



Nordic
Innovation

Nordic AI and data hackathon



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The report was compiled by Rambøll Management Consulting in April-May 2022

1. Executive summary

Contributing to the launch of Nordic Innovation's (NI) AI and Data Program 2021-2024, a Nordic AI and data hackathon was conducted on 18-19th March 2022. The event was prepared and executed by Ramboll Management Consulting and Happy42 in close cooperation with NI and held at venues at the Danish Technical University in Copenhagen, KTH Royal Institute of Technology in Stockholm, and virtually as a hybrid event.

The hackathon had a dual purpose. One primary objective was to create awareness around the AI and Data Program and engage important AI and data communities – both public and private – in utilising Nordic open public data for the sustainable solutions of the future. There is great potential in strengthening visibility and awareness of public data in academic and industrial AI and data communities. In addition, the hackathon aimed to get insights on the applicability of Nordic datasets with high potential by getting students, start-ups, public data owners and private sector actors together and work with data.

Generally, the first objective was fulfilled by the hackathon. Both in the preparation of the event and at the hackathon target groups were engaged and enthusiastic. The hybrid format of the hackathon helped to ensure participants from across the Nordics – and beyond – and there was satisfactory diversity in participants concerning gender and occupation. Especially students were highly engaged. To a lesser degree start-ups, academics, and industry stakeholders. The hackathon also succeeded in investigating the sustainability potential in selected open public data and creating innovative AI and data solutions of relevance to SDG 9, 13 and 15. More than 15 open data sources were utilised at the hackathon across more than 15 solutions addressing a variety of challenges and possible applications relevant to the SDGs.

Based on the hackathon some learnings and subsequent recommendations are derived. To a large extent they align with overall conclusions of the report Nordic cooperation on data to boost the development of solutions with artificial intelligence why recommendations with some additions and adjustment matches the joint Nordic actions in the prior report. Learnings and recommendations are divided into reflections related to data and related to awareness and engagement matching the dual purpose of the hackathon. Full descriptions of learnings and recommendations are presented in section 3.4 of the report.

Main data learnings and recommendations from the hackathon are:

- Open public data are not always truly open across the Nordics – recommendations concern contributions to non-limited and equal access to data across the Nordics to the largest extent possible.
- Significant variation in Nordic public data - purpose of the recommendation is to get a more coherent and transparent data structure of open public data sources across the Nordics.
- Competitive edge of road camera data – and other public data – not fully clear - recommendations aim at investigating further the business and application edge of road camera data and similar public data sources.

Main awareness and engagement learnings and recommendations from the hackathon are:

- Untapped potential in public-private partnerships - purpose of recommendations are to support platforms and communities where private sector stakeholders and public agencies can have direct AI and data application dialogues – preferably across the Nordics.
- Data events and utilization of "real" data engage students and new talent – recommendation concerns using data to lay the foundation for innovative sustainability solutions of the future utilizing open public data.

2. About the hackathon

In recent years, extensive work has been carried out with regard to mapping, collecting, and presenting government datasets to a public audience. However, many datasets are still not being used to their full potential, and while companies and citizens have access to vast amounts of data, similar amounts of data are still locked away in the databases of public agencies. From the report on Nordic cooperation on data to boost the development of solutions with artificial intelligence, NI gained valuable insight into issues related to public datasets.

The report states that public agencies have a limited number of resources available and have a hard time allocating resources to prepare and publish datasets. Therefore, they request a certain degree of external interest in their data before prioritising these tasks¹. Besides the existing use and reuse of data by public agencies, companies, and citizens, open public data could also be used to develop AI solutions addressing complex societal challenges. On the one hand, open government data keeps the promise of solving complex issues for public agencies while on the other hand promoting growth among AI companies in the Nordic region. Many companies would like to use government data to a greater extent, but lack of transparency into the data collection processes and types of data stored by public agencies are barriers that prevents full utilisation of government data.

2.1 Overall purpose of the hackathon

To solve this dual problem, a recommendation in the report was to create transparency and bring companies and the public agencies together through a hackathon, where companies, start-ups, and students compete to develop innovative solutions based on datasets provided.

In addition, a hackathon is a valuable and significant take-off for launching the AI and Data Program 2021-2024 creating wide awareness of the important agenda.



¹ An AI nation – Harnessing the opportunity of AI in Denmark (The Innovation Fund Denmark and McKinsey & Company, 2019); Nordic municipalities' work with artificial intelligence (Ulf Andreasson and Truls Stende, 2019); Artificial Intelligence in Swedish Business and Society (Vinnova, 2018); How Artificial Intelligence Will Transform Nordic Businesses (McKinsey & Company, 2019); 4. Främja den offentliga förvaltningens förmåga att använda AI (Myndigheten för digital förvaltning (DIGG), 2019)



Figure 1: Purpose of the hackathon

2.2 Format and venues

The hackathon was held as a hybrid event taking place simultaneously in three different venues. At the Danish Technical University in Lyngby, Denmark, at KTH Royal Institute of Technology in Stockholm, Sweden, and virtually utilizing Zoom. These venues were selected to engage directly with target communities and participants optimizing engagement across the Nordics.

The technical universities were selected as venues because of their potential for engaging individuals and start-ups interested in AI and data. DTU is not only the largest university in Denmark for engineers but also an innovation and start-up hub for students and companies to engage with each other through prototype workshops, internships, projects, and events. KTH in Sweden is similarly a promoter of innovation and start-ups. Both universities are also part of the collaboration “Nordic AI Network” consisting of five universities across the Nordics.

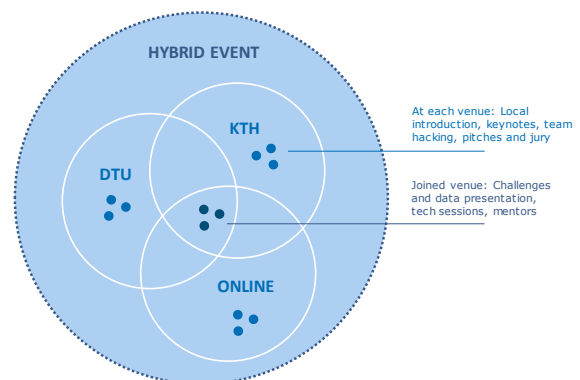


Figure 2: Hybrid event model

An online venue was also established to reach potential participants outside the larger cities and to provide opportunities for participating throughout the Nordics. Participants from all three venues could engage with each other online and attend mentor sessions with experts joining the online venue from across the Nordics.

Part of the hackathon was held online to avoid unnecessary transportation across countries, both to reduce the climate footprint of the event and to improve the likelihood of a diverse group of people participating across the Nordics. With the possibility of participating in person at the two remaining venues, it was possible to accommodate participants who prefer to be physical present, something in high demand after a couple of years with limitations to physical events due to COVID-19 restrictions.

Each venue had its own experienced facilitator to ensure a good balance between creating local enthusiasm by

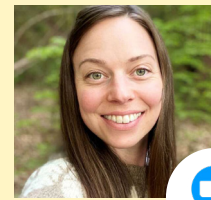
3 facilitators across 3 locations



Lasse Chor
Copenhagen, DK



Linda Pedersen
Stockholm, SE



Maria Garde
Online



well-executed events and at the same time facilitating a sense of togetherness and connectedness across the Nordic countries.

2.3 Programme of the hackathon

The hackathon was held as a two-days event from Friday March 18 to Saturday March 19. To create an engaging, dynamic, and varied event, the programme contained a mix of keynote speakers, tech sessions, team hacks, online mentor sessions and pitches presentations. For some activities, all participants across the three venues were gathered, while other activities were held locally on each venue.

The keynotes from stakeholders working with Smart Mobility and intelligent traffic solutions presented a motivating platform by means of a view “from the real world” to stress the importance of addressing the sustainability challenges by utilizing AI and data. Similarly, mentor sessions with relevant stakeholders working in the field of AI, machine learning, and data contributed with relevant knowledge and input supporting the participants to weigh their ideas against real life situations and to facilitate the development of a final pitch. All this helped to ensure relevancy, actuality and application potential of ideas and pitches developed at the hackathon.

Duration and timing of the event allowed participants enough time to learn about and understand data before working on potential solutions. Additionally, the aim was to ensure enough time to work on viable solutions which could result in potential start-ups after the event.

Friday March 18



- 3:30 pm: Arrival, registration and networking
- 4:00 pm: Kick-off on each venue by facilitator, introduction by Nordic Innovation and keynote speakers
- 4:30 pm: Presentation of challenges and data across venues
- 5:00 pm: Team formation and start hacking
- 6:00 pm: Dinner
- 6:30 pm: Tech sessions across venues
- 12:00 pm: End of today – venues close

Saturday March 19



- 8:30 am: Breakfast and check-in
- 9:00 am: Online mentor sessions
- 12:00 am: Lunch
- 3:00 pm: Jury presentation on each venue
- 4:30 pm: Announcement of top two at each venue
- 5:00 pm: End of hackathon

2.4 Promotion and outreach

Participants – students, start-ups, academia, and companies – were recruited through a range of communication channels using existing and new networks. A solid foundation for the engagement was strong, existing relations to the start-up communities in the Nordic countries by the event organizers. These relations were utilised to engage both directly and to activate central sector stakeholders to spread the word about the hackathon in various networks.

