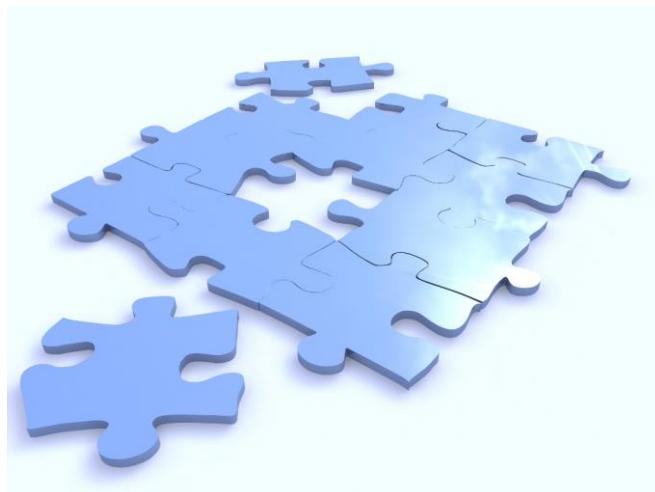


EAST Transport Samverkansplattform VTI och LiU



vti **li.u** LINKÖPINGS
UNIVERSITET

2018 12 20

Foto: Mostphotos (sid 1, 3, 5, 6, 7, 8), Peter Karlsson, Svarteld (sid 3)

EAST Transport

Samverkansplattform

VTI och LiU

Bakgrund

Linköpings universitet, LiU, och Statens väg- och transportforskningsinstitut, VTI, har under många år samverkat inom en rad olika områden. Med syftet att fördjupa, stärka och vidareutveckla denna samverkan tecknades den 27 augusti 2014 ett strategiskt samverkansavtal. Som en följd av partnerskapet har VTI och LiU sedan dess bedrivit ett systematiskt arbete som har fokuserats kring en årligen uppdaterad handlingsplan. En samverkansgrupp med representanter från bågge organisationerna har regelbundet träffats för att upprätta och följa arbetet med denna plan, och det har också hållits ledningsmöten där arbetet har avrapporterats och nya handlingsplaner har fastställts.

En viktig del i det strategiska arbetet har varit att undersöka formerna för en mer riktad och fokuserad samverkansplattform. Avsikten har varit att utveckla en stark och tydligt profilerad plattform för att bedriva forsknings- och utvecklingsverksamhet med hög internationell kvalitet. Verksamhetens samhällsrelevans ska säkerställas genom samarbeten, nätverk och förankring. Fokus ska vara att på ett mer strategiskt sätt än idag marknadsföra och visualisera den samlade styrkan i VTI:s och LiU:s partnerskap. Detta genom att lyfta fram ett antal ”styrkeområden”, dvs. områden där VTI och LiU redan idag har ett starkt och konkurrenskraftigt samarbete. Avsikten är också att identifiera områden med potential för etablering av nya samarbeten. Det finns även ett behov av att arbeta med administrativa frågor och med kommunikation för att underlätta en ökad samverkan.

Ytterst är det förstås själva innehållet i samarbetet, såväl sakområdes- som kompetensmässigt, som är mest intressant. Det är viktigt att utpekade styrkeområden ligger i linje med

forskningsfinansiärernas prioriteringar, vilka i sin tur är kopplade till relevanta samhällsutmaningar. En möjlighet är att, efter en sådan analys, formulera särskilda ”innovationsagendor” för ett eller flera styrkeområden och föra en diskussion om finansiering och utveckling av området med relevanta finansiärer.



Syfte

Syftet med detta dokument är att sätta formerna för en samverkansplattform inom transportområdet i Östergötland – EAST¹ Transport. Det här är ett ”paraplydokument”, vilket innebär att det inte formuleras en fullödig innovationsagenda eller motsvarande för de styrkeområden som identifieras här. Däremot presenteras en översiktlig beskrivning av respektive styrkeområde. I de fall det finns behov av att ta fram en innovationsagenda eller liknande för ett styrkeområde, så behöver det göras av de forskare som är kopplade till området ifråga.

Avsikten är att detta dokument på sikt överförs till en för samverkansplattformen gemensam kommunikationsportal i syfte att mera slagkraftigt beskriva verksamheten.

Mål

En konkurrenskraftig samverkansplattform inom transportområdet har positiva effekter för

¹ Efficient And Sustainable Transport

regionen. LiU och Region Östergötland har inlett ett brett regionalt samverkansarbete där denna samverkansplattform är en viktig del.² Inom ramen för det samverkansarbetet har ett antal övergripande mål formulerats:

- Identifiera styrkor för samverkan inom Östergötland
- Positionera mot strategiska uppdrag och ansökningar
- Skapa synergieffekter mellan kompetens och resurser
- Attrahera resurser till regionen
- Stärka regionens varumärke
- Nyttiggöra genom samverkan
- Bedriva samverkan mot samhällsutmaningar

Syftet med samverkansplattformen EAST
Transport är att öka den samlade styrkan hos VTI och LiU när det gäller forskning inom transportområdet. I detta dokument presenterar vi dels ett antal befintliga gemensamma styrkeområden, dels ett antal åtgärder som ska bidra till ökad styrka framöver. Vår övertygelse är också att EAST Transport kommer att bidra till uppfyllelsen av de övergripande mål som presenteras ovan.

Samverkan i styrkeområden

VTI och LiU samverkar idag inom flera viktiga forskningsområden, vilka här beskrivs som ”styrkeområden”. Samverkan inom respektive område kännetecknas av god finansiering, med potential för ytterligare innovation och finansiering, och av att både LiU och VTI organisoriskt är väl rustade för att bedriva forskning.

Det är i sammanhanget viktigt att understryka att samverkan mellan VTI och LiU inte är begränsad till dessa styrkeområden. Det finns flera exempel på andra områden, där det finns god potential för utveckling i termer av fördjupad samverkan, innovation och finansiering. Ett exempel på ett

sådant område är skadeprevention och rehabilitering. Här sker dialog och samverkan gällande detaljerade matematiska modeller av människan och då specifikt muskler för ökad förståelse inom området personskadeprevention och rehabilitering. Samarbetet utgår från whiplashskadan som är den vanligaste invalidiseringen skadan bland fordonspassagerare och där det hittills inte har etablerats någon framgångsrik rehabilitering. Ett annat exempel är att det bedrivs gemensam forskning som anlägger ett kommunikations- och samtalsanalytiskt perspektiv på mobilitet. Detta innebär till exempel att forskare från VTI och LiU gemensamt bygger upp ny kunskap om samspellet mellan instruktör och elev under körelktioner, såväl som social interaktion mellan trafikanter i andra mobilitetssituationer.



I bilaga 1 återfinns en presentation av de forskargrupper som är verksamma inom transportområdet på VTI respektive vid LiU, inklusive en beskrivning av de forskningsområden som forskargrupperna arbetar inom. Redovisningen baseras på en kartläggning som genomfördes under hösten 2018.

Styrkeområde 1: Hållbar mobilitet

En viktig utgångspunkt för styrkeområdet Hållbar mobilitet är den kanske största samhällsutmaningen kopplat till transportsystemet – beroendet av fossila drivmedel som bidrar till utsläpp av växthusgaser och andra luftföroreningar. Privatbilismen står idag för drygt hälften av växthusgasutsläppen vid inrikes transporter i Sverige och utgör därför ett av de huvudområden som kräver

² Liknande verksamhet som på området Transport and logistics sker inom områdena Life Science, Bio-circular economy och Viable Societies. Områdena har valts ut med tanke på deras koppling till regeringens s.k. samverkansprogram, och det finns även en koppling till FN:s Agenda 2030.

fler innovativa lösningar för att åstadkomma en omställning till ett hållbart transportsystem. Stora kostnader är också förknippade med ineffektivitet och ökat res- och transportbehov som på många platser har givit upphov till trängsel.

