Mainstreaming Sustainable Urban Mobility – The Mieri-Mobil Project

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Abstract. In 2021, the Berlin district Charlottenburg-Wilmersdorf offered residents various mobility options on a part of an urban square called Mierendorffplatz. The overall objective was to explore how people living at the square or in the closer neighbourhood could change their mobility habits to become more environmentally friendly. The test aimed at exploring how sustainable urban mobility can be successfully implemented on a wider scale in in other parts of the city - thus seeking to contribute to mainstreaming sustainable mobility planning in regular city-wide mobility planning processes.

This article describes results from evaluating the project: Implementing such exploratory living labs successfully and without excluding specific user groups, depends on the integration of knowledge and resources of both the local governing bodies and civil society. This puts a focus on the question of accessibility of urban space and on the need to re-organize it differently if sustainability criteria should be met.

It concludes that sustainable forms of mobility need to become more demand-orientated and that different legal and economic frameworks are necessary to make it a real alternative for everybody. These two aspects will be elaborated. The findings are based on empiric evaluation and validated through consultations with high-ranking experts.

1 Introduction

From mid-June to the end of December 2021, the Berlin district of Charlottenburg-Wilmersdorf implemented the project Mieri-Mobil on the eastern part of southern Mierendorffplatz (www.mieri-mobil.berlin). Located in the central part of Berlin, it is connected to the public transportation system by bus, subway and city train (S-Bahn). For many years, this district has not been affected too much by gentrifications processes - a large number of residents lives there for decades. But in 2017, the demographically largest group were people in work between 25 and 45 years as well as families with children not attending primary school yet (BA Charlottenburg-Wilmersdorf 2017).

The project aimed at offering different forms of alternative mobility to exactly this mix of local residents. This was based on the basic assumption that alternative forms

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of local mobility are more sustainable in both environmental and social aspects than privately owned cars. Another aim of the project was to carefully evaluate the project. The approach pursued was to not only assess the actual effects of alternative mobility services and forms but also the planning and implementing procedures that accompanied the project. This way it should be made sure that factors leading to a successful implementation and transferability criteria could be identified.

The legal basis of the planned project is Section 45 of the German Road Traffic Act "§45 traffic signs and traffic facilities.

The road traffic authorities may restrict or prohibit the use of certain roads or stretches of road for reasons of safety or traffic order and divert traffic. They have the same right… 6. to investigate accidents, traffic behaviour, traffic flows and to test planned traffic safety or traffic regulation measures"[1].

The Mieri-Mobil project was characterized by three unique aspects: First, it focussed on introducing new forms of sustainable and smart mobility. Second, the project was based on several mobility and logistics projects in the same area and with a similar group of actors that have been implemented since 2016 and their findings: these are NEW MOBILITY BERLIN, distribut-e, Stadtquartier 4.1, the KIEZBOTE and a mobility transformation concept for the Mierendorffinsel based on SUMP (Sustainable Urban Mobility Plan, Rupprecht Consult 2019). Third, it was evaluated by applying a specifically developed evaluation approach (by the authors of this article).

Over the entire period of the project, various forms of micro-mobility were offered in this one location. In addition to a mobility point (called Jelbi in Berlin) with rental bicycles, e-mopeds and e-scooters, the offers also included stationary and free-floating car sharing and cargo bikes. In order to create space for the new offers, existing parking spaces were temporarily rededicated to eight car-sharing parking spaces, a disabled parking space, a cargo bike parking space, a delivery parking space and a logistics hub for a local delivery service (Kiezbote), in the form of a container. Replacement parking spaces were provided for the residents about 200 m away.

Initially, at the beginning of planning the project it was also intended to set up a temporary play street. This linking of different approaches to put more attention to more sustainable mobility increased the experimental character of the project.

Time for preparing the implementation and the evaluation of the project was very short: the decision to implement the project was taken in November 2020 with the actual project work starting in January 2021. The inauguration was scheduled for mid-June 2021, leaving some five months to prepare the mobility offers and the evaluation. Informal discussions with residents and local business people started in April 2021, a formal information letter was sent in early May.