Concretely, several channels and activities were used to engage the participants:

- **Website:** A website dedicated to the hackathon was established very early in the preparation of the event (www.nordicopendata.com) to engage and create awareness before the hackathon and as a platform after the event. On the website information about the hackathon were presented and updated on an ongoing basis including links to the AI and data Program 2021-2024 to create traffic and awareness around the programme initialisation. The website is still active and online to be utilised as an ongoing platform for participants and others of interest.
- **Social media:** Extensive engagement of relevant start-ups and student communities through social media-channels relevant to AI, data and innovation. Primary channels activated were LinkedIn and Facebook which has high usage and impact potential in relevant communities
- **Direct engagement of start-ups:** it can be difficult to engage start-ups. They have limited resources and need to see a clear purpose and potential to engage in events such as hackathons. In addition, the start-up community is relatively defragmented and heterogenic. To engage start-ups, a systematic mapping of relevant start-ups and subsequent direct engagement by telephone or mail were conducted.
- **University partners:** Promotion of the hackathon was made aimed at students within AI, machine learning, sustainability, Smart Mobility, and transportation. Both student organisations and the institutes were approached, and information and marketing material was given to professors to get them properly informed, so that they could promote it directly to their students and classes.
- **Sector actors:** Relevant stakeholders such as AI, start-up and innovation hubs were mapped to support the promotion of the hackathon. When identified, they were engaged to share it through channels such as newsletters, social media pages, LinkedIn pages, etc. A consistent follow-up was made to engage the stakeholders to ensure dedication to the promotion. The response across all countries was very positive, and a lot of the stakeholders were very helpful in promoting the event.

Overall, the many promotion and engagement activities helped maximise the number of participants and engagement of relevant communities. This contributed to creating awareness of and interest generation around the AI and data Program 2021-2024 and the potential in open public data with academic and private sectors stakeholders.

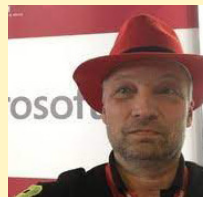
Industry and university partners



Mentors



Zhenliang Ma
Assistant Professor,
KTH



Jan Cordtz
SR Cloud Solution
Architect, Microsoft
Denmark



Christoffer Riis
PHD Student, DTU



Hafsteinn Einarsson
Assistant, Professor,
Háskóli Íslands



Kamal Nasrollahi
Head of Machine Learning,
Milestone Systems



Elin Hauge
AI and Business Stra-
tegist



Felix Wilhelm Siebert
Assistant Professor,
DTU



Stefán Ólafsson
Assistant Professor, Department
of Computer Science at Reykjavik
University



Ehsan Hashemi
Director, Networked Op-
timization, Diagnosis, and
Estimation Lab, University
Alberta



2.5 Partners

Getting the right partners involved in the hackathon was paramount to make the event attractive and relevant to participants. Thus, engaging partners has been a priority in preparing the hackathon.

Confirming the relevancy of the hackathon, the data in focus and the challenges addressed generated strong commitment and engagement of relevant partners across the Nordics – both industrial sector stakeholders and university partners. Similarly, the public data owners have been very helpful, interested, and committed to help preparing data and making it available at the hackathon. As an example, the Danish Road Directorate has been considering a similar event, so they were very pleased and excited about contributing to the event. As a result, they contributed with live presentation of their data sources at the hackathon.

The partners contributed to the hackathon in different ways. ITD Logtech Hub, for example, participated as a keynote speaker at DTU, offered 20.000 DKK in cash prize and supported the acceleration package for the winners. Microsoft similarly gave out free trial passes for MS Azure where all sample data were made available. Accesses are still active to make it possible for participants to access sample data after the hackathon. Microsoft also contributed to the acceleration package and as a tech session speaker.

University partners similarly made a huge contribution. Venues were made available by the technical university partners, and they participated as mentors and in juries. This helped to a high degree in making the hackathon valuable and interesting for participants, especially students and start-ups looking for talent with recruitment potential.

All three venues had a jury consisting of high-profiled stakeholders with experience in traffic research, logistics, AI, and data science who attended the final pitch of the participants. The juries represented a good mix of innovation capabilities, academic profiles, and industry partners from across the Nordic countries.

All in all, the contribution from and engagement of partners were satisfactory and contributed to deliver a high-level event based on the distribution and generation of knowledge and competencies in the field of AI and data science.

Opening talks



Gina Aspelin Hedbring
Smart City Sweden



Ditte Hvas Mortensen
ITD Logtech Hub



Kristjana Björk Barðdal
The City of Reykjavik



2.6 Participants

Naturally, a high level of participant engagement was a central success criterion of the hackathon. The success of the hackathon depended to a large extent on the volume and engagement of the participants. It was also very important for the legitimacy and cross-Nordic relevancy to ensure diversity among participants as to gender, nationality/affiliation, occupation, etc.

In total, 142 people signed up for the hackathon across the three venues. Especially considering the aftermath of the COVID-19 restrictions, this was very satisfactory and fulfilled participant targets.

Generally, there was good mix of participants at the hackathon. Around half of the participants were students while around a third represented a company. The mix of students, AI start-ups, and established industry stakeholders was valuable as it contributed to high engagement among the participants. While students might want to impress their potential future employers, start-ups might be looking to impress and attract talent. The participation mix was also valuable to ensure innovation as well as the potential for future recruitment. Students can provide AI start-ups with an outside perspective on methods and processes, which can contribute to innovative thinking among the participants. Additionally, there is a potential matching between students and start-ups, which can stipulate the foundation for further co-working in the future.

Ideally, a larger portion of the participants should have been start-ups to achieve the above-mentioned synergies between students and start-ups and to contribute to the overall purpose of the hackathon of creating sector and industry awareness of the potential in utilizing open public data for the sustainable solutions of the future. This, especially considering the efforts, put engaging start-ups in the recruitment strategy, e.g. by systematic mapping of Nordic AI and data start-ups.



Nationality/ affiliation

Denmark 42 %
Sweden 38 %
Finland 5 %
Norway 2 %
Iceland 1 %
Others 12 %



Occupation

Students 54 %
PhD/Postdoc/research 11 %
Company/industry
stakeholders 30 %



Gender

Women 23 %
Men 77 %

Figure 4: Participation across nationality, occupation and gender

A learning is that other methods might be better suited for engaging with the industrial stakeholders.

Regarding gender and nationality/affiliation country, the hackathon succeeded in creating some diversity. To a large degree, this can be ascribed to the high emphasis and effort put into securing this diversity throughout the recruitment activities. Around one third of participants were females, despite the imbalance still present at some of the relevant technical higher educations and in the sector. The hackathon also succeeded in engaging participants from all Nordic countries as well as countries outside the Nordics. However, most of the participants came from Denmark and Sweden, probably as an effect of the physical venues being held at these locations. Thus, the virtual format and the presence of Icelandic, Finnish, and Norwegian keynote speakers and jury members did not fully succeed in engaging participants across the Nordics.

2.7 Data and challenges

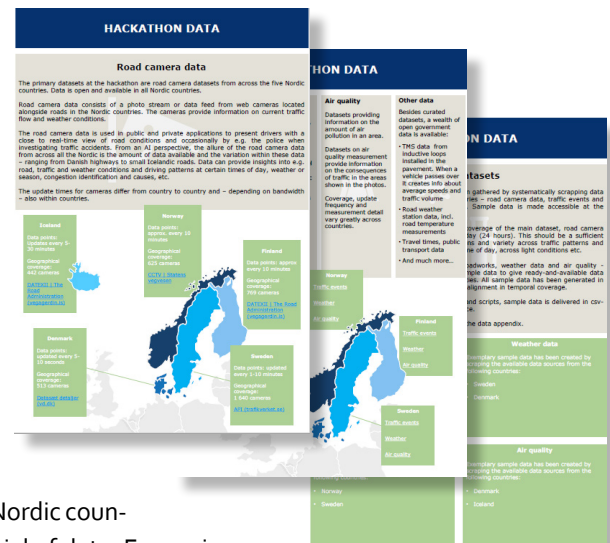
Data and challenges of the hackathon are of paramount importance to ensure real world relevancy and application potential of the solutions and ideas developed. An extensive data package with closely connected SDG challenges – with applicability and utilization potential for the data – where provided for participants.

The starting point was the datasets identified in the report on Nordic cooperation on data to boost the development of solutions with artificial intelligence as having high cross-Nordic potential. Potential relates both to the application possibilities of the datasets, the Nordic coverage of datasets as they are available from all Nordic countries, and the untapped business and sustainability potential of data. Four primary datasets were selected based on the mapping:

1. Road camera data
2. Weather data
3. Data on traffic events and roadworks
4. Air quality data

Primary datasets were prepared by systematically scrapping open-source APIs across the Nordics and made available to the participants as sample data through Microsoft Azure storage account. This ensured ready-and-available data for proof-of-concept and script testing to limit hackathon time spent on preparing a dataset, especially relevant in relation to live-feed data where historical data is not available (e.g. road camera data). Participants afterwards highlighted the sample data package very useful and accommodating to focus on working with data and developing innovative ideas. The sample data package made it possible to quickly start working on solutions rather than spending too much time on searching for data. It is thus difficult to easily get an overview of the relevant public datasets and finding the right data sources. There are no cross-Nordic data portals and no heterogenic structure in where data are accessed. In addition, there are access limitations to some data sources of the hackathon where you need national identification solutions or to set up a login to enter data sources.

In addition to the primary datasets, several supplementary open data sources of relevance and possible application to innovative AI and data solution were presented to the participants. In all, + 10 open public datasets were engaged at the hackathon.