Den nödvändiga omställningen till hållbar mobilitet är beroende av tillgång till fossiloberoende fordon, smart uppkopplad infrastruktur, beteendeförändringar och nya kombinerade mobilitetslösningar. Minskat bilresande till förmån för kollektivtrafik, cykel och gång samt styrmedel för att skynda på utvecklingen är också av central betydelse. Laddbara bilar, självkörande fordon, elvägar, uppkopplade samverkande system (Cooperative Intelligent Transport Systems, C-ITS,) och digitala plattformar ("Mobility as a Service, MaaS") blir tillsammans med stadsplaneringsåtgärder viktiga komponenter i ett framtida hållbart transportsystem.



VTI och LiU har båda omfattande kompetens och stor verksamhet inom området. Båda organisationerna ingår i Centrum för trafikforskning, CTR, ett kompetenscentrum som initierar, samordnar och bedriver forskning och utveckling inom modellering och analys av trafikprocesser, och i forskningsprogrammet Transportekonomi, där de övergripande ämnesområdena är samhälls-ekonomisk analys, samt transportmodellering och simulering för transportområdets alla steg utifrån fyrstegsprincipen för att uppnå transportpolitiska mål, miljökvalitetsmålen och de globala hållbarhetsmålen i Agenda 2030. VTI och LiU samarbetar också inom regeringens satsning på strategiska forskningsområden inom forskningsmiljön "Transport research environment with novel perspectives", TRENOP. Samarbetet kring transportmodellering, trafiksimering och analys av trafikprocesser är väl etablerat med delvis

gemensam personal i form av adjungerade seniora forskare och gemensamma doktorander med delade anställningar. Studenter inom grundutbildningen erbjuds också examensarbeten i anslutning till forskningsprojekt inom området.

I handlingsplanen för samverkan mellan LiU och VTI för 2018 finns en punkt som handlar om att driva och utveckla initiativet "Elin", med en autonom buss som en demonstrationsarena, testbädd, för forskning och utveckling inom området. Syftet med denna arena är att fördjupa samverkan inom hållbar mobilitet och bidra till kunskap som är viktig för den framtida hållbara mobiliteten med utgångspunkt i framförallt användarnas perspektiv.

VTI och Tema Teknik och social förändring (vid institutionen för Tema, LiU) har ett mångårigt och väletablerat samarbete om studier som rör människors relationer till transporter samt policy- och planeringsfrågor. Samarbetet har bland annat tagit sig uttryck genom doktorander med delade anställningar. Stor potential finns också för utökat samarbete till exempel inom ramen för det nyetablerade kandidatprogrammet Samhällsplanering som är förlagt till Tema Teknik och social förändring.

Kontaktpersoner inom VTI

- Docent Andreas Tapani (CTR, TRENOP)
- Docent Anna Anund (Elin)
- Dr Ida Kristoffersson
(Forskningsprogrammet
Transportekonomi)
- Dr Åsa Aretun (forskningschef)

Kontaktpersoner inom LiU

- Docent Clas Rydberg (CTR)
- Professor Harald Rohracher (Tema T)
- Professor Jan Lundgren (TRENOP)
- Dr Joakim Ekström
(Forskningsprogrammet
Transportekonomi)
- Professor Tom Ziemke (Cognition & Interaction Lab)

Styrkeområde 2: Framtidens godstransporter

Transportbranschens energiförsörjning består till största delen av fossila bränslen. Branschens utsläpp motsvarar en tredjedel av Sveriges totala utsläpp av växthusgaser. Utsläpp från godstransporter utgör en betydande andel, där tunga lastbilar står för en fjärdedel av hela transportsektorns utsläpp. Transportsektorns omställning är en nyckel för att nå högt uppsatta klimatmål. I våra ambitioner att nå klimatmålen måste vi också värna om godstransportsystemets funktionalitet med hänsyn till den stora samhällsnytta som godstransportsystemet innebär. Sverige har en stor utrikeshandel där såväl import som export är beroende av ett effektivt och tillförlitligt godstransportsystem. Effektiva godstransporter och logistiklösningar för att skapa tillgänglighet till varor och tjänster är också en förutsättning för den starka urbaniseringen.

För att åstadkomma en omställning, som inte försämrar Sveriges konkurrenskraft, behövs forskning som bygger på en trafiklagsövergripande systemsyn, med godstransportsystemets funktionalitet i fokus. Men också en ökad kunskap om hur utveckling och digitalisering av industri- och handelsföretagens logistiksystem och supply chain management, SCM, driver fram krav på nya leveranstjänster. Detta är tydligt i dagens e-handel där utvecklingen går mot allt snabbare leveranser, ibland inom en timme. Logistikforsningen med sin systemsyn är därför viktig för att förstå relationerna mellan varuägare och transportörer och hur dessa kan samverka för att bidra till mindre miljöpåverkan från godstransporter och på sikt till fossilfrihet. Logistiksystemen är också en plattform för implementering av framtidens teknik för fossilfria godstransporter.

VTI och LiU har ett etablerat samarbete inom godstransportområdet genom forskningsmiljön TRENOP där VTI:s och LiU:s gemensamma huvudfokus har varit urbana godstransporter och Citylogistik. Både VTI och LiU är också starkt engagerade i det forskningsprogram om fossilfria godstransporter – Triple F – som Trafikverket finansierar. Linköping är en av fyra programnoder och forskningsledaren för programmets logistikdel är placerad i Linköping. Ett regionalt logistikkluster i Östergötland är också under uppbyggnad, med Norrköpings kommun,

Linköpings kommun och Region Östergötland som huvudpartner, och LiU samt VTI som forskningsaktörer.

Kontaktpersoner inom VTI

- Dr Jenny Karlsson (TRENOP, Triple F, Regionalt logistikkluster)
- Docent Andreas Tapani (TRENOP, Triple F)

Kontaktpersoner inom LiU

- Professor Mats Abrahamsson (TRENOP, Triple F, Regionalt logistikkluster)
- Adj. professor Magnus Blinge (Triple F, Regionalt logistikkluster)
- Universitetslektor Stefan Engevall (Institutionen för teknik och naturvetenskap, ITN)

Styrkeområde 3: Framtidens fordonsystem

Innovationstakten inom fordonsindustrin är idag mycket hög. Detta gäller speciellt områden som digitalisering, automatisering och elektrifiering. Svensk fordonsindustri vill öka sin konkurrenskraft genom att ligga i framkant när det gäller att ta itu med miljö- och klimatutmaningar och kunna erbjuda nya lösningar och tjänster för ren, effektiv, och säker mobilitet, genom automatisering av körruppgiften och nya typer av förarstödsystem och uppkopplade fordon. Samhällets förväntningar på fordonsindustrins förmåga att leverera nya lösningar är mycket hög och är en viktig drivkraft för att nå transportpolitiska och klimatpolitiska mål. För Sverige, som har en stark fordonsindustri, är innovation och framsteg inom fordonsmekanik också en viktig faktor för sysselsättning och ekonomisk tillväxt. Sverige är ett glest befolklat land och vägtransporter är fortsatt nödvändiga för att åstadkomma en väl fungerande transportförsörjning för hela landet.



