Austrian

Success Stories

ECSEL
Austria

Joint Technology Initiatives in Framework Programme 7

Index

FOREWORD for the PROJECT DESCRIPTIONS in the 7th Framework Programme

Electrical components and systems are key enabler to master the Grand Societal Challenges. They act as technological enabler for many processes, machinery and service activities, such as on-road and off-road vehicles, smart-phones, smart energy, smart production, robotics and logistics, internet of things, and big data, just to name the most important ones. bmvit recognized the importance to further fertilize these domains and to keep and expand the associated high-tech jobs in Austria.

Michael Wiesmüller

Austria is well prepared for these challenges having aligned at early stage our national programs, thus strengthening Austrian actors and knowledge profiles in these domains. Complemented by a strong commitment from leading industry and research right from the beginning the actions taken by bmvit led to focused Research and Innovation activities significantly strengthening the Austrian position in electronic components and systems in Europe.

At the beginning of the Public Private Partnership activities in the 7th Framework Programme, during which the components of electronic systems were still treated separately, the active engagement of the bmvit led to alternative approaches like the Joint Technology Initiatives ENIAC and ARTEMIS.

The Austrian actors well received these opportunities and demonstrated their commitment by contributing and even leading challenging collaborative Research and Innovation projects on European level.

Thus, several promising results were achieved and Austria has become excellently anchored in the European network.

The success story summarized in this volume has also led to the creation of the currently established ECSEL activities in Horizon2020, and to provide the according financial support.

This document provides information about the success as well as the impact on the Austrian community.

Michael Wiesmüller
Austrian Ministry for Transport, Innovation and Technology (bmvit)
Head of Department »ICT, Manufacturing, Nano and Space« (iii/I 5)

Josef Affenzeller

Johann Massoner

In the period of the 7th Framework Programme Austrian actors have been very active in the fields of Embedded Systems, Micro- and Nanoelectronics and System Integration. Within this time frame, a Public Private Partnership model for financing was established for the first time in the EU with participation of national authorities and strong industry leadership. This booklet summarizes many of those challenging research activities.

Overall, the European research budget amounted to over EUR 3 billion. This led, both in Europe and in Austria, to a broad commitment of industry complemented by leading research institutions. The Austrian partners in these research projects invested more than EUR 230 million to strengthen their Research and Innovation in the areas of Embedded Systems, Micro- and Nanoelectronics and System Integration. The results achieved have contributed significantly to the current positioning of Austrian actors. In addition, networks for cooperation, not only for research and development but along the entire supply chain, were established.

Looking ahead, the technology platform ECSEL-Austria will continue to foster cooperation and technology development of the Austrian stakeholders. Cooperation activities on European level will further strengthen Austria's leading role in these domains. Here, the recently signed Memorandum of Understanding between CEA Leti and ECSEL-Austria to further intensify collaboration can be mentioned as a first successful example. This will strengthen in particular Micro- and Nanoelectronics, Embedded Systems and the topic System Integration in Austria.

Other collaborations with eg. ProcessIT (Sweden) or ECSEL Germany or EICOSE Europe, to name a few, show of this activity.

This brochure provides information on major projects in the time frame of FP7 with a particular focus on the Joint Undertakings ARTEMIS and ENIAC in collaboration with Austrian partners.

The accompanying project descriptions give a good overview on Research and Innovation activities of these Austrian actors.

Enjoy reading!

Josef Affenzeller & Johann Massoner
Chairmen of ECSEL-Austria

Introduction

This booklet is a summary of posters shown at the ECSEL-Austria event in Vienna from September 16 to 17, 2014. These pages demonstrate the success of Austrian partners during the time frame of FP7 in ARTEMIS; ENIAC and EPoSS JTI's. It summarizes not all the projects with Austrian partners, but the majority.

The next page gives an overview of all projects indicating the total project budget as well as the budget spent in Austria.

The following pages are a summary of impact statements from the project partners. It clearly illustrates the importance of these activities and the strengthening of the Austrian economy in the industry as well as in R&D institutions.

Overview

PROJECTS WITH AUSTRIAN CONTRIBUTIONS

Austrian Project Volume 2008-2013 approx. € 143,9 Mio Participation in 26 of 56 projects

Project Name	Call	Total eligible cost of projects [in Mio €]	Project Name	Call	Total eligible cost of projects [in Mio €]
E³Car	1. Call	44,15	GreenElec	4. Call	10,4
IMPROVE	1. Call	37,61	BattMan	5. Call	5,7
MODERN	1. Call	25,98	EEM450PR	5. Call	84,1
CSI	2. Call	14,64	EPT300	5. Call	43,7
EEMI450	2. Call	18,3	DeNeCor	6. Call	19,9
ESIP	2. Call	36,5	E2COGaN	6. Call	26,3
MAS	2. Call	27,4	LAB4MEMS	7. Call	28,5
MIRANDELA	2. Call	49,18	AGATE	7. Call	59,6
ARTEMOS	3. Call	40,9	EPPL	7. Call	74,8
MotorBrain	3. Call	36,6	E450EDL	7. Call	204,6
DCC+G	4. Call	18,4	Lab4MEMSII	8/9 Call	23,7
E2SG	4. Call	33,5	Polis	8/9 Call	106,9
ELESIS	4. Call	23,9	eRamp	8/9 Call	55,2
				Total	**1150,5**

PROJECTS WITH AUSTRIAN PARTICIPATION

Austrian Project Volume 2008-2013 approx. € 84,5 Mio Participation in 17 of 56 projects

Supported by

bm v t

Bundesministerium für Verkehr, Innovation und Technologie

Project	Total Costs	Industrial Priorities
CESAR *	€ 55,9 Mio	RDA, SCM, DMT
ACROSS *	€ 16,3 Mio	RDA
POLLUX	€ 33,5 Mio	RDA, SCM, DMT
R3 - COP	€ 17,5 Mio	RDA, SCM, DMT
pSafeCer	€ 10,4 Mio	RDA, DMT
MBAT	€ 35,0 Mio	RDA, SCM, DMT
INDEXYS	€ 7,3 Mio	RDA
IOE	€ 46,3 Mio	RDA, SCM, DMT
HIGH - PROFILE	€ 17,1 Mio	RDA, DMT
DESERVE	€ 26,6 Mio	RDA, DMT
nSafeCer	€ 16,3 Mio	SCM, DMT
VeTess	€ 20,2 Mio	RDA, DMT
CRYSTAL *	€ 82,5 Mio	DMT
Arrowhead	€ 67,8 Mio	RDA, SCM
EMC²	€ 98,7 Mio	RDA, SCM, DMT
DEWI	€ 45,7 Mio	SCM

* Coordination by Austrian Organization

RDA: Reference Designs and Architectures
SCM: Seamless Connectivity and Middleware
DMT: Design Methods and Tools

Fotocredit: LCM:Fotolia

Impact for Austria

ACROSS

will offer domain-independent technology (IP cores, middleware, methodology, models and tools) which will enable European supplier industry to increase their market share and OEMs to benefit from mature cross-domain technology at lower cost, reduced development time and accelerated time-to-market.

ADOSE

was set up in the context of EPoSS, the "European Technology Plat-form on Smart Systems Integration" by its Automotive Working Group. AIT expects in the medium term to strengthen its position in the field of automotive electronics and control, targeting at safe and autonomous systems (vehicles and robotics) development, verification and validation in Europe.

ARROWHEAD

By combining market leadership in automotive testing with top-notch expertise in embedded device security and service-oriented architecture, Austrian partners will significantly contribute to ensure industrial applicability of technologies, infrastructure and security standards.

ARTEMOS partner statements

- Increase of the visibility of the Austrian microelectronic sector
- Enhance innovation investments
- Strengthen international competitiveness of Austrian companies
- Developed technologies, were implemented into world-leading products
- Present Austria as highly innovative country
- Inputs for European research activities based on the strengths of Austrian actors
- Promoted Austria as an attractive location for establishing a business and expanding high-technology production

BattMan

Batteries and battery-management systems are essential storage elements for all types of solar-powered equipment. BattMan battery and system innovations demonstrate new solutions for solar-powered off-grid lighting systems.

CESAR partner statements

- Improved products and services of the industry partners by integrating the relevant project outcomes into their portfolio
- Long-term employment secured and new jobs created by the anchoring of new teams for the development of safety-critical systems in industrial projects
- New market opportunities by correct positioning in new fields supported by the industrialization of selected CESAR technologies
- Improved positioning of competences in leading industrial and academic domains as key innovators and think-tank for providing solutions to future demands
- Recognized European stakeholder for eco-systems on safety-critical systems and interoperability, leading to participation and coordination of further R&D projects (e.g., SafeCer, MBAT, CRYSTAL, VeTeSS)

CRYSTAL

The strong and focused involvement of Austrian organizations in CRYSTAL will further strengthen Austrian´s leading edge know-how in the design, development, and deployment of interoperable safety-critical embedded systems.

DeNeCoR

AIT is working on software supporting the diagnosis and treatment of epilepsy for more than five years. The investigations in DeNeCoR will contribute to the development of a software package.

DESERVE

Vehicle measurement data are used to identify parameters of vehicle and engine simulation software. So finally the so called MiL-Environments (Model in the Loop) are enabled to reach the accuracy needed for calibration works regarding the whole vehicle – as needed for ADAS systems.

