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Message from Project Director

The transportation mode in Bangkok is changing from car-centric to public-transit/shared mobility. Towards transit-oriented development, this project aims to study and suggest how to integrate transport and land use policies, to promote compact and intense urban configurations, for better quality of life (QOL) and less resource consumption with the consideration of environmental conservation and sustainability. As interdisciplinary research collaboration among researchers in the field of civil/environmental engineering (CEE) and information and communication technology (ICT), several technologies including simulation, transportation theory, geoinformatics, artificial intelligence, and virtual reality, are harmoniously applied.



The project ranges from (1) urban planning of land use and urban transport network, to (2) district road network analysis and smart transportation suggestion, (3) street, crossing, and infrastructure design (4) data analytics, visualization, and smart application development, and (5) QOL assessment and policy recommendation. Based on collection and analysis of survey data, environment images/videos, and sensor data, simulation is applied to estimate QOL with respect to a location, a route, and a time point. As a showcase in Bangkok, to make transportation and its infrastructure efficiently managed, a series of evidence-based policies can be proposed to the city administration by utilizing the result from the AI-based simulation.

Dr. Thanaruk Theeramunkong, Professor, Thammasat University, Sirindhorn International Institute of Technology

Message from Project Chief Advisor

Leap-frog Growth Based on Smart Transport



Thailand aims to become a value generating economy in 20 years with the Thailand 4.0 National Strategy. However, traffic congestion in the mega-city Bangkok deprives its citizens of significant time, and increases the risks of global warming, pollutions and health. We are developing QOL-MaaS^{*1}, a cyber-based application, to design individual citizen's daily integrated plan of activities and travels to realize the personal better quality of life as well as low-carbon society. We will develop a model district in Sukhumvit Road, called Sukhumvit Model.

^{*1} QOL-MaaS=Quality of Life - Mobility-as-a-Service

Contribute to Thailand 4.0 and SDGs with

The Sukhumvit Model is an urban experiment aiming to achieve "Economy for the people" (Thailand 4.0) with "No one left behind" (SDGs^{*2}). It shifts the focus of transport policy from infrastructure development (road or railway) to the needs of diverse citizens, young and old, male and female, rich and poor, etc. For a better lifestyle, AI^{*3} will be used to develop a system, QOL-MaaS, enabling seamless selection and combinations of time, mode and route of transport such as walking, personal mobility and railway.

^{*2} SDGs=Sustainable Development Goals, ^{*3} AI=Artificial Intelligence

Dr. Yoshitsugu Hayashi, Distinguished Professor, Chubu University, Center for Sustainable Development and Global Smart City

Background

Our everyday activities, such as driving cars, consume energy and produce greenhouse gases (GHGs). Increasing GHGs drives global warming and makes threats to life more likely. A key global issue is how to develop low carbon societies by reducing GHGs. This issue requires international efforts as it cannot be solved by one country alone. Bangkok, the capital city of Thailand, has experienced dramatic economic growth, with an increased population, numbers of private cars and traffic jams, all of which cause air pollution and GHGs to increase. To tackle such problems, the Royal Thai Government has developed an economic model called "Thailand 4.0". One of its priorities is to develop innovative urban

city planning, via the concept of a 'smart city' that uses advances in technologies such as artificial intelligence (AI) which will contribute to environmental protection and people's quality of life (QOL). In response, research institutions from Thailand and Japan have been implementing a Science and Technology Research Partnership for Sustainable Development (SATREPS) programme, called "The Project of Smart Transport Strategy for Thailand 4.0" since 2018.