It should be noted that, contrary to the original planning, it was decided not to completely block the street as a temporary play street for car traffic for the duration of the campaign. This was mainly justified by a newly set up construction site on the other side of the square, which increased the parking space pressure in the surrounding area. Another reason for it were concerns of the market management, who feared delivery problems and a decline in customers due to the necessary facilities for the play street.

[1] Original text in German: http://www.verkehrsportal.de/stvo/stvo_45.php.

2 Evaluating the Project – Effects and Processes

Mieri-Mobil is a unique experiment in this specific location. As mentioned before, it combined a car-based shared mobility hub with additional features and aimed at providing analysis regarding the location and general idea of this area of sustainable and smart mobility. Mobility hubs, in their widest definition, are objects of a growing number of case studies and conceptual studies from all over the world (for example: Schelling 2021; Difu 2020; Bell 2019).

While research on mobility hubs is still an emerging topic, there are three early findings: First, the location should be selected carefully (van Gerrevink 2021; Bell 2019). Second, the provided services should be tailored to suit local needs and be integrated into the existing urban space and uses - and therefore may vary in size and offer (Arseneault 2022; Difu 2020). And third, that existing business models for mobility hubs and the provision of alternative mobility pose new challenges to local governance structures (Arseneault 2022; Pangbourne et al. 2018).

In this context, it needs to be stated that the idea of mobility hubs is still strongly rooted in the concept of mobility as a service (MAAS), focussing on the provision of new vehicles and infrastructures while actual user needs are not yet much in the focus of quantitative and qualitative scientific research (Bell 2019; Pangbourne et al. 2018; Utriainen and Pöllänen 2018).

It may be assumed that the private mobility providers do gain profound insight in the usage numbers and users of their services. But these data rather illustrate actual usages than real needs and are in most cases not accessible for scientific analysis for data-protection reasons (Hadachi et al 2018). Nonetheless, some approaches to analyse actual user demands from a qualitative perspective have been implemented. Methods used include on-site observations, random interviews and focus groups (Arseneault 2022; Bell 2019) as well as peer review workshops in order to frame and compare experiences with mobility hubs (Abraham et al. 2021).

With this in mind, the qualitative – and to a lesser extent the quantitative - evaluation of the implemented aims, measures and processes played an important role throughout the Mieri-Mobil project. The overarching goal of the evaluation was, on the one hand, the qualitative analysis of the use of the mobility offers and their effects on urban space (impact evaluation) and, on the other hand, the implementation of the project itself (process evaluation). Detailed results have been published in a technical report.

The impact evaluation recorded the effects of the implemented measures on two levels: Evaluation of the effects of individual measures and evaluation of the project as a whole. Methods used for impact evaluation were

- Participatory observation through regular on-site visits, including photographic documentation
- Qualitative survey of residents and local businesses on the use and location of offered mobility services in the period from August to December 2021, both on paper and online via the project website.
- Quantitative collection of selected data from mobility service providers
- Three resident workshops with participation of representatives of the district Council in June, August and September 2021

- A peer review workshop (focus group workshop) in February 2022

The process evaluation was performed on two levels as well: Evaluation of the processes of implementation individual measures and evaluation of the implementation processes within the whole project. Methods used for process evaluation were

- A process evaluation workshop on October 14, 2021 with representatives of the Center for Technology and Society of the TU Berlin (ZTG), the insel-projekt and Schröder&Abraham GbR
- Two resident workshops with the District City Council in August and September 2021
- A peer review workshop (focus group workshop) in February 2022

3 Results - Impact Evaluation

Impact evaluation comprised mainly counting the numbers of usages of the new mobility services, a survey among neighbors of the street and the closer surrounding of the square, and information gained by observing how people are dealing with the new services on site. The most relevant and exemplary results are summarized in the following.

User numbers provided by the operators of the new mobility services: After the new mobility service was introduced in June, the number of Lime Scooters rented at Mierendorffplatz rose steadily to almost 70 rentals in August. Thereafter, the number dropped sharply until December, presumably due to deteriorating weather conditions.

The number of MILES rental cars rented at Mierendorffplatz increased after the introduction to more than 50 car rentals in November. Then, the number dropped to 35 by January 2022. The reasons for this are probably the high number of public holidays in December and early January, the reintroduced lock-down caused by the Covid pandemic, or fewer vehicles available for hiring. A correlation of the number of uses with bad weather could not be observed for the closed vehicles.

