Future Urban TRANSPORT

VREF Report 2008:01

VREF
VOLVO RESEARCH & EDUCATIONAL FOUNDATIONS

Content

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Production: Capito AB, Copy: Mette Hultgren, Graphic design: Pelle Björkman & Heli T Björkman, Printed by: Prinfabriken AB

Photographs: Cover Pontus Johansson, p. 2 Richard Baker/Corbis, p. 4 Paulo Fridman/Corbis, p. 5 Claro Cortes/Reuters /Corbis, p. 6 Pontus Johansson, p. 7 Ken Straiton/Corbis, p. 8 Anna Emilia Lundgren/Johnér, p. 9 Anette Andersson, p. 10 Alan Schein Photography/Corbis, p. 11 Kevin Phillips/Gettyimages, p. 17 Martin Harvey/Corbis, p. 18 Fakey, p. 19 Richeck, p. 20–21 BrandX, p. 23 Yann Arthus-Bertrand/Corbis, p. 24 Peg Skorpinski, Yuwei Li, p. 25 Lixian Hu, p. 26 Atlantide Phototravel/Corbis, p. 27 Andrew Holbrooke/Corbis, p. 28 Pontus Johansson, p. 29 Time & Life Pictures/ Getty Images, p. 30 Robert Essel/Corbis, p.32 Joel W. Rogers/Corbis & Per Westergård, p. 34 Bob Sacha/Corbis p. 35 Ron Watts/Corbis and p. 39 Scott Stulberg/Corbis.

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Cover: The Public Transport Authority in the region of Västra Götaland in Sweden operates the boat traffic in the south archipelago. There are two different routes on the harbor traffic, Älvsnabben and Älvsnabbare. The boats depart from the terminal at Saltholmen, easily accessed by tram, bus, bicycle or car.

Dealing with transport complexity

The Future Urban Transport (FUT) program – how to deal with complexity – is a research program financed by the Volvo Research and Educational Foundations (VREF). The overarching aim of VREF is to contribute to the development of sustainable transportation systems.

Today, some three billion people live in cities – more people than live in rural areas – and the urbanisation continues. Within a couple of decades another two billion people are expected to move to cities, nearly all in developing countries. Urbanisation goes together with industrialisation and development and the search for a better life.

People move to cities in order to move around in cities. Increasing standards of living increase the value of time and thus the search for faster transport and the increasing access that faster transport brings again widens the opportunities.

The scale of urbanisation now taking place globally is unprecedented and so are the challenges that cities have to meet when setting up and organising an urban transport system. Many cities are becoming overwhelmed by the combination of rapid growth of population and increased pressures for transport that the increased standard of living brings. Congestion slows cities down and makes the search for new opportunities that much harder.

Urban transport is rapidly becoming one of the major headaches of political leaders on city, regional and even national levels.

A sustainable urban transport system has to be cost-effective, give adequate access also for the poor; and reduce the environmental foot-print compared to today's urban transport. It requires enormous amounts of investments in infrastructure as well as sophisticated organisations than know how to operate the infrastructure and the services.

Part of the challenge is technological but the much bigger challenge is institutional, organisational and financial. So far no city has come close to a reasonably sustainable transport system.

Transforming today's urban transport into a sustainable system is a huge challenge. Transport is a fundamental element of a hugely complex urban social and economic fabric extended over large amounts of land. Urban transport is therefore in itself is a complex system where intervention in one place or of one kind can have unforeseen consequences in totally different places or aspects. Learning to understand this complexity is a key condition for managing this transformation.

ABOUT VREF

VREF – Volvo Research and Education Foundations – was established in 2000, when four foundations, each of which finances research and education in different areas, united under a common goal and created the FUT program. The founders and contributors to VREF are: the Volvo Research Foundation; the Volvo Education Foundation; the Pehr G. Gyllenhammar Foundation; and the Håkan Frisinger Foundation for Transport Research. All four of these foundations support a number of research and educational programs.

VREF is governed by a Board of Directors and a Scientific Council. The Board establishes policy and decides what research will be supported, and is responsible for long-term asset management for VREF. The Scientific Council is responsible for scientific reviews of both funding applications submitted to VREF and the research performed under its auspices.

VREF assets are comprised of the original contributions that were made by its founders, additional subsequent contributions made by the founders, and income acquired through the management of the foundation's assets.

The FUT program was initiaed in the year 2000 with this goal: coping with the complexity of urban transport with the aim to make urban transport more sustainable.

Three cornerstones

The FUT program rests on three cornerstones: a number of Centers of Excellence (CoE) with the goal of establishing an international network built on collaboration within and across scientific disciplines; a somewhat larger number of so-called Smaller Projects (SP) that complement the research at the CoEs and emphasize the role of young researchers in creating new knowledge; and regular FUT conferences that assemble FUT researchers as well as politicians, city planners, industrialists and other stakeholders. The research at every CoE is designed based on the insight that future transportation systems will be extremely complex. An interdisciplinary effort is required to develop new and better-adapted knowledge about how to handle an increasingly multifaceted development in large cities – and to arrive at useful and sustainable solutions. Every CoE is financed by VREF for five years at a level of SEK25 million. It is encouraged that each Center will also attract additional funding.

It is important to consider local and regional conditions when exploring transportation solutions. Therefore, VREF is currently supporting seven Centers of Excellence in four regions of the world. To ensure the relevance of the research performed, the researchers at all of the Centers work in cooperation with the intended end users of their results. End users can include everyone from traffic and city planners to politicians, government agencies, policy makers and stakeholder organizations.

Parts of the whole

The Smaller Projects supported by VREF create opportunities to perform research on narrower questions related to key aspects of future urban transportation. Grants normally cover the cost of one researcher – often a doctoral student – for a period of two years, with the possibility of extension for an additional two years. The grants range in size from 250 to 750 thousand Swedish Crowns (SEK) per year.

FUT conferences are intended to provide links between the researchers in the program and between the researchers and stakeholders. The purpose is to create a platform where the main actors responsible for development and for urban transportation systems can meet and share experience. The conferences are organized by VREF's Scientific Council and are held every two to three years. Thus far, three conferences have been held and a fourth is planned for the spring of 2009.

ABOUT COE

Through the FUT program, VREF currently finances seven Centers of Excellence in four regions of the world. The Centers are: the Australasian Centre for Governance and Management of Urban Transport (GAMUT), University of Melbourne, Australia; the UC Berkeley Center for Future Urban Transport, University of California, USA; the OMEGA Centre for the Study of Mega Projects in Less Motorised Countries: Research and Training, Indian Institute of Technology, New Delhi, India; the Center for Sustainable Urban Development, Columbia University, New York, USA; the African Centre of Excellence in Transport, University of Cape Town, South Africa; and CUSTReC, Beijing.

Research influencing development

The Volvo Research and Educational Foundations want to participate in the formation of tomorrow's cities. Urban transportation systems will need to provide accessibility for the masses while at the same time radically reducing transportation's negative local and global environmental impacts.

Urbanization is occurring at a furious pace and is driven by individuals' desire for a better life. Cities are beacons of enlightenment. They provide opportunities for employment, education and healthcare as well as social and cultural activities. As standards of living in cities increase, motorization and the local, regional and global environmental problems associated with it increase accordingly. Congestion increases, mobility decreases and economic development slows. "This type of development cannot continue. Another path must be designed. Cities have always been the motor of development, where the city represents opportunity and emancipation. We must participate in the efforts to create reasonable urban environments for all urban dwellers, young and old, rich and poor," says Arne Wittlöv, Chairman of the Board for the Volvo Research and Educational Foundations (VREF).

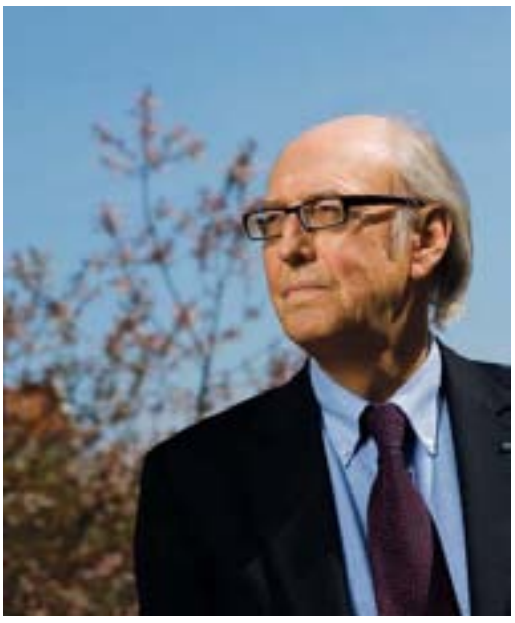
Complex questions

VREF's research program Future Urban Transport – How to deal with complexity, aims to influence the development of transportation systems that are sustainable and accessible for all. The questions and challenges are complex, since issues and subsystems are often closely connected and mutually influence each other. The research that VREF invests in covers traffic safety, energy efficient transportation systems, accessibility, how decisions are made, and how policies are shaped.