VALUE PURPOSE

- Create societal cross-Nordic value
- Support Nordic business and growth potential
- Contribute to SDG 9 (Industry, innovation and infrastructure), 13 (Climate action), 15 (Life on land)

DUAL PURPOSE OF CHALLENGES

DATA PURPOSE

- Consolidate potential in primary datasets
- Investigate role of road camera data in mapping traffic patterns vs. other data sources, eg. GPS, teledate and TMS
- Validate barriers to utilize primary datasets across the Nordics

Figure 5: Dual purpose of the challenges

Rooted in the primary data, challenges and subsequent applications for the hackathon were developed. Besides making the hackathon valuable, relevant and interesting for participants to engage in, the challenges had a dual purpose. Firstly, the challenges had to tap into a value purpose with real contribution potential to SDG 9, 13, and 15 to support sustainability in the ideas and solutions developed. Secondly, the challenges had a data purpose to test and consolidate the application possibilities – and barriers – of primary datasets.

For each of the three SDGs in focus, one or two main challenges were developed with several underlying possible applications. The challenges were identified, developed, and qualified in close cooperation with partners – both academic and industry partners – as well as other transportation and innovation experts, e.g. a Nordic Smart Mobility Network. This created high relevancy and potential, both in relation to business potential and sustainability, in working with the challenges by means of AI and data solutions. To ensure a clear link between the primary and supplementary datasets and the hackathon challenges, relevant datasets for each main challenge were suggested in the material handed out to participants.

For full descriptions of data sources, sample data, and challenges of the hackathon, see Appendix 1.



3. Outcomes and learnings from the hackathon

To sum up, the hackathon's central outcomes concerning participant engagement and solutions developed are presented in this section. This creates the basis for concluding on learnings and subsequent recommendations of the hackathon.

3.1 Being at the hackathon

A central outcome of the hackathon was the ability of the hackathon to engage and create enthusiasm at the event. To a large extent, the hackathon succeeded in fulfilling the engagement purpose. Participants demonstrated high levels of engagement across the three venues - however, to larger degree at the physical venues than at the online venue. In general, the online venue was not as successful as the physical venues in engaging participants and creating a dynamic, interesting event.



At the physical venues, participants were eager to get started on the challenges after the official kick-off of the hackathon and they quickly formed groups and started brainstorming together. All through the hackathon the atmosphere was intense, and the participants addressed the challenges with seriousness and deep concentration. An example of the high engagement was that most participants stayed until midnight on Friday and arrived early in the morning on Saturday to finalise their ideas and prepare their pitches at the physical venues at DTU and KTH.

As a result, the participants expressed high satisfaction with the event – especially participants from the physical venues. They highlighted that the hackathon had been very inspirational primarily due to interesting data to work with, the possibility to meet and create relations across sector actors and the inspirational inputs from mentors.

Examples of participant reflections and citations are presented below.

"Thank you all for the hackathon. It was good to be involved and inspired by the questions and by solving them. Good to meet you all!"

Participant post at Slack-channel used at the Hackathon

"It was good to have so much data available. It helped a lot."

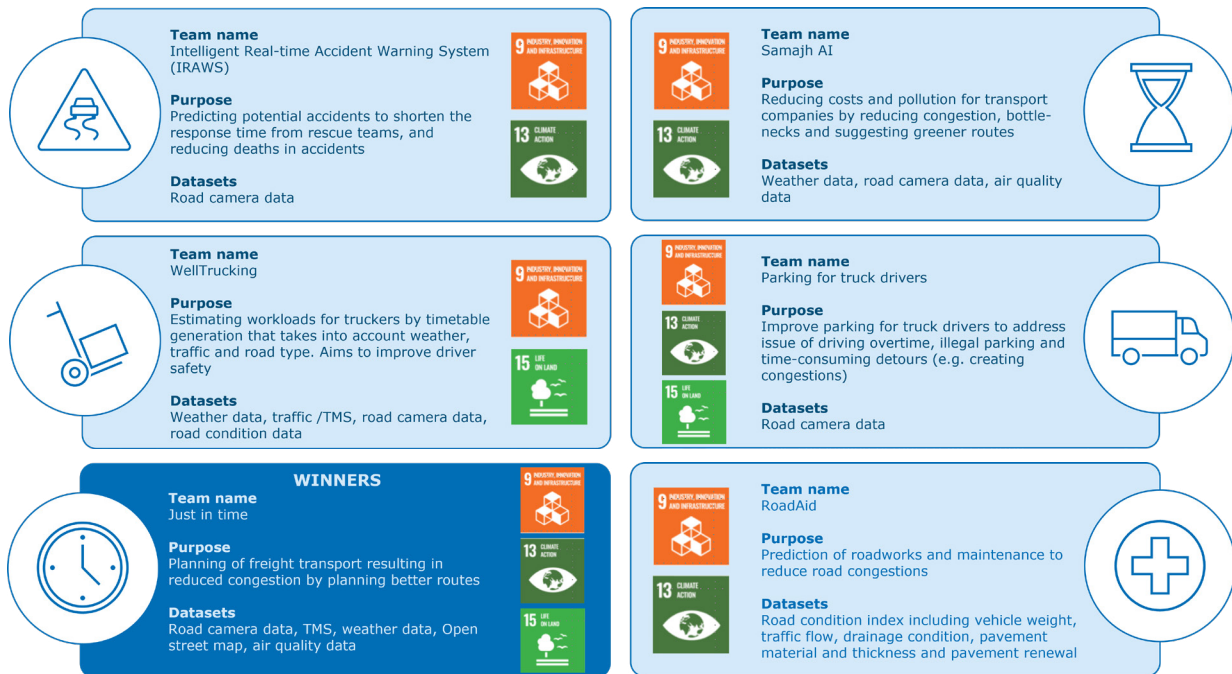
Statement from winner team during winner announcement

"It was so great with mentor inputs"

Participant at KTH, Stockholm

3.2 Solutions developed at the hackathon

Generally, there was a high level of innovation and data application in the solutions developed at the hackathon. All three SDGs in the hackathon challenges were addressed looking across the solutions, and there was great variety in the datasets used. Similarly, more than 15 datasets were utilised in the solutions – including some identified as relevant by the participants themselves and not based on the presentation of data and challenges. An example to this was utilisation of open street map-data from different providers. This was a great example of the innovation and new perspectives a hackathon can create.



In all, around 16 solutions were developed across the three venues with the majority focusing on solutions addressing congestion and optimising trucking/freight transport to create cost efficiency and greener freight transport. Other solutions included predicting road maintenance, and parking optimization for safer roads. The jury judged all the solutions by applying four main dimensions: relevance, impact, feasibility, and scalability.

Out the solutions, six finalists were selected by the juries across the venues. The finalist represented a good mix of data utilisation, SDG's and challenges addressed and diversity in teams and generally demonstrated high levels of innovation and understanding of the link between data, hackathon challenges and sustainability perspectives. An overview of the finalists is presented below. Full pitch videos from the six finalists are available at the hackathon website (www.nordicopendata.com).

In the end, the solution "Just in time" were selected by the jury as overall winner of the hackathon. The jury had three main arguments to why the solution excelled among the finalist:

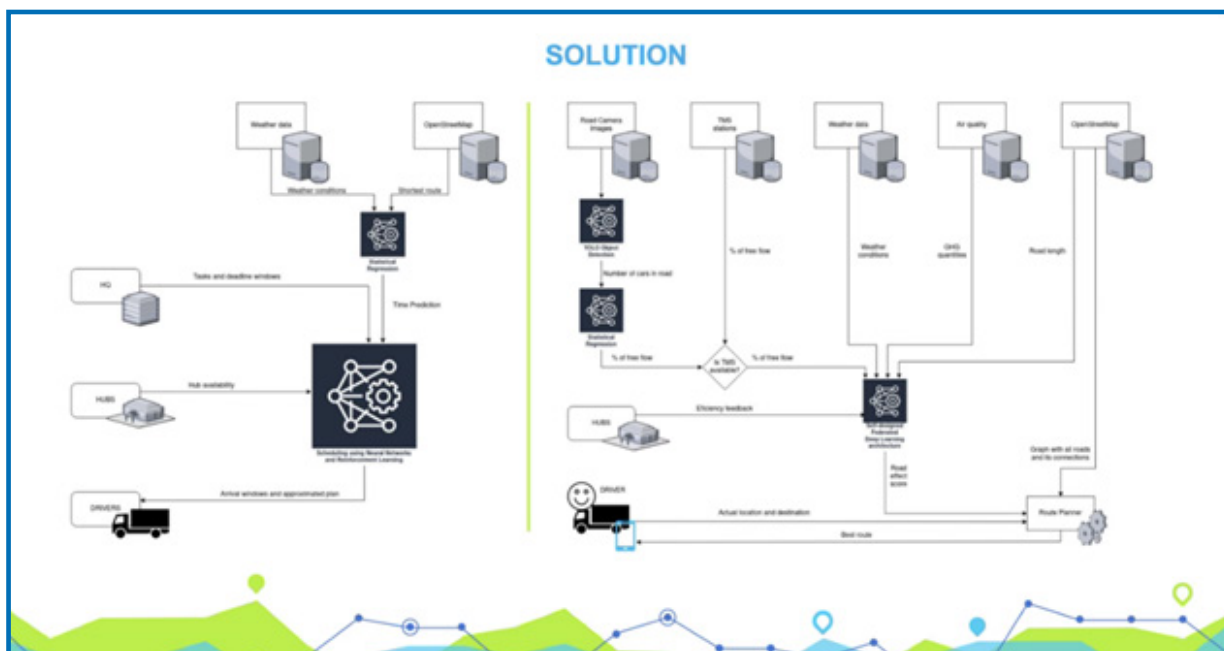
- Wide application of data** – the solution succeeded in combining an extensive amount of data sources to create a coherent solution. For the full data setup see figure below.
- High relevance of challenge addressed** – the solution taps into a relevant and real problem with congestion

as well as suboptimal routes in relation to air quality. By combining information concerning potential for time spent and emissions the solutions contribute both to growth and sustainability.

