929.stm.

BEDZed (2005), *Beddington Zero Energy Development*. Web site accessed on 9 May 2005, http://www.bedzed.org.uk/main.html.

Bemis, A. (2003), *My name is Bill…A Q&A with the anonymous founder of flash mobs*. Los Angeles Weekly, 27 May 2003.

Berger, M. (2001), *Smart growth and the cost of sprawl in Kentucky: Intra-county analysis*. Lexington, US: University of Kentucky.

Bicycle Film Festival (2005), Web site accessed on 13 August 2005, http://www.bicyclefilmfestival.com.

Brand, C. (2000), *Europeans leave cars at home*. BBC News online, 23 September 2000.

BCTB (British Columbia Treasury Board) (1996), *Input/output table*. Victoria: BCTB.

Britton, E. (2005), *The commons*. Web site accessed on 4 September 2005. http://www.ecoplan.org/kyoto/challenge/panel.htm.

Brown, H. (2005), *Bristol—street party capital of UK*. Living Streets Newsletter, 13 July 2005.

Cabe Space (2004), *The value of public space*. London: Cabe Space.

Calthorpe, P. (1994), *The next American metropolis: Ecology, community and the American dream*. Princeton: Princeton Architectural Press.

Carfree Santa Barbara (2005). Web site accessed on 22 April 2005, http://www.santabarbaracarfree.org.

Carfree.com (2005), *The Lyon protocol*. Web document, http://www.carfree.com/lyon_protocol.htm.

Carfree Times (2002), *Fes-al-Bali. Carfree Times*, Issue 24, 19 February 2002, http://www.carfree.com/cft/i024.html.

CDC (Center for Disease Control) (2005), *U.S. Obesity Trends 1985–2003*. Web site accessed on 12 July 2005, http://www.cdc.gov/nccdphp/dnpa/obesity/trend/maps.

CDC (Center for Disease Control) (2004), *Worksite walkability: Are your employees walking at work*? Web document, http://www.cdc.gov/nccdphp/dnpa/walkability.

Cervero, R (2002), *Accessibility through integrated transport & urbanism*. Presentation at the Urban Research Symposium 2002. Washington: World Bank, 11 December 2002.

Chandler, C. (2003), *China goes car crazy*. Fortune, 11 August 2003.

City of London Police (1996), *Annual report 1995/6*. London: City of London Police.

Colwell, D. (2005), *Riding to the rescue: Sympathetic European activists step into critical mess to say*, 'Free NYC cyclists'. Village Voice, 29 August 2005.

Correnti, V., Migliore, M., Barbarossa, L., and Lacava, G. (2002), *Quality pedestrian walkways: A solution for an effective integrated transport system*. In Godard, X. and Fatonzoun, I. (eds.) (2002), *Urban mobility for all*. Lisse, Netherlands: Swets and Zeitlinger.

Crawford, J. (2000), *Carfree cities*. Utrecht: International Books.

Crawford, K. (2004), *Gotcha! Ads push the envelope*. CNN web edition, 17 August 2004.

Critical Mass (2003), Web site accessed on 10 October 2003, http://www.critical-mass.org.

Crowhurst-Lennard, S. and Lennard, H. (1995), *Livable cities observed*. California: Gondolier Press.

Csikszentmihalyi, M. (1990), *Flow: The psychology of optimal experience*. New York: HarperCollins.

Dargay, J and Gately, D (1999), *Income's effect on car and vehicle ownership, worldwide: 1960-2015*. Transportation Research Part A, Vol. 33, pp. 101-138.

Delucchi, M. (1996), *Total cost of motor-vehicle use*, Access, 8: 7-13, spring 1996.

DETR (Department of the Environment, Transport and the Regions) (2000), *Transport 2010: The ten year plan*. London: DETR.

DFID Transport Resource Centre (2002), *Transport's role in achieving the millennium development goals*. DFID: London.

Dittmar, H. (1999), *Highway capacity and economic productivity*. STPP Progress, Feb. 1999.