"Urbanization and motorization proceed rapidly while physical and institutional infrastructure change slowly," says Wittlöv. Institutions and decision-making processes are bottlenecks that must be overcome in order for modern technology to be utilized in the best interest of the majority of the population. Barriers and conditions differ from region to region, and the work at the VREF Centers around the world must be based on their specific regional contexts and political processes. "But researchers in this field also have a lot to learn from each other. We see a strength, therefore, in creating a global knowledge network between the different research Centers," says Arne Wittlöv.

Influencing development

VREF's overarching vision is to contribute to improving mobility for people in general. "We contribute by supporting research and education about policy development and, to some extent, technological development. We have an opportunity to



"Urbanization and motorization proceed rapidly while physical and institutional infrastructure change slowly. We must participate in the efforts to create reasonable urban environments for all urban dwellers, young and old, rich and poor," says Arne Wittlöv, Chairman of VREF's Board of Directors.

influence development by steering calls for proposals toward the areas that we have identified as of critical importance for future development. We see VREF's Centers as investments in a portfolio. It is the composition of the portfolio as a whole that contributes to influencing decisions and formulating a research agenda for urban transportation," says Wittlöv.

In the future VREF intends to steer calls for proposals even more strongly toward areas that the Board and the Scientific Council believe need further research. Bus Rapid Transport (BRT, transportation systems with networks of buses that utilize designated bus lanes that allow relatively high speeds, simplified ticketing systems, etc.) is one such area. "How a city elects to organize its transportation system has a decisive influence on how the city's population plans its transportation. A transportation system that is reliable and relatively inexpensive leads more people to choose it over other modes. Such transportation systems provide the city's inhabitants with the possibility of reaching new workplaces without the city coming to a stand still as a result of increased traffic," says Arne Wittlöv.

Another area that needs more research, according to VREF, is the economics and financing of urban transportation. Seen broadly, financing encompasses a lot of things; everything from questions of what an effective transportation system means for a city's economic development, and what principles should govern how income from taxes and fees should be allocated to different type of infrastructure, to how much a bus ticket should be allowed to cost and who should pay for it. A third area where more research is needed is urban freight.

"We look closely at how researchers will disseminate their knowledge as a basis for all of our funding decisions. We require a close relationship to the region and society that the researchers are working in. We see ourselves not as a research council but, rather, as investors in research, because we want results that will come to practical use. That means that we actively follow our Centers and stimulate contact with users and practitioners," says Arne Wittlöv.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Three tools for future urban transportation

The research program Future Urban Transport is comprised of Centers of Excellence, Smaller Projects, and conferences that tie them together. The common thread is sustainable transportation systems that are accessible to all.

At the turn of the century the Board decided to focus activities on the subject of Future Urban Transport (FUT) with the subtitle, "How to deal with complexity." The Board decided to shift from financing individual projects focused on closely-related questions to supporting a smaller number of larger interdisciplinary research centers (Centers of Excellence, CoE) for a period of five years. "The background to this decision was the developments we see toward increased population, an ever faster pace of urbanization and, with it, growing motorization – primarily in rapidly growing urban areas. These developments create pressure to solve large and complex problems regarding how transportation systems are organized, designed and can be integrated in an environmentally sustainable way that includes all inhabitants – even the poorest," says Henrik Nolmark, Administrative Director of VREF.

Collaboration

VREF currently finances seven Centers of Excellence (CoE) spread across four regions of the world: Africa, Asia, Australia and North America. Each Center receives approximately 25 million Swedish Crowns in total financing over a five-year period. What distinguishes the Centers is that they apply an interdisciplinary approach to illuminating several aspects of relatively wide subject areas within FUT. For example, in New Delhi the research is about developing a transportation policy for the city and includes studies of how decisions are made as well as what type of public transportation is most effective, and how public transportation should be implemented and financed and by whom. It is about illuminating a single but broad question while placing it in a larger context. "Such complex questions require an interdisciplinary approach, which is why researchers from several different scientific disciplines participate at every Center," says Henrik Nolmark.

Every Center must include practitioners in some way – such as employees of government agencies, various decision makers, operators and others – in order to involve those in every region who are involved in making or implementing decisions regarding transportation systems.

In addition to the Centers, FUT finances

"The Centers should be able to cross-fertilize each other. We are exploring how to optimize knowledge transfer between the different research groups and between researchers and practitioners," says Henrik Nolmark, Administrative Director of VREF.

so-called Smaller Projects of shorter duration as well as FUT conferences. Henrik Nolmark describes the different components as FUT's primary instruments, where projects focus on a relatively low system level, the Centers at a significantly higher system level, and where conferences are used to clarify and transfer knowledge and identify new questions and directions at the highest system level. "When we began the work of creating the structure for FUT, we realized fairly quickly that another type of meeting place was needed where the different researchers could exchange knowledge and experience. The conferences are also a way to facilitate the transfer of knowledge between researchers and those who implement different decisions," says Henrik Nolmark.

Useful results

All of the Centers, projects and conference participants, together with external participants, form a network for sharing knowledge and experience. The hope is to be able to keep the network alive, even after a project or Center has come to an end. "To strengthen the network and work on narrower sub-areas, with researchers as well as practitioners, we also work with smaller thematic workshops in between conferences," says Nolmark.

The actual transfer of knowledge – both from academics to practitioners and vice versa – is of course central to VREF and a question that staff works actively with. The money that VREF invests in research and education is intended to create useful new knowledge that is applied and that influences development. According to Henrik Nolmark, the next FUT conference will primarily be about this issue. "It is in part about the best ways of transferring knowledge from researchers to practitioners, but also to a large degree about getting practitioners to describe their experience, and which problems are really difficult, to the more theoretically-focused researchers. It is about involving recipients and users of research results early on in the process of formulating the questions, so that researchers understand and illuminate the really important issues," he says.

Research and advocacy

Technology is not what is missing when it comes to introducing ecologically-sustainable transportation systems. It is old ways of thinking and outdated structures that get in the way. That's why researchers at VREF's CoE in Melbourne are actively participating in a debate aimed to bring about change.

"We will have achieved our desired result when we have succeeded in influencing the government to change its thinking, when climate change and peak oil take precedence over congestion, and when low carbon transport is the main game," says Nicholas Low, the Director of GAMUT.

To realize the vision of sustainable transportation, the Australasian Centre for Governance and Management of Urban Transport (GAMUT) aims to influence governments. Cooperation rather than confrontation is GAMUT's approach, asking politicians to weigh the facts before making decisions about future transportation. "The longstanding norm in Australian politics has been that the government makes proposals, which then come under attack. Our Centre is trying to change that, so that we attain instead a relevant debate about what is important for the future and how we can achieve an ecologically-sustainable transportation system," says Nicholas Low, Professor of City Planning and Director of GAMUT.

Barrier to new solutions

Low believes that the Centre is beginning to get results, in the form of improved cooperation amongst different arms of the government. But decision makers are still stuck in outdated organizational structures and traditional ways of thinking. That is perhaps the greatest barrier to new solutions for achieving an ecologically-sustainable transportation system. For example, a government inquiry in Melbourne recently proposed a new road tunnel to solve traffic congestion. "We have been active in the debate, because we believe that the construction of yet another road tunnel does not address climate change and won't contribute to sustainable transportation for Australia," says Low.

Conventional traffic research is primarily about transportation technology and refining models for understanding demand and travel patterns. "Our research focuses on the political-institutional level of transportation instead, where we identify institutional solutions to transportation problems. We are probably the only Centre in FUT that is focused on changing governance and management," says Nicholas Low.

One research theme at the Centre is about innovations and barriers to change. The Centre is illuminating the path dependence of transportation institutions, which are locked into car and road-based solutions that stand in the way of adopting necessary new policies. "Key government agencies are doing what they have always done, in the way they have always done it. These ways are not well suited to tackling today's key issues of climate change and peak oil. We believe that climate change is not only a result of market failures, as the Stern report claims, but just as much a failure of governance. We are trying to understand institutional histories so that they can adapt better to the environment of the twenty first century," says Low.

