VEHICLE ICT – INDUSTRIAL INNOVATION
THE FUTURE OF INDUSTRY FOR AUTOMOTIVE SOFTWARE

ICT is a rapidly growing feature in vehicles, and now includes functions with crucial importance to factors like safety, the environment and energy consumption. Global competition is driving the industry toward fast and cost-effective product development. The automotive industry needs to be able to develop, acquire and integrate software just as easy as you would in a mobile phone. But if we’re going to get there, we need to join forces.

NEW STANDARDS - NEW POSSIBILITIES
We are seeing the automotive industry heading in the same direction as the software industry in IT, where common standards are opening the market for more players and shortening the route from idea to product. Efforts to design a level playing field must be driven by wide-scale cooperation.

WHAT IS VEHICLE ICT?
Vehicle ICT is a collective term for integrated electronics systems in vehicles that are connected to the outside world, and for interaction with drivers and others through multimodal interfaces. The focus is not only on system architecture and software, but also electronic hardware that is not yet entirely independent. Industry vernacular includes terms like intelligent transport system (ITS), telematics, infotainment, ICT, Internet-of-Things (IoT), and machine to machine communication (M2M), and each of these describe different areas of the field.

To make sure that Sweden retains its strong global position with continued export success, stakeholders in industry, academia, research institutes and the community at large have joined forces to initiate an arena for cooperation – Vehicle ICT Arena.

There is every opportunity right now to become a world leader in vehicle ICT.

NEW BUSINESS STRUCTURE
Vehicle ICT today consists largely of company-specific solutions, built into closed systems in which every supplier owns and installs its own solution. This wastes resources, brings unnecessary costs and limits the potential for new services.

We must instead develop a common and open architecture that stimulates rapid development of new services and opens the way for more players to offer turnkey solutions in a range of different application areas.

GLOBAL STANDARDS
A global standard with strong support is AUTOSAR, both an architecture for software components in vehicles and a working method. This will now be implemented on a large scale. The Swedish automotive industry is at the cutting edge of development. The challenges ahead are not only technical, but also deal with issues of ownership, responsibility and service.

NEW BUSINESS MODELS
The industry needs to develop business models, supplier structures, processes and tools to authorize software solutions from third parties. The special safety requirements for vehicles place increasing demands on third-party suppliers, primarily in certain functional areas.

WHAT DO WE NEED?
ACCESS TO EXPERTISE AND INDUSTRIAL INNOVATION

When everything has fallen into place, a new and potentially very large market for software applications can begin to emerge and offer cost-effective product development.

ACCESS TO COMPETENCE
The automotive industry has, in line with these developments, a rapidly increasing need for expertise in vehicle ICT. This need covers both quantity and quality, i.e. more engineers, both wide-ranging and specialist skills, and cutting-edge research.

AUTOSAR
Automotive Open System Architecture (AUTOSAR) is an architecture for software components and can be likened to an operating system for vehicles. The vision of AUTOSAR is to help the automotive industry develop a horizontal organization in terms of software. This would open entirely new opportunities for developing software applications outside the existing business models, for both the safety-classified system and for in-vehicle-infotainment.
NEW COMPETENCE AND STRONG TRADITIONS
A CORE INDUSTRY UNDER TRANSFORMATION

The Swedish automotive industry is a large and important part of our export industry. According to one risk analysis, however, Sweden has few system suppliers or major development centres contributing to new functions through vehicle ICT. On the other hand, Sweden has many engineers and software companies with leading expertise and experience in a range of different sectors.

WHY IS IT IMPORTANT TO BUILD THIS EXPERTISE IN SWEDEN?

When automakers look for development partners in vehicle ICT, they set requirements on competency, methodology, the ability to develop with short lead times, and high delivery precision. If these requirements aren’t met by stakeholders here in Sweden, we risk also losing contracts in related product development, such as electronic hardware, electric systems and mechanical development.

OUR ASSETS

Sweden has nationwide strength in systems industry. Our automotive industry has extensive expertise in systems and IT architecture, but Sweden is also a global leader in system development in a range of other areas, including aerospace, aviation, telecommunications and automation.

Swedish academia and a number of industrial research institutions hold positions at the forefront of international research. Swedish research funding has also in recent decades prioritized investments involving cooperation between industry and academia on industry-relevant research initiatives, particularly in the automotive industry and telecom sectors.

In the next step, entire vehicle development projects are potentially moved to similar centres, leading to a scenario where production and aftermarket logistics follow close behind. To ensure continued success for our automotive industry and enable growth and new export opportunities, we need a carefully planned and executed strategy.

With all this behind us, vehicle ICT has a very high potential for development in Sweden.