3. **Empowerment of driver** – by making an application designed to give freight drivers information on both duration and emission projections of routes it empowers the driver to make better decisions.

In addition, the winners succeeded in making a clear, well-structured, and entertaining pitch engaging listeners in the solution.

An overview of the winner solution is presented below:



3.3 Hackathon afterlife

To keep the communities established at the hackathon and the momentum of possible business ideas alive several platforms and activities are in place after the hackathon.

Firstly, the digital platforms created prior to the hackathon are still active. The website licenses will run for at least two years and be utilised for communication aimed at participants and the wider public and specifically for promoting the AI and data Program 2021-2024. For the hackathon a Slack-channel was created to facilitate participant communication and data and technical support during the event. The channel is also still active to give participants a channel for communication with the hackathon community.

Secondly, targeted follow-up activities are offered to participants for ongoing support concerning development of solutions and ideas with business potential. Especially the winners are offered a comprehensive acceleration package – besides the 20.000 DKK cash prize – facilitated by ITD Logtech Hub with key components aimed at connecting the winners with potential customers to test and validate the solution as well as facilitating contact to potential implementation partners in the transport industry. Furthermore, the winners are provided mentor sessions from profiles with high expertise within UX, digitalisation and business development that can help adjust and grow the solution further.

3.4 Learnings and recommendations

Concluding on the hackathon some overall learnings and subsequent recommendations can be derived concerning data and challenge purposes as well as awareness and engagement purposes. To a large extent, the relevance and actuality of joint Nordic recommendations identified in the report on Nordic cooperation on data to boost the development of solutions with artificial intelligence were validated and confirmed by the hackathon. The same barriers became apparent and learnings of the hackathon to a high degree parallels observations done in the report. As a result, the recommendations from the report are repeated here structured under the main learnings of the hackathon.

The learnings and recommendations are divided into points relating to data and relating to awareness and engagement matching the overall purposes of the hackathon. As such, it concludes on the hackathons ability to achieve main objectives and how these objectives can be further addressed and fulfilled by future activities.

3.4.1 Data learnings and recommendations

Both preparing the sample data package and working with them on the hackathon resulted in significant learnings concerning the application and relevance of processed data. Based on the learnings relevant joint Nordic recommendations are presented.

Learning: Open public data are not always truly open across the Nordics

Even though only open, publicly available data were utilised at the hackathon there are still limitations to access. E.g. you need a Danish NemID to access the Danish Road Directorate's Datafordeleren with traffic data. This results in barriers for non-Danish citizens in accessing data. Similarly, login is needed to access data in Norway through Statens Vegvesen. Login is however possible to create without being a Norwegian citizen. Another access limitation is language barriers to accessing data. It is not all data where metadata, data descriptions, data labels etc. are available in non-local language. Thereto, there are different policies for national, regional, and local level agencies on how to make datasets available, what standards to be used and what format that is made available.

The overall purpose of recommendations addressing this is to contribute to non-limited and equal access to data across the Nordics to the largest extent possible.

Recommendations	Description
#1 Collect good practice examples from the Nordic countries on good data governance and data management related to publishing datasets <i>Action 8 in report on Nordic co-operation</i>	The action was to a high degree confirmed by the hackathon by the significant differences and limitations to accessibility of data across the Nordics. The action as described in the report in Nordic cooperation with no adjustments is: Many public organisations lack good internal data governance and data management practices. It would be beneficial for these organisations, if the Nordic cooperation funded projects identifying good and best practice examples of data governance, data architecture and data management from public organisations in the Nordic countries experienced with creating, collecting, using and publishing data.
#2 Fund projects to make public data more accessible for companies across the Nordic countries <i>Action 6 in report on Nordic co-operation</i>	Relevance of the action was to a high degree confirmed by the hackathon by the significant limitations in accessibility of data across the Nordics. Part of the action as described in the report on Nordic cooperation with minor adjustments is: There is still a need for making datasets publicly available and/or usable for AI in order to realise potential value. To accelerate that process and ensure data resources are available across the Nordic countries it is suggested to fund projects with standardisation, accessibility and/or usability objectives in the Nordics. This to make it easier to use and combine datasets across the Nordic countries by having similar guiding principles on variables included, data structure, availability etc.
#3 Fund projects investigating the potential of new or known methods to publish sensitive data in accordance with GDPR <i>Action 5 in the report on Nordic cooperation</i>	Relevance of the action was to some extent confirmed by the hackathon, e.g. by limitations to data access – primarily road camera data – of possible sensitivity (number plates and tracking issues). GDPR is not a primary issue regarding open access to road camera data, but there are other complementary datasets that may be hindered by GDPR related issues (such as e.g. health data to capture the effects of pollution). The action as described in the report on Nordic cooperation with minor adjustments is: Many of the datasets of the highest value for AI development in the Nordic countries and beyond contain sensitive information on individuals and thus cannot be made accessible in their raw state. The Nordic cooperation could fund projects addressing this issue, e.g. projects that work towards refining the algorithms necessary to anonymise data and create synthetic datasets and/or projects with a similar purpose. Since the private sector stands to gain a lot from gaining access to these datasets, the Nordic cooperation could also promote and/or fund possible public-private partnerships. Finally, as work is already underway in the Nordic countries on this issue, there is a need for knowledge sharing and dissemination at the Nordic level, ensuring that cutting edge technologies, solutions and best practices are visible to public organisations across the Nordic countries.

Learning: Significant variation in Nordic public data

Working with the datasets there is significant variation in the data structure, variables and formats. E.g. for all the datasets utilised at the hackathon – road camera data, weather data, air pollution, traffic events and roadworks etc. – number and structure of variables, timestamps/time zone, particle measurements included, geographical, temporal coverage and much more varies significantly across the Nordic datasets.

Formats of the open data sources similarly varies. Thus, there is limited cross-Nordic consistency e.g. in API's and scripts needed to work with data.

A derived effect is that it takes significant effort to get an overview of the available datasets across the Nordics and their applicability in addressing challenges, solutions and business potentials. The mapping in the data report helps to create the overview – but there is still work to be done in getting the full overview and promoting it with relevant public and private actors.

The main purpose of the recommendation is to get a more coherent and transparent data structure of open public data sources across the Nordics.

Recommendations	Description
#4 Establish Nordic working group on open data standards and formats including best practices when publishing data <i>Action 4 in report on Nordic co-operation</i>	Relevance of the action was to a high degree confirmed by the hackathon due to the significant variations in formats, structure and variables of data across the Nordics. The action as described in the report on Nordic cooperation with no adjustments is; A Nordic working group on open data standards and formats could be put together. The purpose of the working group would be to create an overview for public organisations on which open data standards and formats should be used. This work needs to be aligned with international standards and European guidelines. Furthermore, such a working group could gather best practices from the Nordic countries on how to publish data in a way that makes data accessible for companies wanting to re-use the data for the development of AI applications and solutions.

Learning: Competitive edge of road camera data – and other public data – not fully clear

Many of the solutions and pitches created at the hackathon succeeded in utilizing road camera data in intelligent and innovative ways. However, there is still work to be done in investigating where road camera data – and other public datasets – have competitive edge and potential compared to private and/or licenses-based data sources. Both concerning business potential and in relation to contributing to sustainability and SGDs.

Road camera data was primarily utilised to predict traffic patterns such as congestion, traffic flows, speed of vehicles and similar. This was for instance the case with the winner pitch, where road camera data together with Transport Measurement System data (TMS stations composed of data collection units and induction loops embedded in roads) is utilised to predict congestion and percentage of free traffic flow. Such applications make full sense but could just as well – and probably with higher precision - be addressed by other traffic data sources such as GPS-data, tele communications data, tracker data, TMS-data and application data from sources such as Google Maps.

Thus, the recommendations aim at investigating further the business and application edge of road camera data and similar public data sources. Is there transparency in data origin, free limitless access, the picture format of road camera data etc.?

Recommendations	Description
#5 Fund projects creating an overview of which government owned datasets are highly used and demanded by companies across the Nordic countries <i>Action 3 in the report on Nordic cooperation</i>	Relevance of the action was to some degree confirmed by the hackathon, primarily in relation to establishing a Nordic overview of open public datasets of high usage and potential. Part of the action as described in the report on Nordic cooperation with some adjustments is: A broader and more complete overview of which datasets that currently are in high demand in the different Nordic countries by AI companies and startups still remains to be established. Further analysis into which datasets are already seeing high re-use across the Nordic countries and especially which datasets are seeing high re-use in some countries and are inaccessible for companies in the other Nordic countries could help public organisations in the Nordic countries to prioritize publishing data that is known to be used for the development of AI applications and solutions.
#6 Fund projects to make public data more accessible for companies across the Nordic countries <i>Action 6 in report on Nordic co-operation</i>	Relevance of the action was to a high degree confirmed by the hackathon by the apparent unclarity not fully addressed by the hackathon to whether open public data sources – especially road camera data – have application edges and potential in predicting traffic patterns and making innovative AI and data solutions compared to other, mostly private, data sources such as GPS, teledata and TMS-data. Part of the action as described in the report on Nordic cooperation with minor adjustments is: It is not enough to make public data resources more accessible for companies. Projects must also aim to harvest experiences on whether collecting and linking of data across the Nordic countries facilitate increased AI usage of datasets, or if another approach to furthering the use of open government data for AI solutions and applications is more effective.