DoE (Department of Environment) and The Association of Town Centre Management (1997), *Managing Urban Spaces in Town Centres—Good Practice Guide*. London: HMSO.

Dockery, D. and Pope, C. (1994), *Acute Respiratory Effects of Particulate Air Pollution*. Annual Review Public Health, 15: 107-132.

Ebinger, F., *et al.,* (1998), *Chief benefits for the future: New jobs created with environmentally-compatible traffic*. Freiburg: Öko-Institut/VCD.

Economist, (2005), *Cars in China: Dream machine*. Economist, 2 June 2005, electronic edition.

Ecoplan (2003), *World Car-Free Days collaborative*. Website accessed on 8 October 2003, http://www.ecoplan.org/carfreeday/cf_index.htm.

Edward Erdman Research (1989), *Traffic free shopping*. London: Edward Erdman Research.

Engwicht, D. (2004), *After traffic calming: A new design ethos emerges*. Presentation at Walk21-V Cities for People, The Fifth International Conference on Walking in the 21st Century, 9–11 June 2004, Copenhagen, Denmark.

Engwicht, D. (1999), *Street reclaiming: Creating livable streets and vibrant communities*. Gabriola Island, BC, Canada: New Society Publishers.

Engwicht, D. (1993), *Reclaiming our cities & towns: Better living with less traffic*. Philadelphia: New Society Publishers.

European Commission (2005), *Reclaiming city streets for people: Chaos or quality of life*? Brussels: European Commission, Directorate-General for the Environment.

European Mobility Week (2005), *Participating and supporting cities and towns*. http://www.22september.org/part/en/day04.html.

Evans, G. and Maxwell, L. (1997), *Chronic noise exposure and reading deficits*. Environment & Behaviour, 29(5): 638-656, September 1997.

Feakes, J. (2005), *Personal communication with Jeremy Feakes on 10 May 2005*.

Fjellstrom, K. (2005), *Non-motorised transport and bus rapid transit*. Presentation at the Regional Forum on Environmentally Sustainable Transport, United Nations Centre on Regional Development (UNCRD), Nagoya, Japan, 1 August 2005.

Frank, L. (2003), *Urban form and health: Effects of the built environment on physical activity and health*. Presented at the Eleventh Congress of New Urbanism, 19 June 2003, Washington.

Gakenheimer, R. (1999), *Urban mobility in the developing world*. Transportation Research A, 33: 671-689.

Gary, L. (2003), *Carfree zones versus carfree days*. Carfree Times, Issue 32, 2 Sep 2003.

Gazette (2005), *Now is the time to fortify public transport*. Montreal Gazette, 22 August 2005.

Gehl, J. and Gemzøe, L. (1996), *Public spaces—public life*. Copenhagen: The Danish Architectural Press.

Gehl, J. (1987), *Life between buildings: Using public space*. New York: Van Nostrand Reinhold.

Gemzoe, L. (2001), *Copenhagen on foot: Thirty years of planning & development*, World Transport Policy & Practice, 7(4): 19–27.

Gilbert, R. (2000), *Sustainable mobility in the city.* Proceedings from URBAN21, Global Conference on the Urban Future, Berlin, Germany, 4–6 July, 2000.

Goff, P. (1997), *Car culture and the landscape of subtraction*. Monocular Times, 1997, http://www.monoculartimes.co.uk/architexts/carculture_1.shtml

Goodman, P. (2004), *Booming China devouring raw materials*. Washington Post, 21 May 2004, p. A1.

Goodwin, P., Hass-Klau, C., and Cairns, S. (1998), *Evidence on the effects of road capacity reduction on traffic levels*. Traffic Engineering and Control, June: 348–354.

Greene, D. and Schafer, A. (2003), *Reducing greenhouse gas emissions from US transportation*. Arlington, VA, USA: *Pew Center on Global Climate Change*.

Gruen, V. (1964), *The heart of our cities*. New York: Simon and Schuster.

Guitink, P. and Flora, J. (1995), *Non-motorized transportation systems: Back to the future*? Paper presented at the Transportation Research Board 74th Annual Meeting, Washington, DC, USA, January 1995.