För att kunna dra full nytta av den snabba takten inom fordonsutvecklingen är det även viktigt att förstå hur tekniken bäst kan utnyttjas i ett systemperspektiv. Ett exempel på detta är utvecklingen av hybridelektriska fordon och infrastruktur för energiförsörjning såsom laddstationer och elvägar.

Här är det inte bara utvecklingen av elektrisk framdrivning av fordon som är av vikt, utan även hur fordonen kan bli kraftförsörjda på ett sätt som minskar beroendet av fossila drivmedel och ökar energieffektiviteten. Andra exempel på områden där utveckling sker är effektiva och säkra autonoma fordon samt hur effektivt och individanpassat diagnostik- och prognostikstöd för fordonsunderhåll kan ge ökad tillgänglighet och kapacitet hos transportsystemet.

En intressant aspekt för framtidens fordon är möjligheterna som kan fås med uppkopplade fordon, vilket ger tillgång till stora mängder information och data. Data kan användas för att bygga modeller baserade på antingen fysikaliska principer eller rent datadrivna metoder. Dessa modeller är användbara i analyser och optimering av enstaka fordon, fordonsflottor, trafik, och infrastrukturfrågor. Systemmodeller kan till exempel användas för att analysera underhållsbehov av fordon och flottor i en modellerad omvärld. Ett exempel är modellering av fordon, väg, trafik, och förarbeteende för att studera hur samspellet mellan fordon och infrastruktur belastar drivlinja vilket möjliggör optimering för minskade emissioner och bränsleförbrukning.



En lika viktig aspekt är att förstå interaktionen mellan människan och den nya tekniken. VTI och LiU har haft långvarig samverkan på detta område, bland annat i projekt där man genomfört tester i VTI:s körsimulatorer. VTI:s professorstjänst inom HMI, Human Machine Interaction, i transportsystemet syftar bland annat till att

vidareutveckla samverkan mellan LiU och VTI på detta område.

VTI och LiU är, tillsammans och var för sig, inblandade i flera viktiga satsningar som adresserar utveckling av framtidens fordon. Bland dessa kan nämnas WASP, som adresserar teknik och metoder för autonoma system, Fol-plattformen för elvägar, Svenskt elektromobilitetscenter, EU-projekten ADAS&Me, Brave, Virtual samt flera fristående FFI-projekt m.m. Inom detta område finns stora möjligheter att ytterligare hitta goda synergier och utöka samverkan mellan LiU och VTI.

Kontaktpersoner inom VTI

- Forskningschef Arne Nåbo (Fol-plattform elvägar)
- Forskningschef Anders Lindström (Brave)

Kontaktpersoner inom LiU

- Professor Lars Nielsen (Fordonssystem, WASP)
- Professor Lars Eriksson (Fordonssystem)
- Professor Erik Frisk (Fordonssystem)

Organisation, arbetssätt och åtgärdsplan

Samverkansplattformen organiseras kring tre huvudprocesser: strategisk styrning, löpande samordning och löpande operativt arbete.

Den övergripande strategiska styrningen av EAST Transport sker via de årliga ledningsmöten där ledningarna för VTI och LiU träffas för att få en rapport av arbetet med gällande handlingsplan och för att fastställa handlingsplanen för nästkommande år.

Det löpande samverkansarbetet under året samordnas via en s.k. samverkansgrupp, där representanter för VTI och LiU ingår. Sammankallande för gruppen är de s.k. samverkansansvariga, vilka under 2018 är Maria Swartz (LiU) och Mattias Viklund (VTI). I bred bemärkelse handlar gruppens uppgifter om att organisera och följa arbetet med handlingsplanerna. Mera konkret har gruppen följande ansvarsområden:

- Underlätta strategisk kommunikation kring exempelvis gemensamma styrkeområden³.
- Samordna diskussioner om nya potentiella styrkeområden, t.ex. genom att sammanföra berörda forskare.
- Övergripande samordna kommunikationsarbetet kring större, strategiskt viktiga utlysningar (informera varandra och i förlängningen bakomliggande organisationer, men även när behov bedöms föreligga initiera gemensamma uppstartsmöten) och viktiga forskningsresultat.
- Underlätta samverkan mellan VTI och LiU genom att löpande diskutera potentialen för administrativ utveckling (ekonomi, personalfrågor, IT-frågor) och i förekommande fall bereda åtgärdsförslag inom respektive organisation.
- Verka för en systematisk användning av regionala nätverk i form av såväl regionala och kommunala som industriella aktörer, t.ex. genom att bjuda in lämpliga aktörer till samverkansmöten och/eller intressanta akademiska seminarier.
- På sikt utveckla en gemensam, elektronisk kommunikationsportal för EAST Transport. Här bör samma information som i detta dokument återfinnas (bakgrund, syfte, mål, styrkeområden, forskargruppskatalog), tillsammans med en kalenderfunktion.
- Verka för ökad akademisk gemenskap mellan VTI och LiU genom att initiera åtminstone ett årligt seminarium, gärna i anslutning till det årliga ledningsmötet.
- Ansvara för löpande uppdatering av den forskargruppskatalog som finns i detta dokument.

- Löpande diskutera fortsatt utveckling av samverkansplattformen⁴.

Med det löpande operativa arbetet avses helt enkelt det forskningsarbetet som hela tiden pågår vid VTI och LiU, ibland separat och ibland i gemensamma projekt. Avsikten är således inte att det byggs upp en särskild funktion för detta arbete (på det sätt som har gjorts för de två övriga processerna).



³ Huvudansvaret för detta ligger på de forskare som arbetar mera konkret med forskningsområdena men samverkansgruppen kan till exempel verka för ökad samverkan och initiera kommunikationsaktiviteter i de fall man bedömer att det finns sådana behov.

⁴ Här kan det vara lämpligt att inspireras av liknande samverkansplattformar för att se vilka metoder som kan användas för fördjupat samarbete. Möjliga metoder är t.ex. frukost- och/eller lunchseminarier med viss regelbundenhet, working paper-serier och nyhetsbrev.

Bilaga

Current research groups at VTI and LiU

Research group: Simulation and analysis of road traffic systems – VTI

(Part of the Traffic Analysis and Logistics (TAL) unit, Department of Society, Environment and Transport (SAMT))

- This research area is about developing and applying simulation-based and analytical methods for empirical studies of effects on traffic performance of different road measures.
- The research can be applied in areas such as traffic planning, traffic management, intelligent transport systems (ITS), autonomous vehicles, connected vehicles and infrastructure (focus on traffic management and traffic effects). The group wishes to expand in bicycle traffic simulation and bicycle traffic models.
- Important collaboration platforms for the group are ECTRIs Traffic management thematic group, where European research institutes and universities participate (e.g. VTI, AIT, IFSTTAR, TUC, DLR, Bast), and FEHRL (research institutes and universities in the fields of road construction and road design, eg. VTI, AIT, IFSTTAR). The group also cooperates with LiU. Two of its researchers and the PhD student have adjunct lectureships at LiUs Department of Communication and Transport Systems. In addition, there are several joint projects with researchers from this department, e.g. projects financed by CTR (Centre for Traffic Research, where VTI, LiU and KTH are research partners, financed by Trafikverket) and other projects with external financing.
- Coordinator of the group is Johan Olstam, Research leader, johan.olstam@vti.se, 013 – 20 41 82. In total, the group consists of four researchers, two research engineers and one PhD student.

Keywords of the group are:

Traffic simulation, Microscopic traffic simulation, Automated vehicles, Connected vehicles, Traffic control, Capacity models.