DEWI

enables Austrian partners to combine their deep knowledge for very efficient and robust wireless communication and embedded system design with top industrial players in several domains to prepare entry of Wireless Sensing Network in several markets.

EMC2 partner statements

- Sustainably improve position of Austrian organizations on the world-wide markets due to driving European technologies at the cutting edge
- Securing high value-adding, long-term employment by raising the claim as top innovators and leading drivers for key-technologies
- Engineering of new business relations for future contracts in an European network of experts due to the cooperation in a consortium of 99 partners
- High visibility and awareness of the main stakeholders thanks to the political weight of the project (impact on the community)

EPPL partner statements

- The project strengthened the industrial competitiveness and growth of Austrian Companies.
- We enable a positive synergy among production, development, research and applications in Austrian environment and ecosystem
- Establish pilot line(s) for power semiconductors in Austria strengthening European power electronics industry by providing early innovation.

EPT300

The project strengthened the industrial competitiveness and growth of Austrian Companies.

HIGH PROFILE

aims to deliver a significant contribution to diagnosis and therapy of severe illnesses of the central nervous system and brain. The partners use the results in their future offering to hospitals and healthcare providers improved, integrated equipment.

INDEXYS

contributes to mastering new computing architectures and enables European industries across different application domains to maintain and even improve their technological leadership.
Thus, strengthening European excellence in computing architectures of the automotive, aerospace, and railway domains.

IoE

Through the project Infineon will be able to broaden its technology portfolio for wireless communication by applying the developed concepts. The results will support the development of a new line of wireless control products for automotive applications.

The MBAT

reference technology platform will allow the integration of tools and their flexible combination to tool chains.

POLLUX partner statements

- A solid basis for a new line of wireless control products for automotive applications.
- Starting point to develop products for industrial applications such as Automatic Meter Reading.

R3-COP

supports accelerated uptake of next generations of autonomous systems and robotics, particularly for robust, safe and reliable robotic applications, even in niche application sectors. AIT expects in the medium term to strengthen its position in the field of safe and autonomous systems development, verification and validation in Europe.

SafeCer

will enable innovations in multiple application domains by paving the way for cost-efficient and even cross-domain reuse, and by providing lighter, cheaper and faster certification.

VeTeSS

results will enable Infineon to deal with todays and tomorrows challenges in the field of safety relevant electronics for the automotive market.

ACROSS

ARTEMIS CROSS-Domain Architecture

Project Description

Multi Processor Systems on a Chip (MPSoCs) potentially bring many benefits to safety-critical application domains. However, the currently existing MPSoC architectures were not designed with a strong focus on safety and certification. Thus they have serious drawbacks and limitations with respect to this domain. To overcome these limitations, a European consortium of 16 partners of industry and academia joined together in the ARTEMIS ACROSS project. A major result of this project is a new generation of multi-core processors designed specially for safety-critical embedded systems: the *ACROSS MPSoC*.

Based on the FP 7 GENESYS project architectural template, the ACROSS MPSoC uses a time-deterministic architecture which provides reliable temporal and spatial partitioning mechanisms that support modular certification and the integration of subsystems with mixed-criticality levels. Within the project, the MPSoC is complemented by a comprehensive set of middleware services and an integrated tool chain. The feasibility of the ACROSS approach is shown by demonstrators in the automotive, avionics, industrial control and wireless application domains.

Partners: Austria: Vienna University of Technology (Coordinator), AVL List GmbH, Danube Mobile Communications Engineering GmbH & Co KG, Siemens AG Österreich, TTTech Computertechnik AG; **Germany:** Cassidian, EADS Innovation Works, EADS France, Fortiss GmbH, Sysgo AG, Lauterbach; **France:** Prismtech, Thales Communications S.A., Thales S.A, Université Joseph Fourier Grenoble; **Italy:** Selex Systemi Integrati S.p.A.

www.across-project.eu

Austrian Contribution

Vienna University of Technology is coordinating ACROSS and provides significant input to the work packages 1 and 2, dealing with the FPGA design and GENESYS core services implementation and the optional services software implementation. AVL List GmbH is work package 4 leader, developing the automotive demonstrator. Danube Mobile Communications Engineering GmbH & Co KG develops wireless instantiations for the MPSoC. Siemens AG Österreich is work package 6 leader, developing the industrial demonstrator. TTTech is leading WP 1 and designs the MPSoC VHDL code. In addition, TTTech is providing middleware building blocks, tools and support to the demonstrators.

Long-term Benefit

ACROSS will offer domain-independent technology (IP cores, middleware, methodology, models and tools) which will enable European supplier industry to increase their market share and OEMs to benefit from mature cross-domain technology at lower cost, reduced development time and accelerated time-to-market. The ACROSS results will enable the embedded systems designer to use a building block based platform, which allows to tailor the FPGA/chip, the middleware and models according to application or domain specific requirements despite relying on one and the same GENESYS based architectural approach. Due to its open architectural structure the embedded systems designer is free to select building blocks and add others as needed. Due to the cross-domain applicability of the building blocks the reliability and maturity of the building blocks will increase over time reducing the design risk similarly like using libraries in VHDL designs. This is the basis of the anticipated cost and development-time reduction resulting from applying the ACROSS developments for embedded systems design. Consequently, the ACROSS results will ease the introduction of new cross-domain applications, which rely on the interplay of different, formerly disjointed, disciplines. The cross-domain solutions will also enable to benefit from the economies of scale in the semiconductor industry. The reliable partitioning mechanisms of the ACROSS MPSoC will enable the cost-efficient certification of dependable systems by lowering and managing the complexity of highly integrated designs.

Key Facts

Project Duration:	36 months, start April, 2010
Project Coordinator:	TU Wien
Project Costs:	16 Mio. €

Partners: 16 industrial, SME, academic and research partners from 4 different countries

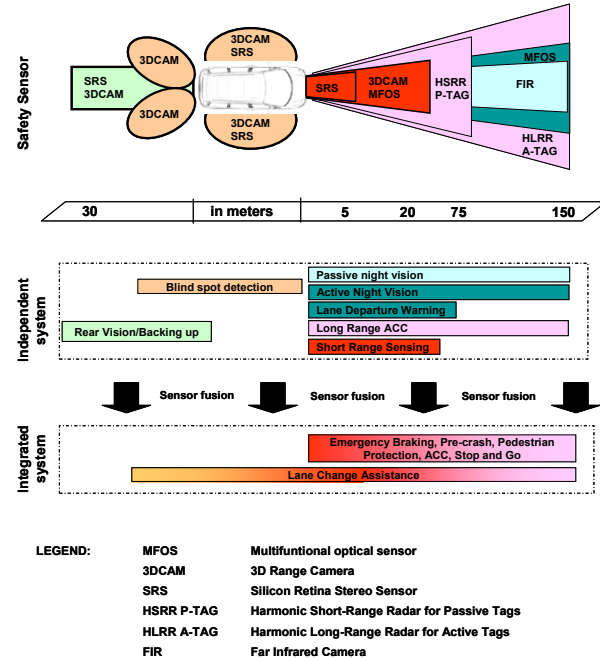# ADOSE (Reliable Application Specific Detection of Road Users with Vehicle On-board Sensors)

Project Description

Enhanced low-cost sensing technologies for vehicle on-board safety applications

Advanced Driver Assistance Systems (ADAS) like lane departure warning, collision detection and many more, need sensor support to analyze the traffic environment. These sensors deliver information needed by different safety applications inside the vehicle. For some applications a distance information is necessary to calculate results used for miscellaneous assistance systems. Moreover, sensors have to be developed which can deal with different environmental conditions.

ADOSE addressed **five breakthrough sensing technologies** to improve the current state-of-the-art in terms of performance, reliability and costs.

Partners: AIT Austrian Institute of Technology, Fiat CRF (co-ordinator, Italy), Magneti Marelli (Italy), ST Microelectronics (Italy), BOSCH (Germany), Fraunhofer IZM (Germany), Paragon (Greece), UMICORE (Belgium), IMEC (Belgium), VTT (Finland), TRIAD (Norway), Uppsala University (Sweden)

LEGEND:	MFOS	Multifuntional optical sensor
	3DCAM	3D Range Camera
	SRS	Silicon Retina Stereo Sensor
	HSRR P-TAG	Harmonic Short-Range Radar for Passive Tags
	HLRR A-TAG	Harmonic Long-Range Radar for Active Tags
	FIR	Far Infrared Camera

Austrian contribution

AIT Austrian Institute of Technology GmbH developed a **stereo vision system** which consists of two **Silicon Retina** imagers (**SRS**). For the experimental evaluation of the stereo vision system the "side impact scenario" was chosen. In this scenario the system must react very fast on approaching objects from the side. A potential reaction would be releasing a side-airbag, tensioning the belts etc. (pre-crash warning and preparation). The "silicon retina" sensor technology is based on bio-inspired analogue circuits that pre-process the visual information on-chip in parallel for each pixel. These optical sensors provide excellent temporal resolution, a wide dynamic range and have low power consumption. In ADOSE AIT developed efficient stereo matching algorithms and evaluated SRS as a high-speed and low-cost ranging sensor for time-critical decision making functions. AIT contributed further to scenario identification, requirements, data processing and functional system integration and provided one of the two demonstrators (demo car).