Gwilliam, K. (2003), *Urban transport in developing countries*. Transport Reviews, 23(2): 197-216.

Harvard Business School (2005), *The three windows of opportunity*. Web document, http://hbswk.hbs.edu/item.jhtml?id=4835&t=entrepreneurship.

Hass-Klau, C., Crampton, G., Dowland, C., and Nold, I. (1999), *Streets as living space: Helping public places play their proper role*. London: Landor Publishing.

Hass-Klau, C. (1993), *Impact of pedestrianization and traffic calming on retailing: A review of the evidence from Germany and the UK*. Transport Policy, 1(1): 21-31.

Hass-Klau, C. (1988), *New life for city centres*. London: Anglo-German Foundation.

Hjorthol, R. (2002), *The relation between daily travel and use of the home computer*. Transportation Research Part A, 36(2002): 437452.

Hook, W. (2003), *Preserving and expanding the role of non-motorised transport*. In GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit) (2003), *Sustainable transport: A sourcebook for policy-makers in developing cities*. Eschborn: GTZ, http://www.sutp.org.

Hook, W (2002), *Does it make sense for China to motorize?* Sustainable Transport, Fall 2002, 14, pp 2, 19, 29.

Hook, W (2000), *Improving conditions for non motorized transport in Surabya, Indonesia: A pilot project in two neighbourhoods*. Eschborn, Germany: GTZ.

Hook, W. and Garb, Y. (2002), Nowa Huta: *Can the "model city" be rebuilt*? Sustainable Transport, Fall 2002, pp. 16-18.

Hook, W. and Howe, J. (2004) *Transport and the millennium development goals*. A Background Paper to the Task Force on Slum Dwellers of the Millennium Development Project, ITDP: New York.

Institute of Transportation Engineers (2005), *Traffic calming for communities*. Web site accessed on 3 May 2005, http://www.ite.org/traffic/tcdevices.htm.

IPCC (Intergovernmental Panel on Climate Change) (2001), Climate change 2001: *Synthesis report* (IPCC Third Assessment). Geneva: IPCC, World Meteorological Organisation (WMO).

IBF (International Bicycle Fund) (2005), *99 alternative names for "bike to work"*. Web document accessed on 21 July 2005, http://www.ibike.org/encouragement/bikeday.htm#Names.

IEA (International Energy Agency)/SMP, 2004, *The IEA/SMP transportation model*. Web document accessed on 10 March 2005, http://www.wbcsd.org/plugins/DocSearch/details.asp?type=DocDet&ObjectId=MTE0Njc.

Jacobs, J. (1961), *The death and life of great American cities*. New York: Random House.

Japan Today (2003), *Toyota tells employees not to drive to work*, Japan Today, 19, August 2003, http://www.japantoday.com/e/?content=news&cat=3&id=269910.

Katz, P. (1994), *The new urbanism: Toward an architecture of community*. New York: McGraw-Hill.

Keddeman, W (1998), *Of nets and assets: Effects and impacts of employment-intensive programmes–A review of ILO experience*. Geneva: ILO.

Kenworthy, J., Laube, F., Newman, P., and Barter, P. (1997), *Indicators of transport efficiency in 37 global cities*. Perth: Murdoch University.

Kitahara, T. (2005), *Personal communication with Professor Toshio Kitahara of Chiba University*, 16 May 2005.

Kopytoff, V. (2005), *S.F. getting 2 new hot zones for Wi-Fi–Fillmore, Castro*. San Francisco Chronicle, 2 May 2005.

Kushner, J. (2004a), *Europe's carfree residential developments*. Presentation at Towards Carfree Cities IV Conference, Berlin, Germany, 20 July 2004.

Kushner, J. (2004b), *Car-free housing developments: Towards sustainable smart growth*. Presentation at ENHR Conference, Cambridge, UK, 2-6 July 2004, http://www.enhr2004.org/files/papers/kushner-Car-freeHousword%5B1%5D.pdf.