Research group: Transportation and logistics – VTI

(Part of the Traffic Analysis and Logistics (TAL) unit, Department of Society, Environment and Transport (SAMT))

- This research area is about transportation and logistics, with a focus on sustainable freight transport and urban freight. Methods commonly used are freight models, other quantitative models for transportation and logistics planning and analyses and case studies.
- The research can be applied in areas such as energy and climate efficient freight transport from a national systems perspective, distribution systems for e-commerce (retail) and e-grocery, transportation systems for circular economy, and city logistics (e.g. business models for urban freight distribution; fossil free last mile distribution systems, including bicycle and urban waterways). The group wishes to expand in logistics solutions using new fossil free technique (e.g. electric roads).
- Important networks for this group are Triple F (a national research program, with a focus on fossil free freight, including partners from industry, authorities and academy), the research program Transportekonomi (Transport Economics, financed by the Swedish Transport Administration, Trafikverket) and ECTRI's freight and logistics thematic group (members are European transport research institutes, e.g. Fraunhofer, IFSTTAR, TNO). The group cooperates with LiU in several areas – at IEI, the Department of Management and Engineering, with Annelie Carlson, Maria Huge Brodin and Mats Abrahamsson, at ITN, the Department of Science and Technology, with Stefan Engevall, and at MAI, the Department of Mathematics, with Elina Rönnberg.
- Coordinator of the group is Jenny Karlsson, Researcher and Research leader, jenny.karlsson@vti.se, 0708 – 19 59 44. In total, the group consists of three researchers, two research engineers and one PhD student (planned dissertation in January 2019).

Keywords of the group are:

Transportation models, mode choice, energy, sustainability, transportation planning, distribution systems, e-commerce, e-grocery, omnichannel, urban freight, city logistics.

Research group: Transport modelling at system level – VTI

(Part of the Traffic Analysis and Logistics (TAL) unit, Department of Society, Environment and Transport (SAMT))

- This research area is about transport models at system level, including demand models for car ownership, trip generation, mode, destination and route choice (typically discrete choice models) and supply models for assignment of the demand to the network.
- The research can be applied in areas such as transport planning, transport policy, public transport, bicycle and automated vehicles. The group wishes to expand in the use of new data sources, such as cellular network data, to estimate travel demand models. The area of commute travel by boat is also of interest to this group.
- Important networks for this group are the research program Transportekonomi, hEART (European Association for Research in Transportation) and IATBR (International Association for Travel Behaviour Research). With respect to cooperation with LiU, there are several ongoing projects where researchers from this research group work together with researchers from LiU, and cooperation is increasing because of the new research program Transportekonomi (where both VTI and LiU are members).
- Coordinator of the group is Ida Kristoffersson, Researcher, [ida.kristoffersson@vti.se](mailto:idam.kristoffersson@vti.se), 08-518 388 11. The group consists of four researchers.

Keywords of the group are:

Transport model, travel demand model, macroscopic, static assignment, network analysis, trip generation, mode choice, forecast, policy analysis, infrastructure investment, cost-benefit analysis, travel behavior survey.

Research group: Problems and possibilities regarding public procurement of bus traffic – VTI

(Part of the Traffic Analysis and Logistics (TAL) unit, Department of Society, Environment and Transport (SAMT))

- This research area is about different kinds of problems connected to the public procurement of bus traffic, such as increasing costs. The problem with the steep peak curve is also considered, as well as the effects of different conditions in different procurements areas. The group uses different kinds of methods (both qualitative and quantitative methods).
- The research is commonly applied to the public transport sector and the group wishes to expand in overall logistics and transportation areas.
- Some important networks of the group are K2 (Sweden's national center for research and education on public transport) and Thredbo (The International Conference Series on Competition and ownership in Land Passenger Transport). Cooperation with LiU is well-developed, where the group's coordinator is employed by both VTI and LiU, and the PhD student is affiliated with LiU.
- Coordinator of the group is Helene Lidestam, associate professor LiU and VTI, Helene.lidestam@vti.se 0736-209578. The group consists of one associate professor, one assistant professor and one PhD student.

Keywords of the group are:

Public procurement, peak-traffic, costs in public transport, traffic authorities, bus operators.

Research group: Planning and decision-making processes – VTI

(Part of the Mobility, Actors and Planning Processes (MAP) unit, Department of Society, Environment and Transport (SAMT))

- This research area concerns how decision-making and planning processes at various levels of society affect the development and transition of the transport system. Using a range of different methods and theoretical perspectives, the group contributes with detailed, multifaceted knowledge in a complex and topical empirical field. The group's research is interdisciplinary and involves researchers from several social scientific disciplines including Human Ecology, Human Geography, Sociology and Political Science as well as the interdisciplinary field of Science and Technology Studies. The bulk of the research is social-scientific and qualitative in nature, with occasional quantitative elements. The methods used consist specifically of interviews, focus groups, group interviews, surveys, participant observations and document analysis. Link to web page: <https://www.vti.se/en/research-areas/planning-and-decision-making-processes/>
- The research can be applied in areas such as transport and spatial planning, public transport and smart mobility. A considerable part of the research relates to the issue of long-term sustainable development and the prerequisites for working towards such a transition. The research aims to provide detailed scientific knowledge of these transition processes. This knowledge is important for understanding both the opportunities and the barriers that determine the frameworks for governance, planning and decisions aimed at increasing the proportion of those travelling on foot, by bicycle and by public transport.
- One very important Swedish network of the group is K2 (Sweden's national center for research and education on public transport). Much of the group's work together with Swedish researchers has been carried out in conjunction with researchers at K2 (together with colleagues at Lund University and Malmö University) and also with KTH-based researchers. The group maintains international links through research together with e.g. British researchers at Edinburgh Napier University and the University of Leeds; and Kedge Business School in France. The group's contact persons at LiU are Wictoria Glad and Dick Magnusson, both at the Tema T institution.
- Coordinator of the group is Robert Hrelja, Ph.D. Docent (Reader in Transport and Roads), robert.hrelja@vti.se, 070-883 27 40. The group consists of nine full time researchers and three PhD students.

Keywords of the group are:

Governance, policy, planning, decision making.

Research group: Mobility, participation and social justice – VTI

(Part of the Mobility, Actors and Planning Processes (MAP) unit, Department of Society, Environment and Transport (SAMT))

- This research area concerns social sustainability with a focus on mobility, accessibility and justice. Research interests include everyday practices, conditions, rights and premises with respect to mobility, and accessibility related to questions on justice and welfare. The projects are often interdisciplinary and apply qualitative and/or quantitative methods. Theoretical knowledge (on e.g. social practice and accessibility) is combined with methodological knowledge on how to make the mobility of individuals and groups visible and equitable. Link to web page:
<https://www.vti.se/sv/forskningsomraden/social-tillganglighet-i-transportplanering/>
- The empirical field of research include areas such as mobility, transport use and planning. Studies can concern social consequences of existing and planned transport infrastructure; public participation; and inclusion of the perspective of individuals and user groups.
- Important networks of the group are: Time-geographical network (administered by LiU); KOMPIS (combined mobility in Sweden); The network for Social sustainable transport planning (administered by MISTRA and University of Gothenburg); Gendering smart mobilities in the Nordic Region (administered by Copenhagen University); IAIA (International Association for Impact Assessment); ECTRI (The European Conference of Transport Research Institutes: Thematic work group Mobility); MOBSIN (Advanced workshops on Mobilities and Social interaction. European network); and the Network for gender equality in the transport sector (Nätverket Jämställdhet i Transportsektorn). The group's contact persons at LiU are Harald Rohracher, Tema T; Anna Kaijser, Tema M; Jakob Cromdal, ISV (Department of Social and Welfare Studies); and Mathias Broth, IKK (Department of Culture and Communication).
- Coordinator of the group is Lena Levin, and the group consists of four researchers and two PhD students. E-mail to the researchers: Lena Levin, lena.levin@vti.se; Jessica Berg, jessica.berg@vti.se; Malin Henriksson, malin.henriksson@vti.se; Anna Wallsten, anna.wallsten@vti.se

Keywords of the group are:

(Gender) equality, social sustainability, everyday life, every day practices, mobility, mobility practices, traveller perspectives, social categorizations of travellers (e.g. younger, older, women, men), intersectionality, inclusion, exclusion, welfare, justice, policy analysis, critique, assessments, citizens' trust in government, method development.