Impact for Austria

ADOSE was set up in the context of EPoSS, the "European Technology Platform on Smart Systems Integration" by its Automotive Working Group. The project was designed to focus on the development of high performance and low cost sensing technologies for ADAS as basis for accident prevention and pre-crash warning. Enhanced cost-efficient sensors were developed and evaluated. They will in the long term enable evolution towards autonomous vehicles in combination with other technologies.

AIT expects in the medium term to strengthen its position in the field of automotive electronics and control, targeting at safe and autonomous systems (vehicles and robotics) development, verification and validation in Europe. In the long term, AIT expects to contribute to a stronger Austrian economic and industrial position in the autonomous vehicles and systems field, including SMEs, and to a possible knowledge and innovation cluster, by technology transfer, education & training, and future projects.
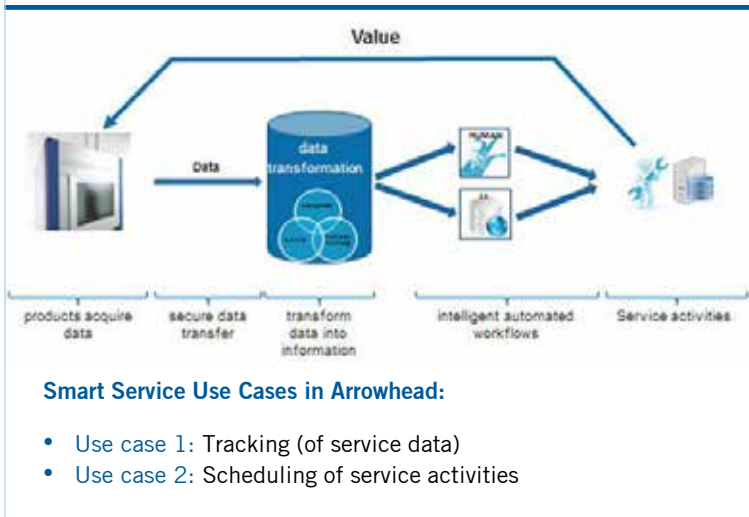
Key Facts

Project Duration:	Start: **Jan. 2008**
	End: **Nov. 2011**
Project Coordinator:	**Fiat CRF, Torino**
Project Costs:	**10,2 Mio. €**

Partners: 12 industrial, SME, academic and research partners from 8 different countries

ARROWHEAD

ARTEMIS Innovation Pilot Program addressing AIPP4 and AIPP6

Smart Service Use Cases in Arrowhead:

- Use case 1: Tracking (of service data)
- Use case 2: Scheduling of service activities

FUNDING PROGRAM
EU ARTEMIS

PROJECT COORDINATOR
Lulea Tekniska Universitet

PROJECT TIME FRAME
03/2013 – 02/2017

PARTNERS
Austria: AIT, AVL, Campus02, Evolaris, Infineon, TU Graz
79 partners in 10 European countries

PROJECT COSTS
69 M€

PROJECT DESCRIPTION

The Arrowhead project envisions collaborative automation by networked embedded devices. It addresses efficiency and flexibility on a global scale for five application verticals: production, smart buildings and infrastructures, electro-mobility and virtual market of energy. Research and innovation will be applied to technical and applicative challenges associated to cooperative automation:

- Provide a technical framework and standardization
- Propose solutions for integration with legacy systems
- Implement and evaluate cooperative automation in several domains

AUSTRIAN CONTRIBUTION

AVL and partners address communication, security and authentication challenges to develop prototypes of connected measurement devices based on existing AVL products. These new devices will interact with AVL servers via the Internet to demonstrate, test and evaluate smart services, such as automatic maintenance scheduling in close-to-reality environments.

IMPACT FOR AUSTRIA

By combining market leadership in automotive testing with top-notch expertise in embedded device security and service-oriented architecture, Austrian partners will significantly contribute to ensure industrial applicability of technologies, infrastructure and security standards. By building upon research results and commonly developed technologies within ARROWHEAD, the industry shall be enabled to develop products for the "Internet of things" with autonomous and secure ways to communicate and interact with cloud-based systems.

www.avl.com   ITS Research & Technology   peter.priller@avl.com

ARTEMOS

Agile **R**F **T**ransceivers and Front-**E**nds for Future
Smart **M**ulti-Standard C**O**mmunications Application**S**

ECSEL Austria

Project Description

- architecture and technologies for implementing **agile radio frequency (RF) transceiver capacities** in future radio communication products
- manage **multi-standard operation** with high modularity, low-power consumption, high reliability, high integration, low costs, low PCB area, and low bill of material (BOM).
- incorporating of e.g. MEMS technologies and novel simulation methodology for achieving these **complex optimizations**.
- consortium with **partners in the full value chain**
- over **100 scientific publications** and public project deliverables
- **27 demonstrators** have been built to showcase the achieved innovations like LTE-Advanced modem, tuneable circuits etc.
- assist Europe to achieve **technological leadership** in domains that are targeted by ENIAC.
- **Impressive results** according to external reviewers
- Project conclusion: *"We could significantly advance the technological base of each partner. Even more important is that this cooperative project strengthened European industry and research institutions in the highly competitive mobile communications market."*

Lantiq WLAN-gateway with LTE

Austrian Contribution

- **Johannes Kepler University** - tunable circuits, developed a demonstration system
- **FH Upper Austria** - work package leader "Methodology & Simulation" of circuits in high GHz frequency range
- **Intel MCA GmbH** – work package leader "Enabling Active Building Blocks for Agile RF Solutions"
- **DMCE GmbH & Co KG** – coordinator, modem functions
- **FH Kärnten** – CMOS RF wide-band LNA's including automatic gain control and band-pass filter characteristics
- **Lantiq** - work package leader "System Architecture and Control", first DSLTE-based Residential Gateway for stationary and mobile internet use developed by Lantiq with extremely high data rates

Impact for Austria

Gateway with integrated technology of ARTEMOS

- increase of the **visibility** of the Austrian microelectronic sector
- enhance innovation investments
- Strengthen international **competitiveness** of Austrian companies
- increase the international visibility of businesses and R&D facilities
- developed technologies, were implemented into **world-leading products**
- present Austria as **highly innovative country**
- **inputs for European research activities** based on the strengths of Austrian actors
- promoted Austria as an **attractive location** for establishing a business and expanding high-technology production

Key Facts

Project Duration:	Start: **April 2011**
	End: **March 2014**
Project Coordinator:	**DMCE GmbH & Co KG**
Project Costs:	**40,9** Mio. €
Grant Agreement No.:	270683

*Austrian Partners: more than **6** industrial, SME, academic and research partners*

BattMan

## Solar Powered Efficiency

ECSEL Austria

Project Description

BattMan is a collaborative European project with seven partners supported by the ENIAC Joint Undertaking under contract #834720.

The main targets are:
- Design and develop Lithium battery-pack systems which manage photovoltaic power feed efficiently and deliver optimized, reliable, low-cost and predictable performance.
- Improved Li battery cell chemistry and battery pack design.
- Improved battery management systems (BMS) for ensuring specifications, including state-of-health (SoH) and state-of-charge (SoC)reporting, cell balancing and temperature stabilization.
- Enhanced efficiency of the overall energy chain in the system, including maximization of system performance for both the application requirements and battery lifetime.
- System integration of electronics with photovoltaic panels and the application of systems to allow support of the smart grid over the Internet.
- System and prototype designs for the demonstrator application of the Solar-powered Off-grid Street Lighting (OSL).
- Extend range of OSL to cold climates and higher latitude installations.
- Demonstration, reliability analysis, and design for further optimization.

Storing the most natural source of energy.
BattMan
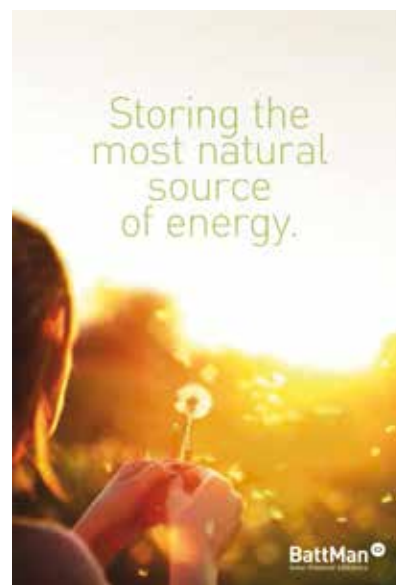
Austrian contribution

ams provides a new approach for Li-Ion battery management:
- Active cell balancing: runs autonomous on trigger signal decided by battery controller. Balance ready indicated. High efficiency active balancing through small DCDC fly-back converters each serving up 14 cells. All charge shuttling switches integrated for low Bill of Materials (BOM) and highest reliability. Adopting the pre defined automotive solution to PV lighting applications by increasing efficiency and eventually skipping some of the ASIL safety features. Improvement of cell voltage measurement accuracy to improve support of Li-FePO chemistry
- Simultaneous and accurate battery voltage and battery current sense for SOC, SOH, SOF calculations at further improved accuracy. Highest accuracy Coulomb counter for SOC under load utilizing shunt and ADC error compensation to achieve close to 0,1% current sense accuracy. Improved ADC reference accuracy and calibration techniques to get close to 0,05% accuracy target for pack voltage measurement.
- Adapt temperature monitors to application needs Ambient temperature sense for thermal battery model together with load history from current sensor
- Optional scalable High voltage CMOS for cost down
- Low RDS ON driver devices for active balancing efficiency improvement
- Embedded memory for post calibration purposes to achieve the accuracy targets (optional)

Impact for Austria

Batteries and battery-management systems are essential storage elements for all types of solar-powered equipment. As such, they can be employed in a variety of markets and applications – from future electric vehicles to street lighting. Their main purpose and toughest challenge is to provide reliable long-term service to the equipment they support. Solar-powered, off-grid street lighting has been identified as a demanding application that requires very reliable battery systems. BattMan battery and system innovations demonstrate new solutions for solar-powered off-grid lighting systems.

ams

Key Facts

Project Duration:	Start: **April 2012**
	End: **March 2015**
Project Coordinator:	**Philips Electronics (NL)**
Project Costs:	**5,77** Mio. €

Austrian Partner: ams AG

CESAR - Cost-efficient methods and processes for safety relevant embedded systems

Project Description

"CESAR" stands for **Cost-efficient methods and processes for safety relevant embedded systems** and is a European funded project from ARTEMIS JOINT UNDERTAKING (JU).

