VTI carries out applied research and development, investigations, measurement and testing. Our activities and operations concern all modes of transport. The institute has a broad competence profile, with its key capabilities in the areas of safety, economics, the environment, traffic and transport analysis, public transport, behaviour and human-vehicle-transport system interaction, and in road design, operation and maintenance.

VTI’s head office is in Linköping where most of the activities and operations are based along with the institute’s laboratory resources and heavy research equipment. The institute also has branch offices in Borlänge, Stockholm, Gothenburg and in Lund. VTI has about 190 employees.
Facts and figures from 2017

Gender among staff 2017

- Men: 59%
- Women: 41%

Professors at VTI

- Jane Summerton: Technology & Social Change, in conjunction with Linköping University.
- Jan-Eric Nilsson: Transport Economics, in conjunction with KTH Royal Institute of Technology.
- Sigurdur Erlingsson: Pavement Technology, in conjunction with KTH Royal Institute of Technology and Iceland University.
- Jan Andersson: Human-Machine-Interaction (HMI) within the transport sector, in conjunction with Linköping University.
- Yvonne Andersson-Sköld: Environmental Analysis, in conjunction with the Department of Civil and Environmental Engineering at Chalmers University of Technology.
- Maria Börjesson: National Economics, in conjunction with KTH Royal Institute of Technology.

Income from (SEK million) and number of foreign clients

- 2015: EU (30), ERA.net/CEDR (8), Other (4), Total (42)
- 2016: EU (28), ERA.net/CEDR (7), Other (3), Total (42)
- 2017: EU (38), ERA.net/CEDR (5), Other (3), Total (46)

Number of employees: 190 persons
Average age: 44 years
Recruited during the year: 12 persons
Licentiate and doctor’s degree: 83 persons
Doctoral students: 19 persons
Degree students: 13 persons

43.2% of the staff have Licentiate or Doctoral degree.
19 doctoral students have been located at VTI during the year.
A selection of events from the year

Transportforum 2017
For the 34th time running, the year began with Transportforum, the largest conference for the transport sector in the Nordic countries. The conference was organised by VTI on the 10th and 11th of January and attracted approximately 1,600 participants. The infrastructure minister at the time, Anna Johansson opened the conference and Gabe Klein, former traffic planner in Washington D.C. and Chicago, gave a speech during the introductory session about changing urban environments in a sustainable direction. The number of sessions was 88 and the interest in giving lectures continued to increase, almost 500 suggestions were received. According to the questionnaire, the score for the conference in 2017 was just as high as the previous year. A score of 4.1 on a five-mark scale for “as a forum for exchange of knowledge” and a score of 4.0 for “as a forum for generating contacts”.

Awards for researchers at VTI

Award for cycle research
Anna Niska, Senior Research Leader at VTI has been awarded the Swedish Cycling opinion award 2017. The award rewards initiatives that influence the view of cycling in a constructive manner and develop Sweden as a cycling nation. She was given the award for her many years work to improve possibilities for more people choosing to cycle. Part of the citation reads: “Anna has, with relentless commitment and positive energy and assisted by research, delivered new findings and an excellent basis for decision making and thereby made it possible for decision makers to make life better for cyclists in practice. Not least when it comes to making everyone understand the importance of operation and maintenance of the infrastructure for cycles...”.

Award for study of automation
Ignacio Solis, Research Assistant at VTI, has been given the award Best Early Career Paper 2017 for a study of automated vehicles. The award is given by the Human Factors and Ergonomics Society, Europe Chapter. In the study, Ignacio has examined whether automated driving systems are of benefit in being able to undertake other tasks while driving. The results showed that partial automation does not help drivers to focus on and undertake secondary tasks.

Tomas Svensson appointed as Director General
On the 29th of June, Tomas Svensson took upon the post of Director General of VTI. Tomas had been appointed by the government as acting Director General since the beginning of the year and has previously had a long background in transport research. He started his research career at the Linköping University and later at VTI, where he worked as a researcher and Research Director.
New collaboration with competence centre in China

In December, VTI was elected as a member of the competence centre China-Sweden Research Centre for Traffic Safety (CTS). The Chinese participants come from the research institute RIOH and the universities of Tongji and Tshinghua. The Swedish participants in the centre besides VTI are Volvo Cars, Volvo AB, Chalmers and Autoliv.

