

Summary project report

Bicycle frequency measurement from anonymized mobile phone movement data for the top 10 Lower Austrian cycling routes 2020

References	EZL 7324, RB 2019.011
Client	ecoplus. Lower Austria Business Agency GmbH
Contractor	Invenium Data Insights GmbH
Project partner	A1 Telekom Austria Kondeor GmbH Radlobby Austria Snizek + Partner Verkehrsplanungs GmbH

Project design

Project name: NOEVelo_19+	Kick-off date: July 2019
Project end goal: Cycling frequency survey (cycling traffic volumes) at the top 10 Lower Austrian cycling routes by means of mobile phone movement data	Project completion: Q4 / 2020
Objectives: <ol style="list-style-type: none"> 1. Current trajectories of the cycling routes 2. Procedure adjustment + calibration (previous measurement → new procedure using mobile radio data) 3. Process development for the detection of cycling trips along the cycling route 4. Visualization of the cycling route frequency (paper) 	Non-objectives: <ol style="list-style-type: none"> 1. Interactive dashboard 2. Detecting short cycle paths
Main tasks: <ol style="list-style-type: none"> 1. Travel the cycling routes 2. Generate cellular data and GPS data for reference 3. Collect counting stations data and integrate them into the model 4. Model mobility types 5. Data analysis and representation 6. Create visualizations 	Project critical factors: <ol style="list-style-type: none"> 1. Mobile phone data 2. Weather for traveling 3. Equipment (reference measurement) 4. Availability of calibration data
	Project team: A1 Telekom Austria Kondeor GmbH Radlobby Austria Snizek + Partner Verkehrsplanungs GmbH
Project client: ecoplus. Lower Austria Business Agency GmbH (Mag. Christian Weinberger)	Project manager: Barbara Kajak (part 1), Christian Fritsch (part 2 + 3), Christof Bernsteiner (part 3)

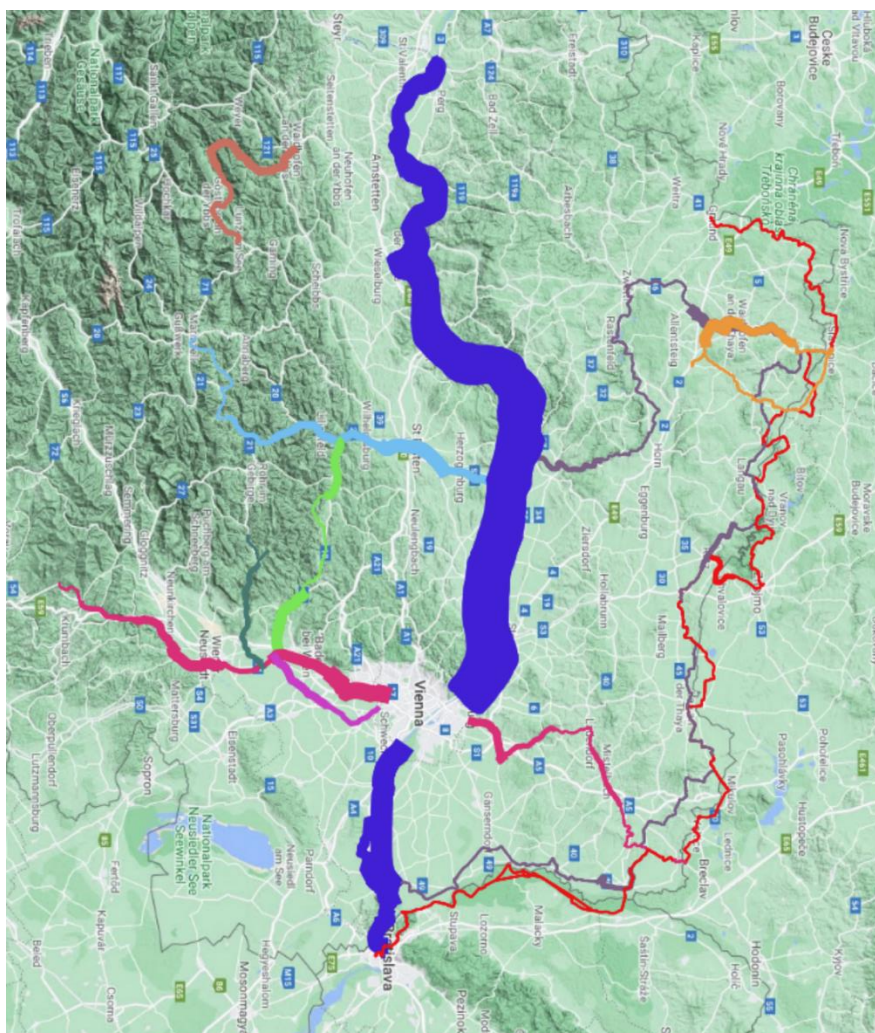
Table 1: Project overview.



*1. April bis 30. September 2020

Figure 1 shows the phase plan for the NOEvelo_19+ project. Originally, the project was scheduled for completion in the first quarter of 2020. Delays occurred due to a wide variety of challenges during the course of the project. In summary, GPS data of the route as well as mobile radio reference data is to be generated in phase 1. Phase 2 will investigate the feasibility of detecting “tourist cycling trips” from cellular data. An evaluation of a cycling season based on mobile phone data will be carried out in phase 3.