The three transportation domains **automotive**, **aerospace**, and **rail,** as well as the **automation** domain share the need to develop ultra-reliable embedded systems to meet societal demands for **increased mobility** and **ensuring safety in a highly competitive global market.**

To maintain the European leading edge position in the transportation as well as automation market, CESAR aims to **boost cost efficiency of embedded systems development and safety and certification processes by an order of magnitude**.

CESAR pursuits a **multi-domain approach** integrating large enterprises, suppliers, SME's and vendors of cross sectoral domains and cooperating with leading research organizations and innovative SME's.

The CESAR project started in March 2009 and has successfully been finished by end of June 2012 after 40 months of project duration.

Austrian contribution

The CESAR project has been set-up already in 2008 at the very beginning of the ARTEMIS program. The motivation was to follow the ARTEMIS philosophy "*think bigger*" and regroup all the activities related to the development of safety-critical embedded systems over the different application domains. This resulted to the largest funded European project at this time with 55 partners and 58M€. **The CESAR project has been set on a new funding scheme with the objectives to provide a sound basis on a young, cutting edge technology.**

The Austrian community accepted the challenge and took over the overall project coordination – and finally drove the project to success, as concluded by the reviewers: "*CESAR represents without doubt taxpayer's money well spent!*". Austrian contributions to this success were both on the technical level (e.g., with the development of two prototype tool-chains integrating CESAR technology) and on the political level to disseminate the results and improve acceptance of this technology in different expert groups.

Impact for Austria
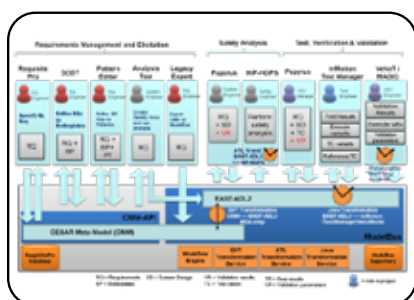
The Austrian national- and EC- funding has enabled Austrian partners to benefit from:

➢ **Improved products and services** of the industry partners by integrating the relevant project outcomes into their port-folio
➢ **Long-term employment secured and new jobs created** by the anchoring of new teams for the development of safety-critical systems in industrial projects
➢ **New market opportunities** by correct positioning in new fields supported by the industrialization of selected CESAR technologies
➢ **Improved positioning of competences** in leading industrial and academic domains as key innovators and think-tank for providing solutions to future demands
➢ **Recognized European stakeholder for eco-systems on safety-critical systems and interoperability**, leading to participation and coordination of further R&D projects (e.g., SafeCer, MBAT, CRYSTAL, VeTeSS)

Key Facts

Project Duration:	Start: March 2009
	End: June 2012
Project Coordinator:	AVL List GmbH
Project Costs:	~58 Mio. €

Austrian Partners: 2 industrial partners, 1 research partners

Enabling Seamless Life-Cycle Collaboration for Safety-Critical Systems Engineering

Project Description

The process for developing safety-critical embedded systems is highly complex and requires specialized tools supporting different activities throughout the entire product life cycle. In this process the collaboration among all stakeholders and consequently interoperability between the tools they are using is of utmost importance.

The project CRYSTAL has identified this need and takes up the challenge to establish and push forward an Interoperability Specification (IOS) and framework as an open European standard for the development of safety-critical embedded systems in the automotive, aerospace, rail and health care domains. This standard will allow loosely coupled tools to share and interlink their data based on standardized and open web technologies that enable common interoperability among various life cycle domains.

CRYSTAL is driven by real-world industrial use cases and builds on the results of successful predecessor and parallel projects like CESAR, iFEST, MBAT, p/nSAFECER, SAFE, TIMMO-2-USE, OPENCOSS and EMC2 on European and national level.
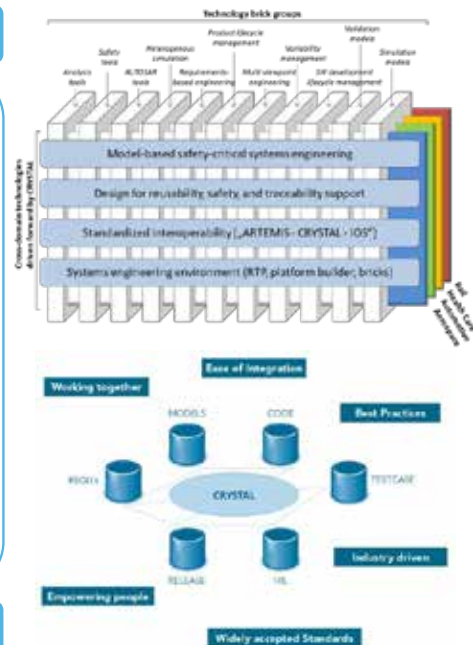
Austrian contribution

AVL is the global coordinator of CRYSTAL. As an engineering company AVL contributes with automotive use cases and as a tool provider AVL concentrates on testing, calibration and verification. **TTTech** leads the work package on AUTOSAR tools and components and focuses on development of a platform as well as of associated configuration tools. **AIT** concentrates on the development of new methods and tools for verification and validation of highly reliable and safe software and systems, in particular supporting use cases in the automotive and rail domain. **Thales Austria** brings in use cases from the rail domain concentrating on the "TAS platform", a technology platform for all types of safety-critical transport applications. **TU Graz** focuses on tools for safety integration and model-based test case generation. **ViF** leads the automotive public use case and concentrates on model-based requirements engineering, test and validation, multi-domain co-simulation, and tool integration and implementation.

Impact for Austria

The aims of CRYSTAL are ambitious and the expected results will have significant economical and societal impacts. Engineering companies will benefit from better supplier collaboration and reduced system design costs due to the improved and smart integration of tools for system analysis, safety analysis, testing and system exploration. In addition, the CRYSTAL IOS will increase the flexibility for all stakeholders and has the potential to deeply impact the market on a global level. Engineering companies can easily combine tools from different vendors, and tool vendors will be able to find new market opportunities in an open and extensible environment.

The Austrian consortium is well-balanced and consists of OEMs, engineering companies, tool suppliers, research institutes and academia. The strong and focused involvement of Austrian organizations in CRYSTAL will further strengthen Austrian's leading edge know-how in the design, development, and deployment of interoperable safety-critical embedded systems.

Key Facts

Project Duration:	Start: *May 2013*
	End: *April 2016*
Project Coordinator:	AVL List GmbH
Project Costs:	82 Mio. €
Partners:	*68 from 10 countries*

Web: http://www.crystal-artemis.eu/

DC Components and Grid (DCC+G)

www.dcc-g.eu

The European Nanoelectronics Forum,
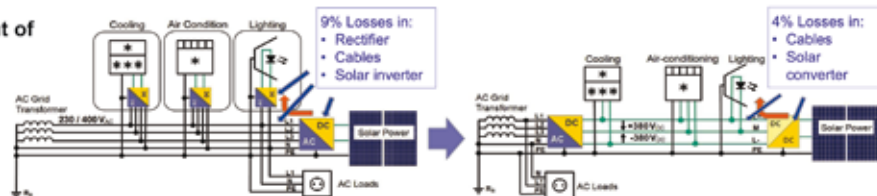Nov 27 / 28, 2013, Barcelona, Spain

ECSEL Austria

Motivation

Re-consider AC-grids in the light of
➢ Renewable energies
➢ Switch mode power supplies

Demonstrate
➢ 5% less power consumption
➢ 7% cost reduction for solar power

9% Losses in:
· Rectifier
· Cables
· Solar inverter

4% Losses in:
· Cables
· Solar converter
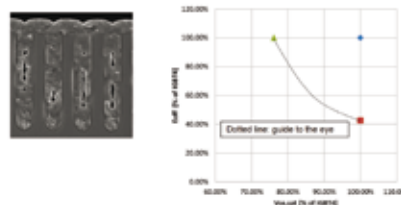
DC Components

Current - / Voltage - / Power-Sensors
➢ Based on magnetoresistance
➢ Galvanically isolated from measured circuit
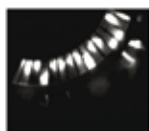➢ High accuracy & low power consumption
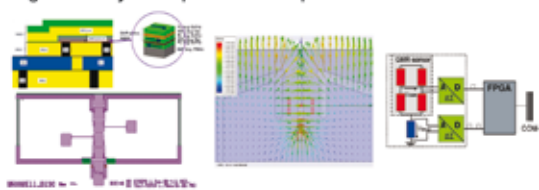
Semiconductor Switches
➢ Development of MPT-IGBT technology
➢ Next improved generation w.r.t. losses vs. switching speed