Kushner, J. (2004c), *The post-automobile city: Legal mechanisms to establish the pedestrian-friendly city*. Durham: Carolina Academic Press.

Laosirihongthong, T. and Pattaramunikul, S. (2004), *Development of the walking street in Thailand: Concepts, problems and recommendations*. Paper presented at Walk21-V Cities for People, The Fifth International Conference on Walking in the 21st Century, 10 June 2004, Copenhagen, Denmark.

Limpert, R. (1994), *Motor vehicle accident reconstruction and cause analysis*. Chalottesville: Michie Company.

Ling, Z. and J. Zhongyi (1996), *Public works and poverty alleviation in rural China*. New York: Nova Science Publishers.

Litman, T. (2005a), *Transportation costs and benefits*. Web document accessed on 22 July 2005, http://www.vtpi.org/tdm/tdm66.htm.

Litman, T. (2005b), *Economic development impacts*. Web document accessed on 8 February 2005, http://www.vtpi.org/tdm/tdm54.htm.

Litman, T. (2005c), *Evaluating non-motorised transport*. Web document accessed on 13 August 2005, http://www.vtpi.org/tdm/tdm63.htm#_Toc28159022.

Litman, T. (2004), *Car-free planning*. Web document accessed on 18 September 2004, http://www.vtpi.org/tdm/tdm6.htm.

Litman, T (2003), *Transportation cost analysis: Techniques, estimates and implications*. Victoria, Canada: Victoria Transport Planning Institute (VTPI).

Living Streets (2005), *Community street audits*. Web site accessed on 5 August 2005, http://www.livingstreets.org.uk/consultancy.php.

Local Government Commission (2001), *The Economic Benefits of Walkable Communities*. Sacramento: Local Government Commission, http://www.lgc.org/freepub/PDF/Land_Use/focus/walk_to_money.pdf.

Maharaj, J. (2003), *US lifestyles blamed for obesity epidemic sweeping Mexico*. The Guardian, 16 December 2003.

Maslow, A. (1970), *Motivation and personality*. New York: Harper & Row.

McGranahan, G. and Murray, F. (eds.) (2003), *Air pollution & health in rapidly developing countries*. London: Earthscan Publications.

McNichol, T. (2004), *Roads gone wild*. Wired Magazine, 12(12).

Metschies, G. (2005), *International fuel prices* 2005. Eschborn: GTZ, http://www.gtz.de/en/themen/umwelt-infrastruktur/transport/10285.htm.

Michaelson, J. (2005), Paris: *Lessons from abroad*. Making Places Newsletter, June 2005, http://www.pps.org/info/newsletter/june2005/paris.

Miller, J., Robison, H., and Lahr, M. (1999), *Estimating important transportation-related regional economic relationships in Bexar County, Texas*. San Antonio: VIA Transit.

Mokad, A., Bowman, B., Ford, E., Vinicor, F., Marks, J., and Koplan, J. (2001), *The continuing epidemics of obesity and diabetes in the United States*. Journal of the American Medical Association, 286(10), pp. 1195-1200.

Mokhtarian, P. (1998), *A synthetic approach to estimating the impacts of telecommuting on travel*. Urban Studies, 35(2): 214-241.

Newman, P. and Kenworthy, J. (1999), *Sustainability and cities: Overcoming automobile dependence*. Washington: Island Press.

OECD (Organisation for Economic Cooperation and Development) and ECMT (European Conference of Ministers of Transport) (1995), *Urban travel and sustainable development*. Paris: OECD.

OECD (Organisation for Economic Cooperation and Development) and IEA (International Energy Agency) (2001), *An initial view on methodologies for emissions baselines: Case study on transport*. Paris: OECD/IEA.

Pedestrian and Bicycle Information Center (2005), *Walkability checklist*. Web document, http://www.walkinginfo.org/cps/checklist.htm.

Peñalosa, E. (2004), *A dramatic change towards a people city—the Bogotá story*. Keynote address at Walk21-V Cities for People, The Fifth International Conference on Walking in the 21st Century, 10 June 2004, Copenhagen, Denmark.