The focus area is on driver assistance systems, evaluation of scale and context effects, human factors in connection with assistance systems and traffic safety.

“The outcome between China and Sweden could be interesting”, believes Jonas Janson, Head of Research for Research Department Traffic and Road-users (TRAF) who worked to establish the collaboration. Traffic safety is higher in Sweden, while the Chinese are quicker at implementing new techniques. The Swedish Zero Vision is for example something that has received attention within CTS.

Maria Börjesson new Professor of National Economics

During 2017 Maria Börjesson took up her position as Professor of National Economics, with the focus on transport.

Maria Börjesson has a background in several disciplines. She received a degree in technical physics from KTH (Royal Institute of Technology), but very soon her interest in national economics was awaken and she studied the subject in Uppsala. In 2006, Maria obtained a doctorate with her thesis: Issues in urban travel demand modelling: ICT implications and trip timing choice.

During her career path, Maria has worked in both academia and as a consultant at WSP Analysis and Strategy. Most recently, Maria came from the Centre for Transport Studies (CTS), a collaboration between KTH and VTI, where she was a Centre Director.

Maria’s long term aim is to influence the development of the transport system in such a way that it promotes welfare in society.

The nomination took place in February and Maria took up her post in August.
Great variety in the department’s projects

During 2017 the Research Department Infrastructure (INFRA) was involved in a number of projects focusing on collision safety, cycling, simulators and heavy vehicles. The department also participated in international comparative tests with VTI’s equipment for friction measurement and received several international visits.

Heavy vehicles and different aspects of the breakdown of roads was an area where several projects were implemented at INFRA during 2017. Roads with weak construction have been instrumented, i.e. equipped with measuring instruments that measure how the body of the road is influenced by heavy loads over time. Different compositions of tyres on heavy vehicles and how this influences the formation of ruts in the roadway have been examined as well.

Within the area of collision safety, an assignment from Skanska was implemented. VTI’s collision safety laboratory implemented testing of the parapets of Slussen bridge, which is undergoing a large rebuild up due for completion in 2025.

Cycle collision tests increase knowledge of injuries

The project for testing how different cycles behave in a collision was completed during the year. The purpose was to increase knowledge of what significance the seat height and riding position has for the injury outcome of a single vehicle accident with a cycle. The project formed part of a research programme about unprotected wheeled road users, financed by Länsförsäkringar’s Research Fund.

“We were also responsible for a government commission about the reasons behind children and young people cycling less and a government commission about describing the primary needs within cycle research in the short and long term”, says Anita Ihs, Head of Research at INFRA.

INFRA’s measurement laboratory and workshop were also involved in ordering smaller simulators and train simulators that were received by VTI from train operators and others.

Anna Niska took up her appointment as Senior Research Leader within the subject field of cycles.

Friction tests evaluated

During the year a European Pavement Friction Workshop was held at a test facility in Nantes, France. The test facility is run by IFSTTAR (French Institute of Science and Technology for Transport, Development and Networks). Different stakeholders can test how their equipment functions at the facility. VTI participated with the friction equipment SFT (SAAB Friction Tester) and the portable equipment PFT (Portable Friction Tester) with good results.

A new type of technique to measure the condition of the road surface, called scanning laser, was being evaluated during the year. The evaluation showed that this technique fulfils the quality requirements set for measurement equipment and measurement data. The review also showed that it is possible to connect to historically measured data on road condition and thereby ensure the possibility of performing trend analyses.

In the area of climate-friendly solutions for urban environments, INFRA has contributed with a study on how different systems for disposal of surface water in cities through drained pavements function.

Several international visits

The department had many international study visits during the year. INFRA held a seminar on recovery of by-products and industrial waste in road construction for participants from Japan, Sweden, Denmark and the Netherlands. A delegation from Norway visited the collision test facility in order to learn more about children in cars.
A strong presence in shipping and railways

The Research Department Society, Environment and Transport (SAMT) continued to expand, and widened its operation during 2017. An important tool for the expansion was an increased focus on different types of collaboration platforms. SAMT also strengthened its position within railways as well as shipping.