3.4.2 Awareness and engagement learnings and recommendations

In the recruitment process and execution of the hackathon significant learnings on creating awareness and engagement with central AI and data actors – start-ups, students, public data owners, sector stakeholder, established companies etc. – were gathered. Based on the learnings, joint Nordic recommendations are presented to furthering the potential for business and innovation utilization of publicly available data in the Nordics.

Learning: Untapped potential in public-private partnerships

Even though there were some representation of public and private sector actors at the hackathon, the event had limited success in initiating, strengthening and consolidating relations between the public data owners and businesses – both start-ups and established companies. However, the hackathon demonstrated the huge interest in and desire on both sides to get closer cooperation and coordination. The public data owners engaged in the hackathon such as the Danish Road Directorate and the Swedish Vegvesen demonstrated high levels of enthusiasm and will to contribute to heightening the innovation and private sector usage of data. They have significant desire in utilization of their data to create sustainable solutions with business potential. Partly due to a recognition there is untapped potential in usage of their data. In this connection it relates to transportation and smart mobility but expectedly the same is the case concerning other subjects and domains. Similarly, the start-ups and companies involved were very interested in closer dialogues with the data owners.

Overall purpose of recommendations are to support platforms and communities where private sectors stakeholders and public agencies can have direct AI and data application dialogues – preferably across the Nordics.

Recommendations	Description
#7 Collect and showcase examples of the value of government owned data from across the Nordic countries <i>Action 2 in the report in Nordic cooperation</i>	Relevance of the action was to a high degree confirmed by the hackathon, e.g. by the need for showcasing good examples of business solutions based on open public data. However, focus of the action is a bit different then in the report where the aim is to create public sector awareness. In this connection the action aims just as much to create private sector awareness – but at the same time contributing to public sector engagement. Part of the action as described in the report on Nordic cooperation with minor adjustments is: A way of making open data more accessible for companies is to collect and showcase best practice examples of open data business cases from across the Nordic countries. Examples can be collected and showcased by a working group in the Nordic cooperation and/or funds could be directed towards projects with the aim of gathering good examples and showcases of beneficial re-use of open government data. The Nordic collaboration could support the establishment of a Nordic case-bank with examples and links to the datasets being used.
#8 Fund projects creating an overview of which government owned datasets are highly used and demanded by companies across the Nordic countries <i>Action 3 in the report on Nordic cooperation</i>	Relevance of the action was to a high degree confirmed by the hackathon, e.g. by the apparent limited insight with private sector actors into the public datasets. As well as the impression public data owners have huge interest in and are searching for ways of creating higher value of public datasets. Part of the action as described in the report on Nordic cooperation with minor adjustments is: Work could go into constructing business cases on datasets, giving public organisations solid economic arguments for directing funds towards making those datasets publicly available. Another similar approach is to establish Nordic public-private networks on data re-use and access to data, where public organisations and AI companies can have a constructive dialogue on government owned datasets and their business potential.
#9 Promote the open data portals in the Nordic countries <i>Action 7 in report on Nordic cooperation</i>	Relevance of the action was to a high degree confirmed by the hackathon by the significant limitations in overview of datasets of high potential across the Nordics. Part of the action as described in the report on Nordic cooperation with minor adjustments is: More work could go into promoting the open data portals in the Nordic countries, both internally in the different countries but also at a Nordic level, making it easier for Nordic companies to find and access data from different countries. The Nordic cooperation should consider linking to open data portals in the Nordic countries on a Nordic website. Funds could be directed towards identifying all open data portals and repositories of open government data across the Nordic countries. As a continuation of that work, the Nordic cooperation should consider establishing a working group exploring the possibility of having a joint Nordic open data portal, similar to the European Open Data Portal. Nordic datasets are typically very similar with regard to information, variables and quality and would be easier to group and present on a platform separate to the European Open Data Portal.

Recommendations	Description
#10 Acceleration programmes for SME's <i>New action</i>	Dialogue with start-ups before, during and after the hackathon pointed towards a need for supporting business maturation. For start-ups engagement in events, network and similar is a significant investment were return of investment and output not always meet the expectations. Instead, initiatives with a tailored and "close-to-business-case" approach are in high demand with start-ups. Acceleration programmes is one way of achieving this and could be of relevance as a joint Nordic action. Preferably this could be done in collaboration/coordination with other agencies of similar interest, e.g. the UNDP-programme "SDG Accelerator for SDGs" and the existing NI initiative "Nordic scalers".

Learning: Data events and utilization of "real" data engages students and new talent

The hackathon had limited success in broad engagement of start-ups and Nordic businesses of relevance probably due to a lack of resources, of a clear and concise challenge, of a small prize sum. And perhaps also due to no clear "owner" of the challenges at the hackathon making the path from hackathon to start-up business potential a bit more unclear resulting in limited return-of-investment perception with start-ups of limited resources. However, the hackathon clearly demonstrated data events and "hands-on" work with real open data sources is highly engaging and motivating for AI and data students. Thus, data events are one way to lay the foundation for innovative sustainability solutions of the future utilizing open public data.

Recommendations	Description
#11 Arrange cross-Nordic data events on government owned data <i>Based on Action 1 in the report in Nordic cooperation</i>	Relevance of the action was to a high degree confirmed by the hackathon, e.g. by the high engagement and satisfaction of students participating in the hackathon. However, the action from the report has been adjusted and broadened to include other activities than hackathons and to make students the primary target group of activities as hackathons have limited impact in creating public and private sector awareness and engagement: Often cutting-edge AI and data ideas, solutions and start-ups originate at universities and academic communities. New talent brings new perspectives and an ability to think out of the box. Thus, disseminating public data sources and creating awareness in relevant student communities is important to create the foundation for the sustainable AI and data solutions of the future. Data events engage students/new talent because it creates actuality and real-world relevance of working with data. And because it can be a recruitment channel by matchmaking between companies, start-ups and new talent. At a Nordic level it should be considered to further support such data events, e.g. by hackathons, case competitions, mentor programmes and student-public-private networks. Perhaps in connection with or inspired by existing initiatives such as the NI "the Catalysts project".

Appendix: Hackathon data and challenges

NORDIC AI AND DATA HACKATHON

CHALLENGES AND DATA

HACKATHON DATA

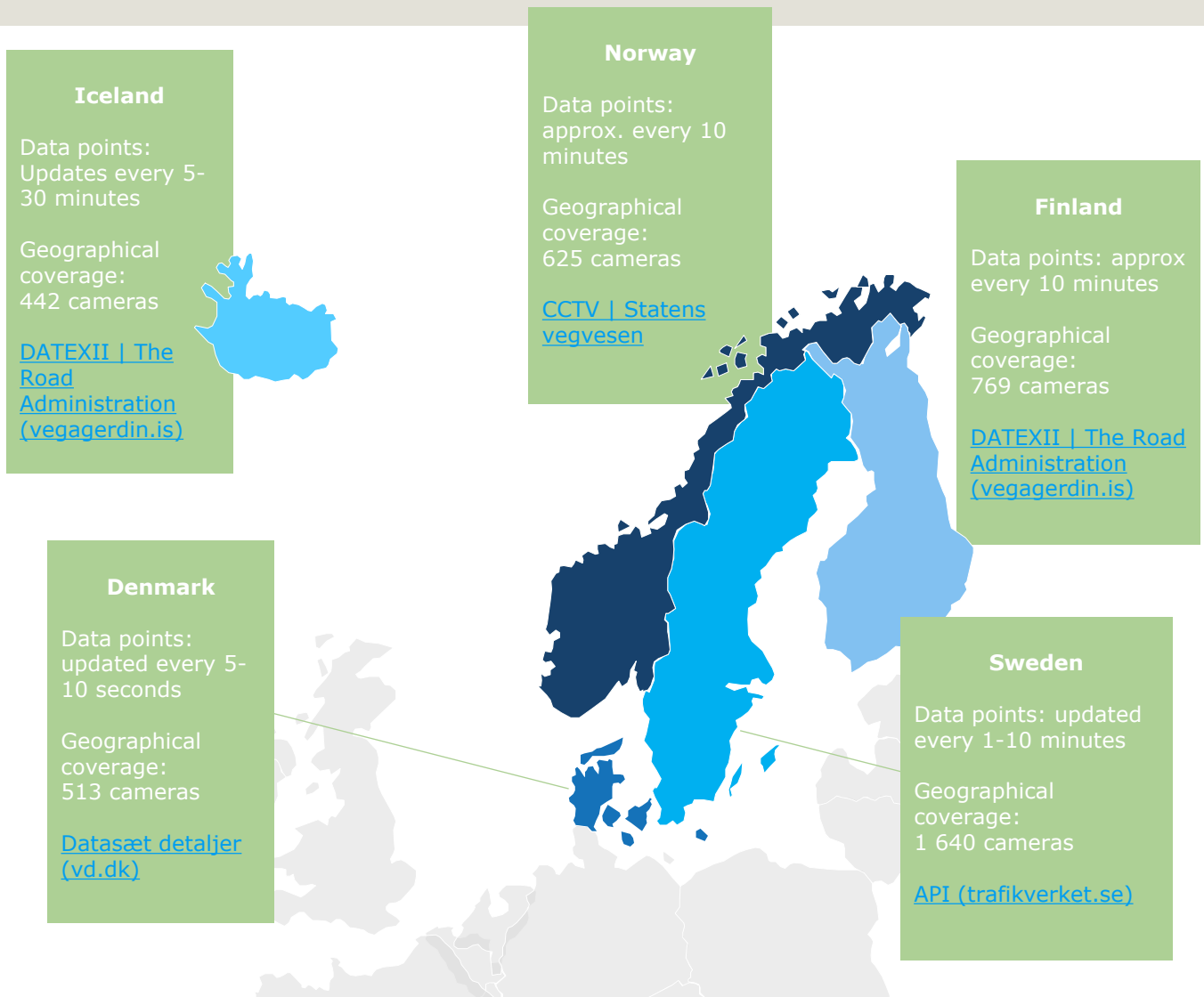
Road camera data

The primary datasets at the hackathon are road camera datasets from across the five Nordic countries. Data is open and available in all Nordic countries.