With more than 20 rentals Emmy scooter rentals reached a peak at the launch of the service in July. The number then fell in August significantly and then rose steadily until October. Usage numbers in November and December differ a lot. The assumed explanation for this development is that more vehicles were brought back to the location by the operator in the first weeks after its introduction. Another reason for lower user numbers in November and December is likely to be the colder and thus more uncomfortable weather conditions.

The qualitative evaluation from the residents and business owners and employees around the square was performed via questionnaires from August until the end of December. Paper questionnaires were provided on site and in nearby cafés and shops. In addition, the questions could be answered in the digital version of the questionnaire that was provided on the project website. A total of 33 people replied either on the paper or digital version of the questionnaire, 13 male, 15 female, one diverse and four without indications on gender. Out of these, were 14 residents and 3 business people. With over 55years, the average age was quite high. More than half of the respondents had a higher education entrance qualification (13 people) or high school diploma (nine people). When asked how they asses the new overall situation compared to the situation before, the participants in the survey answered on a scale from 1 to 5 - Much better (1), A little better (2),

Same (3), Slightly worse (4), Much worse (5) with a clear majority "Much worse" (24 of the respondents). In very few cases, however, this was related to the specific mobility services. Interestingly, only four of all respondents used the new mobility services, three people in their free time and one person to go to work. In particular, the position of the mobility offers met with resistance: 23 people stated that the new mobility services would not fit into the local surrounding. When asked for reasons, people indicated that the new service is an impediment to the market (8x); the container is ugly (3x), there is no need for the new services (7x), it leads to a loss of car parking places (7 x). In addition, almost half of the participants in the survey (16 people) stated that they would also not like to have any of the mobility offers at other nearby locations.

Participant observation was performed through regular visits on site by the evaluation team, on different days of the week and at different times of the day. Observation focused on the new parking situation from the start which did not change a lot during the first weeks after the start in June. Most car drivers ignored the newly introduced parking limits and designated spaces for alternative mobility services. In consequence, larger signage in accordance with the Road Traffic Act, had been installed. After a couple of days, the new parking arrangements had been largely accepted by users. But the number of shared cars available on site varied considerably, at times there were no cars available at all. After consulting the mobility providers, the availability of car sharing could be organized more evenly.

The number of available shared bikes, e-mopeds and e-scooters also varied significantly over time. The latter usually outnumbered any other form of mobility - sometimes early in the day, some 30 vehicles were available on site - which was a very large number for this rather peripheral location of the Berlin city center.

A weekly market – existing since many years - has been held right next to the experimental area. On the two market days, access to the mobility services was also massively restricted by market vehicles and visitors. As a result, the access to the vehicles on the market days was restricted. Among other things, this meant that the usage figures on these days were significantly lower than on other days of the week.

4 Results - Process Evaluation

As a follow-up to discussions that took place between residents and organizers at the opening event of Mieri-Mobil, the first user participation activity took place in form of a first residents' workshop. It was organized in August 2021 with the same people, some other interested residents – altogether almost 15 - the district councilor and four project members. During the discussion, four main points emerged, that were subject of complaints: The container that had been set up to serve a storeroom and as a surface for attaching project posters, the massive number of e-scooters, the lacking possibility to participate in the first planning process of the project, and the density to the weekly market.

Regarding the container, it was suggested by all residents that it should be completely removed from this very place for aesthetic reasons. Also, almost all agreed that the e-scooters were considered a problem as the (sometimes) large number of vehicles often looked messy, the users did not follow the rules and the (nightly) battery replacement

was a source of noise that has been perceived as very annoying. It was also noted that the project as a whole should have been better communicated. Also, some of the participants expressed that they could not understand the meaning of the new signs that had been put up. Some of these signs have been just recently introduced with the reform of the official national German road traffic regulations ('Straßenverkehrsordnung'). Especially the new sign for car-sharing was not being understood as such. Also it seemed to be hardly comprehensible how the signs for regulating parking spaces exactly were meant and what is the purpose of the container. In this context, it was also criticized that there was no opportunity to discuss the type and scope of the individual measures. The new mobility services were perceived more as a hindrance to the weekly market (Wednesday and Saturday mornings), since they made it more difficult to deliver the goods and also to use the market "as a meeting place". It was therefore proposed to relocate the car-sharing spaces.

