# AV Approval in Nordics

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Hans Fridberg, Holo

holo

## List of approved projects in the Nordics

| Project Name | Country | Route information |
|---|---|---|
| Ski, Ruter/Holo<br><br>Active operation, launched | Norway | Length of route: 2,0 km<br>Number of passengers: 459<br>Kilometers driven: 22.624,2<br>Vehicle: Toyota ProAce/Sensible 4 ADAS |
| Slagelse Hospital, Movia/Holo<br><br>Active operation, launched sep 2021 | Denmark | Length of route: 3,0 km<br>Number of passengers: 509<br>Kilometers driven: 1313,6 km<br>Vehicle: Navya Arma DL4 PMR |
| Aalborg Municipality<br><br>Inactive operation, ended on November 2021 | Denmark | Length of route: 2,1km<br>Number of passengers: 21.127<br>Kilometers driven: 30.357 km<br>Vehicle: Navya Arma DL4 PMR |
| Nordhavn/AVENUE Horizon 2020<br><br>Inactive operation, ended on February 2021 | Denmark | Length of route: 1,1 km<br>Number of passengers: 1579<br>Kilometers driven: 2416,9<br>Vehicle: Navya Arma DL4 PMR |
| Ormøya, Oslo, Ruter/Holo<br><br>Inactive operation, ended on December 2020 | Norway | Length of route: 1,6 km<br>Number of passengers: 6.670<br>Kilometers driven: 23.022,3<br>Vehicle: Navya Arma DL4 PMR |
| Kongensgate, Oslo, Ruter/Holo<br><br>Inactive operation, ended on sep 2020 | Norway | Length of route: 1,3 km<br>Number of passengers: 1560<br>Kilometers driven: 2540 km<br>Vehicle: Navya Arma DL4 PMR |
| Vippetangen Oslo, Ruter/Holo<br><br>Inactive operation, ended on october 2019 | Norway | Length of route: 1,3 km<br>Number of passengers: ~20000<br>Kilometers driven: 9410<br>Vehicle: Navya Arma DL4 PMR |
| RISE, Lindholmen<br><br>Inactive operation, ended on October 2019 | Sweden | Length of route: 1,3 km<br>Number of passengers:<br>Kilometers driven: 5965,9<br>Vehicle: Navya Arma DL4 PMR |
| Tallinn, Sohoja Baltic<br><br>Inactive operation, ended on December 2019 | Estonia | Length of route: 1,9 km<br>Number of passengers: ~3200<br>Kilometers driven: 2449,2 km<br>Vehicle: Navya Arma DL4 PMR |
| Helsinki, Sohoja Baltic<br><br>Inactive operation, ended on Sep 2019 | Finland | Length of route: 2,5 km<br>Number of passengers: ~3500<br>Kilometers driven: ~2500 km<br>Vehicle: Navya Arma DL4 PMR |
| Køge hospital, Movia<br><br>Inactive operation, ended on August 2018 | Denmark | Length of route: 0,8 km<br>Number of passengers: ~6000<br>Kilometers driven~1000 km<br>Vehicle: Navya Arma DL4 PMR |

# Navya Arma Autonomous shuttle

**Facts on Navya Arma DL4 PMR:**

- Max speed in autonomous mode: 18 km/h
- Classified as SAE3, M2 vehicle
- Capacity: 11 seating passengers, 1 wheelchair
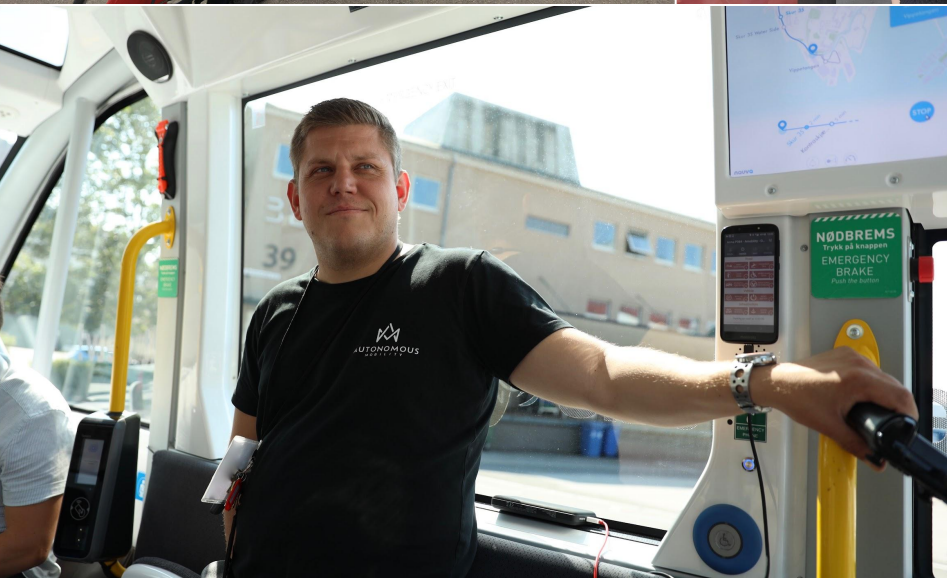- Automatic ramp for wheelchair access