VTI intensified its work in the different collaboration platforms during 2017. For some time, the institute has been the main partner in the Centre for Transport Studies, CTS. The collaboration is now entering a new phase where VTI through SAMT is taking an active role both in the research network which will continue to be operated together with KTH as the coordinator and in a transport economics programme which is being built up.

VTI continued to be the main partner in the National Knowledge Centre for Public Transport, K2, which during 2017 decided on a number of major new K2 projects, several of which went to VTI and SAMT. The department was also still engaged in the Centre for Traffic Research, CTR.

“In addition to our engagement in the existing centres, the department worked actively for new collaboration platforms, among others a knowledge centre focusing on noise issues”, says Mattias Viklund, Head of Research at SAMT.

“VTI also entered into a joint programme initiative focusing on a fossil free goods transport system together with RISE Research Institutes of Sweden and Lindholmen Science Park, LSP, as an answer to the Swedish Transport Administration’s announcement within this area.

At the end of 2017, VTI reported through researchers from SAMT on a government commission about public transport in rural areas.

Many shipping and railway projects

During the year SAMT was awarded a number of projects in the area of shipping. Two of the projects that can be highlighted are a government assignment about society’s marginal expenses focusing on shipping and aviation and the project “Carrots and sticks”. The target for “Carrots and sticks” is to recommend cost-effective combinations of governance that can contribute to fulfilling many environment quality targets. VTI also played an important role in the continuing research discussion in the shipping area, among other things by CTS arranging a well visited shipping seminar.

SAMT also strengthened its presence in the area of railways through several new projects. This happened to a large extent within the framework of the EU’s programme for railway research Shift2Rail. The project that VTI is participating in is about assessing the effects of new technology within the areas of mobility, society and the environment. VTI also led the work to find a common research and innovation agenda for railways together with other participants in Järnvägsbranschens Samverkansforum (JBS) [the Railway Industry Cooperation Forum].

“We hope that the agenda will generate further research finance within the area of railways”, says Mattias Viklund.

A new professor and additional research managers

During 2017, VTI’s most recently appointed Professor, Maria Börjesson took up her position. Maria is a professor in national economics specialising in transport and is part of the SAMT organisation.

SAMT gained a further research manager when Johan Olstam was selected as Research Leader for the area of Simulation and Analysis of Road Traffic Systems.
Automation is still a hot research area

Automation, train simulation, goods, electric roads and visual field tests continued to be high interest areas at the Research Department Traffic and Road-users (TRAF) during 2017. The department was also involved in several collaborations nationally and internationally and gained a new Research Leader.

During the last year, TRAF participated in several new and interesting projects. A new project within the department’s area was the EU project BRAVE (BRidging gaps for the adoption of Automated VEhicles). The project is made up of representatives of the vehicle industry, universities and research institutes from seven countries. The purpose is to improve and ease the transfer to automatic vehicles in the future.

TRAF has started working to achieve a large scale demonstration project in automation, a self-driving bus, which will be able to operate in the area around the Linköping University.

“The self-driving bus is a collaboration project between VTI and the Linköping University, which is also our strategic cooperation partner. A number of other stakeholders from companies and the public sector are also taking part”, says Jonas Jansson, Head of Research at TRAF.

TRAF’s expertise in visualisation expanded within the framework of “Visual Sweden”, an initiative based in Östergötland, aiming to promote innovation and regional growth in the field of visualisation and image analysis. In precise terms, this means participation in a project about visualisation of Norrköping.

The field of train simulation also made progress. The user group, TUFFA, for train operators and train driver trainers, which purchased train simulators from VTI, gained additional members. In addition, VTI through TRAF received its largest order for train simulators and a number of train simulators have been delivered to SJ and Green Cargo, among others.

Important collaboration projects for TRAF and VTI

Another area where VTI and TRAF strengthened their presence was electric roads. VTI has, since 2016, participated in a research and innovation platform for electric roads with the purpose of strengthening Swedish and Nordic research and innovative power within the field of electric roads. This is done through building common knowledge in collaboration between institutes, universities, authorities and companies. During 2017, VTI was also involved in a collaboration project between Sweden and Germany on the subject of electric roads, initiated by the governments of Sweden and Germany.