The second resident workshop was designed as a simulation game on the future of local mobility. It took place in September 2021 and acted as a follow-up to the first workshop with almost the same group of participants (12 residents, district councilor, three members of the project team, and two external facilitators). In contrast to the first workshop, the participants now agreed that alternative mobility offers make sense - only the implementation at this specific location was criticized partially: These were in particular the insufficient number of cars available and the use and appearance of the container). A relocation of the mobility station to a less exposed part (not on a main through road) was suggested. Also, some participants preferred a distribution of several mobility stations throughout the wider area. It was mentioned that commercially used areas (for example supermarket parking lots) appear to be particularly appropriate locations for new mobility services, since there, they cause less disadvantages for neighboring residents.

A Process Evaluation Workshop was arranged in October 2021 with the four members of the core project team. As all of them have been involved since the beginning they were perfectly suited to comment on the processes of planning and implementing the experiment project. The workshop started with conjointly setting up a timeline of important project-related milestones. Subsequently, these were assigned to events that had either a positive or negative effect on the project:

During the first months of preparation (January to March 2021), the plan to use the entire stretch of road as an experimental space and to use it for activities throughout the project period seemed very ambitious to the project team, especially given the short preparation time and limited resources. However, regular team meetings with members of the project team and responsible persons in the district were able to allay many concerns. In addition, flexible adjustments to the planning and implementation concept could be discussed and decided at the meetings. Holding these regular meetings was considered essential.

In April and May, the lack of project resources became noticeable: Additional costs for necessary traffic signs, for additional time required for informal discussions with residents and the market management or the organisation of further events could not be foreseen prior to the start of the project, and additional funds could not be provided. In consequence, some necessary steps had to be taken without funding but with flexible approaches of the project team. Furthermore, the decision was taken by the local

administration that a temporary closure of the street was not feasible. This went along with another decision that there would be no play street because the market could not be relocated and construction site nearby that has not been communicated early enough aggravated the local parking situation. The offer for residents to use a replacement parking space about 200 m away was not accepted. On the one hand, the distance was judged to be too impractical, on the other hand, the insufficient lighting in the replacement parking lot was rejected due to safety concerns, especially from women.

From the very beginning, a sceptical attitude towards the project and the team was expressed by local residents and traders. The most common concerns were fears about restrictions on the usability of the traffic areas and a devaluation of the appearance of the square due to the large number of mobility services. The project team reacted to this scepticism with more intensive communication about the scope and goals of the project. This was done through informal on-site discussions, in written form on a provided poster and the project website, and most importantly in the workshops with local residents. Around July, a positive change in the attitude of many local residents could be observed. Three factors that caused this change need to be mentioned: First, the presence of the responsible district councillor at all workshops, second a good preparation and moderation of the workshops that made the participants feel that their perspectives and suggestions were being heard. Third, the project team invested more time than planned in building trust between the team, the local administration and the residents through informal and formal discussions.

The final step of the process evaluation activities undertaken by the project team was to present the results and findings from the process and impact evaluations to experts from similarly experimental projects in Berlin. In a Peer Review Workshop carried out in February 2022, crucial aspects of implementing mobility experiments were discussed in a group of seven experts and project members. Referring to the intermediary findings from the Mieri-Mobil project three aspects were identified beforehand: Communication (before the start and in the project), organizational pitfalls when implementing experimental spaces, and appropriate evaluation methods.

Regarding the communication aspect, the participants agreed that any project aiming at the transformation towards more sustainable urban mobility must expect strong headwinds. In order to deal with this adequately, transparent communication is necessary right from the start. However, the participants also agreed that very early information concerning the idea to implement a project such as this, led to strong protests, while information about four to six weeks in advance led to productive discussions. This is the case particularly when discussion take place in smaller rounds. This raises the question again - which remains unanswered even after all the decades of successful citizen participation - when is the ideal time to start successful communication.

Furthermore, it is essential that an experimental area is communicated as a “temporary” area and that the term “Temporary” needs to be taken seriously by the organizers. This includes clearly communicating the end of the project right from the beginning. In addition, it is essential to address all local stakeholder groups, i.e. not only residents but also tradespeople and organizations. Personal contacts and discussions seem preferable.