Road camera data consists of a photo stream or data feed from web cameras located alongside roads in the Nordic countries. The cameras provide information on current traffic flow and weather conditions.

The road camera data is used in public and private applications to present drivers with a close to real-time view of road conditions and occasionally by e.g. the police when investigating traffic accidents. From an AI perspective, the allure of the road camera data from across all the Nordic is the amount of data available and the variation within these data – ranging from Danish highways to small Icelandic roads. Data can provide insights into e.g. road, traffic and weather conditions and driving patterns at certain times of day, weather or season, congestion identification and causes, etc.

The update times for cameras differ from country to country and – depending on bandwidth – also within countries.



HACKATHON DATA

Traffic events and roadworks

Datasets providing information on roadworks, traffic incidents, road conditions etc.

These datasets provide context to the road camera photos and could e.g. be an important parameter in explaining current traffic flows and conditions.

Data is relatively similar across countries. It is available from all Nordic countries, except Iceland.

Weather

Datasets providing information on wind, down pour, temperature, water levels, etc.

These datasets provide another level of context to road conditions and traffic flows and could e.g. be used to predict when road accidents happen or how drivers act under certain weather situations.

Data is relatively similar across countries. It is available in all five countries.

Air quality

Datasets providing information on the amount of air pollution in an area.

Datasets on air quality measurement provide information on the consequences of traffic in the areas shown in the photos.

Coverage, update frequency and measurement detail vary greatly across countries.

Other data

Besides curated datasets, a wealth of open government data is available:

- TMS data from inductive loops installed in the pavement. When a vehicle passes over it creates info about average speeds and traffic volume
- Road weather station data, incl. road temperature measurements
- Travel times, public transport data
- And much more...

Iceland

[Traffic events](#)

[Weather](#)

[Air quality](#)



Norway

[Traffic events](#)

[Weather](#)

[Air quality](#)

Finland

[Traffic events](#)

[Weather](#)

[Air quality](#)

Denmark

[Traffic events](#)

[Weather](#)

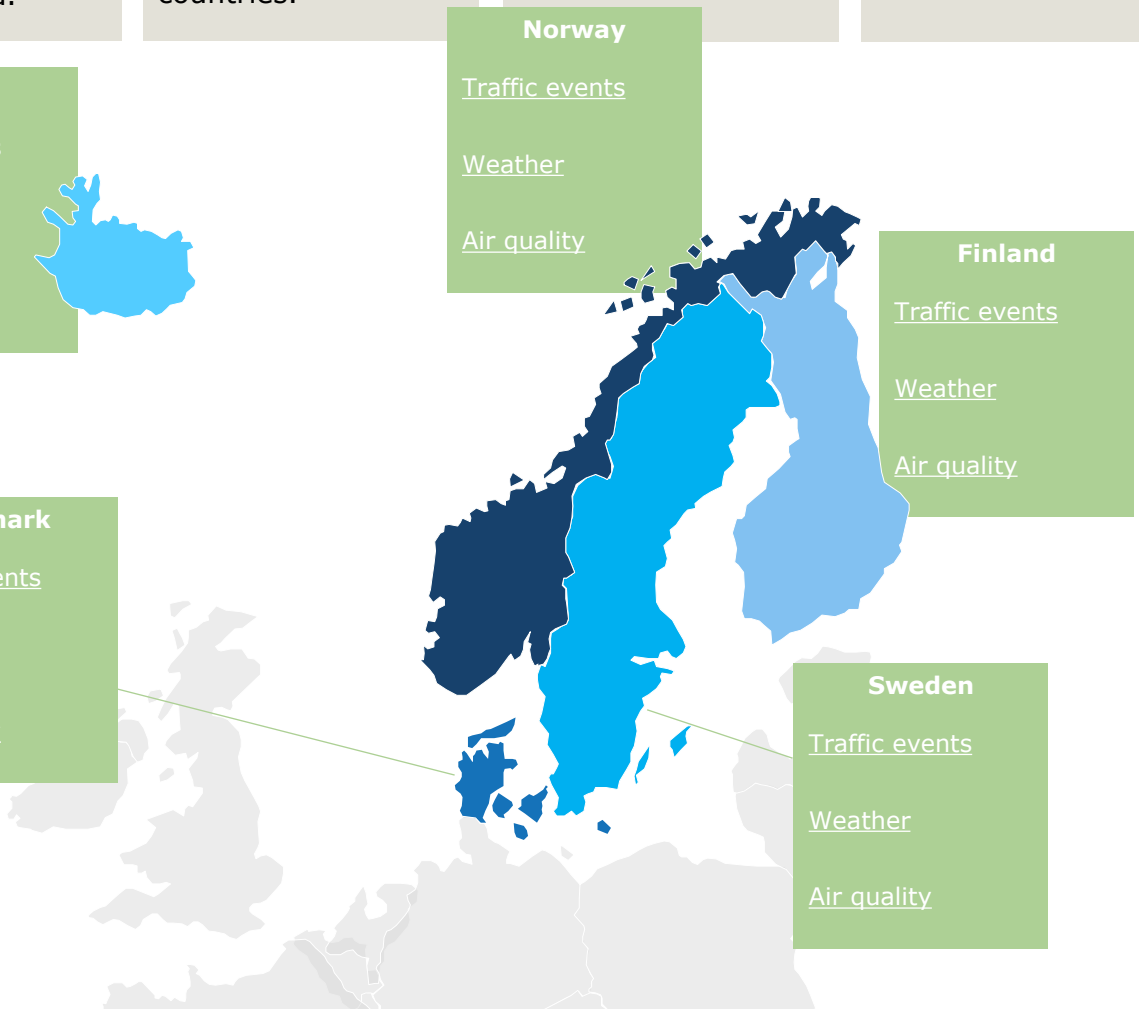
[Air quality](#)

Sweden

[Traffic events](#)

[Weather](#)

[Air quality](#)



HACKATHON DATA

Sample datasets

To get started curated sample datasets have been gathered by systematically scrapping data from main data sources across the Nordic countries – road camera data, traffic events and roadworks, weather data and air quality data. Sample data is made accessible at the hackathon through a dedicated Azure account.

To optimize variation possibilities and scenario coverage of the main dataset, road camera sample data cover a time duration of one full day (24 hours). This should be a sufficient starting point for proof-of-concept AI applications and variety across traffic patterns and fluctuations, across weather conditions, across time of day, across light conditions etc.

For the other datasets – traffic events and roadworks, weather data and air quality - representative examples are provided in the sample data to give ready-and-available data for investigating data combinations and possibilities. All sample data has been generated in conjunction with the road camera data to ensure alignment in temporal coverage.

To ensure room for different preferences in API and scripts, sample data is delivered in csv-format directly available from the open data source.

For more thorough data descriptions, please see the data appendix.

Road camera data

Sample data has been created by simultaneous scrape of live feed data across the Nordic countries on the 16-17th March.

Sample data covers a full day (24 hours). The full day is a normal weekday to ensure interesting traffic patterns representative of normal activity.

To limit amount of data the scrape has been done for 30 selected cameras in each country.

Weather data

Exemplary sample data has been created by scraping the available data sources from the following countries:

- Sweden
- Denmark

Traffic events and roadworks

Exemplary sample data has been created by scraping the available data sources from the following countries:

- Norway
- Sweden

Air quality

Exemplary sample data has been created by scraping the available data sources from the following countries:

- Denmark
- Iceland



Resilient infrastructure and freight transport

In all Nordic countries, road traffic is expected to keep increasing, putting pressure on the existing infrastructure. Concerning the area of personal transportation, many existing applications guide us every day wherever we go. Few of those applications use the road camera data publicly available in the Nordic countries. What kind of information can these camera data contribute with in addition to the existing data sources?

In this challenge, focus is on freight transport and heavy vehicles since this area of transportation has less coverage in other data sources and thus yields large untapped potential.

(How) can road camera data, supplemented by other data, be used to optimize freight transport and traffic flows around heavy vehicles?

(How) can road camera data be used to monitor the resilience and health of the transport infrastructure?

Possible applications

- Optimizing freight transport routes and travel times
- Ensuring safe traffic flows in areas with heavy vehicle traffic
- Tracking freight transportation and heavy vehicles
- Identifying (climate) risk to critical infrastructure
- Identifying road conditions and their impact on traffic flows

Datasets of relevance

Curated data

- Road camera data
- Weather data
- Traffic events and roadworks

Other data

- TMS-data
- Travel times
- Road conditions
- Open Street Map



Supplementary datasets

TMS-data: TMS stations are composed of data collection units and induction loops embedded in roads. The stations contain sensors that produce computational data. The computations use sensor constants whose values are station-specific. The TMS device registers vehicles passing the point, recording data such as time, direction, lane, speed, vehicle length, time elapsed between vehicles and the vehicle class.

Data is open in Finland and can be found at <https://www.digitraffic.fi/en/road-traffic/lam/>

OpenStreetMap represents physical features on the ground (e.g., roads or buildings) using tags attached to its basic data structures (its nodes, ways, and relations). Each tag describes a geographic attribute of the feature being shown by that specific node, way or relation.