NEW PLAYERS

The industry needs new subcontractors and partners who can supply them with innovative solutions for tomorrow’s challenges. This opens up exciting business opportunities for a large sector of IT consulting, specialist and engineering companies, who until now have not considered the automotive industry a potential client.

As with all major leaps in technology, it’s all about keeping up. Or even better – leading the evolution.

DRIVEN BY SOCIETAL CHALLENGES
SAFETY, SUSTAINABILITY AND INDUSTRIAL INNOVATION

Vehicle ICT is absolutely crucial for vehicle manufacturers worldwide to maintain their brands and future competitiveness. The innovations now being created will lead to safer vehicles that have less impact on the environment.

STRUCTURAL TRANSFORMATION

With vehicles becoming increasingly complex, however, the need for skills and expertise is huge. For the industry, it is no longer technically or financially viable to conduct increasingly complex development projects for electronics and software in-house. And even less so to maintain the expertise needed to develop or manage an integrated system.

Handling the high demands, at an acceptable cost, requires cooperation and investments in research and development. We are now aware that we are facing a paradigm shift in the global automotive industry.

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VEHICLE ICT ARENA
COMPETENCE AND INNOVATION NODE

We offer an open environment for innovation and skills supply and development in vehicle ICT, helping to secure Swedish competitiveness in safe and sustainable mobility.

CONFIDENCE AND COLLABORATION
In the Vehicle ICT Arena, strategic decisions can be made concerning the development of a common reference architecture and harmonized processes for model-based development. Broad and trusting cooperation is crucial to setting the frameworks for the future.

Vehicle ICT Arena welcomes all types of players, from small, startup engineering companies to research institutions, universities, colleges, service companies and established suppliers for the automotive industry, to automotive companies themselves.

The arena fills an important role between research and industry, where conceptual ideas can be taken through the early phases of innovation to industrialization. Close cooperation with neighbouring arenas and centres of excellence create a powerful ecosystem around the automotive industry.

Vehicle ICT Arena also offers an opportunity for all players to technically verify and demonstrate their ideas in test environments.

CONFIDENCE AND COLLABORATION

For more information see lindholmen.se/vehicle

VISION AND GOALS
SECURE AND ADVANCE SWEDEN’S LEADING POSITION

The vision is to ensure Sweden’s leading position in safe and sustainable transport systems with vehicle ICT.

PRIMARY OBJECTIVES

- Implement new innovations in vehicle ICT, from research to industrialization projects.
- Contribute to improve the access to competence and attract more engineers to a new automotive industry.
- Contribute to the establishment of a new supplier structure and attract companies outside today’s automotive industry.

GOALS
Vehicle ICT Arena will work to bring stakeholders to an agreement on:

- One reference architecture, one modular system for electronics in vehicles with application software decoupled from the platform.
- One development process for model-based development, with associated methods and tools.
- Principles for business models with vehicle ICT.

This would:

- Enable a whole new service industry to emerge and application software suppliers to reach a larger market.
- Allow the industry to focus on its profile areas and procure turnkey solutions for others.
- Prompt both new and existing supplier companies to specialize and attain globally leading positions.
- Inspire companies to focus more of their development activities in Sweden.
- Bring cost-efficiency gains for both the industry and its suppliers.
- Ensure skills development and supply.
- Increase the global competitiveness of the Swedish automotive industry.
“Vehicle ICT is becoming an increasingly crucial factor in improving the customer experience. In Scandinavia, we have long held a strong position in supporting the development of environmentally friendly vehicles boasting the highest level of traffic safety. We also have a strong tradition of being “early adopters” for new IT related products and services. We need an innovation and excellence centre in electromobility, active safety, connected vehicles, interaction design and system integration/verification. This initiative is fully in line with these needs.”

Thomas Müller, Vice President Electrical and Electronics System Engineering, Volvo Cars

“Continuous innovations and increased productivity are crucial to remaining competitive on the global market. The Vehicle ICT Arena is a key initiative to ensuring the continued strength and development of the Swedish automotive industry.”

Jan Hjelmgren, Senior Vice President, Vehicle Engineering, Volvo Group

Vehicle ICT Arena is conducted as a programme within Lindholmen Science Park. The Arena is funded through a combination of public funds and membership fees. We offer three levels of partnership.

**CORE PARTNER**
Participates in strategic management, Roundtable Forum and meeting places. Access to Vehicle ICT Lab at discounted rate. Volvo Cars and Volvo Group have been Core Partners since inception.

**PREMIUM PARTNER**
Participates in Roundtable Forum and meeting places. Access to Vehicle ICT Lab at discounted rate.

**ASSOCIATE PARTNER**
Updated on decisions by Roundtable Forum and access to meeting places. Access to Vehicle ICT Lab at regular cost.