DC Power Switches

Electro-mechanical switches
Classical solution with special adaption to arc-extinction

Arcing is the main challenge in switching off DC nets

Hybrid Switches
Combine speed of semiconductors with low loss of mechanical switch

Hydraulic-magnetic circuit breaker with remote on / off
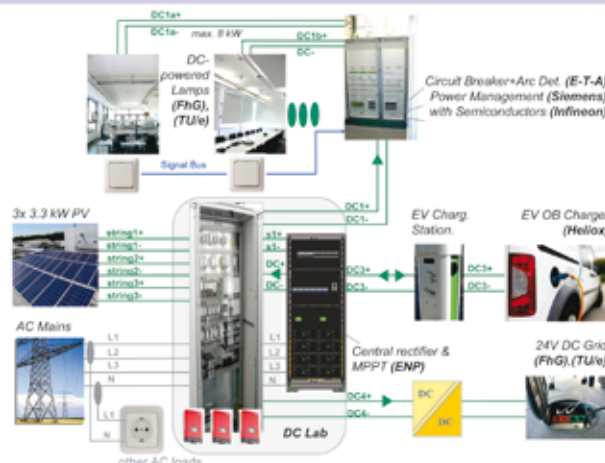
Electronic device

DC Grid Demonstration

Office Building Test Bed at Fraunhofer IISB
➢ Safe environment to test systems & concepts
➢ Extended measurement facilities

Retail Demonstrators
➢ In negotiation

Solar Energy   Wind Energy

Retail Market

DC-powered Lamps (FhG), (TU/e)

Circuit Breaker+Arc Det. (E-T-A) Power Management (Siemens) with Semiconductors (Infineon)

3x 3.3 kW PV

EV Charg. Station.

EV OB Charger (Heliox)

AC Mains

Central rectifier & MPPT (ENP)

24V DC Grid (FhG),(TU/e)

DC Lab

other AC loads

eniac JOINT UNDERTAKING

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www.infineon.com

SIEMENS   Fraunhofer IISB   SolCalor   EMERSON Network Power

TU/e   PHILIPS   heliox   EMERSON Climate Technologies

E·T·A   MTT

DeNeCoR:
Devices for NeuroControl and NeuroRehabilitation
HANNES PERKO, Safety & Security Department, **Austrian Institute of Technology**
M +436648251397 | hannes.perko@ait.ac.at | http://www.eeg-vienna.at

Project Description

It is well known that aging of population will cause a strong impact on the incidence of neurological diseases like Parkinson, epilepsy, stroke survivors and pain. On the other side there is a large reluctance of the neurologist to refer patients for electronic neuromodulation therapy, in particular with implantable devices. This is mainly related to the incompatibility of neuromodulation devices with the key neurological diagnostic systems as ElectroEncephaloGraphy (EEG) and Magnetic Resonance Imaging (MRI). The DeNeCor project contributes to improve this situation by defining the three main objectives:
· Improving compatibility of electronic neuromodulation devices
· extrapolate existing MR safety regulations to other diagnostic systems and the interaction between diagnostic systems and non-invasive electronics based neuromodulation therapies
· test methods such that the development of therapy devices and diagnostic systems can be decoupled
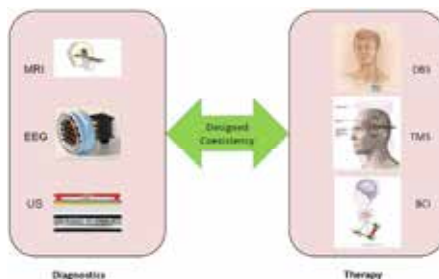
Austrian contribution

The Austrian partners work together in order to develop and evaluate a new EEG system with potential for home based recordings that may coexist with MRI. Currently the EEG is obtained from continuous recordings in the hospital lasting for several days to weeks and are evaluated manually. In this project the **Austrian Institute of Technology (AIT)** develops software for the analysis of the EEG of an ambulatory EEG system for home use. This will enable large scale ambulatory EEG recording for the diagnosis of neurological disorders. We believe that home based EEG recording will replace the long term monitoring in the hospital for many patients in the future. **Guger Technologies (Gtec)** will design and develop a signal processing procedure and a platform prototype enabling real-time processing, feature extraction and classification of EEG and ECoG signals. The purpose of the process is to detect signal patterns associated with certain functions and enable controlling e.g. extern devices. A further tasks is to realize a rapid functional mapping procedure including brain stimulation based on invasive and noninvasive recordings. Gtec will focus on the hardware aspect of data pre-conditioning and processing as well as on the cross -modality compatibility.

Impact for Austria

AIT is working on software supporting the diagnosis and treatment of epilepsy for more than five years. The investigations in DeNeCoR will contribute to the development of a software package that can be used for automatic analysis of epileptic events and many other purposes in the field of home based EEG monitoring. For Gtec the project will open an international market in the area of medicine, R&D and rehabilitation and will offer Gtec a scientific-established, sophisticated package for brain monitoring.

Key Facts

Project Duration:	Start: June 2013
	End: May 2016
Project Coordinator:	Philips Healthcare
Project Costs:	9 Mio. €

DESERVE

DEvelopment platform for Safe and Efficient dRiVE

ECSEL Austria

TOOLCHAIN FOR THE INTEGRATED DEVELOPMENT AND TESTING OF ADAS FUNCTIONS

ProSiVIC / ASM / PELOPS + ADTF / RTMaps + Matlab & Simulink

MODEL-IN-THE-LOOP | SOFTWARE-IN-THE-LOOP | RAPID PROTOTYPING | HARDWARE-IN-THE-LOOP
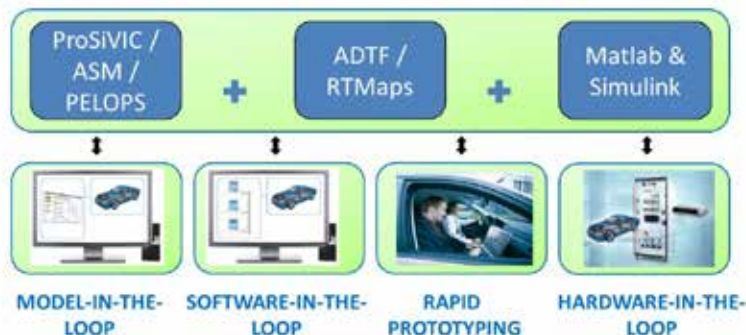
Project description

According to a forecast of ABI Research, a fast growth of the market of Advanced Driving Assistance Systems (ADAS) is foreseen in next five years. To manage the expected increase of function complexity together with the required reduction of costs (fixed and variable) DESERVE will design and build an ARTEMIS Tool Platform based on the standardisation of the interfaces, software (SW) reuse, development of common non-competitive SW modules, and easy and safety-compliant integration of standardised hardware (HW) or SW from different suppliers.

With innovative design space exploration (DSE) methods system design costs can be reduced by more than 15%. Hence, DESERVE will build an innovation ecosystem for European leadership in ADAS embedded systems, based on the automotive R&D actors, with possible applications in other industrial domains. Since the purpose of ADAS functions is also to support the driver, an advanced human-centred design strategy will be integrated in the Tool Platform. Therefore, the developed applications will provide natural and friendly support to the driver, with proper levels of overall functional safety also during complex or emergency manoeuvres.

Austrian contribution

AVL`s focus is the identification of a proper ADAS-related component and hence the identification of parameters that can be optimized. After thorough investigations it was decided to choose one of the steering functions – motor driven power steering function, which is the actor for several ADAS-functions – as the component to be optimized. Further investigations were made to select XCU functions and parameters. Maneuvers for the test cases, which adapts the test online according to reactions of the system. Identification of appropriate measurement channels that are necessary for the optimization of the entire system-behavior, which includes ADAS functions. Setup for virtual testing environment of ADAS-functions (steering system) available.

Impact for Austria

AVL List GmbH
Vehicle measurement data are used to identify parameters of vehicle and engine simulation software. So finally the so called MiL-Environments (Model in the Loop) are enabled to reach the accuracy needed for calibration works regarding the whole vehicle – as needed for ADAS systems.
The Calibration – Optimization tool AVL-CAMEO can be connected to such environments in similar way like it has been proven already for Engine calibration on the engine test bed.
Within DESERVE it is planed to perform a corresponding calibration of a power steering function using Vehicle simulation-Environments and a steering test bed as well.

ARTEMIS | bmvit | FFG | AVL | VTT

Key Facts

Project Duration:	Start: Sep. 2012
	End: August 2015
Project Coordinator:	VTT Teknologian Tutkimuskeskus
Project Costs:	25,3 Mio. €
Partners:	*25 from 8 countries*

http://www.deserve-project.eu/

DEWI
Dependable Embedded Wireless Infrastructure

FUNDING PROGRAM
EU ARTEMIS

PROJECT COORDINATOR
Virtual Vehicle Graz

PROJECT TIME FRAME
3/2014 – 2/2017

PARTNERS
Austria: AVL List GmbH, FTW - The Telecommunications Research Center Vienna, Johannes Kepler University Linz, NXP Semiconductors Austria GmbH, Graz University of Technology, Alpen-Adria-Universität Klagenfurt, Virtual Vehicle Research Center
58 partners from 11 countries

PROJECT COSTS
39,6 M€

PROJECT DESCRIPTION
DEWI (dependable embedded wireless infrastructure) envisions to significantly foster Europe's leading position in embedded wireless systems and smart (mobile) environments such as vehicles, railway cars, airplanes and buildings. The project focuses on development of wireless sensor networks, communication and applications, and will provide key solutions for wireless seamless connectivity and inter-operability. Results will be introduced to the public in all of Europe by using clear practical demonstrations in the areas of aeronautics, automobile, railroad and building automation. Furthermore DEWI provides essential contributions to interoperability, standardization and certification of wireless sensor networks (WSN) and wireless communication.

