日本―ドイツ、ハンガリー、スペイン 国際共同研究「レジリエント、安全、セキュアな社会のための ICT」 2021 年度　年次報告書	
研究課題名（和文）	ディープラーニングを用いた都市モビリティのピーク予測（DARUMA）
研究課題名（英文）	Deep Learning Anticipated Urban Mobility Peaks (DARUMA)
日本側研究代表者氏名	Jan-Dirk Schmöcker
所属・役職	Kyoto University ・ Associate Professor
研究期間	2021 年 4 月 1 日～2024 年 3 月 31 日

1．日本側の研究実施体制

氏名	所属機関・部局・役職	役割
Jan-Dirk Schmöcker	Associate Professor, Kyoto University, Department of Urban Management	PI, Overall responsibility for the project. Co-ordination of collaboration between the different partners.
Kouji Fukuda	Senior Research Fellow, Hitachi	Mainly overseeing the machine learning work package in the project. Also involved in general framework discussion.
Toshiyuki Nakamura	Associate Professor, Nagoya University, Institute for Innovation for Future Society.	Supporting various activities, in particular the Kyoto case study and data collection
Tadashi Yamada	Professor, Kyoto University, Department of Urban Management	Advising the whole project on inclusion of supply-chain aspects. Further involved in the Kyoto case study.

2．日本側研究チームの研究目標及び計画概要

The main goals of this year are twofold. Firstly, the completion of a comprehensive literature review leading to a refinement of the framework and suitable definition of resilience indicators for the project. We will review general network resilience indicators that describe the ability of cities to cope with the COVID pandemic. Furthermore, we will review specifically a range of formal and informal literature with respect to Kyoto. Secondly, we collect and create the database of Kyoto data that will be used for subsequent WPs. This database consists of a range of quantitative and qualitative data describing mobility patterns in Kyoto.

3. 日本側研究チームの実施概要

The outcome of our extensive literature review resilience of urban mobility to events such as COVID has led us to propose a four-layer analytical framework. According to the lessons learned from papers of different parts of the world, our framework identifies “Governance”, “Transport”, “Mobility”, and “Resilience” as the four main layers receiving and imposing impacts. This framework illlustrates how a policy implemented by the government will affect the transporation systems and further affect the mobility and activity participations of the population. We also link policies to one or multiple of the “4R resilience properties”: robustness, redundancy, resourcefulness and rapidity.

We have furthermore collected the relevant data - or set up processes to collect the data - that are used for our analysis to be carried out in the next two project years. In particular we made data purchases for two datasets from Docomo and developed some tools to collect open data such as “Google popular times” (GPT) and “Twitter” posts. The Docomo data provide us with spatial temporal data about the population distribution and their movement in Kyoto. GPT data are information embedded in Google maps with respect to busyness of “points of interest” (POIs). They provide a rich data source to understand mobility patterns within cities including trip purposes. For a large number of points live data are available. By collecting this data we can understand changes in mobility patterns. We have downloaded this data for an extended period of time for Kyoto as well as, in collaboration with the European partners, for Budapest and Madrid. We have shown in initial analysis that GPT data can explain to some degree also public transport usage patterns. Finally, we have analysed the “city mood” with Twitter data and found also here that the number of Tweets with positive contents or the percentage of Tweets with fearful contents correlate with travel patterns.

Finally, in collaboration with our European partners, we have created a data inventory that describes the overlaps and differences among the datasets have been collected by the Japanese team and the European partners. This is the foundation for further joined data analysis in the next academic year.