The Centre's vision is to create a society characterized by less dependence on fossil fuels, where private cars are less dominant and city planning is improved to avoid urban sprawl (the problem of cities growing without truly integrated planning for their expansion). "To avoid the spread of such unsustainable patterns to developing countries, we have to begin at home. Although we have good links with our East Asian region, GAMUT is strongly focused on solving problems in Australia. We cannot require that developing countries work

with sustainable transportation systems before we've cleaned up our own act. That's why our research focuses on cities whose transportation systems are highly dependent on cars. In this respect Australian cities have much in common with those of North America," says Nicholas Low.
The work at the Centre has three dimensions: pure research, advocacy, and education. The researchers come from disciplines such as town planning, engineering, political science, environmental management, and sociology. Five doctoral students are funded through GAMUT, and the Centre presently offers two courses in the Master of Urban Planning program, in addition to existing transport planning subjects. In the future GAMUT will offer a full major in Sustainable Transport in this Master's Course, as well as training workshops for professionals.

Three types of users

The Centre aims to reach three types of users: government professionals in transportation and planning ministries; private companies interested in sustainable development; and NGOs such as the Public Transport Users' Association. One of the Centre's research topics is about trying to see how optimal public transportation networks should be designed and managed and how different transportation modes can be integrated. "We want to find the world's best examples of urban transportation systems. We are also trying to create better procedures for evaluating transportation projects, in order to apply the best available knowledge to the design of new systems," says Nicholas Low.

Traffic planning and behavior

The Centre is carrying out several case studies in large cities, in Australia as well as Shanghai, Singapore, Tokyo and Hong Kong, together with researchers from each city. In Shanghai GAMUT is exploring the changing institutional basis of transportation planning and the social impact of the metro system.

In another sub-project, GAMUT is studying children's independent mobility. Today children in Australia are as dependent on cars as their parents. One of the reasons is they are driven to school and other activities instead of, for example, walking or cycling. "One reason for this behavior is the lack of safe paths and places, bike lanes or sidewalks, necessary for them to be able to move independently," says Nicholas Low.

In another project, researchers are analyzing Australia's transportation budget. The purpose is to see how money is intended to be spent and how it is actually used. "We have discovered that budgets are far from transparent, which makes it difficult to see how money has been used. We are working to achieve better transparency and consultative processes that make it possible to ensure that budgeted funds are used correctly," says Nicholas Low.

GAMUT

Activities under the auspices of the Australasian Centre for Governance and Management of Urban Transport (GAMUT) were launched in 2006 and will continue through 2010. The Centre is financed by VREF (SEK25 million), the VREF OMEGA Centre (SEK1.37 million), Melbourne University (SEK2.5 million), and through a range of contract research projects (approximately SEK250 thousand). The Centre employs 14 researchers, of which five are doctoral students.

Road Safety and Urban Transport Planning

During its first five years, VREF's first Center of Excellence – in New Delhi – has explored a range of transportation questions, from increased safety for pedestrians to developing traffic planning and policy making.

Sustainable Urban Transport in Less Motorized Countries: Research and Training in New Delhi was the first Center of Excellence financed by VREF. The Center was launched in April of 2003 and research has been carried out in a number of areas, including Bus Rapid Transport Systems (BRTS), pedestrian behavior at intersections, air quality in Delhi, and helmet optimization.

The Center has also been involved in developing an urban transportation policy for Indian cities. That work has included analyses of how decisions are made and what types of public transportation are the most effective, as well as how they should be financed and implemented. Perhaps the greatest success for the researchers is that the Center now has an advisory role with the Indian government. "We have direct contact with decision makers such as the Minister of Transport, and we have even succeeded in convincing the government to establish an agency for road safety. We are also official members of most of the committees that work with road safety and traffic planning," says Dinesh Mohan, Professor of Biomechanical Engineering and Director of the CoE in New Delhi.

Sustainable transportation

There are 35 cities in India with populations that exceed a million people, of which three have over ten million inhabitants. In another five to eight cities the population is expected to grow to between five and ten million. That creates a large need for public transportation and planning for it.

The Center's researchers have, under the course of the program, discussed and gained approval for their projects with diverse stakeholders, such as traffic planners, policy makers, business people, traffic police and politicians at the local and national levels. Through the dialogue, the researchers have been able to observe a range of needs and aspects of traffic planning. The Center has also helped in the development of a National Urban Transport Policy that has been formally accepted by the government. An important part of the policy plan is the clearly identified need for improved bus systems in a number of Indian cities. That has, in turn, led to the development and implementation of Bus Rapid Transit Systems in five cities: New Delhi, Pune, Jaipur, Indore and Ahmedabad.

In simple terms, BRTS can be described as effective transportation systems with buses that drive in dedicated traffic lanes. Accessibility is an important element of BRTS and the cost of bus fares for passengers is relatively low. The goal of BRTS is to be able to transport more people with fewer vehicles than is the norm today. "But it is also about addre ssing the problem of emissions and achieving a shift in choice of transportation mode, from cars to public transportation. The problem with CO_2 emissions and how to reduce them is gaining increasing attention in India, so we are moving in the right direction," says Geetam Tiwari, who leads the transportation group at the Center.

The way forward to a finished system has been lined with a number of questions, both with respect to physical conditions

"Here at the Center in New Delhi we have had significant influence, at both the national and local levels. We have been given a role in national planning. Now we are trying to get involved in all of the large cities in the country," says Dinesh Mohan, Director of the CoE Sustainable Urban Transport in Less Motorized Countries: Research and Training in New Delhi.

such as road quality and to how decisions are made and gain acceptance. "Urban transportation planning is a complex field and requires the integration of knowledge from several disciplines. For that reason, the Center has been interdisciplinary from the beginning and has involved researchers from engineering to economics," says Tiwari. We expect that New Delhi will be the first city in India to fully implement BRTS by the end of this year. The construction and introduction of the system has required a new road design that includes designated bus lanes and also more space for pedestrians and bicyclists.

Non-motorized transport

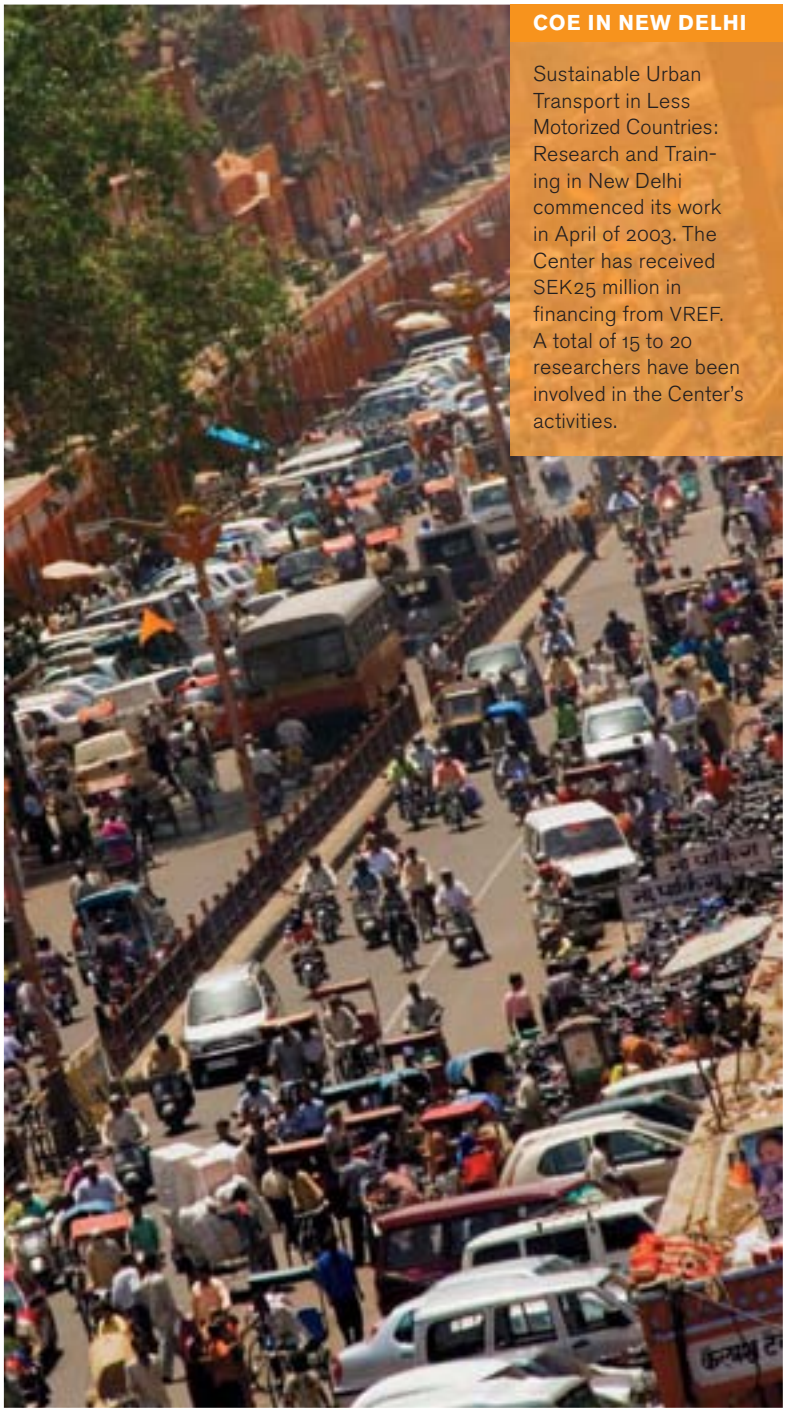
Roughly 40 percent of all transportation in Indian cities is – and will remain – non-motorized. Therefore, the Center has been interested in increasing traffic safety for individuals using non-motorized modes of transportation and reducing the number of accidents resulting in fatalities. Researchers have explored pedestrian behavior at intersections, which has led to a proposal as to how traffic signal systems can be modified to avoid injury to pedestrians. "Urban transport planning for vulnerable road users is an important area of research. One of our smaller projects, for example, is about creating guidelines for the design of cars and bus stops that are safer for pedestrians. There is no formal standard for this in India. We are working, therefore, with Indian industries to create one," says Mohan.