“Collaboration with other stakeholders on a national and international level was also expanded by VTI being elected into CTS, the China-Sweden Research Centre for Traffic Safety”, says Jonas Jansson.

CTS is a competence centre with participants from the Swedish vehicle industry, Chalmers and a number of Chinese parties, one of which is the research institute RIOH.

During the year a number of field of vision tests were completed in Simulator III, using the tests developed by VTI commissioned by the Swedish Transport Agency. This led to some drivers getting their driving licences back.

New research managers

With an aging population, society needs to prepare for the future seniors and their mobility in the traffic, but in order to do this a research basis is required. This autumn, Tania Dukic Willstrand therefore joined as a Senior Research Leader within the area of safe mobility for vehicle drivers.
International cooperation helps to disseminate VTI research

According to VTI’s instruction, the Institute is to engage in international collaborative efforts in fields that fall within its purview.

VTI has clear international ties through its collaborations in EU projects, involvement in organisations and networks, participation in scientific committees, bilateral cooperative arrangements, and international standardisation efforts.

These collaborative efforts bolster VTI’s status as a prominent research institution engaged in activities of high scientific quality. Such collaborations also help to ensure that project results can be disseminated and implemented in the Swedish and international transport systems.

**EU framework programmes**

VTI has a long-term objective in its collaboration in EU framework programmes, which will involve greater participation than in earlier framework programmes. The EU’s Eighth Framework Programme, Horizon 2020 (2014–2020), represents the world’s largest investment in research and innovation, with a total budget of roughly EUR 80 billion. The programme has three priorities: scientific excellence, industrial leadership, and societal challenges. VTI is involved in a number of projects within the Horizon 2020 framework programme.

**SANA-4U**

SANA-4U is a research project within CEDR that is being implemented in coordination by VTI together with Arup in Ireland and BRRC in Belgium.

The purpose is to identify improvement areas for the current standards and guidelines for the road network and the safety of unprotected road users on the non-urban road network. Arup, Ireland has long experience in road design from Ireland and Great Britain, whose road design is mostly regulated by standards. BRRC has long experience in road audits from for example Benelux and France and their unique and characteristic landscapes with a cycle friendly road network culture. VTI contributes with its long experience of human factors and traffic safety work in Sweden.

In this project we will be examining the VRU standards of the member countries, analysing these and developing a “best practice guide” focusing on self-explanatory systems for VRU in non-urban areas. Since these roads outside the metropolitan area are mainly used for transport of goods and services between the larger metropolitan areas and at the same time these are being used by local communities including pedestrians and cyclists, these best practice guidelines will give an illustrative example of a self-explanatory system that has been shown to be effective for this type of environment.
In addition to its collaborations in Horizon 2020, VTI was also involved in the EU’s Seventh Framework Programme, FP7 (2007–2013). VTI participated in just over 30 FP7 projects, in five as the project coordinator. This can be compared with just over 20 projects in which VTI was involved in the Sixth Framework Programme, FP6 (2002–2006), while serving as project coordinator in three of them. It is clear that the Institute has enjoyed successful participation in the EU’s framework programmes to date.

**European institutional collaboration**

During the year, VTI continued its involvement in umbrella organisations for research institutions in the transportation field. Such collaboration creates opportunities to influence the direction of the EU’s research programmes, prepare project applications, and facilitate consortium building. VTI has participated in EU projects and theme-based work groups within the frameworks of:

- FEHRL – Forum of European Highway Research Laboratories
- ECTRI – European Conference of Transport Research Institutes
- FERSI – Forum of European Road Safety Institutes
- HUMANIST – Virtual Centre of Excellence.