AUSTRIAN CONTRIBUTION
Austrian partners led by AVL mainly contribute in the automotive domain, and will work on solutions allowing flexible, cost-effective and robust instrumentation in verification and validation (V&V) of automotive components. Partners will focus on extreme reliability and energy efficiency of wireless communication and localization devices in order to enable wireless sensor networks to be used in challenging industrial applications. Besides this, Austrian partners focus on interoperability and transfer of expertise between the automotive and the aeronautics domains, and coordinate the overall transfer of know-how from DEWI into the ARTEMIS repository.

IMPACT FOR AUSTRIA
DEWI enables Austrian partners to combine their deep knowledge for very efficient and robust wireless communication and embedded system design with top industrial players in several domains to prepare entry of WSN in several markets.

EMC² – 'Embedded Multi-Core systems for Mixed Criticality applications in dynamic and changeable real-time environments

Project Description

EMC² – 'Embedded Multi-Core systems for Mixed Criticality applications in dynamic and changeable real-time environments' is an ARTEMIS Joint Undertaking project in the Innovation Pilot Program 'Computing platforms for embedded systems' (AIPP5).

Embedded systems are the key innovation driver to improve almost all mechatronic products with cheaper and even new functionalities. They support today's information society as inter-system communication enabler. A major industrial challenge arises from the need to face cost efficient integration of different applications with different levels of safety and security on a single computing platform in an open context.

EMC² finds solutions for dynamic adaptability in open systems, provides handling of mixed criticality applications under real-time conditions, scalability and utmost flexibility, full scale deployment and management of integrated tool chains, through the entire lifecycle.

The objective of EMC² is to establish Multi-Core technology in all relevant Embedded Systems domains.

EMC² is a project of 99 partners of embedded industry and research from 19 European countries with an effort of about 800 person years and a total budget of about 100 million Euro.
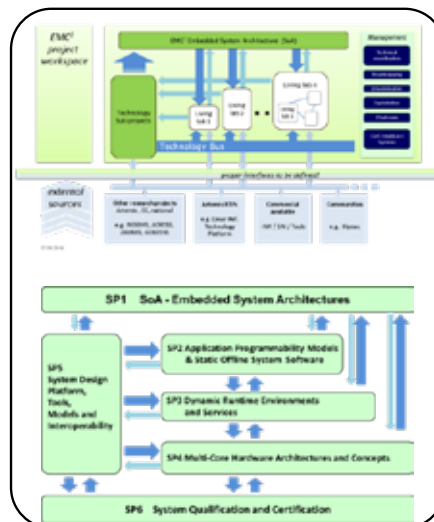

Austrian contribution

Austrian partners contribute to the EMC² project with **more 1100 person-months**. The efforts are equally distributed between the six technical work-packages WP1 through WP6 (see figure top box left) and the living labs for automotive (WP7), space (WP9), internet of things (WP11) as well as cross-domain application (WP12 contribution for railway systems). This wide spread of cutting edge technology contributions illustrates the high innovation grade from the Austrian consortium. In addition it impressively demonstrates the **capability and the needs for industrialization of the multi-core technologies in the different application domains**.

The Austrian partners are taking key responsibilities in the project such as work-package co-lead for WP1 (Embedded Systems Architecture), for WP6 (System qualification and certification), or as standardization manager, as well as different task leads. **This is an acknowledgment for Austrian expertise from the embedded systems community.**

Impact for Austria
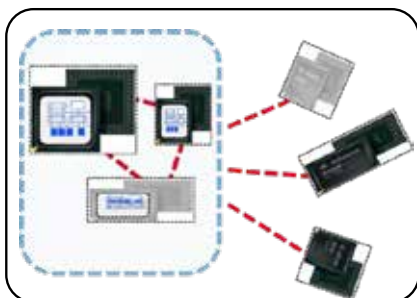
The Austrian national- and EC- funding enables Austrian partners to benefit from:

➢ **Directly improve products and services** of the industry partners by integrating the relevant project outcomes into their port-folio
➢ **Improve positioning of competences** in leading industrial and academic domains as key innovators and think-tank for providing solutions to future demands
➢ **Sustainably improve position of Austrian organizations on the world-wide markets** due to driving European technologies at the cutting edge
➢ **Securing high value-adding, long-term employment** by raising the claim as top innovators and leading drivers for key-technologies
➢ **Engineering of new business relations for future contracts in an European network of experts** due to the cooperation in a consortium of 99 partners
➢ **High visibility** and awareness of the main stakeholders thanks to the political weight of the project (impact on the community)

Key Facts

Project Duration: Start: April 2014
   End: March 2017
Project Coordinator: Infineon AG (Dr. Weber)
Project Costs: ~100 Mio. €

in total 8 Austrian Partners: 4 industrial, 1 SME, 1 academic and 2 research partners

EPPL – Enhanced Power Pilot Line

http://www.eppl-project.eu/

Project Description

The EPPL project strengthens Europe's leading position in power semiconductors by:

•providing a new generation of power semiconductors based on 300mm technology (ACD7, IGBT, CoolMOS™, SFET)

•setting up pilot lines for advanced power semi-conductors based on 300mm wafer and for silicon interposer solutions,

•and demonstrating highly energy efficient solutions for applications like renewable energy, automotive, high power and efficient automotive led and healthcare

Thus EPPL project - ENIAC JU will combine research, development and innovation to demonstrate market readiness by industrial implementation at an early stage. Second generation power semiconductor devices fabricated in European leading 300mm pilot lines are placed at the heart of the project, for which manufacturing excellence, cost competitiveness and challenging applications are critical boundary conditions.

Austrian contribution

With 10 partners , Austria is well represented in EPPL project.

Contribution from **Infineon Tech. Austria** is the coordination of the project and the management of all the activities concerning the pilot lines for the 300mm technology (ACD7, IGBT, CoolMOS™, SFET).
All the research centers and Universities (**Tu Graz, KAI, CTR, CEST, UNI MONTAN**) are involved in WP2 "Semiconductor technology and silicon demonstrator research" , WP3 Leader is **KAI**. The main objective is the basic research on the new power technologies and the advanced assembly technologies with respect to the 300mm manufacturing challenges.
Fronius is WP5 Leader for the "Application domain renewable solar".
EVG and Plansee are involved in WP3 "semiconductor assembly and 3-D integration".

S. Kirnstoetter, M. Faccinelli, M. Jelinek, W. Schustereder, C. Gspan, W. Grogger, J. G. Laven, H.-J. Schulze and P. Hadley, "High Dose Proton Implantations into Silicon: A Combined EBIC, SRP and TEM Study;" , E-MRS 2014 SPRING MEETING
Application Solar goals:
improve the WHOLE PV-Inverter
• Smaller volume
• Less weight
• Better efficiency
• Higher level of automation
• Lower total system costs

Impact for Austria

1) The project strengthened **the industrial competitiveness and growth** of Austrian Companies.

2) The project aims to ensure workplaces in Europe and particularly in Austria

3) We enable a positive synergy among production, development, research and applications in Austrian environment and ecosystem

4) Establish pilot line(s) for power semiconductors in Austria strengthening European power electronics industry by providing early innovation.

Key Facts

Project Duration:	Start: *01.04.2013*
	End: *31.03.2016*
Project Coordinator:	**Infineon Tech. Austria AG**
Project Costs:	~ **€ 74,8 million**

Austrian Partners: Infineon Technologies Austria AG, ams AG, KAI, CTR, TU Graz, Fronius, EVG, Plansee, CEST competence center, UNI Montan

http://www.ept300.eu/

EPT300 – Enabling Power Technologies on 300mm wafers

Project Description

The project EPT300 researches basic capabilities to produce power Technologies based on 300mm wafers along the full value chain
Golas:
1) achieve the realization of demonstrators for IGBT, SFET, COOLMOS™ in a pilot line
    a) for manufacturing excellence, cost, competitiveness and challenging applications

2) demonstrate the readiness for large scale production environment

3) assembly and interconnect technologies to allow integration into a package or sub system

4) particular attention is posed in the definition and implementation of several automation aspects
    b) ensuring low production costs, short cycle-time and important quality improvements due to very constant constant and stable handling procedures
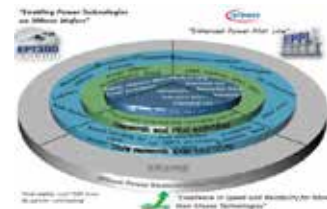
Austrian contribution

Eight partners from Austria are actively participating in the EPT300 Project.
Infineon Tech. Austria is the coordinator site of the project and parallel to the management of all the activities particular focusing is posed in Villach on the realization of demonstrators in 300mm (IGBT, CoolMOS™, SFET).
Eutema supported The project management. **UNI Klagenfurt & IFAT** are active in researching models to reduce Burn-In effort and here the dissemination is of particular high quality. **LAM** was active in Research on „Uniformity optimization @ Si spin etch process". **Mechatronic** worked for "Thin wafer handling in lead fab an in volume managing at a high automation level". **CTR** made FEM simulations for new wafer design and is/was active in different activities in enhanced equipment simulations. **SICO** produced several different versions of a handling/holding fixture for 300mm wafers.
EMERSON activity is/was in the Highly efficient telecom rectifier.