Continued research

In the original plan, activities at the Center were expected to be concluded at the end of 2008. But the Center will continue its work for an additional three years, partially funded by VREF. "The financing from VREF provides us with stability and enables us to continue our work while we seek funding from other supporters for future projects. There is no question that additional research is needed," says Dinesh Mohan.

One of the tasks that lie ahead for the Center is to evaluate the effects of introducing BRTS. Experience from the first BRTS projects needs to be collected so that traffic and community planners, politicians and others can utilize it in the planning and development of new systems. Empirical data is lacking today on, for example, fuel consumption and the effects of BRTS on choice of transportation mode. "How many people actually use the buses and how many of these that actually elect to park their cars and take the bus instead are important questions that need to be evaluated. This is about how to achieve sustainable development in India with respect to transportation. We need to compare the effects of different transportation systems, such as subways, trams and buses to determine what is best for India," says Geetam Tiwari.

Another task that the Center has taken on is producing textbooks on traffic safety. "Today there is no course literature about traffic safety, so we are going to spend the next three years producing teaching materials that can be used for university courses," says Mohan.



COE IN NEW DELHI

Sustainable Urban Transport in Less Motorized Countries: Research and Training in New Delhi commenced its work in April of 2003. The Center has received SEK25 million in financing from VREF. A total of 15 to 20 researchers have been involved in the Center's activities.

Needs-based transport research

The African Centre of Excellence in Public and Non-Motorised Transport (ACET) aims to produce better analytical methods and models of transportation systems, for infrastructural development in a region where pedestrians and paratransit are important.

"One of our goals is to create a knowledge base for Africa. We want to catch up and contribute to international research while at the same time developing academic knowledge that is specifically adapted for different stakeholders in our region," says Roger Behrens, Director of the African Centre of Excellence in Public and Non-Motorised Transport.

ACET is the most recent research center in the Future Urban Transport program. The Centre is a joint effort between the Centre for Transport Studies at the University of Cape Town (South Africa), the Institute for Development at the University of Nairobi (Kenya), and the Department of Transportation and Geotechnical Engineering at the University of Dar es Salaam (Tanzania). Researchers from several disciplines – including development economics, city planning and engineering – will collaborate on the Centre's 12 sub-projects. The Centre was launched in January of this year and is in full swing with initiating activities.

"We are a rather unusual center, in that we are working together with two additional African universities. One of our primary aims is to contribute knowledge, methods and analytical models about the specific conditions that exist in our region with respect to transportation systems and needs. Our target audience includes decision makers as well as operators in the transportation sector," says Roger Behrens, Associate Professor at the Centre for Transport Studies at the University of Cape Town and Director of ACET. In the field of international transportation research, scientific studies from South Africa and the rest of Africa are few. The Centre aims to create a knowledge base for Africa. "We want to catch up and contribute to international research while at the same time developing scientific knowledge that is specifically adapted for different stakeholders in our region," he says.

Research at the Centre will focus on two themes: contributing to improving and integrating so-called paratransit systems that integrate private taxis, minibuses, etc. into public transportation systems; and studying the needs of the non-motorized segment of the transportation sector (pedestrians, bicyclists, vehicles drawn by animals, etc.). The researchers will also work to produce better tools for decision making.

Informal transportation

Paratransit systems consist of minibuses that provide intermittent, unscheduled services and are partially or not at all regulated. They belong to the informal service sector. Such systems are widespread in developing countries. "We intend to explore how paratransit systems can be integrated into the formal transportation system. To succeed we must first understand what the driving forces are that motivate operators in such systems. We also need to show them how they could be included in the formal transportation system and the benefits that would arise from this," says Behrens.

In a program that was carried out in Cape Town – the Taxi Re-capitalization Program – the government offered vehicle owners 50 000 Rand to scrap their minibus-taxis. The goal of the program was to improve passenger safety and comfort by replacing unroadworthy vehicles, and to reduce the number of operators within an overtraded sector characterized by occasionally violent competition. Of the original ~120 000 paratransit vehicles, only 13 000 have, several years later, been scrapped. "There are additional examples of projects with similar goals that have

all failed, primarily because the underlying operating conditions and realities were not sufficiently understood. That is why we must begin by carefully analyzing the motives of operators, and how they might respond to plans to rationalize and improve public transport systems," says Roger Behrens.

The importance of walking

The other theme – non-motorized transportation – represents a significant part of total transportation in many parts of the world. Accounting for all trip purposes throughout the day, upwards of 40 percent of the populations of Cape Town, Dar es Salaam and Nairobi move by foot. And walking is the dominant mode of transportation in the countryside. "Above all, walking is the most common mode of transportation for the very poor, who cannot afford to pay for public transportation. Pedestrians are almost always overlooked in international traffic research. We will give them the place they deserve," says Behrens.

The transportation problem in urban environments is usually defined as how to avoid congestion and how to build roads that can absorb an ever growing quantity of traffic. Pedestrians have therefore been overlooked. "We need to understand pedestrians and their needs in the same way that we analyze other modes of transportation. And we need to plan infrastructure systems that cater to non-motorized transportation just like we plan for roads that cater to cars," says Roger Behrens.

End-users for our results

Users of the Centre's results can be found among private entrepreneurs within the paratransit sector and among government agencies, decision makers and their advisors. Developing good strategies for decision making is an important part of developing public transportation systems. "That's why we want to develop effective methods that can be used by decision makers at different levels. They must be based upon relevant analyses of the existing transportation system and take the transportation needs of several different actors into account. We have seen too many poor public investment decisions in the public transportation sector."

One of the Centre's goals, therefore, is to assist those responsible for all types of transportation infrastructure, by providing them with better information to base their decisions on. The Centre is creating a network where researchers, city planners, politicians and other decision makers meet regularly. The network is intended to improve understanding about transportation needs, what kind of knowledge is lacking among practitioners, and where researchers should focus their efforts. "We hope to be able to create tools that help decision makers to make relevant decisions," says Roger Behrens.

ACET

The African Centre of Excellence in Public and Non-Motorised Transport is a joint effort between three educational centers: the Centre for Transport Studies at the University of Cape Town (South Africa), the Institute for Development Studies at the University of Nairobi (Kenya), and the Department of Transportation and Geotechnical Engineering at the University of Dar es Salaam (Tanzania). Approximately 18 researchers collaborate on 12 sub-projects under the auspices of the Centre. VREF has provided ACET with SEK25 million in financing for the period 2008 through 2012.

Judging Success in Mega Transport

By comparing the development of 35 large transportation systems around the world, the OMEGA Centre has collected and is examining information concerning what is required for these projects to succeed in the 21st Century.

As cities grow, so do the number, size and complexity of so-called Mega Urban Transport Projects (MUTP). For the purposes of the Centre's study, MUTP are defined as large investments in public transportation infrastructure, costing in excess of half a billion US$ (at 1990 values) These include railways, bridges, tunnels and freeways, or projects that combine several different types of links. In a comparative study of 35 larger MUTP in Asia, Australia, Europe and the United States, the OMEGA Centre at University College London is exploring how decision making related to planning, appraising and evaluating MUTP has taken place, and what the effects of the projects have been. "The fundamental question that we want to answer is, what characterizes a successful project? In a world where urbanization is increasing and uncertainties are rapidly growing, concerns about issues such as climate change cause us to look more carefully at the risks and uncertainties of alternative scenarios in our analyses," says Harry Dimitriou, Professor of Planning Studies and Director of the OMEGA Centre.