**CONTACT**
For more information on partnership, please see lindholmen.se/vehicle

**PARTNERS**

**DIFFERENT LEVELS OF PARTNERSHIP**

**PARTNERS 2013**

**COMPANIES**
- ArcCore
- Actia
- Alpine
- Autoliv
- Consat
- Cybercom
- Denso
- Fengco
- HiQ
- Infotiv
- Microchip/SMSC
- Mitsubishi Electric
- Mecel
- Pelagicore
- Qamcom
- QRtech
- Semcon
- Sentient
- Vector Informatik
- Volvo Cars
- Volvo Group
- Yazaki
- ÅF

**UNIVERSITIES AND INSTITUTES**
- Chalmers University of Technology
- Halmstad University
- SP
- Viktoria Swedish ICT
- VTI

**PUBLIC FINANCING**
- Business Region Göteborg
- VINNOVA
- Region Västra Götaland

**COLOR CODES**
- Core Partners
- Premium Partner
- Associate Partners
- Public Financing
The Board of Directors for Vehicle ICT Arena sets strategy, vision and objectives and decides on budget and fees. The Board is composed of representatives from Lindholmen Science Park AB and Core Partners. Lindholmen Science Park is responsible for the programme office and communication for Vehicle ICT Arena.

Vehicle ICT Arena offers a number of opportunities for forums and activities on a range of levels.

**ROUNDTABLE FORUM**
Monthly meetings to establish sector-specific processes and reference architectures. This is where strategies are developed for increased innovation and to ensure the value of investments. In this forum, trusting discussions are carried out and experience exchanged on research, product and industrialization strategies. Participants are representatives from Core and Premium Partners.

**ASSOCIATE PARTNERS MEETING**
Quarterly meetings in which Associate Partners are brought up to date on the latest developments in the arena.

**INNOVATION BAZAAR**
Events for inspiration and networking, with presentations, demonstrations and experiments. Open to everyone interested in bringing new ideas and making partnerships and new alliances.

**ANNUAL MEETING**
An important task for the arena is to manage, cultivate and share knowledge. This is done through the Annual Meeting, with workshops, seminars, exhibitions, matchmaking, etc.

**OPEN INNOVATION CHALLENGES**
Innovation challenges are arranged in a new needs-driven concept, Open Innovation Challenges.

**VEHICLE ICT LAB**
A lab with simulators that are open for all players to test and demonstrate products in a comprehensive automotive environment. It also offers a guarantee for the customer that the product has been run in the test environment reference architecture.

**EDUCATION**
Educational initiatives are conducted by the arena to both broaden and deepen knowledge in the area of expertise. The lab is a instructional tool.

**PROJECT BROKER**
As a neutral party, Vehicle ICT Arena can initiate collaborative projects with opportunities for co-funding. Funds can be applied for, for example, from the FFI programme for vehicle and traffic safety, or the EU framework programme for research for innovation.

**PhD-PROGRAMME**
Vehicle ICT Arena participates in PhD programmes. Long-term and applied research offers specialist expertise and contributes to new, innovative products. Slated to begin shortly.

**GOGLOBAL**
The Arena will promote the Swedish automotive industry’s international dissemination in issues concerning export, import, investments and partnership. Global initiatives of stakeholders will be promoted through seminars, study visits and matchmaking. Slated to begin shortly.

Strategic discussions are carried out in Roundtable Forum. Participants are representatives from partners in Vehicle ICT Arena.
There is a need for a common test environment that is open for all players, with simulators for the entire electric system in a vehicle and its surroundings. A possibility to demonstrate and verify solutions in a reference architecture in a cost-effective way.

**STANDARD PLATFORM CREATED**

A common test environment builds important expertise and experience through model-based development. The lab promotes cooperation between players by creating a standard platform for application. This strengthens Swedish competitiveness and supports innovation and product development by offering the opportunity to investigate and visualize future vehicle and infrastructure solutions today.

**COMPLEMENTS OTHER TEST ENVIRONMENTS**

Vehicle ICT Labs is an important complement to other open test environments such as VTIs driving simulator SIM4 at Lindholmen in Gothenburg and the full-scale test track AstaZero between Gothenburg and Borås that is slated for completion in 2014. But for the early development phases, cost-effective and distributed simulators are needed in the PC environment, and the arena will also offer these. There, all players will have access to the lab’s software development environment.

**VEHICLE ICT LAB**

The lab offers more opportunities and provides a platform for test and demonstration within the arena.

Suppliers can demonstrate and verify their latest product improvements in a reference architecture in a cost-effective manner.

Students and doctoral candidates can test and demonstrate new research findings in a complete system in a cost-effective manner.