Project Goal

Developing Smart Transport Strategy for Thailand 4.0, a policy package the Sukhumvit Model



By using

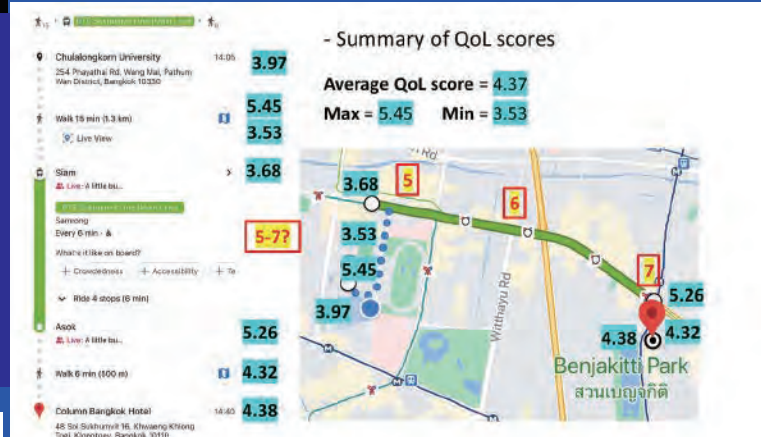
- 1 Simulation Model
- 2 Streets for All Guidelines
- 3 QOL Evaluation Method
- 4 Digital Earth System

Scientific Meeting in Feb 2021

On 9 February 2021, the Project organized an online meeting between Thailand and Japan. The meeting was divided into two parts: the first part was on scientific achievements and the way forward; the second part was on the plan for forthcoming activities in 2021. The first part invited a target audience of 25 delegates from Thai governmental organizations including the Ministry of Transportation (MOT), the Bangkok Metropolitan Administration (BMA) and others. The second part involved in total 36 project research team members in Thailand and Japan.

Meeting Summary

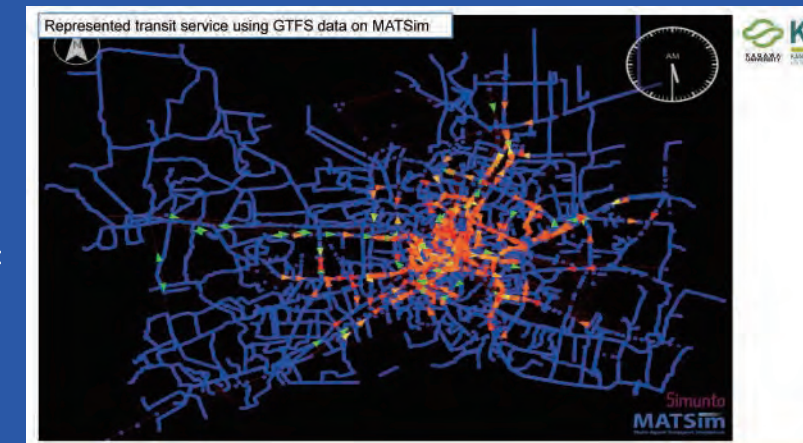
Session 1: Prof. Thanaruk and Prof. Hayashi outlined the background problems of the Thai transport systems, how each research group is working towards their solution. To tackle the problems of traffic congestion, traffic accidents, climate emergency, infectious disease pandemic, changes in income and lifestyle, and demographic ageing, the project focuses on a demand-oriented solution that will propose a flexible style of working in place and time with a system called QOL-MaaS to maximize each citizen's quality of life.



Session 3: Kasetsart University team introduced what inputs would be ready for QOL estimation from an integrated model of land use and transport interaction. Having gathered information such as land price, population, employment, and public transport network, the team is developing a microsimulation model to predict future land use and dynamic traffic assignment. The model will be used for policy evaluation, for example, to see the impacts of a railway network, Transit Oriented Development (TOD) with micro mobility, the pricing of parking space, and new-normal lifestyle changes due to COVID-19.