Project results for Lower Austria



Top 10 Radrouten

- Donauradweg
- Eurovelo 9
- Eurovelo 13 - Iron Curtain Tra
- Kamp-Thaya Radweg
- Piestingtalradweg
- Thayarrunde Radweg
- Traisental Radweg
- Triesting-Gölsental Radweg
- Triestingau Radweg
- Ybbsalradweg

Radverkehrsstärke (1. April - 30. September 2020)

- 0 - 10000
- 10000 - 25000
- 25000 - 50000
- 50000 - 75000
- 75000 - 100000
- > 100000

Figure 2: Cycling traffic volumes for the evaluation period from April 1 to September 30, 2020 of the 10 cycling routes in Lower Austria under evaluation.

Counting stations	Mobile signal analysis values	Counting station values
dr-07 – Dornach	45,000	77,375
dr-08 – Ardagger	45,000	54,500
dr-09 – Persenbeug – Marbach	65,000	61,643
dr-10 – Ybbs – Krummnussbaum	75,000	57,956
dr-11 – Spitz – Weißkirchen	110,000	55,462
dr-12 – Mitterarnsdorf – Rossatz	45,000	46,122
dr-14 – Tulln – Greifenstein	55,000	81,457
dr-15 – Langenzersdorf – Vienna	400,000	370,494
dr-16 – Vienna – Kuchelau	655,000	498,793
dr-17 – Vienna – Orth a. d. D.	65,000	54,030
Thaya Circuit Cycle Route Dobersberg	35,000	49,117
Thaya Circuit Cycle Route Gross Siegharts	5,000	24,404
Thaya Circuit Cycle Route Waidhofen	50,000	58,381
Traisen Valley cycle path St. Pölten	80,000	199,212

Table 2: Seasonal total values of cycling trips for the counting stations available in the project as well as the respective tourist cycling trips values of the corresponding counting stations determined by means of mobile radio signal analysis. The values for the season from April 1 to September 30, 2020 are used in this comparison for both systems. For those days of the evaluation period where no values were available from a counting station, the corresponding values of the mobile signal analysis were not taken into account either, so that comparability is ensured in any case.

Cycling route	Cycling trips per season
Danube Cycle Path	1,100,000
Eurovelo 9	480,000
Kamp Thaya March cycling route	195,000
Traisen Valley cycle path	170,000
Triesting Gölstental cycle path	100,000
Thaya Circuit Cycle Route	75,000
Eurovelo 13	70,000
Ybbs Valley cycle path	65,000
Triestingau cycling route	45,000
Piesting Valley cycle path	35,000

Table 3: Number of tourist cycling trips per cycle path (sections in Lower Austria) for the period from April 1 to September 30, 2020.



Comparison of data collection methods

Feature \ Method	Counting stations	Mobile signal analysis
Data collection	☹️ Specific points	😊 Area-wide (depending on network coverage)
Stage starting point / end point	☹️ No	😊 Yes
Stage start time / end time	☹️ No	😊 Yes
Source-destination relationship	☹️ No	😊 Yes
...based on area	☹️	😊
...based on coordinates	☹️	😊
...based on any categorization	☹️	😊
...based on the purpose of the	☹️	😊
Partial collection (temporary) or Full collection (permanent)	😊 In some cases only partial collection	😊 Full collection
Model conception necessary for analysis	😊 Partly special calculation methods necessary	☹️ Yes, necessary for extraction of tourist cycling trips from data
Prerequisite on the part of the cyclists	😊 No prerequisite	☹️ Mobile phone switched on
Planning the analysis	😊 Necessary in advance	😊 Possible afterwards
Carrying out the analysis	😊 During the planned analysis period	😊 Possible afterwards
Maintenance and servicing	😊 Necessary	😊 Not necessary
Calibration	😊 Not necessary	😊 Necessary (by counting station values)
Counting other road users as cyclists	😊 Yes, possible depending on the installation site and counting station	😊 Yes, in areas of complex transport infrastructure situations
Distinction between the purpose of the trip (tourist cycling trips / everyday cycling trips)	😊 Not possible	😊 Possible (based on characteristics)
Willful multiple triggering possible	😊 Yes	😊 No
Data protection	😊 Unobjectionable	😊 Unobjectionable, since completely anonymized (TÜV tested)
Failure of the system possible	😊 Yes	☹️ Yes

Table 4: Comparison of methods, findings from the project, and features of the two data collection methods.

Data protection in the processing of mobile data

Invenium Data Insights GmbH strictly adheres to the applicable regulations based on the Data Protection and Telecommunications Act. The processing of raw mobile data and mobile movement data at Invenium complies with the European Union's General Data Protection Regulation (GDPR-compliant data processing). Even before any data processing takes place, the data is anonymized by A1 Telekom Austria AG, which makes the subsequent identification of individuals impossible. Furthermore, no real-time data (delay up to 24 hours) is provided and a minimum aggregation size of 20 (in words: twenty) observations is collected, related to the base layer (district boundaries, postal codes, counting districts, or similar). This means that the identification of individuals or small groups on the basis of the data can be ruled out.

The handling of personal customer data in compliance with data protection regulations and applicable laws is continuously audited and certified by TÜV Saarland.