Research group: Traffic and transport psychology – VTI

(Part of the Mobility, Actors and Planning Processes (MAP) unit, Department of Society, Environment and Transport (SAMT))

- This research area is organized in five broad areas: road crashes and human factors, motivational, affective and cognitive characteristics, driver training, sustainable transport and road safety communication campaigns. Models and theories that are used by this research group include theoretical models that predict behavior, theoretical models that explain persuasion and change, theoretical human factors-models that structure and contextualise human performance and limitations, especially cognitive limitations, models and methods to explain and predict driver behavior, and models of personality. A variety of methods are used, including observations, field experiments, in-depth interviews, focus groups and surveys. The group's approach is both descriptive and experimental.
- The research can be applied in government work, local councils, educational establishments. Within the area of traffic safety, the target groups are drivers of cars, motorcycles and mopeds. In addition to this, the research group also focuses on vulnerable road users (e.g. cyclists and pedestrians). Within the area of sustainable transport, the target groups are mainly pedestrians, cyclist, and public transport users. This research group is interested in cooperation with other transport psychologists as well as working in multidisciplinary teams.
- Important networks of the research group are the International association of applied psychology (IAAP) and the European Federation of Psychologists' Associations (EFPA). In addition to this, the group has regular contact with colleagues at various national and international Universities and Research Institutes. At present, there is no cooperation with LiU.
- Coordinator of the group is Sonja Forward, researcher, Sonja.forward@vti.se, 013-20 41 33. The group consists of five researchers.

Keywords of the group are:

Traffic safety, modal choice, attitudes, motivation, alcohol, drugs, TPB (Theory of Planned Behavior), TTM (Transtheoretical model), errors, violations, workload, human performance.

Research group: Air quality Group – VTI

(Part of the Environment (MILJÖ) unit, Department of Society, Environment and Transport (SAMT))

- This research area is about road dust, non-exhaust emissions and air quality. Methods used are emissions, properties, effects and abatement methods. Several unique methods, like a road simulator for particle production and analyses, WDS (wet dust sampler) – a road dust sampler developed at VTI. NORTRIP emission model, a particle emission model which can take into account physical processes affecting road dust emission, like road surface properties, road operation measures, road humidity etc.
- The research group conducts research that can be applied in the transportation system as a whole and wish to expand in the areas of vehicles, air and water pollution research and analytical methods (physics and chemistry).
- Important networks of the group are NORTRIP/NorDust-network (Nordic collaboration within road dust research), Swedish municipal network (collaboration in air quality and road dust, Stockholm, Göteborg, Uppsala, Karlstad) and a network focused on toxicology and non-exhaust particles (Norwegian public health institute, KTH, RIVM and Stockholm university). The groups primary contacts at LiU are Thomas Lingefelt (IFM, Department of Physics, Chemistry and Biology) and Anders Ljungman (IKE, Department of Clinical and Experimental Medicine).
- Coordinator of the group is Mats Gustafsson, researcher, mats.gustafsson@vti.se, 013- 20 43 26, and the group consists of three researchers, two PhD students and one research assistant.

Keywords of the group are:

Road dust, PM₁₀, NORTRIP, non-exhaust emissions.

Research group: Contract analysis of the transport sector – VTI

(Part of the Transport Economics (TEK) unit, Department of Society, Environment and Transport (SAMT))

- The core question of this research field is to design an optimal contract to find the most efficient outcome (in terms of cost and quality) with regards to the specific circumstances of each project. The work is mainly applied to The Swedish Transport Administration's procurement and contracting of investments, reinvestments and maintenance of road and rail. The research includes both theoretical and empirical studies.
- The research group conducts research that can be applied in the areas of procurement and contracting of investments, reinvestments and maintenance of road and rail.
- The primary network of this research group is InfraSweden2030, one of the strategic innovation programs financed by Vinnova.
- Coordinator of the group is Johan Nyström, Research leader, johan.nystrom@vti.se. In total, the group consists of four researchers and two PhD students.

Keywords of the group are:

Contracts, procurement, transaction cost.

Research group: Freight transport and logistics – VTI

(Part of the Transport Economics (TEK) unit, Department of Society, Environment and Transport (SAMT))

- The focus of this group are qualified analyses, model development and research regarding industry transports, including cargo. A special focus area is sea transports. Research about modal shift and policy instruments and measures that can reduce emissions from maritime transports are examples of ongoing research projects within this area.
- Areas of special interest to this research group are freight transport, logistics, shipping and policy.
- Important networks of this group are Triple F (a national research program, with a focus on fossil free freight, including partners from industry, authorities and academy) and Lighthouse (a research platform that gathers leading maritime stakeholders through Triple-Helix collaboration between industry, society, academia and institutes for research, development and innovation within the maritime sector).
- Coordinator of the group is Inge Vierth, inge.vierth@vti.se. In total, the group consists of five researchers and one PhD student.

Keywords of the group are:

Cargo, sea transports, shipping, model, policy.

Research group: Transport economics – VTI

(Part of the Transport Economics (TEK) unit, Department of Society, Environment and Transport (SAMT))

- Research interests of this group include transport cost-benefit analysis, appraisal and sustainability, transport policy and pricing for all modes, distribution effects and equity, the econometrics for valuation of non-market goods such as travel time, reliability and security, the impact of the transport system on employment and productivity, the economics of cycling, gender differences, railway economics, survey design, choice experiments, gender differences, public opinions, transport modelling, travel behavior, active mobility and cycling.
- Important networks of this group are International Transportation Economics Association (ITEA), Institute for Transport Studies at University of Leeds and hEART (European Association for Research in Transportation).
- Coordinator of the group is Maria Börjesson, Professor, maria.borjesson@vti.se. In total, the group consists of six researchers.

Keywords of the group are:

Cost-benefit analysis, appraisal, sustainability, transport policy.

Research group: Traffic safety and traffic system – VTI

(Traffic Safety and Traffic System (TST) unit, Department of Traffic and Road Users (TRAF))

- This objective of this research group is to generate knowledge that contributes to reduced risk of lost life and health in the transport system for all road user groups, evaluate traffic safety measures (e.g. speed cameras), develop risk models for different road users (cyclists, older drivers, etc.) and conditions (alcohol- and drug-impaired drivers, speeding, etc.), and finally to develop statistical and biomechanical models by using register-based studies and observational studies.
- The research is applied in the area of traffic safety in the road transport system, and the group wishes to expand in the area of falling accidents (pedestrians) in the road traffic environment - especially in relation to medication use and diseases.
- Important networks of the group are SAFER (a network of more than 30 partners within academia, industry and society), ECTR (the traffic safety thematic group) and FERSI (Forum of European road safety research institutes, such as VTI, SWOV and IFSTTAR). As to cooperation with LiU, several students from the Division of Statistics and Machine Learning (STIMA) at LiU have been writing their theses at VTI (candidate/master).
- Coordinator of the group is Astrid Linder, research director, astrid.linder@vti.se, 070-828 64 68. The group consists of seven researchers, four research engineers and one PhD student.