The purpose of the c omparative study is to learn from previous MUTP and make the knowledge gained available for future projects. "It is a little surprising that similar studies have not been carried out earlier, especially because there are more and more MUTP, and they are increasingly expensive and complex. We need to collect both general and context-specific experience that can be useful for future projects," says Dimitriou. It is about both understanding the complexities of every project and understanding the complexity of the interplay with the rest of society. The structure of political institutions and how decision making takes place significantly influence a project's design and its results. "That means that some experience is applicable to other projects under certain specific conditions. The structure of political institutions and the resources one has at one's disposal create different possibilities and different results," says Harry Dimitriou.

Useful information

The Centre has elected to focus on large transportation projects in urban areas, or areas connecting cities and/or metropolitan regions in the developed world. The Centre collaborates with 11 academic partners in as many countries. Each academic Partner collaborates in turn with several local stakeholders. The dialog between academics and the local stakeholders is important for achieving relevant results.

One question being studied at the Centre is to what extent visions of sustainable dev elopment are planned into projects and what the frictions are between the local and international needs for such projects. "We are aware that 20th Century criteria were dominated by economic growth aspirations, but given the current grave concerns about climate change, emissions, energy shortages, credit crunches, equity imbalances etc., it is much more difficult to discern what a 'successful' project is today. Making sense of the changing priorities between these concerns and their relationship to economic growth aspirations requires an understanding of complexity and dynamic complex systems

"The purpose of our research is to attempt to explain what characterizes successful Mega Urban Transport Projects (MUTP) in the 21st Century in an increasingly globalized world," says Harry Dimitriou, Director of the OMEGA Centre.

THE OMEGA CENTRE

The OMEGA Centre for the Study of Mega Projects in Transport and Development, Bartlett School of Planning, at University College London, is a five-year research program that commenced in October 2006. The Centre is financed by VREF (SEK25 million) and the South East England Regional Development Authority (SEK 50 000). The Taiwanese Government is planning to contribute a further SEK 100 000. Other modest contributions have also been made directly to various individual OMEGA partners by their local and national government agencies and private sector parties.

that goes far beyond traditional appraisal methodologies" Dimitriou says.

Web-based database

In the past, clear divisions existed between the perceptions and interests of politicians, entrepreneurs, corporate stakeholders and academics about the expectations of MUTP, across which very often little was shared. The Centre, as a result, has an explicit goal to disseminate the knowledge it acquires to all parties interested in MUTP developments. "The purpose of the project is to acquire knowledge that is useful for policy makers and planners in the public and private sectors, as well as among infrastructure investors, politicians and others interested in MUTP decision making. It is not about creating an exclusive international knowledge network for academics," says Harry Dimitriou. One of the major ways the Center will disseminate knowledge is by creating a web-based database with mounting information about the various case study projects. It is to be supported by in-depth related specialist reports produced by the Partners over the duration of the research program.

Story telling

Each case study database will be complimented by a story-line and related narratives. These will clarify: how decisions were made in the planning and appraisal of the MUTP; what analyses were used to support different decisions that led to their implementation; why the costs of the various measures/phases were estimated to be at the level they were; and why they finally cost what they did. "The narratives will offer insights that cannot be discerned from the technical documentation or statistics. They promise to give us a totally new appreciation of how many priorities were set and changed over time. We consider this aspect of the study one of the most innovative of our research."

Each of the reported narratives and insights is based on interviews conducted with key MUTP stakeholders. "The stories that emanate from these sources illustrate and reinforce the complexities of both the MUTP themselves and the decisions that contributed to their conception, planning and construction. Every country and project has its own background and stakeholders, with their own stories of why projects have been successful or not. By systematically comparing the different MUTP and the contexts in which they were planned and implemented, we expect to be able to draw significant conclusions about why certain countries have been good at implementing MUTP and others have not, and the important role of effective planning and decision making in determining success or failure," says Dimitriou.

Land use and transport planning

The Center for Sustainable Urban Development (CSUD) in New York aims to contribute to achieving physically and socially sustainable cities, by establishing research and educational exchanges with cities in developing countries, particularly with cities in Sub-Saharan Africa.

"We have already made progress. The national government has realized that there is a need for coordinated city and traffic planning for Nairobi and its satellite cities," says Elliot Sclar, Director of CSUD.

Africa's cities are growing faster than those in many other places in the world. The United Nations estimates that the number of people residing in African cities will grow from 210 million in 2000 to nearly 522 million in 2025. Therefore, the need for transportation and infrastructural planning is large. One problem is that cities often grow faster than the infrastructure needed to support them. For that reason, the Center for Sustainable Urban Development (CSUD) at Columbia University's Earth Institute in New York City is focusing on what is required to bring about integrated planning, as well as how different infrastructure and land-use plans can become useful for the development that is taking place. "We start with two premises: 1) the world today is predominantly urban, and solutions must, therefore, be globally viable while taking local perspectives and the city as a starting point; and 2) the world's resources are limited. Our primary focus is on knowledge that is meaningful for middle- and low-income countries, but we also concern ourselves with challenges in our home region, the New York metropolitan area," says Elliot Sclar, Director of CSUD.

Much of CSUD's work is centered on developing research and educational exchange with cities in developing countries, with a focus on land-use and transportation planning. The purpose of this work is to stimulate cities to develop city and transportation plans as well as sustainable development policies. The Center has, among other things, examined how information about an area of land is used, and how that information can be shared so that it becomes valuable and useful for a range of stakeholders (including, most importantly, the communities impacted). "We have focused on land use and transportation planning, which are two sides of the same coin. How land is used is central to development as a whole, and must be linked to transportation and other infrastructural investments, such as water and electricity supply," says Elliot Sclar.

Ruiru

The Center has collaborated with the Department of Urban and Regional Planning at the University of Nairobi on a project which aims to initiate a planning process for Ruiru, one of six satellite cities outside the Kenyan capitol, Nairobi. "Ruiru is 16 kilometers from Nairobi and has all of the problems that are normally associated with fast-growing cities. There are slum areas, and the city has problems with water supply and transportation. Ruiru's primary problem is that the city has not had an integrated plan for its infrastructure," says Elliot Sclar.

A first step for the Center was to map what was needed in the city, who should be involved in the process of developing both planning and policies, and strategies for their development. Researchers and students from several scientific disciplines – including international and public affairs, urban planning, public health, and economics – participated in the study, along with the Ruiru Municipal Council, land owners and other local collaborative partners. All information was then disseminated to all stakeholders. A first result of the collaboration was the crea-

tion of a physical development plan for Ruiru. "The process also resulted in increased appreciation on the part of the Kenya Ministry of Local Government for the need that all of the municipalities surrounding Nairobi have for similar land-use, transportation and infrastructure planning. We have also demonstrated the importance of involving all those who will be affected by development in planning, in order to achieve higher levels of participation and increase the chance of success when it comes to implementation," says Elliot Sclar.

The importance of institutions

One of the lessons that Elliot Sclar has learned from the project is that there are often plenty of small projects in growing cities in developing countries that work locally but that are difficult to scale up. The question is, why? "We concluded that it is often a question of how local decision making takes place and how authorities work. We can present a multitude of solutions, but they won't work unless they are locally driven and unless there is institutional infrastructure to support the process," he says.

That is why one part of CSUD's work concerns the question of access to information and how it is used. "We discovered that people in different offices sometimes sat on information and didn't share. It was often difficult to get access to relevant information. So we are creating a digital map of all of Nairobi with detailed information that will be made available to all stakeholders on the internet."

Results from the Center are intended to be useful to both academics and local users, such as the Ruiru Municipal Council, stakeholder organizations, city and societal planners, architects, landscape architects, and others. "The challenge is not going in as experts and saying what should be done, but providing information and solutions that they can really use. That is why we have made an effort to start a dialogue between different kinds of experts, interest groups and decision makers at several levels in and around Nairobi," says Elliot Sclar.

The close collaboration between academics and local actors, and the focus on disseminating knowledge, are what separate CSUD's projects from much of the research that has previously been carried out in this field. "The questions that we are exploring are not new, but the way we approach them is, as are our efforts to determine what knowledge is specific and what is general. What can we learn from each other? We hope to be able to use specific knowledge from the Ruiru effort in combination with broader regional data in an effort to help create and implement a metropolitan Nairobi transport and land-use plan; one that is environmentally sustainable and socially equitable," says Sclar.