In addition, it could be observed that the number of complaints seems to be higher when people get the chance to give their feedback online.

Challenges to implementing such experiments were distributed responsibilities in the district administration. In the case of Mieri-Mobil, the people responsible for authorizing the restructuring of the parking spaces were different from those setting up the construction site, or in charge of the local market. In addition, many resources are necessary for the preparation and implementation of such projects. This is often exacerbated by time pressure. If Mieri-Mobil had been implemented as originally planned, even more resources would have been needed. As in many other similar projects, the budget was restricted which did not allow for integrating local NGOs with experience in interactive project communications.

Another challenge was that the existence and implementation of the legal basis the 'experimentation clause' were unknown in large parts of the administration.

In addition, the signage with the car-sharing parking space symbols that were new at the start of the project was unknown. This meant that in the first few weeks it was very time-consuming and a lot had to be explained.

A last but important finding was that the degree of car use and car ownership in the respective districts seems to have a surprisingly high influence on the positive or negative effects of mobility experiments. It is also easier to persuade people with higher education (university degree) and (high) environmental awareness to participate.

As mentioned before, the evaluation of such experiments is not common yet – neither the evaluation of the project nor the evaluation of individual measures. Accordingly, there were only few ideas which methods would be suitable. However, it became apparent that older people tend to take part in surveys and reflection. This raises the question of how different user groups could be included in an evaluation.

5 Challenges to Making Digital Mobility Accessible and Inclusive

The last chapters described main results of both impact and process evaluation of the Mieri-Mobil project. Most obviously, during the short running time of the experiment, many adjustments to aims and processes of the project had to be made. Nonetheless, the project can be considered a success, as valuable insight into the usefulness and spatial impact of a mobility station could be gained that will be helpful to organize and implement future mobility experiments in Berlin or elsewhere.

At the same time, it became clear that there are still several challenges to mainstreaming alternative forms of mobility.

From the data available, three basic findings could be identified: First of all, the overall usage numbers increased over the course of the project, with a peak shortly after the introduction of the mobility offers in July. From this it can be concluded that people generally seem to be curious about new mobility offers – interestingly, e-scooters seemed more popular than e-mopeds and shared cars. In order to be accepted such new offers and experiments need time to unfold positive effects.

Second, the usage numbers of open vehicles such as e-scooters or e-mopeds seem to be influenced significantly by external influences such as weather, holiday seasons and pandemic events. In consequence, usage numbers were lower during periods of bad weather, during public and school holidays and during phases with increased Corona rates in November and especially in December.

Despite the fact that most mobility alternatives offered at Mierendorffplatz are considered "smart" ones, it is astonishing how little scientific knowledge has been gained so far about their actual usefulness. Of course, data protection is very important, but it would be very helpful if forms of cooperation between mobility providers and scientists could be developed that would allow for further insight into the actual usability of such mobility offers.

During the evaluation, it was very difficult to obtain reliable data regarding usage numbers. Not all providers were able - or willing - to provide usage numbers, not even after repeated requests. In addition, where data was available, the periods of collection were different. Statements about the usage figures over the entire campaign period were therefore not possible. Likewise, no statements could be made about which persons used the offers, since this information was not transmitted for data protection reasons. In consequence, it is impossible to tell which population groups used the offer and which didn't – and why.

Public attitude towards the project changed over time towards the positive. Most significantly, a bias between users of the mobility alternatives and the non-users could be observed. The latter, the non-users, were basically immediate residents and business people - middle-aged and well-educated - who never intended to use alternative forms of mobility. In consequence, the mobility offers were met with a lot of scepticism regarding their usefulness and – more important - their negative impact on urban space and community structure in the beginning. It may be concluded that addressing questions of adequate access to alternative mobility an of impact of mobility stations on public space - are equally important for the success of such experiments. In addition, in may be concluded that the introduction of a mobility station is much more than just offering alternative forms of mobility and that communication with (potential and actual) users and non-users must be organized very differently: The acceptance of the non-user/residents depended heavily on the degree to which they felt understood and to the extent that suggestions for change and improvement were integrated into the project.