Keywords of the group are:

Traffic safety, statistics, biomechanics, road traffic accidents/crashes, Vision Zero, injury prevention, speed, alcohol and drugs, lost life and health, cyclists, car occupants, passengers in public transport, pedestrians, riders of powered two-wheelers.

Research group: Driving simulation and visualization – VTI

(Driving Simulation and Visualization (SIM) unit, Department of Traffic and Road Users (TRAF))

- This research area is about achieving simulation environments to study traffic situations where it is essential to involve real people. The simulation environment then constitutes an “experience room” for the people involved. The group has three motion-based driving simulators: one freight train simulator, one passenger train simulator and one walking simulator. Projectors, screens and VR-technology is used for visualization.
- The research group conducts research that can be applied in the transport sector (e.g. vehicle dynamics, driving support systems, automation, electrification, road and rail design, signal systems), in the education sector (e.g. train drivers, driving license, ambulance drivers) and in the health care sector (e.g. testing driving ability in the case of visual field loss and diagnostic tool in the case of certain medical conditions, such as stroke or dementia). The group wishes to expand in several areas, e.g. real time simulation and programming, VR applications, mathematic models and communication simulation.
- Important networks of this group are DSA (Driving Simulator Association) and ASAM OpenDRIVE/ASAM OpenSCENARIO (collaboration regarding software for driving simulation). Two of the group's PhD students are affiliated with LiU (at IEI and IDA, the Department of Computer and Information Science).
- Coordinator of the group is Arne Nåbo, research director, arne.nabo@vti.se, 031-750 26 17. In total, the group consists of twelve researchers and three PhD students.

Keywords of the group are:

Driving simulator, Train simulator, Virtual reality, Vehicle simulator.

Research group: Driver and vehicle – VTI

(Driver and Vehicle (FOF) unit, Department of Traffic and Road Users (TRAF))

- This research area is mainly studying the interaction between the human and the vehicle. Modelling, simulator studies, naturalistic studies and measurements are common. Link to Web page <https://www.vti.se/en/employees/>
- The research group conducts research that can be applied in areas such as road traffic, maritime, railway, drones, new vehicle types.
- Areas of special interest to this research group are automated driving, C-ITS (Cooperative Intelligent Transport Systems), digital twins and virtual prototyping. The primary contact at LiU is Mattias Arvola.
- Coordinator of the group is Anders Lindström, Research Director, anders.lindstrom@vti.se, 08-555 365 09. In total, the group consists of twelve researchers and three PhD students.

Keywords of the group are:

English: Tyre friction, vehicle dynamics, automation, remote operation, C-ITS, traffic medicine, simulator-based driver training and assessment, traffic safety, efficiency and sustainable mobility.

Research group: Human factors in the transport system – VTI

(Human Factors in the Transport System (TIL) unit, Department of Traffic and Road Users (TRAF))

- This research area has a focus on drivers with and without impairment. Studies in the area concern how people read, interpret and interact with other people and with the infrastructure of the transport system. Current research issues concern attention, fatigue and stress of drivers and unprotected users of the transport system.
- The research group conducts research that can be applied in areas such as autonomous vehicles, connected vehicles and infrastructure, road design and road infrastructure, vehicle systems, behavior and driver impairment. Areas of special interest to this research group are how different conditions affect people's ability to reach a sustainable, safe and independent mobility.
- Important networks of this group are Stockholm University (in particular its research institute on stress), Leeds University and the University of Jyväskylä. With respect to cooperation with LiU, there is collaboration with Tom Ziemke at IDA, the Department of Computer and Information Science, and there is also cooperation with researchers at IDA and ISY (the Department of Electrical Engineering) regarding the plans of an automated bus in the VTI and LiU campus area. Three of the group's researchers are associate professors at LiU.
- Coordinator of the group is Anna Anund, Research Director, anna.anund@vti.se, 013-20 43 27. In total, the group consists of six researchers, two research leaders and two research assistants.

Keywords of the group are:

Inattention, fatigue, sleepiness, driver impairment, road infrastructure, road markings, user of the transport system.

Research group: Infrastructure Maintenance – VTI

(Infrastructure Maintenance (DOU) unit, Department of Infrastructure (INFRA))

- This research area is about producing knowledge that can form the basis of efficient maintenance measures in road transport (car, bicycling, pedestrian), electric roads and railroads. The main orientations are developing measures to describe and follow up on the condition of the road surface, analyzing the effect of different maintenance measures on the condition of the road surface, developing models to describe how the road surface change over time because of e.g. traffic, weather and climate, and analyzing the impact of climate change on the need for future maintenance measures.
- Areas of special interest to this research group are many, including e.g. signal analysis, filter technology, machine learning, analysis of big data, statistical methods, and sustainable maintenance.
- Important networks of this group are Cykelcentrum (the national platform for bicycle research in Sweden, hosted by VTI), FEHRL and ERPUG (European Road Profile User's Group)
- Coordinator of the group is Leif Sjögren, Research Director, leif.sjogren@vti.se 013-204359. In total, the group consists of eleven researchers, two research engineers and one PhD student.

Keywords of the group are:

Road networks, measurement technology, condition, IRI, road profiles, data, electric roads, Laser RST, friction, noise, environment, particles, Big Data, climate.

Research group: Road Materials – VTI

(Part of the Pavement Technology (VBA) unit, Department of Infrastructure (INFRA))

- This research area is about durability of road building materials and about development and characterization of bound (asphalt, cement concrete) and un-bound materials for road, pavement, airfields, harbours etc. to achieve the lowest life-cycle social costs.
- The area of application for this research group is road infrastructure and some areas of special interest are physical and chemical characterization of materials, as well as sensors
- Important networks of this group are European National Highway Research Laboratories and Swedish universities (mainly KTH, LTH, LTU).
- Coordinator of the group is Björn Kalman, Research Director, bjorn.kalman@vti.se 013-204255. In total, the group consists of seven researchers, six research engineers and two PhD students.

Keywords of the group are:

Infrastructure, materials, unbound materials, asphalt, concrete, life-cycle costs.

Research group: Road construction and pavement design – VTI

(Part of the Pavement Technology (VBA) unit, Department of Infrastructure (INFRA))

- This research area is about developing mechanistic and empirical structural design models, applied to the area of road infrastructure.
- The area of application for this research group is road infrastructure and some areas of special interest are sensors for stresses and strains and moisture sensors.
- Important networks of this group are Swedish universities (mainly KTH, LTH, LTU and UU), the Technical University of Dresden and Háskóli Íslands. There is also cooperation with LiU in the area of sensors.
- Coordinator of the group is Sigurdur Erlingsson, Professor, sigurdur.erlingsson@vti.se, 013-204123. In total, the group consists of four researchers, four research engineers and two PhD students.

Keywords of the group are:

Infrastructure, pavement design, road, ME design models, moisture

Research group: Climate smart transport systems – LiU

(Part of the Logistics and Quality Management (LOGQ) division, Department of Management and Engineering (IEI))

- The research is about how logistics systems should be designed, managed and controlled to be more sustainable with less negative environmental as well as social impact as a result. We study logistics systems often with a company perspective, including interorganizational issues. In our research the balance between environmental, social and economic aspects are an important part of our analysis. Our research primarily focuses on various business models for sustainable logistics. We apply various theories and models to analyze and increase the understanding relating to the overall societal challenges. In this pursuit, we apply multiple models such as case studies, action research, surveys and focus groups.
- The area of application for this research group are the logistics sector, the transport sector, the retail sector and municipalities/city logistics. Areas of special interest to this research group are the manufacturing sector and supply chains for sustainability
- The research group is in general interested in collaboration with researchers in adjacent areas, such as technology development and behavioral studies relating to sustainable logistics. An important network for this group is LENS (research collaboration network, LiU+LU+Chalmers/GU)
- Coordinator of the group is Maria Huge-Brodin, Professor Green logistics, maria.huge-brodin@liu.se, 013-28 15 33. Spec. for social aspects and city logistics: Maria Björklund, Associate professor, maria.bjorklund@liu.se, 013-28 15 70. In total, the group consists of three core senior researchers and three partly involved senior researchers, three PhD students at LiU and one at another University.