Peñalosa, E. (2003), Foreword. In Whitelegg, J. and Haq, G. (2003), *The Earthscan reader on world transport policy and practice*. London: Earthscan.

Peñalosa, E. (2002), *Urban transport and urban development: A different model*. Presented at the Center for Latin American Studies, University of California at Berkeley, 5 April 2002.

Poulsen, E. and Mozer, D. (2005), *Rainbow of free bikes*. Web site of the International Bicycle Fund (IBF), accessed on 3 September 2005, http://www.ibike.org/encouragement/freebike-details.htm.

Ravallion, M. (1990), *Reaching the poor through rural public employment: A survey of theory and evidence*. World Bank Discussion Paper 94, Washington: World Bank.

Reclaim the Streets (2003). Web site accessed on 10 October 2003, http://www.reclaimthestreets.net.

Reuters (2005), *US prison population continues rising*. CNN, http://www.cnn.com/2005/US/04/24/prison.population.reut/index.html

Scheurer, J. (2002), *Car-free housing in European cities: A survey of sustainable residential development projects*. Web document accessed on 20 February 2002, http://wwwistp.murdoch.edu.au/publications/projects/carfree/carfree.html.

Schumpeter, J.A. (1961), *Capitalism, socialism and democracy.* London: George Allen and Unwin.

Schwela, D. and Zali, O. (1999), *Urban traffic pollution*. London: E. & F. N. Spon.

Shah, J. and Iyer, N.V. (2003), *Two- and three-wheelers*. In GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit) (2003), *Sustainable transport: A sourcebook for policy-makers in developing cities*. Eschborn: GTZ.

Sierra Club (2003), *A century of innovation: Except at Ford (advertisement).* New York Times, 3 June 2003.

Soholt, H. (2004), *Life, buildings and spaces—turning the traditional planning process upside down*. Paper presented at Walk21-V Cities for People, The Fifth International Conference on Walking in the 21st Century, 10 June 2004, Copenhagen, Denmark.

Space Hijackers (2005a), *Personal communication with "Agent Robin" of Space Hijackers*, 7 March 2005.

Space Hijackers (2005b), Web site accessed on 13 April 2005, http://www.spacehijackers.co.uk/html/projects/mayday03/report2.html.

Sustainable Transport (2004), *Iraqi flooded with cars in occupation's wake*. Sustainable Transport e-Update, No. 14, May 2004, http://www.itdp.org/STe/ste14/index.html#iraq.

Texas Transportation Institute (2005), *2005 urban mobility study*. College Station, TX, USA: Texas Transportation Institute.

Transparency International (2005), *Transparency International corruption perceptions index* 2004. Web document, http://www.transparency.org/cpi/2004/cpi2004.en.html.

Transportation Alternatives (2005), *The car-free Central Park campaign*. Web site accessed on 18 July 2005, http://www.transalt.org/campaigns/cpark.

Transport and Environment Studies (TEST) (1987), Quality streets. London: TEST.

UNCFD (United Nations Car-Free Days) (2005a), *Timeline: Some major carfree days benchmarks*. Web site accessed on 20 April 2005, http://www.uncfd.org/index2.php?menu=1|4&id=4&pid=1&tl=1&page=Timeline.php

UNCFD (United Nations Car-Free Days) (2005b), *Why use car free days*? Web site accessed on 20 April 2005, http://www.uncfd.org/index2.php?menu=1&id=1&pid=0&tl=0&page=About.php

UNESCO (United Nations Educational, Scientific and Cultural Organization) (2005), *World Heritage List*. Web site accessed on 13 March 2005, http://whc.unesco.org/en/list.

USEPA (United States Environmental Protection Agency) (2003), *Light-duty automotive technology and fuel economy trends: 1975 through 2003*. Washington: USEPA.

USEPA (United States Environmental Protection Agency) (1999), *Indicators of the environmental impacts of transportation*, EPA report number 230-R-99-001. Washington: USEPA.

USEPA (United States Environmental Protection Agency) (1996), *Indicators of the environmental impacts of transportation*. EPA report number 230-R-96-009. Washington: USEPA.