Despite all efforts, not all uses of urban space could be integrated into the project adequately: Above all, this was the conflict between the market on Wednesday and Saturday mornings and the mobility offers. In addition, the positioning of the mobility offers and parking spaces right next to a busy main thoroughfare created some issues with people's safety, be it users of the offers or people walking by. In addition, a road construction site that the project team was not aware of in the beginning, caused further issues with public safety and parking space.

In the future, it will be crucial for any mobility experiment to take into account possibly conflicting uses of urban space or temporary restrictions. This requires an early exchange with different administrative units and local stakeholders. In addition, sufficient preparation time for both implementation and evaluation is crucial, along with a comparatively high input of human resources and dedication of the project team as well as the local administration in order to deal adequately with the experimental character. This must include regular project meetings to coordinate feasibilities and pitfalls, as well as the readiness of the time for flexibility, spontaneous actions, alternative solutions and meaningful communication with stakeholders, businesspeople and residents.

Decadelong experiences with participatory processes emphasized the need for early participation and communication in planning and implementation processes (Creighton 2005). During our peer-review workshop, it became obvious that information, participation and communication in temporary experiments must be framed differently: As experiments are clearly time-restricted and have a test character, it must be clear to everyone that there are not and that there cannot be any prefabricated solutions. And that experiments are not (yet) part of traditional planning and implementation processes. In consequence, communication in experimental projects can start too early. This especially if early phases of communication are not attended to intensively by the project team: In the case of mobility, which is a very emotional and contested topic in Germany, informing early about mobility experiments often triggers negative emotions and may also leave a lot of time for organizing protests. About six to eight weeks before the implementation seemed a suitable period for several representatives of Berlin mobility experiments. In this context, the two workshops with residents can be considered a success as continued dialogue, individual information and commitment of the project team and the district councillor helped to develop informed decisions among the residents and to obtain a different perspective on temporary experiments: "First, I was really annoyed, now I see that something is happening. I think that's good!".

6 Conclusions

It is more than obvious that we, as a society, will need new approaches to urban mobility. The project and its evaluation give concrete impetus as to where and how mobility measures can successfully be organised and implemented. In addition, there were direct consequences of the project and the workshops: The offered range of new mobility services will be relocated to a safer location nearby. As a side effect, other local mobility issues were also discussed in the workshops, for example that a pedestrian crossing is needed nearby and that the general topic of mobility has been picked up by local initiatives.

Mieri-Mobil presented a specific mobility mix at a specific location. Experiences made with each experiment are unique as they relate to specific administrative settings, to a specific population and stakeholder structure, and to specific urban space. However, some of the results can be transferred to other settings in Charlottenburg-Wilmersdorf or to other sites in Berlin (see Sect. 5).

Therefore, for future similar experiments in the district, cross-departmental reflection on the project would be recommendable. A comprehensive (sustainable and) smart urban mobility system will need more integration (Uteng et al. 2019) and coordination (Docherty et al. 2018) in order to overcome fragmented responsibilities, singular solutions and path dependencies. In addition, a continuous exchange with those involved in other experimental spaces in Berlin and elsewhere seems sensible, because similar experiences to Mieri-Mobil might have been also made in other projects.

It remains unclear in what terms such experiments focussing on alternative, smart mobility is accessible to different population groups and therefore (socially) inclusive. Clearly, using the mobility alternatives costs money that not everyone is willing or able to pay. In addition, the concentration of mobility services in one single spot leaves

many people with long (walking) distances – which may discourage people to use these offers, especially if they have problems walking. And there are indications that people with lower education are less interested in questions of mobility (Neue Mobilität Berlin 2020). Mobility alternatives in the project were clearly supply-led and focussed on testing new technologies. In consequence, mobility needs of specific user groups may not have been met.

Nonetheless, Mieri-Mobil clearly showed the importance of experimenting as the organisation of uses of urban space is very complex, and in most cases unintended effects and overlooked uses of space may complicate a proper integration of new forms of mobility into people's daily lives.

The project also showed that a much more and more in depth evaluation of these projects are needed to be able to really address not only the mobility needs of specific user groups but also to guide planners and administrations the direction towards reaching a true mobility transformation.

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