Keywords of the group are:

Sustainable OR Environmental OR Green OR Social AND Transport OR Logistics OR Supply Chain Management.

Research group: Competitive and dynamic industry – LiU

(Part of the Logistics and Quality Management (LOGQ) division, Department of Management and Engineering (IEI))

- The research of this group is management-oriented research, where the strategic role of logistics or the quality function is highlighted: "How can a company compete with its logistics/quality services?". Important metrics (in addition to costs and delivery services), are e.g., profitability, growth and customer satisfaction. The research is often linked to supply chain management and interorganizational relationships or design issues of the supply chain.
- Theoretically, sometimes, but not always, research is based on different approaches to strategy- and organizational theory. For example, RBV (the resource-based view of the firm) and dynamic abilities. This kind of theory-based research helps us understand the role of logistics and quality, based on a wider business perspective. Methodically, the majority of research is based on case studies. Simpler forms of surveys also occur sometimes.
- The area of application for this research group are the manufacturing sector and commerce. The research group is in general interested in collaboration within the area of digitization
- Important networks for this group are Handelsrådet, NOFOMA, and SQMA
- Coordinator of the group is Erik Sandberg, Associate professor, erik.sandberg@liu.se, 0736-121880. In total, the group consists of five-six core senior researchers and two PhD students.

Keywords of the group are:

Supply chain management, strategy, Six Sigma, logistics, quality systems, business models.

Research group: Cognition & Interaction Lab – LiU

(Part of the Human-Centered Systems (HCS) division, Dept of Computer & Information Science (IDA))

- Research in the Cognition & Interaction Lab (COIN) focuses on people's interaction with different types of technology, in particular interaction with different types of autonomous systems and AI: social robots, virtual agents, automated vehicles, and other complex systems. Most COIN researchers have a cognitive science background.
- Research Application Areas are any area in which people interact with complex technical systems, and in particular the above types of technologies.
- The research group is interested in collaborating in human factors research, and in particular people's interaction with different types of autonomous systems. Our main interest is in the cognitive and social aspects of such interactions: How can, for example, pedestrians or bicyclists know an automated vehicle's intentions? How can they understand what such a system attends to, perceives, or remembers? Similar questions apply to car-driver interaction (where we already collaborate with VTI).
- Important networks are various academic networks, European projects, active collaboration with RISE Viktoria.
- Coordinator of the group Tom Ziemke, Professor of Cognitive Systems, tom.ziemke@liu.se, 0705-44 14 44. In total, the group consists of 7-8 senior researchers: 2 full professors, 2 assistant professors, 1 postdoc, 1 adjunct professor, 1 adjunct assistant professor, 1 professor emeritus. FTE in transport research is currently small (<1). 5 Ph.D. students (of which 2 are employed by VTI)

Keywords of the group are:

Human-machine interaction, social robotics, human factors, cognitive systems, situated cognition, distributed cognition, embodied cognition, intention, situation awareness.

Research group: Public Transport and Railway – LiU

(Part of the Communications and Transport System (KTS) division, Department of Science and Technology (ITN))

- The research group for public transport and railway develop computational support tools for good planning of railway traffic and public transport. The tools can be used for evaluating systems and making better decisions. The group is interested in developing models and methods that describe the traffic and can be used as decision support tools by infrastructure managers and operators. On a strategic level, researchers of the group are interested in evaluating the imposed effects of changes in the infrastructure. At a tactical level, they construct timetables and schedules, and on the operational level these have to be adjusted in (close to) real time. Models can describe a complete network, a line, or a node, representing some type of terminal.
- Most of the methodological approaches come from the academic field of operations research, where we use optimization, simulation and statistics. An objective is often formulated as to gain time, cost, capacity, energy, stability or robustness.
- The area of application for this research group is planning problems in public transport and railway. Stakeholders are infrastructure managers, rail undertakings, maintenance contractors, regional public transport authorities, and bus and tram operators. For the time being, the group would like to expand its collaboration with rail undertakings, and operators for bus and tram. Areas of special interest to this research group are optimization, simulation, statistics in combination with railway and/or public transport.
- Important networks for this group are KAJT (www.kajt.org), K2 (k2centrum.se), CTR (ctr.kth.se)
- Coordinator of the group is Anders Peterson, Associate professor in Traffic systems.
- anders.peterson@liu.se; 011 –36 31 07. In total, the group consists of six core senior researchers and seven PhD students. <https://liu.se/en/research/public-transport-and-railway>

Keywords of the group are:

Public transport, railway, operations research, planning, capacity timetabling.

Research group: Traffic systems – LiU

(Part of the Communications and Transport System (KTS) division, Department of Science and Technology (ITN))

- The research group for traffic systems work with modelling of the transportation infrastructure and the people using the transportation system, as well as estimation of travel demand in urban areas, and simulation of traffic – both macroscopic models for planning and forecasting and microscopic models including modelling of detailed vehicle interactions. The group also work with modelling of future transport systems, with a mix of ADAS equipped vehicles and self-driving cars, and analytics of data from transport-related sensors, like radar detectors, floating car data etc.
- The area of application for this research group are transport modeling and planning, and decision support and traffic information. Areas of special interest to this research group are traffic modelling, traffic simulation, transport analytics; combining traditional models with data fused from new sources.
- An important network for this group is the Centre for Traffic Research (CTR) with VTI, KTH and Trafikverket. The group cooperates with VTI regarding senior researchers and PhD students.
- Coordinator of the group is Clas Rydbergren, Associate professor, clas.rydbergren@liu.se, 011-363314. In total, the group consists of eight core senior researchers and two PhD students.

Keywords of the group are:

Traffic modelling, traffic simulation, transport analytics.

Research group: Emergency response and health care logistics – LiU

(Part of the Communications and Transport System (KTS) division, Department of Science and Technology (ITN))

- This research group develop models, methods, and decision support for the optimized management of emergency response and health care resources. Quantitative methodologies are often used, such as for example optimization, simulation, statistical analysis and geographical analysis. This is done in close cooperation with the rescue and health care sector, and often within the framework of CARER (Center for advanced research in emergency response).
- The area of application for this research group are Emergency response, Health care, Disaster management. The research group is in general interested in collaboration in any area where quantitative methods may be applied to emergency response or health care related problems
- An important network for this group is CARER (Center for advanced research in emergency response), <https://liu.se/en/research/center-for-advanced-research-in-emergency-response>
- Coordinator of the group is Tobias Andersson Granberg, Associate professor, tobias.andersson.granberg@liu.se, 011-363213. In total, the group consists of five core senior researchers and one PhD student. <https://liu.se/en/research/emergency-response-and-health-care-logistics>

Keywords of the group are:

Optimization, simulation, health care, emergency response, humanitarian logistics, decision support tools.