**Specification**
- Electric drivetrain
- 2 x 360° multi-layers LiDARs
- 6 x 180° single-layer LiDARs
- Wheel encoders + Inertial sensor
- RTK antenna

# Complex project approvals in Scandinavian & Baltic countries has prepared Holo for level 4 applications in the future

Holo has identified the categories below for application content, applicable across the Nordic and Baltic countries.

## Project approval: Application content

### Project descriptions and conditions

**Example of content:**
Project scope, purpose and partners
Operational and safety organization
Crisis management process and tools
Standard Operating Procedures
Training programme
Maintenance procedures

### Technical documentation/ application

**Example of content:**
Essential technical requirements e.g. according to Directive 2007/46/EC

Application for exemptions

Registration Process

### Autonomous system documentation

**Example of content:**
Autonomous capabilities and functionality
Operational Design Domain
Objects & Events Detection and Responses
Fallback Minimal Risk Condition

SAE level of automation
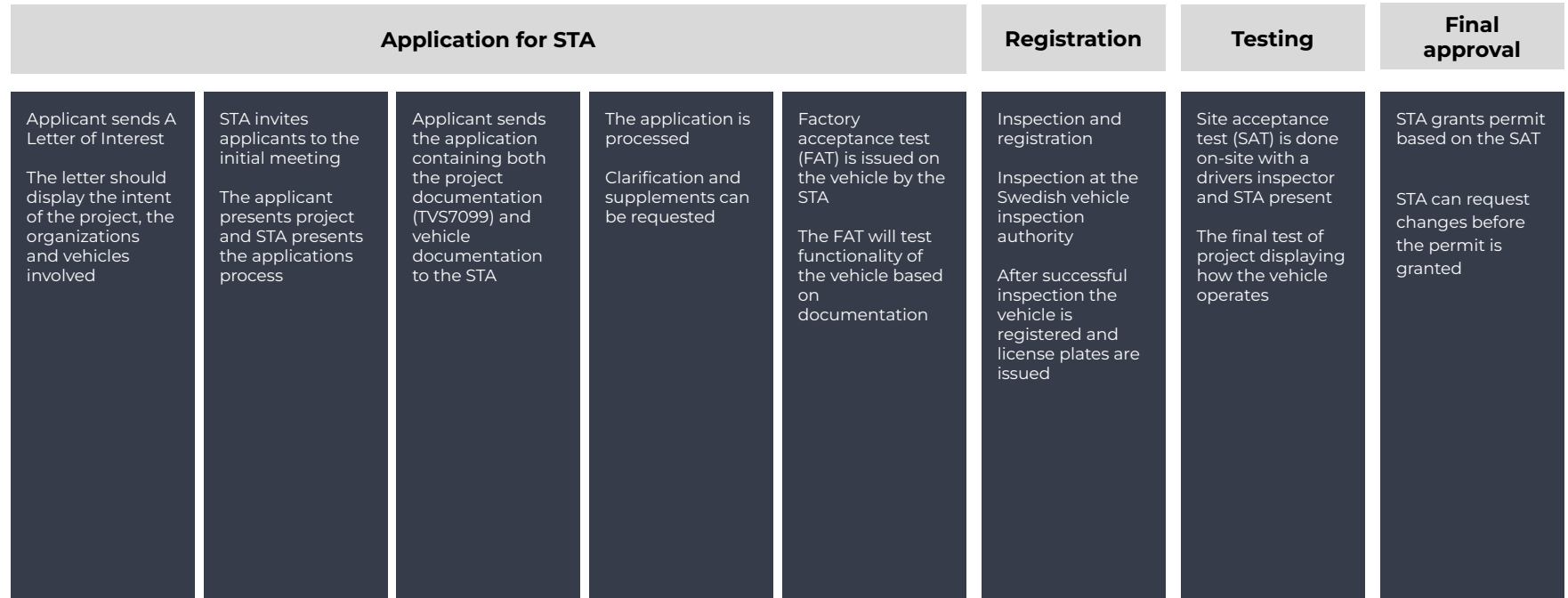Data recording & Data protection
Cybersecurity

### Risk assessment

**Example of content:**
Functional Safety assessment e.g. ISO26262

Traffic Safety: Route assessment of the autonomous vehicle(s) impact on traffic safety on the specific route