Data is available at: <https://www.openstreetmap.org/>

See https://wiki.openstreetmap.org/wiki/Downloading_data for tips on how to access the data

Data on travel times, road conditions (incl. road maintenance) and much more can be found at:

The Nordics

<https://www.digitraffic.fi/en/road-traffic/>

<https://du-portal-ui.dataudveksler.app.vd.dk/>

<https://www.vegvesen.no/en/about-us/about-the-organisation/open-data/et-utvalg-apne-data/datex/publications/travel-times/>

<https://www.trafficdata.se/dataset>

European level at <https://nordicopenmobilitydata.eu/data/>



Green mobility

Transportation is one of the main culprits contributing to climate change – one of the greatest threats to our planet. It is responsible for almost a quarter of total energy related CO2 emissions. Creating a more sustainable transportation system will be critical in combatting climate change and its associated impacts. Camera data provides “eyes on the road” in a way that other traffic datasets do not – can we leverage this information to create a more sustainable transportation system?

(How) can road camera data improve traffic flows, prevent congestion and ensure a greener transportation sector?

Possible applications

- Distributing traffic across the road network
- Ensuring up-to-date information on traffic conditions
- Counting and monitoring electrical vehicles
- Identifying and preventing congestion
- Enabling collaborative travel

Datasets of relevance

Curated data

- Road camera data
- Weather data
- Air quality

Other data

- TMS-data
- Travel times
- Data on public transportation



Green mobility

Supplementary datasets

Data on public transportation can be found at e.g.:

<https://www.trafiklab.se/api/>

<https://du-portal-ui.dataudveksler.app.vd.dk/data/62/overview>

<https://nordicopenmobilitydata.eu/data/>

<https://vayla.fi/en/transport-network/data/digiroad/data/bus-stop-data>

TMS-data: TMS stations are composed of data collection units and induction loops embedded in roads. The stations contain sensors that produce computational data. The computations use sensor constants whose values are station-specific. The TMS device registers vehicles passing the point, recording data such as time, direction, lane, speed, vehicle length, time elapsed between vehicles and the vehicle class.

Data is open in Finland and can be found at <https://www.digitraffic.fi/en/road-traffic/lam/>

Data on travel times, road conditions (incl. road maintenance) and much more can be found at:

<https://www.digitraffic.fi/en/road-traffic/>

<https://du-portal-ui.dataudveksler.app.vd.dk/>

<https://www.vegvesen.no/en/about-us/about-the-organisation/open-data/et-utvalg-apne-data/datex/publications/travel-times/>

<https://www.trafficdata.se/dataset>

<https://nordicopenmobilitydata.eu/data/>



Human health and ecosystems

Road traffic injuries and deaths have a terrible impact on individuals, communities and countries. They often involve massive costs to health care systems, consume resources and result in significant losses of productivity and prosperity. Road cameras are conveniently located to identify safety risks to drivers and dangerous road and weather conditions.

Ecosystems all over the world are under pressure from climate change and human development. Could road cameras bring additional insights by monitoring roadside flora and fauna?

(How) can road camera data contribute to improved road safety and better human health?

(How) can road camera data monitor roadside ecosystems and their health?

Possible applications

- Improving road safety
- Identifying dangerous road conditions and warning drivers
- Monitoring roadside ecosystems
- Identifying trash in the roadside
- Monitoring the impact of climate change on ecosystems

Datasets of relevance

Curated data

- Road camera data
- Weather data
- Traffic events and roadworks
- Air quality data

Other data

- TMS-data
- Nature registration data
- Traffic accidents



Human health and ecosystems

Supplementary datasets

TMS-data: TMS stations are composed of data collection units and induction loops embedded in roads. The stations contain sensors that produce computational data. The computations use sensor constants whose values are station-specific. The TMS device registers vehicles passing the point, recording data such as time, direction, lane, speed, vehicle length, time elapsed between vehicles and the vehicle class.

Data is open in Finland and can be found at <https://www.digitraffic.fi/en/road-traffic/lam/>

Data on traffic accidents is open in Finland and can be found at <https://vayla.fi/en/transport-network/data/open-data/road-network>

Diverse datasets on nature can be found at

<https://naturdata.miljoeportal.dk/advancedSearch>

<https://viltkamera.nina.no/>

<https://www.gbif.org/dataset/492d63a8-4978-4bc7-acd8-7d0e3ac0e744>

<https://www.naturvardsverket.se/verktyg-och-tjanster/data-databaser-och-sokregister/oppna-data-fran-naturvardsverket/>

NORDIC AI AND DATA HACKATHON

DATA APPENDIX

ROAD CAMERA DATA

Norway

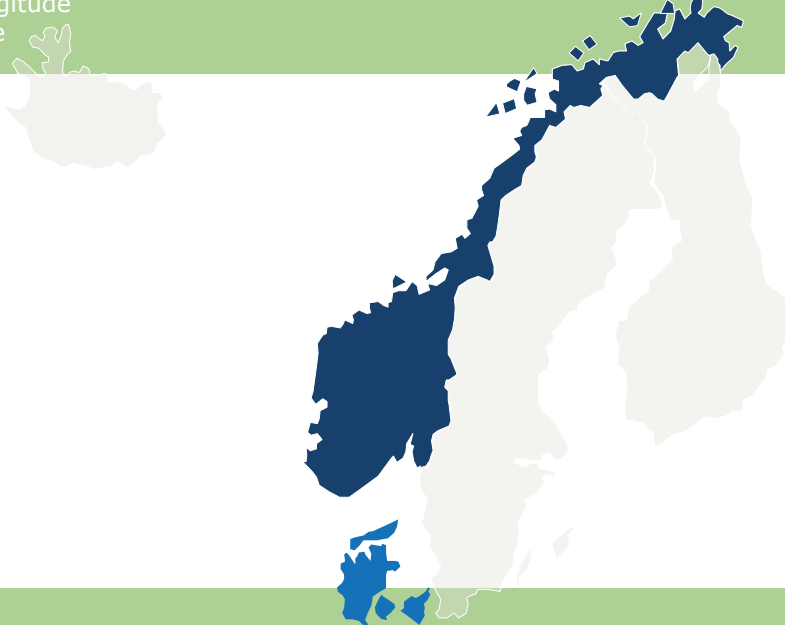
Data and description are available at <https://www.vegvesen.no/en/about-us/about-the-organisation/open-data/a-selection-of-open-data/datex/publications/cctv/>

Data access does require a login. Nationals and internationals can register for a login free of charge.

Data contains links to images from 625 cameras in Norway. Images are updated every 5 minutes to every 4 hours depending on the camera. Some cameras also change perspectives during the day. Historic data is not available.

Data (incl. metadata) includes the following variables of interest:

- Camera ID
- Location
- Orientation
- Camera type
- Road Number
- County Number
- Latitude/Longitude
- URL to image



Denmark

Data and description are available at <https://du-portal-ui.dataudveksler.app.vd.dk/data/61/overview>

Data access requires a login. Danish users can sign up using their NemID while international users must reach out to the Danish Road Directorate (see <https://du-portal-ui.dataudveksler.app.vd.dk/support>).

Data contains links to images from 513 cameras in Denmark (and a few in the Southern part of Sweden). Images are updated every 5-10 seconds. There is no historic data available.

Data (incl. metadata) includes the following variables of interest:

- Country (DK or SE)
- ID number of camera
- Camera identification, e.g. "Vejle N Horsensvej" and "E20 Esbjerg"
- Camera serial number
- Latitude/longitude of camera location
- URL to image

ROAD CAMERA DATA

Iceland

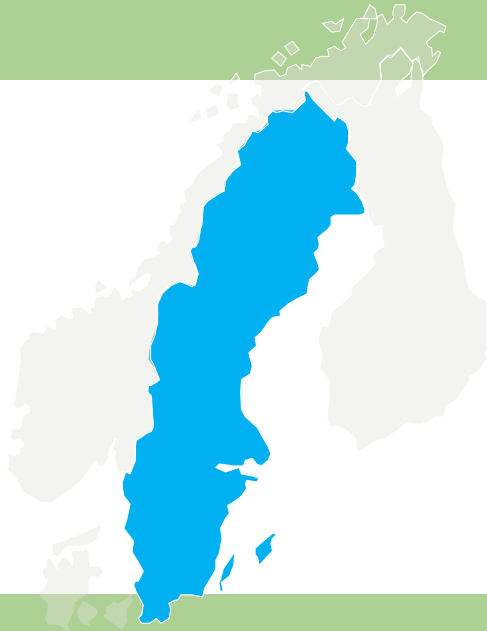
Data and description are available at <https://www.vegagerdin.is/upplýsingar-og-utgafa/gagnaveita-vegagerdarinnar/datexii/>

Data access does not require a login.

Data contains links to images from 442 cameras in Iceland. Images are updated every 5-10 minutes depending on the bandwidth at the camera location. Historic data can be requested from The Icelandic Road and Coastal Administration (IRCA).

Data (incl. metadata) includes the following variables of interest:

- Description of camera location (in Icelandic)
- Road name ("Vegheiti")
- Latitude/longitude of camera location
- URL to image



Sweden

Data and description are available at (under "Väg – Trafikinformation – Camera") <https://api.trafikinfo.trafikverket.se/API/Model>

To get full data access, a login is required. Whomever can set up an account.

Data contains links to images from 1.460 cameras in Sweden. Images are updated every 1-10 minutes. Historic data is not available. Data retrieval is done with an HTTP call. A query is sent with the POST method, which describes the data requested and any filters it contains. The data format returned is XML or JSON.