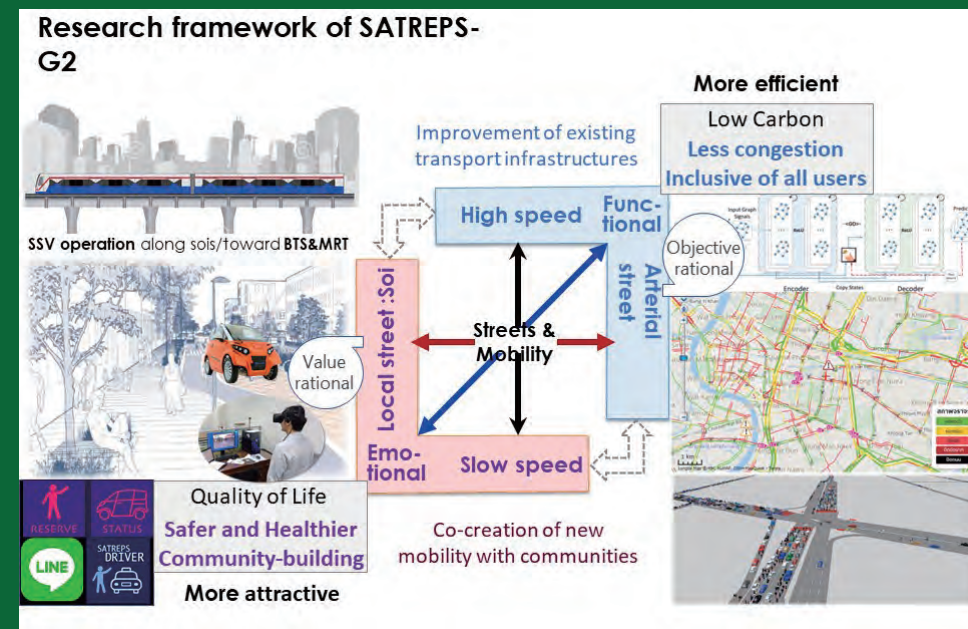


Session 2: A framework of QOL research was presented by Osaka University, including the QOL-MaaS system. Then Chulalongkorn University team introduced the estimation of QOL using an image recognition technique, showing examples of QOL scoring in Bangkok. The QOL score was evaluated using a newly developed two methods: a vision-survey method estimating personal stated-preference on the scenes of video data set, and a method of knowledge accumulation of scene-preference relations using a deep learning technique.



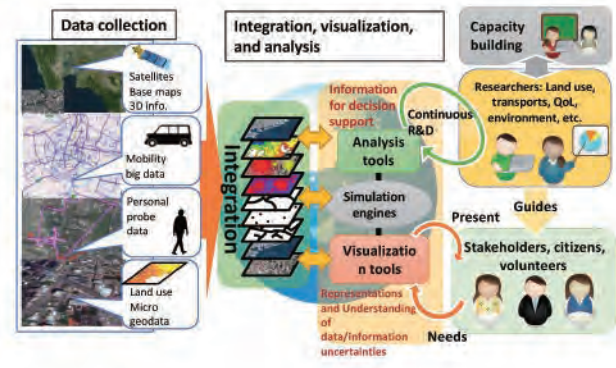
Meeting Summary (cont.)

Session 4: NECTEC overviewed a research framework for developing the Streets for All. They planned a demonstration experiment with a Smart Share Vehicle Service (SSVS) along side streets (sois) toward a Bangkok Mass Transit System (BTS) station to enhance QOL and realize a low carbon society. The SSVS uses Electric Vehicles (EV) without CO₂ emissions, which increases mobility in the sois. Three EVs will be operated between condominiums and a BTS station (Thong Lo), using a smart phone application.