## Test, validation and maturity documentation

# The Swedish approval process is handled primarily by Transportstyrelsen

## Project approval process - Sweden

| Application for STA | | | | | Registration | Testing | Final approval |
|---|---|---|---|---|---|---|---|
| Applicant sends A Letter of Interest<br><br>The letter should display the intent of the project, the organizations and vehicles involved | STA invites applicants to the initial meeting<br><br>The applicant presents project and STA presents the applications process | Applicant sends the application containing both the project documentation (TVS7099) and vehicle documentation to the STA | The application is processed<br><br>Clarification and supplements can be requested | Factory acceptance test (FAT) is issued on the vehicle by the STA<br><br>The FAT will test functionality of the vehicle based on documentation | Inspection and registration<br><br>Inspection at the Swedish vehicle inspection authority<br><br>After successful inspection the vehicle is registered and license plates are issued | Site acceptance test (SAT) is done on-site with a drivers inspector and STA present<br><br>The final test of project displaying how the vehicle operates | STA grants permit based on the SAT<br><br>STA can request changes before the permit is granted |

**Feedback loop**                    **Feedback loop**

# The Norwegian approval process is handled primarily by the Norwegian Public Road Administration (NPRA)

## Project approval process - Norway

### Collect documentation

Following type of documentation is required to be added to the submission form. :

1. Plan for pilot project
2. Insurance certificates
3. Customs declarations
4. Vehicle registration
5. Vehicle compliance with EU directive 2007/46/EC
6. Dispensations from directive 2007/46/EC
7. Functional description of the ADAS
8. System description of the ADAS
9. Technology description
10. Maturity of the autonomous system
11. Data security and privacy measures
12. Risk assessment of the autonomous system
13. EMC compatibility
14. Risk assessment of the project route
15. Verification of trained operators
16. Other relevant information

### Send full project application to the NPRA

Complete project application is send by email to relevant contact person from NPRA.

Application is sent to the NRD (Norwegian Road Directorate) only.

It is not possible to get insurance or register the vehicle before the permit is granted, once registration and insurance is in place, this must be sent to NPRA.

### Full project evaluation by the NPRA

The overall project is assessed and reviewed by NPRA, who might use external parties to assess the application.

During this process written feedback and questions is to be expected to the applicant.

### Project approval from the NPRA

A written permit is issued by NPRA and send by email to the applicant contact person.

### Inspection and registration

Inspection at the Norwegian Public Roads Administration.

After successful inspection the vehicle is registered and license plates are issued.

The documentation for this must be sent to NPRA as an orientation.

Feedback loop

# The Danish approval process has a number of complex steps - including approval by parliament and the minister of transportation

## Project approval process - Denmark

### Application for vehicle approval

| Collect documentation | Send application to the DRSA | Evaluation by the DRSA | Approval from the DRSA |
|---|---|---|---|

Feedback loop

### Registration

Inspection and registration.

License plates are issued.

### Application for Road Directorate

Collect documentation for application for Danish Road DIrectorate

Including approval from DRSA and Assessor Approval

Send application through online forms at DRD website

Application processed and commented on by a public Task force, consisting of the DRSA, DRD, Director of Public Prosecutions and the Danish police.

Task force might inquire updated documentation

Legal declaration is made by DRD and sent into public hearing for all interested parties (4 weeks)

The declaration has to be approved by the Danish Transport Committee (elected politicians)

The Minister of Transport has to approve the declaration and process before final approval is granted

### Application for assessor approval

| Collect documentation | Send application to assessor | Evaluation by assessor | Approval from the Assessor |
|---|---|---|---|

Feedback loop

Feedback loop

# The Finnish proces is the most straight forward in the Nordics

| Project approval process - Finland | Registration |
|---|---|

## Collect documentation

Following type of documentation is required to be added to the submission form. :

1. General description of the trial
2. Research plan
3. Technical specification of the test vehicle
4. Information on the road area
5. Description of how road safety will be ensured
6. Risk analysis and functional safety
7. Data security and privacy
8. Training plan for operators
9. Other relevant information

## Send application for testplates to Traficom

Application for test plates is send on email to Traficom.

## Evaluation of application for test plates by Traficom

The application for test plates is evaluated by Traficom alone.

Traficom will message back on email if they need clarification.

## Test plate approval from Traficom

When test plate application is approved, the applicant will receive test plates by mail for the vehicle and no more registration is required.

