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On the banning of cars on the TU/e campus

Eindhoven University of Technology (TU/e) has been vocal with its efforts to increase sustainability on campus, as well as promoting sustainable innovations and technology outside of it. The university focuses its sustainability contributions with research in four areas: smart cities, smart mobility, energy and engineering health[1]. These four areas are part of the seventeen Sustainable Development Goals defined by the United Nations, adopted by the member states of the United Nations[2]. A central part of smart mobility is the transition to alternative means of transport. In practice, this frequently translates to promoting clean, smart and sustainable means of transport as an alternative to transportation by car. Following the efforts by the TU/e to invest in smart mobility, a question which was asked is whether the university should ban cars from campus by 2025[3]. Banning cars on campus could bring unforeseen consequences. This text analyzes the possibile reasoning, feasibility and consequences of banning cars on the TU/e campus by 2025.

One of the key responsibilities of TU/e is to protect the ability of their students to follow their education unhindered by various factors, including that of mobility and accessibility. This responsibility extends to their staff as providers of their education. A portion of students and staff do not live in close proximity to the campus. There are different reasons for students and staff to live outside of Eindhoven, ranging from financial reasons to shortage of student housing close to campus. For these students and staff members, sustainable means of transport might not be a realistic alternative to cars. For instance, the time it takes to travel using public transport might not be reasonable in comparison to traveling by car due to limited public transportation options. For some, the right to an accessible campus, and thereby accessible education, hinges on the use of a personal vehicle for transportation.

As a result of banning cars on campus, students and staff members would need to park their car outside of campus grounds. Additionally, a portion of students and staff would be incentivized to defer to alternative means of transport as a whole. Although it can be argued less people traveling by car is a positive result, the fact remains that for students and staff unable to make the switch to other means of transport, the consequences of banning cars is undesirable. With TU/e no longer allowing cars on campus, the burden of parking locations is shifted to outside of campus grounds. This results in a less accessible campus as a whole. Furthermore, TU/e banning cars on campus will increase the strain on available parking in the neighborhoods around campus. This is in conflict with the smart mobility efforts the university is promoting.

Contrary to transportation to campus and parking, the impact of banning cars on on-campus transportation will be negligible. The majority of students and staff use bikes for transportation on campus, or simply walk when the distance is short enough. Consequently, it is not realistic to expect significant changes in travel behavior caused by the banning of cars for on-campus transportation.

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[1] https://www.tue.nl/en/our-university/about-the-university/sustainability/sustainable-development-goals-sdg

[2] https://sdgs.un.org/goals

[3] Assignment 0, academic writing. This is a spoof source to support the otherwise unreferenced question.

Although the thought of banning cars from campus by 2025 might seem to fall in line with sustainability initiatives of TU/e at first sight, this prospect brings forward unforeseen complications to both staff and students. Those receiving and providing education require apt ways to reach the campus regardless of where they live. Disallowing cars from campus as a whole results in accessibility problems for a portion of students and staff. In addition, the parking spaces in neighborhoods around campus will be congested by students and staff deferring to those locations. Using the right incentives to decrease car usage is befitting an innovative organization such as TU/e, but banning cars from campus outright by 2025 is not desireable.

Challenges in data availability for deep learning models used in European hospitals.
The World Index of Healthcare Innovation, a ranking created by the non-profit equality focussed organization FREOPP, shows Switzerland, The Netherlands and Germany topping the charts in innovation in healthcare[1]. This ranking is constructed by means of four factors; choice, quality, science & technology and fiscal sustainability. Although certain European countries have generally been soaring ahead in terms of quality, fiscal sustainability and choice, the United States are topping the charts in terms of science and technology. The US topping the charts in terms of science and technology is partly caused by the large amount of financial resources available to US researchers in medicine, as well as the economies of scale at play due to the nature of the large hospital 'networks' which are found in the US. In this text, I discuss a particular problem in healthcare and technology where there is a gap between the US and Europe: the data availability for deep learning models in healthcare and medicine.

In deep learning models, such as convolutional neural networks for classifying various diseases in healthcare, a similar phenomenon is seen as that of economies of scale, but time in regard to data and predictive power of these models. With certain diseases being very rare, creating a model which is able to correctly label these diseases requires a large amount of pre-labeled data. For example, the 2005 MIT-BIH Arrhythmia dataset[2] is a popular exemplar dataset for classifying various sorts of Arrhythmia (irregular heartbeat). Using snippets of ECG data taken from patients which are labeled by experts, a deep learning model can be trained to classify heartbeat patterns. A particular pattern is quite rare, and the low amount of data available makes it hard to predict this specific pattern. This is not a problem unique to this healthcare dataset, but shared amongst all healthcare problems where certain diseases are significantly more rare than others and data availability is scarce.

Hospitals in Europe face the problem that they cannot compete with the scale of hospital networks in the United States (and therefore the available data to work with). While data sharing is common practice in (US-based) hospital networks, sharing relevant patient data in Europe is often made complex due to a multitude of factors. These factors include the amount of deep technical knowledge required in order to standardize and provide the data sharing, the complexity of properly anonymizing data shared between hospitals, as well as policy- and incentive related problems. The result is scarcity of data availability in European hospitals.

Recent innovations in policy as well as technology have shown promising signs of increasing the data availability in healthcare. Recently, the European Health Data Space was made a top priority of the European Commission[3]. This is a data system aimed to improve sharing different types of health data between member states in Europe. A more technical solution is the privacy centered forms of AI which have been gaining ground in research and practice. A particular example is Federated Learning. This is a machine learning technique where the data used by models is never shared, but instead the models are trained locally (in "silos") and only the model

[1] https://freopp.org/united-states-freopp-world-index-of-healthcare-innovation-72256925520f
[2] https://physionet.org/content/mitdb/1.0.0/
[3] https://ec.europa.eu/health/ehealth-digital-health-and-care/european-health-data-space_en

updates are shared to an orchestrator (e.g. see FLUTE by Microsoft Research[4], on which I have personally contributed). Hereby, this technique avoids the problem of data sharing and availability as a whole, as the trained model can be shared between hospitals without patient data being shared.

In conclusion, the availability of data for deep learning models is of crucial importance to providing the best healthcare to patients. While data availability European hospitals have been lagging behind their counterparts in the USA due to policy, expertise and scale related reasons, promising innovations have appeared to either directly improve data availability or circumvent the need of sharing data as a whole. In particular, the European Health Data Space and Federated Learning show great promise in resolving data availability problems for Deep Learning models in European hospitals.

[4] https://arxiv.org/abs/2203.13789