**Other international collaborations and commitments**

In addition to the aforementioned organisations, VTI is involved in a highly developed array of international collaborative efforts and commitments. Our national and international networks and alliances guarantee that the knowledge we generate will be deep, broad-based, and multidisciplinary. Some examples:

- NVF – Nordiskt Vägforum (Nordic Road Association)
- Piarc – World Road Association
- TRB – Transportation Research Board
- GRSP – Global Road Safety Partnership
- CEN – European Committee for Standardization

**Involvement in EU’s Horizon 2020**

- ADAS&ME (VTI coordinator) – Adaptive ADAS to support incapacitated drivers Mitigate Effectively risks through tailor made HMI under automation
- CoExist - ‘AV-Ready’ transport models and road infrastructure for the coexistence of automated and conventional vehicles
- BRAVE - BRidging gaps for the adoption of Automated Vehicles
- XCYCLE – Advanced measures to reduce cyclists’ fatalities and increase comfort in the interaction with motorised vehicles
- NetIRail – Needs Tailored Interoperable Railway
- SafetyCube – Safety CaUsation, Benefits and Efficiency
- PROSPECT – PROactive Safety for PEdestrians and CyclisTs
- USE IT – Users, safety, security and energy in transport infrastructure

**CEDR – Conference of European Directors of Roads**

The form that work takes at the EU level, where the national road administrations jointly finance the research, involves cooperation within CEDR. The purpose of this cooperation is to facilitate the exchange of experience and information, and to analyse and discuss all traffic-related issues in areas such as infrastructure, safety, transport, and the environment. This form of cooperation in CEDR projects is clearly becoming an increasingly important project category for VTI. VTI was involved in numerous CEDR projects in 2017:

- SANA4U (VTI coordinator) – Safety in Non-Urban Areas for VRU
- Harmony – Procedures for the design of roads in harmony with wildlife
- HiSpeq – Hi-Speed survey specifications, explanations and quality
- Prima – Pro-Active Incident Management
- Premium – Practical Road Equipment Measurement Understanding and Management
- FALCON – Freight And Logistics in a multimodal CONtext.
# Income statement

**Amounts in SEK thousand**

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<thead>
<tr>
<th></th>
<th>2017</th>
<th>2016</th>
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<tbody>
<tr>
<td><strong>Operating income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income from appropriations</td>
<td>48 174</td>
<td>48 224</td>
</tr>
<tr>
<td>Income from fees, subsidies and other remuneration</td>
<td>32 412</td>
<td>56 177</td>
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<tr>
<td>Income from grants</td>
<td>130 300</td>
<td>102 860</td>
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<tr>
<td>Financial income</td>
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<td>139</td>
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<tr>
<td><strong>Total income</strong></td>
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<td>207 400</td>
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<tr>
<td><strong>Operating costs</strong></td>
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<tr>
<td>Staff costs</td>
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<tr>
<td>Premises</td>
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<td>20 472</td>
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<tr>
<td>Other operating costs</td>
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<td>43 765</td>
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<td>Financial expenses</td>
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<tr>
<td>Depreciation and write-downs</td>
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<td>8 261</td>
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<tr>
<td><strong>Total costs</strong></td>
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<td>206 910</td>
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<td><strong>Operating results</strong></td>
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<tr>
<td><strong>NET CHANGE IN CAPITAL</strong></td>
<td>575</td>
<td>490</td>
</tr>
</tbody>
</table>
The Swedish National Road and Transport Research Institute (VTI), is an independent and internationally prominent research institute in the transport sector. Our principal task is to conduct research and development related to infrastructure, traffic and transport. We are dedicated to the continuous development of knowledge pertaining to the transport sector, and in this way contribute actively to the attainment of the goals of Swedish transport policy.

Our operations cover all modes of transport, and the subjects of pavement technology, infrastructure maintenance, vehicle technology, traffic safety, traffic analysis, users of the transport system, the environment, the planning and decision making processes, transport economics and transport systems. Knowledge that the institute develops provides a basis for decisions made by stakeholders in the transport sector. In many cases our findings lead to direct applications in both national and international transport policies.

VTI conducts commissioned research in an interdisciplinary organisation. Employees also conduct investigations, provide counseling and perform various services in measurement and testing. The institute has a wide range of advanced research equipment and world-class driving simulators. There are also laboratories for road material testing and crash safety testing.

In Sweden VTI cooperates with universities engaged in related research and education. We also participate continuously in international research projects, networks and alliances.

The Institute is an assignment-based authority under the Ministry of Enterprise and Innovation. The institute holds the quality management systems certificate ISO 9001 and the environmental management systems certificate ISO 14001. Certain test methods used in our labs for crash safety testing and road materials testing are also certified by Swedac.

We have about 200 employees and are located in Linköping (head office), Stockholm, Gothenburg, Borlänge and Lund.