Feedback loop
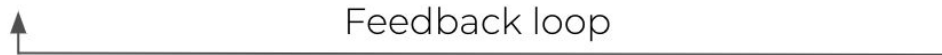
# Holo has unique insight into the difference in approval processes between Denmark and Norway for autonomous passenger vehicles

**Lead time for approvals in DK: ~ 13 months**

- Substantially more costly and time-consuming to conduct pilot projects in Denmark than in e.g. Norway or Sweden

- DK has several approval processes for pilot projects rather than a centralised approach
  - Approval at DRSA
  - Approval from third party assessor
  - Approval from DRD
  - Signed by Minister of transport

- Legislation has poor guidelines and no process for how to handle changes during pilot projects
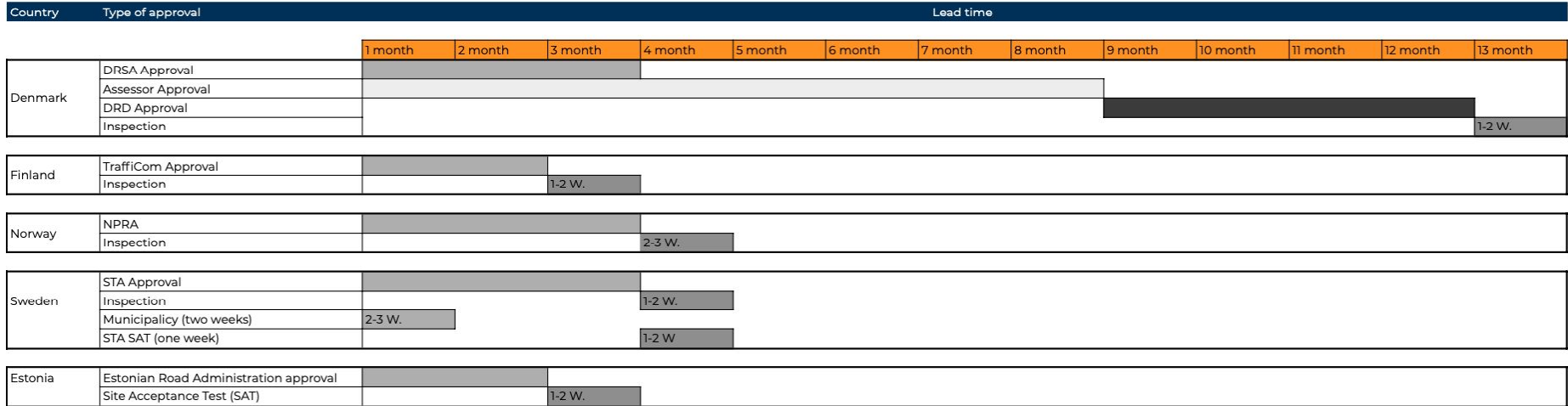
**Lead time for approvals in NO: ~ 3 months**

- Norwegian approvals are granted by DRD, who handles the entire approval process (apart from registration)

  Registration can be done after approval is granted

- Legislation is supported by overall guidelines, but not necessarily detailed

- For vehicles with some degree of maturity the approval process in Norway is transparent and rather flexible

**Lead time for approvals in SE ~ 3 months**

- Swedish approvals are granted by Transportstyrelsen and the local road owner

- The approval process start with a meeting between the applicant and Transportstyrelsen. The meeting will determine the extent of the application

- The application must include:
  - A factory acceptance test of the vehicle
  - FMEA risk analysis of the route
  - A site acceptance test with a drivers instructor

- Legislation is supported by overall guidelines, but not particularly detailed

# The difference in lead time for approvals varies greatly between the different countries Holo has operated in - this will affect decisions on future projects

| Country | Type of approval | 1 month | 2 month | 3 month | 4 month | 5 month | 6 month | 7 month | 8 month | 9 month | 10 month | 11 month | 12 month | 13 month |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Denmark | DRSA Approval | ████ | ████ | ███ | | | | | | | | | | |
| | Assessor Approval | ████ | ████ | ████ | ████ | ████ | ████ | ████ | ███ | | | | | |
| | DRD Approval | | | | | | | | | ████ | ████ | ████ | ████ | ████ |
| | Inspection | | | | | | | | | | | | | 1-2 W. |
| Finland | TraffiCom Approval | ████ | ████ | ██ | | | | | | | | | | |
| | Inspection | | | 1-2 W. | | | | | | | | | | |
| Norway | NPRA | ████ | ████ | ███ | | | | | | | | | | |
| | Inspection | | | | 2-3 W. | | | | | | | | | |
| Sweden | STA Approval | ████ | ████ | ███ | | | | | | | | | | |
| | Inspection | | | | 1-2 W. | | | | | | | | | |
| | Municipalicy (two weeks) | 2-3 W. | | | | | | | | | | | | |
| | STA SAT (one week) | | | | 1-2 W | | | | | | | | | |
| Estonia | Estonian Road Administration approval | ████ | ████ | ██ | | | | | | | | | | |
| | Site Acceptance Test (SAT) | | | 1-2 W. | | | | | | | | | | |

Denmark has been the most extensive country to obtain approvals for, mainly due to several entities being part of the approval process and long lead time for political approval.

The timeline shows comparison based on 1 approval with same vehicle, type of route, complexity etc.

# The honor system will not work for autonomous vehicles - Holo expects regulation to gradually start to resemble aviation