UNI Klagefurt & IFAT Burn-In activities done and planned

EPT300 Demonstrator established and shipped from Villach to Dresden

Impact for Austria

1) The project strengthened **the industrial competitiveness and growth** of Austrian Companies.

2) The project aims to ensure workplaces in Europe and particularly in Austria due to the proven capability to transfer and produce power technologies in 300mm in Villach

3) We enable a positive synergy among production, development, automation research and applications in Austrian environment and ecosystem

4) We developed some essential basis for a challenging automated Feb, see new building project in Villach where core emphasis is posed on the expansion of expertise for the manufacturing of the future as well as research and development (R&D)

Key Facts

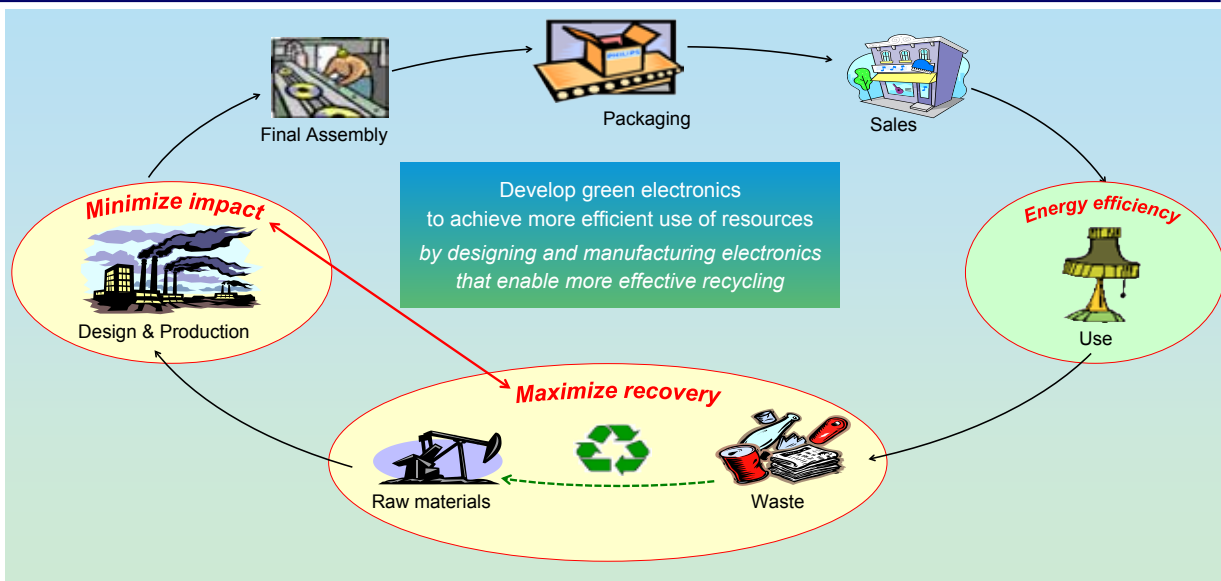|	
Project Duration:	Start: **01.04.2012**
	End: **30.09.2015**
Project Coordinator:	**Infineon Tech. Austria AG**
Project Costs:	**~ € 43.6 million**

Austrian Partners: Infineon Technologies Austria AG, UNI Klagenfurt, CTR, EUTEMA, Mechatronic, Emerson, LAM, SICO
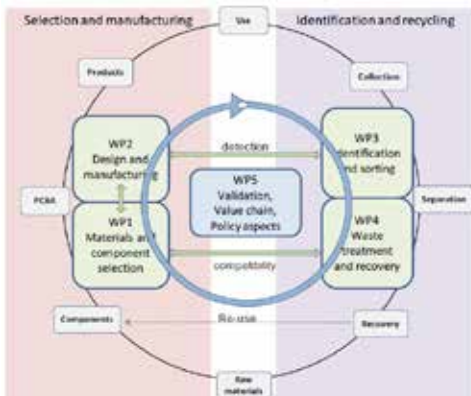
Green Electronics

GreenElec project

Contribution of NXP Semiconductors Austria GmbH

● Evaluation of alternative sorting methodologies
(contactless communication, „RFID")

● Outlook: Multi-use of RFID over complete life-cycle

Project aims

Efficient and sustainable use of electronic materials:
- Suitable *combinations of materials* for recycling
- *Design rules* for electronics
  taking into account recycling processes
- *Identification* of recyclable/recoverable
  electronic devices and components
- Optimum waste stream *separation*
  for maximal recovery
- Business models and policy support that give an
  incentive to the recycling/reuse of electronics

Timeframe: January 2012 - December 2014

| materials	• Only use materials that can be recycled • Avoid the use of (non-compliant) coatings • Limit the number of different materials • Use pure materials

connections	• Avoid fixed connections
	• Break-down (by shredding/disassembly) to
	  o Pieces with uniform composition
	  o Pieces of relatively large size (>1 cm)

electronics	• Get PCB out in one piece (→ smelting) • Enable easy/fast detection of materials

High Profile

Project Description

HIGH PROFILE combines industrial and clinical driven R&D activities dealing with image diagnostic platforms for the central nervous system. The project's approach is to integrate imaging methods for diagnostics to support combinations/fusions of images from different modalities (MRI, MRS, fMRI, NIRS, EIT and EEG). The specific HIGH PROFILE objectives are:

- Develop algorithms that integrate information from different modalities into metadata to provide insight into 3D and 4D brain activity.

- Map this software on a hardware platform specifically conceived to be an evolution of the IT infrastructure in hospitals and medical centers.

- Develop a standards based interoperable solution architecture to support clinical workflows associated with use of advanced imaging technology.
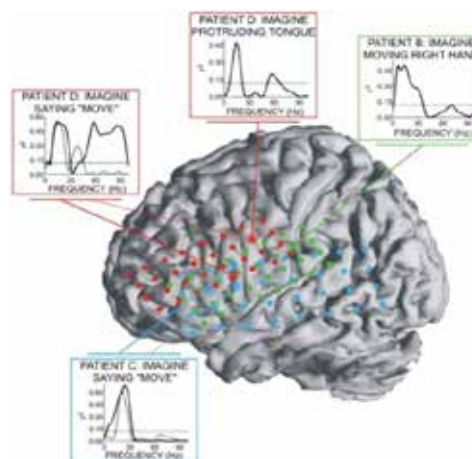
Austrian contribution

The **Austrian Institute of Technology (AIT)** focuses on advanced source localization algorithms combining EEG and MRI data. The algorithms will be specifically designed for rhythmic EEG-patterns, which are associated with epileptic seizures and particularly important in epilepsy. In addition, AIT considers signal pre-conditioning by artefact reduction based on a spectral decomposition of the EEG using filter banks followed by a spatial decomposition.

Guger Technologies (Gtec) designs and develops a signal processing platform both in HW and SW and algorithms for source localization (spatial deblurring and enhancement of spatial resolution) and activation maps. Gtec furthermore focuses on the online aspect of data pre-processing and presentation (spatial pre-filtering for online classification).

Impact for Austria

HIGH PROFILE aims to deliver a significant contribution to diagnosis and therapy of severe illnesses of the central nervous system and brain based on improvements of algorithms that exploit high-performance digital signal processors and computing and content management platforms that make the data available when and where required. The partners use the results in their future offering to hospitals and healthcare providers improved, integrated equipment.

AIT is working on software supporting the diagnosis and treatment of epilepsy for more than five years. The investigations in High Profile will contribute to the development of a software package that can be used for automatic detection of epileptic seizures, epileptic spikes, automatic localization of the epileptogenic zone in the brain and many other clinical relevant purposes in the field of epilepsy. For Gtec the project will open an international market in the area of medicine, R&D and rehabilitation and will offer Gtec a scientific-established, sophisticated package for brain monitoring.

Key Facts

Project Duration:	**Start: *April 2011***
	Duration: *36 months*
Project Coordinator:	**Philips Healthcare**
Project Costs:	**17,2 Mio. €**

Partners: Philips, STMicroelectronics, **AIT**, Barco, UMCU, Zorg Gemak, AnyWi, FEI, PST, Eagle, **Gtec**, Itä-Suomen yliopisto, Valtion Teknillinen Tutkimuskeskus, Neagen Oy, Visidon Oy

improve

ENIAC JOINT UNDERTAKING · **ECSEL** Austria · IMPROVE INNOVATION AWARD 2012

IMPROVE – Implementing manufacturing science solutions to increase equipment productivity and fab performance

Project Description

IMPROVE aims to improve European semiconductor fabs efficiency by providing methods and tools to better control the process variability, reduce the cycle time and enhance the effectiveness of the production equipment.

To achieve these objectives, IMPROVE focused on 3 major development Axes:
- The development of **Virtual Metrology** techniques allowing the control of the process at wafer level whilst suppressing standard metrology steps.
- The development of **Predictive Equipment Behaviour** techniques to improve the process tools reliability whilst optimizing the maintenance frequency and increasing the equipment uptime.
- The development of **Dynamic Risk Assessment and Dynamic Control Plan** concepts, suppressing unnecessary measurements steps whilst dynamically improving the control plan efficiency.