CSUD

The Center for Sustainable Urban Development is a center within the Earth Institute of Colombia University in the City of New York. It carries out its work through partnerships between its New York based professional staff and partners at the University of Nairobi and the Kenya Institute for Policy Research and Analysis, among others. Approximately ten researchers and a varying number of students participate in the Center. The Center was established in 2004 and is financed by VREF through 2008. The Center also has partial funding from the Rockefeller Foundation, which sponsored a month-long conference titled "Innovations for an Urban World: A Global Urban Summit," which was held in Bellagio, Italy, in 2007.

Searching for new ideas

The western world's transportation systems cannot be copied by developing countries because their conditions are too different. Researchers at VREF's CoE in Berkeley are working on new ideas for sustainable transportation systems that suit conditions in both developing and developed countries.

"We can provide advice based on scientific evaluations and, thereby, help bring attention to solutions that can really improve transportation systems," says Carlos F. Daganzo, Director of the UC Berkeley Center for Future Urban Transport.

The UC Berkeley Center for Future Urban Transport was established in 2004. The Center's overarching aim is to develop new methods and solutions for sustainable transportation, addressing the specific problems of developing countries. "We don't believe that the ideas and solutions used in the industrialized world are directly transferable to developing countries. For example, many developing countries have a much larger segment of non-motorized vehicles and pedestrians. They have their own specific problems that must be solved through research that is guided by physical evidence.

We carry out experiments in real environments to test how a system can work in place," says Carlos F. Daganzo, Professor of Civil and Environmental Engineering and Director of the UC Berkeley Center. For example, experiments in Yokohama, Japan, have shown that more passengers would reach their destinations in a downtown area, with less delay and fewer emissions, if during the rush hour the number of vehicles simultaneously circulating in the downtown area were kept below a critical level."

The Berkeley Center aims both to understand effective policy making and to devise physical solutions to urban transportation problems. One example is an attempt to understand how different transportation modes can work together to benefit everyone. "We are now studying new designs for city streets and new ways of operating and placing traffic signals that should allow pedestrians, bicycles, buses and autos to coexist with minimal interference, improving everyone's mobility and safety," says Carlos F. Daganzo. Advances in information technology open the door for new urban transportation management policies that can simultaneously improve safety and mobility in all modes of urban transportation. "Our vision is to study the mutual interdependence of urban transportation policy and technology, and to use the understanding of that concept to devise sustainable transportation strategies for the world's cities," says Daganzo.

New modes of transportation

The Center sees three primary and equally important users of its results: research institutes, universities and think tanks (such as the Tokyo Institute of Industrial Science) consulting firms; and government agencies that are directly responsible for transportation policy (such as the).

The Center engages ten faculty members and many doctoral students from city planning, electrical engineering, and computer science. The research is built around five themes: Mobility & Accessibility, Adapting to Urban Form, Green Logistics, Congestion Mitigation and Wireless Infrastructure. Each doctoral student receives advice from several professors and exchanges ideas with a diverse group of fellow students, which is one way the Center integrates its research themes. "One of our themes, Mobility & Accessibility, is about gaining a better understanding of the interaction between urban structure and the provision of mobility, including emerging transportation modes, to improve accessibility fairly and sustainably," says Daganzo. For example, one of

the Center's researchers has studied the impacts of electric mopeds – so called e-bikes – in Chinese cities. E-bikes are affordable, provide good mobility, and have low emissions per passenger kilometer. But one problem with e-bikes is that they use lead acid batteries, which can create high levels of lead pollution. "In addition, charging the batteries results in significant CO_2 emissions if the energy used comes primarily from coal-fired power plants. This will be a growing problem for China, because e-bikes are getting more and more popular," explains Daganzo.

Life-cycle cost analyses

The researchers have also developed a life cycle analysis method for comparing different transportation modes, such as cars, buses and rail. Factors such as energy consumption, greenhouse-gas emissions and emissions of other pollutants are included and combined in an analysis of the entire life cycle of a transportation system; e.g. taking into account choice of materials, design, production methods, productive life, disposal and the like. "Such analyses provide valuable information that is often overlooked when considering new transportation policies," says Carlos F. Daganzo.

One of the Center's themes is about developing information technology to support the new ideas that the researchers are coming up with. For example, the Center has developed open-source middleware that makes it possible to coordinate different traffic controllers in a city and make them compatible with each other – something that often isn't possible without large costs associated with updating the entire system. "We have developed a robust and relatively inexpensive open source system that can be controlled and monitored over the Internet. Many cities in developing countries experience compatibility problems with traffic control equipment. Robust and relatively inexpensive open source systems can be built using the middleware we developed. These systems can be easily controlled and monitored over the Internet," he says.

Sustainable transportation systems

One subject that the Center has studied is how cities can better allow and plan for different types of users and modes of transportation. The researchers are exploring methods for monitoring and controlling downtown traffic. Another study illustrates that if some lanes on freeways are dedicated exclusively to cars with two or more passengers, the freeway as a whole can absorb more traffic. "We can use that knowledge to plan for a larger number of passengers and for additional modes of transportation, such as cars, buses, bicyclists and pedestrians, so that they can make better collective use of space," says Carlos F. Daganzo.

The Center is also studying how bus networks can be made more efficient and reliable. Getting people to choose buses as a mode of transportation requires, for example, that the buses keep to their schedules. Bus delays often lead to irritation and long waits for passengers. Then several buses on the same route arrive at the same time. "We are studying a system that relies on direct communication between bus drivers. The system should enable the buses to arrive at more evenly spaced intervals. That would, in turn, encourage people to choose buses instead of cars as their mode of travel," says Carlos F. Daganzo.

UC BERKELEY CENTER FOR FUTURE URBAN TRANSPORT

The Center is financed by VREF through 2010 at a level of SEK25 million, plus about 1.3 million US dollars from other sources in the form of research grants and fellowships. The Center collaborates with other CoE and shares knowledge widely with researchers from many universities and research institutes around the world.

Sustainable transportation in China

The China Urban Sustainable Transport Research Center in Beijing is working to find solutions that are applicable at both technical and policy levels. The researchers hope that their results will even be useful in other developing countries.

"We hope that our results and experience will be useful for other developing countries that, like us, are faced with rapid economic development and urbanization," says Zhou Wei, Professor of Transportation Planning and Director of CUSTReC.

China faces a range of challenges as a result of rapid urbanization and motorization. To be sustainable, future urban transportation systems must take many very different issues into account, such as land use, energy consumption, navigability, traffic safety, access, affordability, and local and global environmental impacts. Researchers at the China Urban Sustainable Research Center (CUSTReC) in Beijing are finding solutions that take all of these challenges into account. They hope that their results will even find applications in other developing countries. "We hope that our Center can become a platform for research about transportation in similar countries. We are happy to share our results and experience with countries and regions that face similar problems to ours," says Zhou Wei, President of the China Academy at the Transportation Sciences of Ministry of Transport, Professor of Transportation Planning and Management, and Director of CUSTReC.

A holistic perspective

Researchers at the Center distinguish their work from previous research in China by applying an integrated approach to the challenges of providing sustainable transportation. "We want to achieve an urban transportation system that takes the different issues into account and integrates public transportation, land development and mobility management," says Zhou Wei. The research spans several areas, including institutional arrangements, transportation and city planning, public transportation subsidy and financing, land-use planning, environment, information technology, traffic safety, and the social sciences. One of the Center's research areas – Benchmarking Efficiency of Urban Transport Systems in China – focuses on the current status of urban transportation in China and how systems can be developed in the context of China's fast pace of economic development and urbanization.

Traditional traffic research in China has, until recently, been primarily focused on the balance between transportation supply and demand. "We are also looking at those questions, but we add aspects such as consumption patterns and resource availability, both of which have important implications for the design of future transportation systems," says Zhou Wei.

One of the Center's research areas – Transport, Demand and Management – aims to reduce automobile travel demand or redistribute this demand in space or time, through policy measures and strategies for their implementation. Behavioral changes among Chinese urbanites are also important. The Center hopes to influence people's behavior and desires related to choice between transportation modes. "Sustainable transportation is about limiting resource use, and that requires not only technical solutions but even changes in consumption patterns. We try to influence the behavior of today's Chinese through regulations and information campaigns. In that way, we can realize green consumption and green development," says Zhou Wei.

One goal for the Center is to find and apply solutions that promote sustainable transportation in China at several levels.