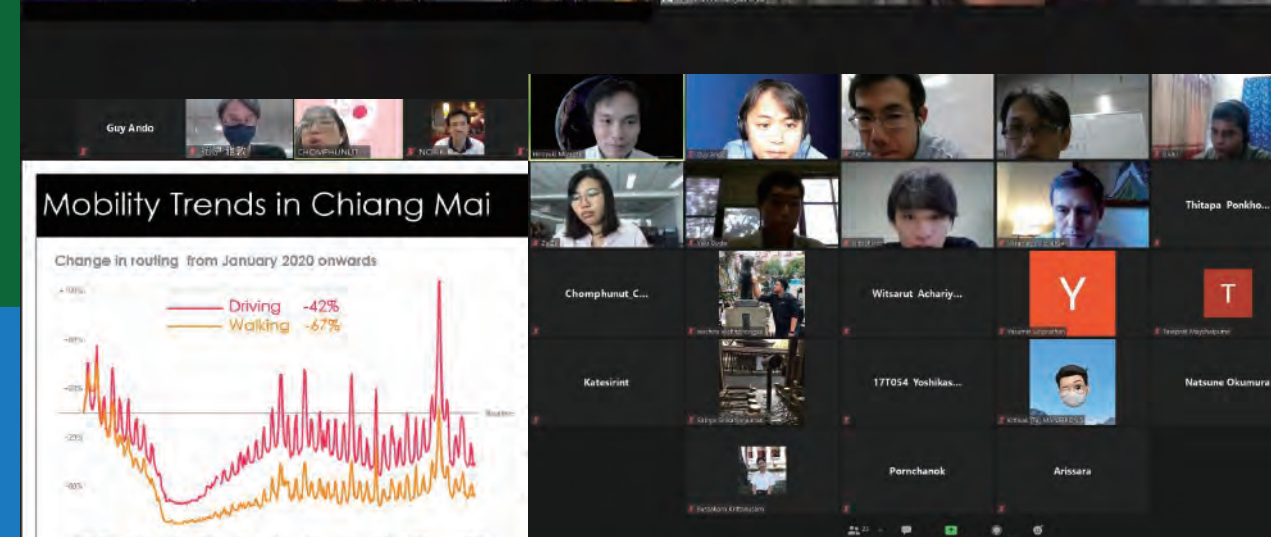
Session 5: Thammasat University presented a Digital Earth System as a seamless visualization platform for urban transport. By integration of collected spatial data such as satellite base maps, mobility big data, personal probe data, and land use geo data, the Digital Earth System helps us in thinking about smart transport strategy. Public transportation supply-demand gap analysis was shown as an example to support thinking about how to make a better transport system in Bangkok and improve QOL.

Outcomes of the Digital Earth: Seamless visualization platform for urban transports



Young Researchers' Networking

On 23 December 2020, online presentations regarding a transport simulation case study took place between Thai and Japanese researchers. To report the assignment set at the last seminar in November, the researchers had developed case studies on transport simulation. In total 17 participants were gathered from Kasetsart University, the Asian Institute of Technology (AIT), Chiang Mai University, Kagawa University and Chubu University. Their case studies were highly praised by Prof. Masanobu Kii of Kagawa University, and Dr. Varameth Vichiensan of Kasetsart University. The presentations were on very timely topics, including, for example, before-and-after COVID-19 pandemic simulation by the Chiang Mai team, and a simulation of the evacuation from the Tsunami disaster in Phuket by AIT team. A doctoral student at Chubu University, Mr. Witsarut Achariyaviriya, constructed a simulation focused on enhancing Quality of Life (QOL) in Bangkok, which could promote a new work-life balanced lifestyle as well as solving traffic congestion issues.



Project Implementation Structure

Thammasat University, Kasetsart University, Chulalongkorn University, Asian Institute of Technology (AIT), National Electronics and Computer Technology Center (NECTEC)



Chubu University, Osaka University, Kagawa University, The University of Tokyo, Meijo University, University of Toyama, Mitsubishi UFJ Research and Consulting, Nippon Engineering Consultants Co., Ltd.



Mitsubishi UFJ Research and Consulting, Nippon Engineering Consultants Co., Ltd.

Japan Science and Technology Agency (JST), Japan International Cooperation Agency (JICA)

Upcoming Events

- Jul. 2021**
Starting the Smart Share Vehicle Service experiment
- Jul. 2021**
Progress Meeting
- Dec.- Jan. 2022**
The 4th Joint Coordinating Committee Meeting

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