Research group: Air Traffic management, AEAR group – LiU

(Part of the Communications and Transport System (KTS) division, Department of Science and Technology (ITN))

- The research of this group is about multi-aviation airspace and capacity estimation and route planning for various kinds of air traffic, including but limited to: unmanned aerial vehicles (UAV), traffic management (UTM), urban air mobility (UAM), conventional air traffic management (ATM) and space2ground missions. Other key research areas are airspace design for a mixture of users, performance-based services (PBS), development and optimization of environmental and other KPIs, lowering environmental impact of aviation (low-noise PBN routes) in terminal maneuvering areas (TMAs), economic mechanisms and game-theoretic concepts for strategic traffic deconfliction, controllers workload and scheduling for multiple remote tower operations, risk assessment, safety and efficiency of flight paths, and finally facility location for UTM and ATM – airports, vertiports, takeoff and landing areas (TOLAs), launchpads.
- The areas of application for this research group are decision support tools for unmanned air traffic management (UTM) and conventional air traffic management (ATM). Areas of special interest are math, probability, analysis of algorithms, competitive programming
- Coordinator of the group is Valentin Polishchuk, tiny.cc/valutm tiny.cc/valatm. The group consists of five senior researchers and two Ph.D. students. [AEAR group](#) (reads “air group”).

Keywords of the group are:

Unmanned air traffic management (UTM) and conventional air traffic management (ATM). Algorithms, optimization, modeling, simulation.

Research group: Construction Logistics – LiU

(Part of the Communications and Transport System (KTS) division, Department of Science and Technology (ITN))

- The research of this group is empirically grounded, but strives towards developing normative tools, methods and models with the purpose to enhance effective construction logistics and management. The goal of the research is to facilitate smooth and sustainable operations and to increase productivity, quality and timeliness of construction projects, mainly within the building sector. A special focus is directed towards construction logistics and supply chain management in three different but interlinked areas: the supply chain upstream of the construction site, the operations at the construction site itself, and the interface between the site and the supply chain. Besides this, research is also focused on the mutual dependence between the construction project and the built environment in a larger context, including stakeholder perspectives, city logistics, urban development, etc.
- The research projects are divided into three research areas: developing new methods and processes to enhance logistics and supply chain management in the construction industry, the industrialization of construction, with a special focus on industrialized production methods and logistics for residential buildings and developing decision support and planning systems for supply chain planning in construction, including VDC and BIM.
- The areas of application for this research group are the AEC industry, the construction industry, municipalities, and third-party logistics providers. Areas of special interest to this research group are digitalization (Industry 4.0), transport planning, city logistics and modal shift road to water.
- Important networks for this group are EurOMA – The European Operations Management Association, ARCOM – Association of Researchers in Construction Management and NOFOMA – The Nordic Logistics Research Network.
- Coordinator of the group is Martin Rudberg, professor, L E Lundberg Chair of Construction Management and Logistics, martin.rudberg@liu.se, 013-28 1566. In total, the group consists of Three core senior researchers and three PhD students. <https://liu.se/en/research/construction-logistics>

Keywords of the group are:

Construction management, construction logistics, construction supply chain management, Industrialized house building, digitalization of construction operations, urban construction logistics, governance of construction logistics, Construction Consolidation Centres (CCC), stakeholder involvement, Supply chain planning in construction.

Research group: Vehicular systems – LiU

(Department of Electrical Engineering (ISY))

- This research group has as core area engineering of technologies for clean, efficient, reliable, and safe transportation systems. Technologies includes theoretical and methodological development as well as software tools and system integration. There are three research focus areas within the transport area: computation and control of autonomous vehicle maneuvers, diagnostics and prognostics, and clean and efficient vehicle propulsion. All three areas share a common methodological base in modelling, estimation, and control. Other key concepts, central to the group's research, are optimization, learning from large datasets, and software development.
- The areas of application of this research group are engine control and supervision, hybrid electric vehicle control, vehicle fleet prognostics and autonomous systems.
- Main research networks and competence centers are Swedish Electromobility Center (SEC), Wallenberg AI, Autonomous Systems and Software Program (WASP), Linköping Center for Sensor Informatics and Control (LINK-SIC), Excellence Center at Linköping and Lund in Information Technology (ELLIIT). Important industrial partners are Scania, Volvo Cars, Volvo Construction Equipment, Volvo Group GTT, and Epiroc.
- The coordinators for the focus areas are: 1) Lars Nielsen, lars.nielsen@liu.se, 013 – 28 13 07, 2) Erik Frisk, erik.frisk@liu.se, 013 – 28 57 14, and 3) Lars Eriksson, lars.eriksson@liu.se, 013 – 28 44 09. In total, the group consists of four core senior researchers and four senior research fellows. eleven Ph.D. students at LiU and one industrial Ph.D. student.

Keywords of the group are:

Control, optimization, vehicle propulsion, diagnostics, prognostics, autonomy, vehicle dynamics.

Research group: Division of Applied Thermodynamics and Fluid Mechanics – LiU

(Department of Management and Engineering (IEI))

- The research of this group is focused on three areas: aerodynamics, biofluid dynamics and industrial heat transfer. The main focus in aerodynamics is devoted towards road vehicle aerodynamics including computational modelling, method development, wind tunnel investigations and practical road tests. Researchers of the group are also heavily engaged in the design and development of full-scale road-going test vehicles and in the development of a driver model for thermal comfort as well as cooling devices for sustainable freight. Some of the research is devoted to method development of computational strategies for road vehicles, both passenger cars and heavy vehicles.
- The areas of application for this research group are the transport sector, forestry, last-mile, high capacity transport and passenger cars. Areas of special interest to this research group are vehicle design for sustainability, real-world applications and economic aspects of vehicle reconfiguration. Important networks for this group are CVEC (Complete Vehicle Energy Consumption Network, including e.g. Chalmers, KTH, LiU, Volvo, Scania) and ETTaero2 (Skogforsk + 7 partners) and industrial networks with Scania, Volvo Cars, Creo Dynamics AB, PLS AB and Alfredssons Åkeri AB.
- Coordinator of the group is Matts Karlsson, professor, matts.karlsson@liu.se, 013-281199. In total, the group consists of one core senior researchers and one partly involved senior researchers, one PhD student. <https://liu.se/organisation/liu/iei/mvs>

Keywords of the group are:

Aerodynamics, computational fluid dynamics, heat transfer, modelling, simulation, high-performance computing.

Research group: Biogas Research Center – LiU

- BRC is a national competence center for biogas research administered by LiU. It is a base for the development of innovative and resource-efficient biogas solutions, often with positive local and regional effects on the environment and the economy. BRC covers many different areas and co-creates knowledge with external partners, the transport sector being one of these. In the research phase of four years that started on December 1st 2018, one of the identified focus areas will be fossil free transportation, where biogas is an important component. One of the identified research areas in BRC phase 3 is “Research efficient value chains for biogas” and one part of the focus here will be to look at the performance of biogas transport in different segments.
- The areas of application for this research group are waste, agriculture, forestry, aquatic, regions, industrial producers – consumers, regions and municipalities.
- Important networks for this group are European Biogas Association (EBA) and IEA Bioenergy Task 37. The center is also closely connected to F3, but not a member.
- Coordinator of the group is Mats Eklund, mats.eklund@liu.se (program director, scientific responsibility). Anna Brunzell is responsible for practical implementation and administrative issues, anna.brunzell@liu.se. In total, the group consists of 28 researchers from LiU and approximately five researchers from SLU. Five PhD students are included. <http://www.biogasresearchcenter.se/>

Keywords of the group are:

Biogas solutions, digestate, co-production of knowledge, environmental technology, cross-disciplinary research, energy and environment, industrial symbiosis, bioenergy, process and technology, system analysis, society.