These include both technical solutions and methods for implementing them. Making this possible requires developing and implementing new policies.

Close to the government

The Center contributes to achieving this in part through its role in the China Academy of Transport Sciences at the Ministry of Transport and the China Council for International Cooperation on Environment and Development (CCICED), which is an advisory body to the Chinese government. The Vice Prime Minister chairs CCICED and the Minister of Environmental Protection is the Executive Vice Chairperson. This brings the researchers close to the government and enables them to provide recommendations regarding the design of a national policy for sustainable transportation in China.

The recent institutional reform of shifting urban transport responsibility from the former Ministry of Construction to the Ministry of Transport will create even better opportunities to provide useful research to China's political leadership and will improve the links between CUSTReC and national and local officials in charge of urban transportation issues. Through the Forum on Transport Reform and Development in the Central Cities of China, the Center closely cooperates with decision makers and public employees in 36 important central cities in China. "That provides us with access to decision makers at both the national and regional levels, which makes our platform powerful. Our results can be used for implementation in different regions and cities, while at the same time we can support the government and government agencies on important policy issues," says Zhou Wei. For example, the Center has cooperated with the Beijing Municipal Committee of Transportation on the research project, the Beijing Olympic Transport Demand Management, and a demo project with the Chengdu Municipal Committee of Transportation on institutional arrangements, urban-rural transport integration, transport-terminal planning, and parking.

International collaboration

CUSTReC collaborates with a number of international agencies, including the European Commission, the World Health Organization, the World Bank, and the German Aerospace Center. Through the CIVITAS Initiative, the Center will enable four to five Chinese cities annually to communicate directly with 36 European cities.

Transit-oriented development is the only option for the healthy development of Chinese cities, and integrating public transportation and land-use planning is prerequisite. CUSTReC collaborates with the Australasian Centre for Governance and Management of Urban Transport at the University of Melbourne on research about institutional perspectives, technology development and the application of Transit Oriented Development in China.

CUSTREC

The China Urban Sustainable Transport Research Center (CUSTReC) initiated activities in 2006. VREF is financing the Center through 2010. Twenty four researchers are employed at the Center. They collaborate with an additional 12 international researchers in China and the outside world. The collaboration provides the Center with access to international expertise and opportunities for the Center to share its experience and results.

Complementary research

More than 40 Smaller Projects have been granted funding since the FUT program was initiated in 2000. The next call for proposals for Smaller Projects will target specific issues, and will require active collaboration with at least one CoE.

The purpose of the FUT program's Smaller Projects (SP) is to make use of ideas that VREF finds valuable but that do not justify the establishment of a new CoE. The projects must be relevant in the context of the FUT program's overarching aim – to support research and education that contributes to the development of sustainable transportation systems – and are intended to complement the research performed at the Centers. Usually the projects receive funding for two years. "We realized when we created the FUT program that we would receive proposals that did not qualify for becoming CoE but that we nevertheless wanted to support. We also expected that some of the ideas in these proposals might provide bases for future CoE," says Bengt Kasemo, chairman of VREF's Scientific Council.

Several of the current CoE developed as a result of Smaller Projects. These include: the Australasian Centre for Governance and Management of Urban Transport (GAMUT) in Melbourne; Sustainable Urban Transport in Less Motorised Countries: Research and Training in New Delhi; and the OMEGA Centre for the study of Mega Projects in Transport and Development in London.

Developing policies

One of the current SP – How policies can stimulate a sustainable modal choice for Beijing – is tied to the Beijing CoE and builds on a previous SP. The current project was defined against the background of conflict between the growing need for transportation services and the requirement to reduce emissions from the transportation sector. This is a dilemma for many of the world's large and growing cities.

Developing policies and strategies is an important first step toward achieving the goals of sustainable transportation. Researcher Haiyan Wu aims to quantify impacts of policies on modal choice, and to investigate ways to influence travelers to shift to more sustainable transportation modes. He is implementing a study within the project of travel behavior characteristics in Beijing. The survey results will provide input to a strategic policy optimization model, which will be used to calculate the degree to which transportation policy proposals for Beijing influence development in the sector.

Another ongoing SP – In search of a mechanism for institutional coordination

SMALLER PROJECTS

Several other Smaller Projects are described on the VREF website: www.VREF.SE

in the planning process: a strategy for improved public transportation in Sub-Saharan Africa – builds upon an earlier SP carried out in Dar es Salaam, which showed that persistent public transportation problems are partly due to lack of coordination between institutions in the planning process. The current project focuses on the importance of institutional coordination in the transportation planning process for achieving sustainable development.

Suitable framework

"All of the various stakeholders, such as government departments, planning authorities and private sector interests, have been working in isolation from each other. As a result, the whole public transport scene in both Dar es Salaam and Nairobi is a mess. Now they have to decide what kind of framework will be suitable, based on the local context, so that public transportation planning will be effective," says Ahmad Kanyama, project leader in the Department of Urban Studies at the Royal Institute of Technology in Stockholm, Sweden. The ongoing project addresses questions such as: what coordination mechanisms can be used to help the institutions/sectors work together effectively, and how can doing so improve the quality of public transportation in cities in Sub-Saharan Africa?

Kanyama has organized workshops to present results from the study to policy makers, researchers, transport operators and their associations, town and transportation planners, transport/traffic regulators and enforcers, and environmentalists. "We have presented our findings from the perspectives of the different stakeholders and talked about how applying the concepts of governance and leadership can facilitate effective coordination in the planning process for public transportation," says Kanyama. As part of the study, output from the workshop is currently being analyzed.

Automobile ownership

In a previous SP – New evidence on public transport accessibility and its effect on car ownership – Carmen Hass-Klau at the Environmental and Transportation Planning Research Institute in Brighton studied the connection between private automobile ownership and public transportation in 17 urban areas in five countries. The study shows that in areas that have quality public transportation, car ownership has been reduced by about nine percent. In Germany reductions have been as much as 42 percent in some locations. The effects vary regionally. In some cases better public transportation attracts higher-income people to live there, without the high levels of car ownership they would otherwise choose. In other areas public transportation releases people with lower incomes from the pressure to buy a car. Underground systems have the strongest impact, then light rail/tram and rail. Bus lane corridors seem to have less effect, but the results are not yet conclusive.

Social development

A Manual for Social Impact Assessment of FUT Projects has been developed in close collaboration with the CoE in New Delhi. The design and planning of different transportation systems must take people's varying abilities to utilize public transportation into account. Anita Anand studied how socioeconomic variables influence both access to and use of public transportation. The objective of the study, which was presented in Anand's doctoral thesis, was to design a tool that enables the integration of Social Impact Assessments into FUT projects.

A meeting place for researchers and practitioners

International conferences are one of three cornerstones of the FUT program. Their purpose is to facilitate the sharing of knowledge and experience between researchers and practitioners. The sharing goes both ways: researchers have as much to learn from practitioners as practitioners from researchers.

How to best transfer knowledge between researchers within the program and between researchers and practitioners is a central question for FUT. From the outset, the VREF Board of Directors and Scientific Council clearly understood the need for a forum where all stakeholders can meet. The FUT conferences fulfill several needs. They provide a way to market the FUT program and its results. In addition, they tie together the research at the different Centers. "The conferences are intended to provide a meeting place for the different research groups, where they can exchange knowledge and experience. The conferences also provide a way for us to gain access to the researchers' results and ideas. In addition, the conferences provide a forum, where we can gather actors that see urban transportation from different perspectives. They can include strategic, theoretical or more practical goals and visions," says Bengt Kasemo, chairman of VREF's Scientific Council.

Broad participation is important

Through the conferences, VREF wants to bring about cross fertilization, where the Centers share experience and results that can be useful for each other. In that way, FUT conferences are a tool for achieving synergistic effects between the Centers. "Conferences provide a way to clarify and transfer knowledge and identify new issues and directions. That is why we work with methods for optimizing the transfer of knowledge," says Bengt Kasemo.

Every conference has had a theme, such as How to deal with complexity or Dynamics of urban transport development – what is generic and what is specific? Conference participants include – in addition to FUT researchers – a range of end-user groups: politicians and other decision makers, business people, city and traffic planners, employees of various types of management and stakeholder organizations, etc. Broad participation is prerequisite to arriving at reasonable and viable solutions that lead to sustainable urban transportation.

"The transfer of knowledge between researchers and the intended users of research results, and between the different Centers, is a central issue that we are currently working with a lot. Our next FUT conference will focus to a large extent on just that question," says Bengt Kasemo. Knowledge transfer is not only about how intended end-users can gain access to research results. Involving practitioners – politicians, city and traffic planners, and others – in the process of formulating the research questions is even more important. That is necessary to ensure that the researchers focus on relevant questions.