Startup software companies can integrate and demonstrate their products in a complete vehicle system.

Consulting companies can supplement their service offerings to form turnkey solutions.

The automotive industry can work together with both large global supplier companies and local specialist companies to develop new and innovative solutions.

Vehicle ICT Lab was born in 2013, after about four years of preparations. With over 25 members from industry, universities, institutions and the community, there is great potential to achieve set objectives over the next five years.

**MILESTONES 2018**

Vehicle ICT Arena has grown and its impact can be measured in the form of corporate establishments. There will then be industrialized functions that have been created in the arena.

An agreed reference architecture is used in Vehicle ICT Lab for a complete vehicle.

- 100 Partners in Vehicle ICT Arena.
- 300 personer i Innovation Bazaar per year.
- 100 new functions in Vehicle ICT Lab a year.
- 200 students a year will participate in courses linked to Vehicle ICT Arena.
- 20 postgraduates connected to the arena.

"The objective is to strengthen our national sector expertise and create new business opportunities based on vehicle ICT. Lindholmen Science Park is hosting this cooperation and also offers a lab for early modelling and testing of new innovations." Niklas Wahlberg, CEO, Lindholmen Science Park.
THE NEW INDUSTRY
ROLE MODELS FROM AN INDUSTRY IN CHANGE

VOLVO CARS

Volvo Cars offers world-class customer functions in the area of Safety. In the framework for these developments, customer functions/software has also been licensed to third parties in the automotive industry. This constitutes an added business opportunity for Volvo Cars.

SENTIENT

Sentient develops innovative software products in active safety and steering control with a focus on increased traffic safety and comfort for the driver. The company integrates the software functions on a licence basis into the steering system, primarily for application for manufacturers of light and heavy vehicles, but also for other types.

VOLVO GROUP

Up-time and fuel economy are the highest priorities for trucks. The I-See function is one of the foremost innovations in the new FH trucks. The second time you drive along the same route, I-SEE will have learned the route and handle speed and gear changes accordingly to reduce fuel consumption by up to 5 percent.

POLESTAR

Polestar was founded in 1996 in collaboration with Volvo to promote Volvo’s racing ventures. In addition to racing, Polestar also offers power and torque optimization for Volvo customers. The software improves the car’s performance without increasing fuel consumption or changing the Volvo Original Warranty.

NIRA DYNAMICS

Nira Dynamics has offered innovative software solutions for vehicles since its start in 2001 in Linköping. The company develops unique sensor fusion systems for various vehicles. Nira Dynamics has successfully sold software products to the automotive industry the world over.

ARCCORE

ArcCore has quickly established itself as a trusted supplier of software products to the automotive industry, with customers across the globe. ArcCore supplies platform software and tools under the AUTOSAR standard. The company uses a business model with Open Source combined with commercial licence models.

CONSAT

Consat is an engineering company operating in system and software development for vehicles mainly in electric and hybrid technology, such as Volvo’s C30 Electric car. With a start as a service provider, the company has developed to also offer products and systems in software, including telematics for public transport with customers on every continent.

PELAGICORE

Pelagicore is a technology development and product company that focuses on applying Open Source software in infotainment, and is a key contributor to the GENIVI alliance. Founded in 2009, Pelagicore is growing fast, with offices in both Sweden and Germany.

MECEL

Mecel is a system and software company with more than 30 years of experience developing solutions for the automotive industry. Mecel has a portfolio of integrated software and development tools in the areas of Autosar, Bluetooth and human-machine interface (HMI) that are licensed to customers worldwide.

VECTOR

Vector is a global company that provides software platforms and tools so that customers can focus on developing their vehicle applications and innovations. The company has been selling software products to the automotive industry for 25 years.

Innovation requires both research and experience – the ability to technically verify and demonstrate ideas.

ERICSSON

Ericsson is shaping the Internet communication of the future through technology leadership. Ericsson offers a back-end business platform that manages and delivers digital experiences on all screens. Their MSDP product has more than 100 installations on five continents.
What are we? Vehicle ICT Arena leads nationwide cooperation between trade and industry, academia and the public sector to develop and refine the Swedish automotive industry in the area of vehicle ICT.

Why are we here? The automotive industry is undergoing a paradigm shift in technology, in which vehicle ICT is an important cornerstone. The demand for skills, rapid product development and a high rate of innovation is driving the industry to seek broad cooperation and create new alliances to achieve success in increasingly fierce global competition.

What do we do? We contribute to safe and sustainable mobility by creating one of the world’s top open innovation environments for vehicle ICT. Through greater cooperation, we can increase the rate of innovation to meet the need for research, expertise and common frameworks. Vehicle ICT Arena fills a vital role by bringing research findings to industrialization projects.