Vasconcellos, E. (2001), *Urban transport, environment and equity: The case for developing countries*. London: Earthscan.

Voorhees Transportation Policy Institute (2005), *Pedestrian-friendliness scorecard*. Web document, http://www.smartgrowthgateway.org/howsmart.shtml#ped.

Walljasper, J. (2005), *New lessons from the old world: The European model for falling in love with your hometown*. E-magazine, April 2005.

Wentz, L. (2002), *Global marketers spend $71 billion*. Advertising Age, 11 November 2002.

West, S. (2004), *iPod-crazed youths invade London station*. The Register, 4 November 2004. http://www.theregister.co.uk/2004/11/04/mobile_clubbing.

Whitelegg, J. (1997), *Critical mass: Transport, environment and society in the twenty-first century*. London: Pluto Press.

Whyte, W. (1988), City: *Rediscovering the center*. London: Doubleday.

Wiggins, P. (1993), *Streets, traffic and trade, Research Report 6*. Leicester: Leicester Environment City Trust.

Wikipedia (2005a), *List of carfree places*. Web site accessed on 13 March 2005, http://en.wikipedia.org/wiki/List_of_carfree_places.

Wikipedia (2005b), *Flash mob*. Web site accessed on 24 February 2005,

Willoughby, C. (2000), *Managing motorization*. World Bank Discussion Paper, TWU-42, Washington: World Bank.

World Bank (2001a), *Cities on the move: A World Bank urban transport strategy review*. Washington: World Bank.

World Bank (1996), *Sustainable transport: Priorities for policy reform*. Washington: World Bank.

WBCSD (World Business Council for Sustainable Development) (2001), Mobility 2001: *Mobility at the end of the twentieth century* (Geneva: WBCSD).

World Carfree Network (2005), *Free NYC cyclists campaign*. Web site accessed on 19 August 2005, http://www.worldcarfree.net/nyc/index.php.

WHO (World Health Organization) (2005), *Noise and health*. Web site accessed on 22 July 2005, http://www.euro.who.int/Noise.

WHO (World Health Organization) (2004): *World Report on Road Traffic Injury Prevention*. Geneva: WHO.

WHO (World Health Organization) (2003), *Injury chartbook*. Geneva: WHO.

WHO (World Health Organization) (2000), *Air pollution*. Fact sheet number 187, Geneva: WHO.

WRI (World Resources Institute) (1999), *Urban air pollution risks to children: A global environmental health indicator*. Washington: WRI.

WRI (World Resources Institute) (1998), *World resources: A guide to the global environment 1998-1999*. Washington: WRI.

Worldwatch Institute (2003), *Vital signs 2003*. Washington: Worldwatch Institute.

Wright, L. (2004), *Bus rapid transit planning guide*. Eschborn: GTZ, http://www.sutp.org.

Wright, L. and Fulton, L. (forthcoming), *Climate change mitigation and transport in developing nations*. Transport Reviews.

Wright, L. and Montezuma, R. (2004), *Reclaiming public space: The economic, environmental, and social impacts of Bogotá's transformation*. Paper presented at Walk21-V Cities for People, The Fifth International Conference on Walking in the 21st Century, 9–11 June 2004, Copenhagen, Denmark.

Xinhua (2004), *Unhealthy lifestyles cause disease among one third of Beijing residents*. Xinhua News Agency, 31 March 2004.

Xinhuanet (2005), *Shenzhen drivers walk to work on 'car-free day'*. Xinhuanet News Service, web document, http://news.xinhuanet.com/english/2004-06/11/content_1521766.htm, 11 June 2005.

Zegras, C., 1998, *Used vehicles in Perú: Effects on motorization, energy and emissions*. Washington: International Institute for Energy Conservation.

Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH

Dag-Hammarskjøld-Weg 1-5
P. O. Box 5180
65726 Eschborn
Germany
Telefon +49-6196-79-1357
Telefax +49-6196-79-7194
Internet: http://www.gtz.de

commissioned by:

Federal Ministry
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