The conferences are intended to provide participants with an opportunity to analyze and discuss different needs and opportunities to influence future development toward sustainable urban transportation systems. But they are also useful for identifying both the barriers that stand in the way and the factors that are favorable for that type of development. How practitioners find out about researchers' results and how researchers listen to practitioners' needs – and translate them into research questions – are central issues for VREF. For that reason, the form and design of FUT conferences and

meetings are continually evaluated and changed.

The very first FUT conference was a pure research conference. Since then, the perspective has gradually changed, toward creating meetings between researchers and practitioners, which is not always that simple. "To get practitioners to listen to what researchers have to say is frequently easier than vice versa. That is because the questions and problems that practitioners formulate almost never fit within one research discipline," says Måns Lönnroth, a member of the VREF Board of Directors.

The fourth conference – planned for the spring of 2009 – will have an even stronger focus on practitioners. "This time it will be more of a conference with practitioners for practitioners, where researchers participate as audience members. The conference will, however, both open and close with research seminars. We want the researchers to think about what the practitioners say, what their needs are, etc.," says Lönnroth. How practitioners learn from researchers and how research results are translated into practice are processes that VREF will continue to think about, as well as how the conferences will be designed in the future. "But the need for different meetings between the Centers' researchers and between researchers and practitioners is still central. How to implement them in the best way is a question that we continually evaluate and develop," says Måns Lönnroth.

Interdisciplinary researchers wanted

Through the FUT program, VREF supports interdisciplinary research, with the aim to stimulate new ideas and solutions for transport systems in large cities. Calls for proposals for new Centers of Excellence and Smaller Projects are announced in the spring.

VREF summarizes its view of how research can contribute to sustainable transportation systems in its policy document. As described there, the overarching aim of the FUT program is to contribute to the development of sustainable urban transportation systems. VREF's calls for proposals are based upon an analysis of which areas are particularly important and where research can make the biggest difference. As a first step in the application process, all applicants are encouraged to review the policy document, which is available on VREF's website. Application forms and instructions are also available there for download.

VREF supports research within the FUT program by establishing interdisciplinary Centers of Excellence (CoE) and through support for so-called Smaller Projects. The CoE are intended to create a platform for researchers who want to collaborate on the development of new and better knowledge about how to cope with the complexity of transport systems in large urban areas.

The CoE are expected to maintain the highest scientific quality and to work together with local actors that can utilize their results. In addition, the Centers are expected to participate in establishing educational programs related to their areas of research. Normally, CoE receive between four and six million Swedish Crowns (SEK, roughly EUR450–650 thousand or USD 550–850 thousand) for a period of five years. The Centers are encouraged to apply for additional funding from national and international research organizations. The hope is that, in that way, the Centers will able to maintain financing even after their support from VREF comes to a close.

The application process for CoE is comprised of two steps. First, VREF provides planning grants for approximately 200 thousand SEK. The planning grants are intended to provide applicants with an opportunity to develop and submit a full proposal, which describes in more detail how research at the proposed CoE is envisioned. The deadline for submitting full proposals is in April.

The final decisions

Each full proposal is peer reviewed by three external experts, who perform their evaluations over a period of approximately two months. Their written recommendations are then reviewed and discussed by the Scientific Council. The Board makes the final decision regarding whether an application is approved or rejected, based on the recommendations of the Scientific Council.

Every CoE is required to submit status reports at the end of the first and second years. In addition, they are required to perform a mid-term evaluation. On the basis of these inputs and a site visit by members of the Board, the Scientific Council and one additional person appointed by the Council, a final decision is made regarding whether or not to continue financing the Center.

CoE financing is allocated in stages. Grant allocations are smaller during the first year, and increase when activities have gotten underway. Centers can then elect to use all of their annual funds directly or to reserve funds from one year to another in order to achieve a smoother transition through the financing period.

The Smaller Projects are intended to function as small islands between the larger Centers. The research carried out under the Smaller Projects shall be associated in one way or another with the research that is carried out in the Centers – a requirement that will be emphasized even more in the future. Every Smaller Project is required to submit a report after its first year and a final report after its second. Occasionally Smaller Projects are seen as having potential to be developed further, in which case grants can be extended for up to two years.

Smaller project

Normally the Board announces calls for proposals for Smaller Projects every year. The year 2008 was an exception, however, due to the ongoing evaluation of VREF.

Applications for Smaller Projects are submitted during the spring. Evaluations of proposals are carried out in a two-step review process. Proposals are evaluated by the Scientific Council during the summer and early fall. An initial selection is made on the basis of proposal summaries. Approximately two thirds of all proposals are rejected at that stage. The remaining submissions are evaluated in their entirety. In December – based on the recommendations of the Scientific Council – the Board decides which proposals will be approved. The entire process from proposal submissions to funding submissions takes just under a year. Smaller Projects receive grants for between 300 and 800 thousand SEK (roughly EUR 32–85 thousand or USD 38–100 thousand) per year.


SORTIE

Achieving our vision

The FUT programme has now been running for seven years. A vast body of experiences has accumulated. Now is the time to sharpen the focus on how VREF best can contribute to a sustainable urban transport. The VREF brand should evolve from essentially being a financer of research into becoming an agent of change toward achieving sustainable urban transport, with research and education as its primary instruments.

In 2006, six Centers of Excellence (CoE) had been established and a large number of Smaller Projects had been funded. It was time to assess the work and modes of operation in order to develop the strategy for the coming years. Accordingly, VREF commissioned an evaluation by Technopolis, an international consulting company specialized in evaluating research, development and innovation. Technopolis concluded that, "FUT has identified a distinctive and important topic, funded a significant body of international research and begun to have a demonstrable impact on urban transportation at the level of planning and early demonstration." However, another important finding was that FUT can increase its effectiveness by requiring the CoEs to put more effort into tool building, education, dissemination, and networking to bring its collective resources to bear on the FUT problem.

Becoming an agent of change

The goal of the FUT program is for results from excellent research to be put to practical use in influencing the development of sustainable transportation systems. Technopolis therefore recommended that financial support for the CoE might be extended from five years to eight. Five years is a relatively short period for the CoE to establish relationships with end users and with each other. Longer financing periods for a CoE must be weighed against the structure of the CoE portfolio as a whole in terms of the number of CoE and their geographical location. VREF has yet, for example, to establish a CoE in South America.

The Technopolis evaluation also recommends that VREF see itself to a larger extent as an agent of change, rather than just a financer of research. Being a financer could be just a passive role, once the best proposals have been identified. But one can also be an agent of change, which is a more demanding role, requiring an active dialogue with the CoE individually and as a network. Today VREF requires that every CoE collaborates with local actors in the region and society that the researchers are studying. The Centers function to some extent as disseminators of knowledge that influence actors and opinion. Technopolis also recognizes that the formation of such a CoE network has already started and regards this as a major achievement. A further option for VREF to strengthen its role is to shift from open calls to targeted calls for proposals in areas that VREF has identified as particularly important but not yet adequately covered within the portfolio of CoE. Technopolis also recommended that the Smaller Projects, which are "somewhat fragmented," be more closely tied to the Centers so that they more clearly contribute to achieving the program's goals.

Disseminating information

Furtermore Technopolis strongly recommends that VREF develop a range of information material and channels in order to become more visible. This report is one part of the effort to address this issue. Another is a new website that will be more informative and rich in information and updated continuously. The purpose is to reach out to both researchers and practitioners.

"By working as an agent of change, our vision of bringing about change through the research we support is articulated even more clearly. What that means for our activities in practice is something we are working on," says Bengt Kasemo, chairman of VREF's Scientific Council.

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What is Future Urban Transport?
The Future Urban Transport (FUT) research program intends to create strategies for developing sustainable transportation systems in large urban areas around the world.

What can be achieved?
The vision is to inspire and support new, equitable urban transport solutions that improve accessibility and safety as well as efficiency and environmental sustainability.

What activities does FUT contain?
The current program has three cornerstones: seven globally-distributed Centers of Excellence (CoE), a larger number of Smaller Projects, and international FUT conferences every two to three years.

Who supports FUT?
Volvo Research and Educational Foundations (VREF) is a collaboration between four independent foundations: the Volvo Research Foundation; the Volvo Education Foundation; the Pehr G. Gyllenhammar Foundation; and the Håkan Frisinger Foundation for Transport Research. The foundations finance research and educational projects. VREF has initiated the research program Future Urban Transport (FUT).

www.vref.se

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