Data (incl. metadata) includes the following variables of interest:

- Name
- Camera ID
- Location
- Camera type
- County Number
- Geometry (SWEREF99TM and WGS84)
- URL to image

ROAD CAMERA DATA

Finland

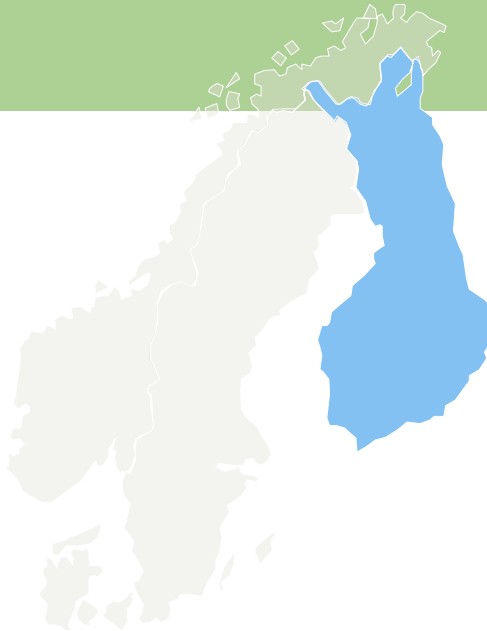
Data and description/metadata are available at (under "Weather cameras")
<https://www.digitraffic.fi/tieliikenne/>

Data access does not require a login.

Data contains links to images from 1913 cameras in Finland. Images are updated approximately every 10 minutes. Historic data (last 24 hours) can be found at [https://tie.digitraffic.fi/api/v3/data/camera-history/history?id=](https://tie.digitraffic.fi/api/v3/data/camera-history/history?id={preset or camera id}) {preset or camera id}

Data (incl. metadata) includes the following variables of interest:

- Camera ID
- Resolution
- Road address
- Province code
- Province
- Municipality
- Camera type
- Latitude/longitude of camera location
- URL to image



TRAFFIC EVENTS AND ROADWORKS

Iceland

No data available

Norway

Data and description are available at: <https://www.vegvesen.no/en/about-us/about-the-organisation/open-data/a-selection-of-open-data/datex/publications/road-traffic-information/>

Data does require login.

Data includes information concerning:

- Road works
- Road closures
- Accidents
- Redirections of traffic

Finland

Data and description are available at (under "Traffic bulletins"):
<https://www.digitraffic.fi/tieliikenne/>

Data does not require login.

Data includes information concerning:

- Exempted transport (transport causing disruption)
- Road work
- Traffic announcements
- Weight restrictions.

Denmark

Data and description are available at: <https://du-portal-ui.dataudveksler.app.vd.dk/data/50/overview>

Data requires a login. Danish users can signup with NemID.

Data includes information concerning:

- Accidents
- Wind warnings
- Slippery roads
- Planed events affecting traffic
- Roadworks

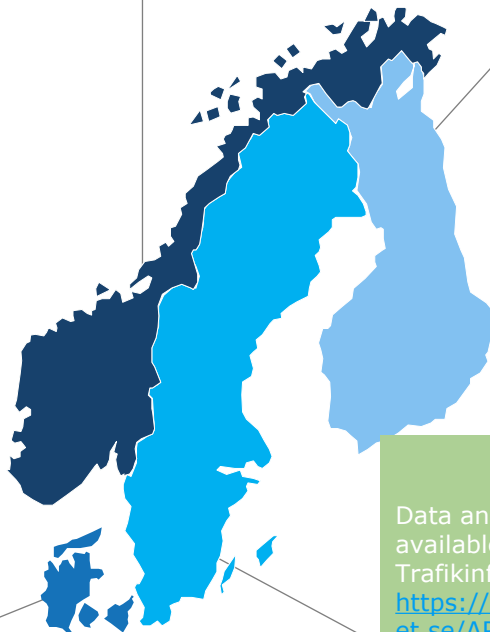
Sweden

Data and description are available at (under "Väg – Trafikinformation - Situation"):
<https://api.trafikinfo.trafikverket.se/API/Model>

Data requires a login.

Data includes information concerning:

- Traffic announcements
- Roadworks
- Accidents
- Restrictions



WEATHER

Iceland

Data and description (in Icelandic) are available at: [https://www.vegagerdin.is/vefur2.nsf/Files/gagnaveita_vedur_2014/\\$file/gagnaveita_vedur_2014.pdf](https://www.vegagerdin.is/vefur2.nsf/Files/gagnaveita_vedur_2014/$file/gagnaveita_vedur_2014.pdf)

Data does not require login.

Data includes information concerning:

- Wind speeds
- Road temperature
- Air temperature
- Humidity
- Dew point

Norway

Data and description are available at: <https://www.vegvesen.no/en/about-us/about-the-organisation/open-data/a-selection-of-open-data/datex/publications/road-weather-data/>

Data does require login.

Data includes information concerning:

- Wind speeds and direction
- Road temperature
- Air temperature
- Humidity
- Dew point

Finland

Data and description are available at (under "Road wheather stations": <https://www.digitraffic.fi/tieliikenne/>

Data does not require login.

Data includes information concerning:

- Temperature
- Wind speeds
- Precipitation
- Humidity

Denmark

Data and description are available at: <https://confluence.govcloud.dk/pages/viewpage.action?pageId=30016125>

Data does require login. Account is created through DMI's Developer Portal

Data includes information concerning:

- Ground temperature
- Air temperature
- Humidity
- Atmospheric pressure

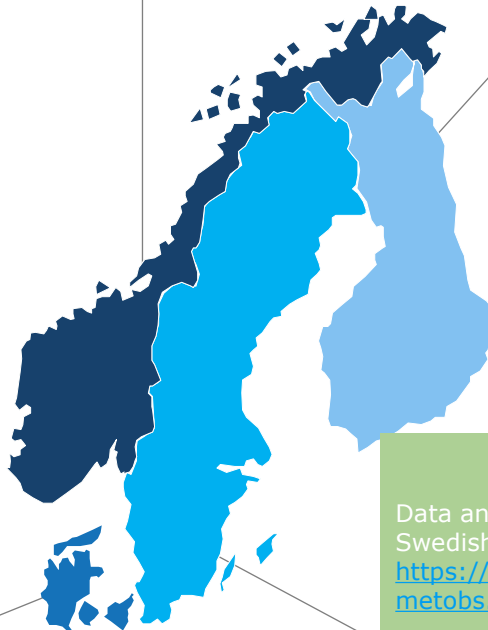
Sweden

Data and description (in Swedish) are available at: <https://opendata-download-metobs.smhi.se/>

Data does not require login.

Data includes information concerning:

- Air temperature
- Wind speeds
- Precipitation
- Humidity
- Atmospheric pressure



AIR QUALITY

Iceland

Data and description for Reykjavik are available at: <https://discomap.eea.europa.eu/map/fme/AirQualityExport.htm>

Data does not require login.

Data includes information concerning:

- NO2 per hour
- NO per hour
- Particles (PM10) per hour
- Particles (PM2.5) per hour
- SO2 per hour
- H2S per hour

Norway

Data and description are available at: <https://api.met.no/weatherapi/airqualityforecast/0.1/documentation>

Data does not require a login.

Data includes information concerning:

- Air quality index
- NO2
- PM10
- PM2.5
- O3
- SO2

Finland

Data and description are available at: <https://www.ilmatieteenlaitos.fi/ilmansaasteet#tilasto>

Data does not require a login.

Data includes information concerning:

- NO2 per hour
- NO per hour
- Particles (PM10) per hour
- Particles (PM2.5) per hour
- SO2 per hour
- H2S per hour
- O3 per hour

Denmark

Data and description (in Danish) are available at: <https://envs.au.dk/faglige-omraader/luftforurening-udledninger-og-effekter/data-om-luftkvalitet/aktuelle-maalinger>

Data does not require login.

Data includes information concerning:

- NO2 per hour
- NOX per hour
- SOW2 per hour
- O3 per hour
- PM10 per hour
- PM2.5 per hour

Sweden

Data and description (in Swedish) are available at: <https://datavardluft.smhi.se/portal/>

Data does not require login.

Data concerning last 24 hours available at [Naturvårdsverket](https://naturvardverket.se):

- NO2 per hour
- Soot, levels in the air per hour
- Particles (PM10) per hour
- Particles (PM2.5) per hour
- Ground-level ozone per hour

Open data portals

In Denmark, core public datasets are presented at <https://datafordeler.dk/>. A list of all datasets can be found at <https://datafordeler.dk/dataoversigt/>. The website is only available in Danish. Data is available through <https://selfservice.datafordeler.dk/> where you need to register.

Open Data DK is a community of municipalities and regions. Since 2016, data from these entities have been published on <https://www.opendata.dk/search>. The website is in Danish.

At <https://www.avoindata.fi/en>, the Finnish government have collected all Finnish open data in one place. The website is accessible in Swedish, Finnish and English.

At <https://gatt.lmi.is/geonetwork/srv/eng/catalog.search#/home>, you can find and access Icelandic data sets, services and maps. The website is in English but most content is in Icelandic.

The National Data Catalog – <https://data.norge.no/> – is the Norwegian public website providing an overview of descriptions of datasets, concepts, APIs and information models. The website can be accessed in Norwegian and English.

DIGG, the Swedish Agency for Digital Government, provides open government data through <https://www.dataportal.se/en/>. The website is in English, but you might be redirected to a Swedish landing page when trying to download a specific dataset.

The Swedish organization Trafiklab provides official open data for all public transport in Sweden. Data can be found at <https://www.trafiklab.se/>. The website is in English.