For these 3 topics, models were developed and assessed for different process steps and equipment platforms in different manufacturing lines leading to the development of generic solutions.

The impact of the integration of the developed techniques in the various line decision systems and IT infrastructure were also evaluated and assessed. To that end, a strong consortium of industrialists, SMEs, academia and institutes has been made-up, including the major European actors.
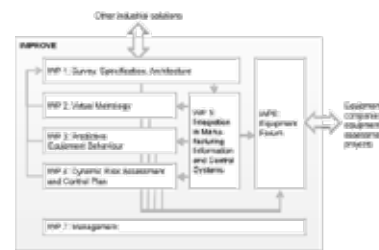
Austrian contribution

Infineon Technologies Austria AG: together with the University of Pavia and Padova, was active in the fields of Virtual Metrology and Predictive Maintenance. The three mentioned partners received 3 international scientific recognitions;
a)   Best Student Presentation Award, Intel European Research and Innovation Conference (ERIC) 2010
b)   Best Student Paper Award, International Conference on Informatics in Control, Automation and Robotics (ICINCO)2011
c)   IEEE CASE Best Student Conference Paper Award, IEEE Conference on Automation Science and Engineering (CASE)2011
A lot of dissemination activities prove the extraordinary contribution of IFAT in the development of new techniques and algorithms to enhance the effectiveness of the production line.

ams AG: together with CamLine and IFX (main partners) contributed in the Predictive Equipment Behavior and Survey, specification and architecture of the PdM framework. One of the goals was to speed up equipment recovery through root cause identification.

Virtual Metrology can be used to predict parameters that normally are measured in-line and additionally those which may not be directly measurable in-line. Available FDC data is used as typical input to the VM module but direct data input from the process module is applicable as well.

Predictive Maintenance: Six steps of data mining according to the Cross- Industry Standard Process for Data- Mining

Impact for Austria

1)   The project **strengthened the industrial competitiveness and growth** of Austrian Companies.

2) Has **improved the innovation capacity** in Austria and the **development of new knowledge** to reduce the cycle time and enhance the effectiveness of the production equipment.

3) IMPROVE has an impact **enabling the stay on market of the Semiconductor companies in Austria.**

4) The know how acquired in this project was the **basis for other innovation and research projects** in Austria.

Infineon · **amu**

Key Facts

Project Duration:	Start: *01.01.2009*
	End: *30.06.2012*
Project Coordinator:	**STMicroelectronics (France)**
Project Costs:	**Mio. €37.61 million**

Austrian Partners: Infineon Technologies Austria AG (Villach), ams AG (Graz)

ARTEMIS Call 2008 Project

INDEXYS

INDustrial EXploitation of the genesYS cross-domain architecture

EXECUTIVE *summary*

INDEXYS tangibly realizes industrial implementations of cross-domain architectural concepts developed in the EC FP7 project GENESYS (GENeric Embedded SYStem Platform) in three domains: automotive, aerospace and railway.

RELEVANCE CALL *2008 objectives*

INDEXYS relates to ARTEMIS' Industrial Priority: "Reference designs and architectures" and targets at composable component integration across different integration levels, thereby addressing the "transition from separate sectoral, vertically structured markets to a horizontally structured market" as mentioned in Sub-Programme 5: "Computing environments for embedded systems".

MARKET *innovation*

Research and development carried out in INDEXYS will deliver significantly advanced technology for strengthening European excellence in computing architectures of the automotive, aerospace, and railway domains. INDEXYS contributes to mastering new computing architectures and enables European industries across different application domains to maintain and even improve their technological leadership.

INDEXYS' instantiations of selected architectural services of the GENESYS generic reference architecture template will support players of the European supplier industry to enhance their product portfolio towards larger markets. OEMs will benefit from mature cross-domain technology at lower cost, as well as from decreased development cost and time-to-market.

TECHNICAL *innovation*

Different application domains traditionally tend to develop customised solutions, thereby often re-inventing concepts that are already applied in other domains. It is therefore expedient to invest into a generic embedded system architecture that supports the development of dependable embedded applications in many different application domains.

Contrary to the approach of many present platform solutions that are tailored to a specific domain, INDEXYS aims at the development of reusable architectural services that can be exploited across platforms of different domains. INDEXYS' architectural service implementations will support a gradual shift towards higher reusability of services across different domains due to lower cost by availability of existing solutions, and by existing experience with these solutions in the engineering community.

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PROJECT COORDINATOR	**DURATION**
Andreas Eckel	30 months + 6 months
INSTITUTION	**START**
TTTech Computertechnik AG	April 2009
EMAIL	**TOTAL COST**
andreas.eckel@tttech.com	7,3 M€
WEBSITE	
http://www.artemis-ia.eu/project/index/view?project=8	

Advanced Research & Technology for EMbedded Intelligence and Systems

Internet of Energy for Electric Mobility

Project Description

The objective of Internet of Energy was to develop innovative solutions for interfacing the Internet with the power grid with applications for electric mobility, helping to make transport more sustainable, efficient, clean, safe and seamless. IoE was supporting both the development of the future electric grid by using data communication to move electricity more efficiently, reliably and affordably and the development of the future Internet by using the electric grid to facilitate and speed-up the communication amongst the various energy nodes and domains.

The underlying architecture consists of distributed Embedded Systems, combining power electronics, integrated circuits, sensors, processing units, storage technologies, algorithms and software. The grid will increasingly rely on smaller, locally distributed electricity generators and storage systems that are based on plug & play principles. Power network devices and loads at the edge (such as electrical vehicles, buildings, electric devices, and home appliances) can be charged or connected on any source of energy being solar, wind or hydroelectric. See www.artemis-ioe.eu

Austrian Contribution

Infineon, Lantiq, Cellstrom, CISC Semiconductor Design + Consulting as well as Technikon supported the IoE project from Austrian side. The main focus from these partners was on the supply chains for near field communication and identification station for energy payments, power network energy management system and energy storage station and they strongly contributed to security issues. Austrian partners furthermore drove dissemination, exploitation and standardization, also in the function of the work package leaders.

Long-term Benefit

The consortium of Internet of Energy consists of a wide range companies within the supply chain for power distribution in vehicles. Thus Infineon will gain a long-term benefit from the strong cooperation with up and downstream companies by giving and receiving direct feedback on the developed concepts within this project.

Through the project Infineon will be able to broaden its technology portfolio for wireless communication by applying the developed concepts. The results will support the development of a new line of wireless control products for automotive applications, as well as further industrial applications. As one area of interest of IoE for example was the power-line and wireless interoperability it can be made sure, that Infineon's future products are well adapted to these requirements. Moreover through the direct contacts with the end users, the demonstrators had to fulfill the demands of end users from the very first moment onwards.

Key Facts

Project Duration:	Start: May 2011
	End: October 2014
Project Coordinator:	STIFTELSEN SINTEF
Project Costs:	45 Mio. €

Austrian Partners: 5 industrial, SME and research partners

MAS
Nanoelectronics for Mobile Ambient Assited Living (AAL) Systems

Project Description

The ENIAC JU project MAS developed nano-electronic components for applications in the field of health and wellness, and created a development platform for the design of complete flexible, robust, and safe mobile AAL systems. The project covered remote patient supervision using multi-parameter biosensors and telecommunication networks to improve the quality of the clinical environment as well as to encourage therapy at home. The implementation required novel nanoelectronic technologies, interfaces, component designs, and architectures for a common architectural approach.

Austrian Contribution

Application demonstrator 5: MOBILE CARDIOTOCOGRAPHY (CTG)
CTG is a common diagnostic technology during the late stage of pregnancy. With the mobile CTG based on the MAS platform the number of regular trips to the hospitals can be reduced and the observation is facilitated at the patients home. The mobile CTG is able to indicate fetal distress, fever, or fetal infection.
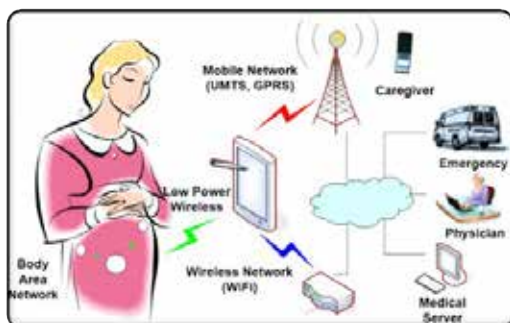
Impact for Austria

- Sensor and system electronics
- Thermoelectric energy harvesting
- On-body radio communication
- Miniaturized antenna design
- Heterogeneous 3D biochip packaging
- Embedded wafer-level ball grid array
- Point-of-care technology
- Fetal heart rate assessment software

Key Facts

Project Duration:	Start: **April 2010**
	End: **March 2013**
Project Coordinator:	**Infineon Technologies**
Project Costs:	**27.4** Mio. €

Austrian Partners: more than 6 industrial, SME, academic and research partners

J. Grosinger and W. Bösch, Institute of Microwave and Photonic Engineering, Graz University of Technology, wbosch@tugraz.at

MBAT
## Combined Model-based Analysis and Testing of Embedded Systems

Project Description

MBAT will provide Europe with a new leading-edge Reference Technology Platform (RTP) for effective and cost-reducing validation and verification of Embedded Systems.

MBAT will enable the production of high quality and safe embedded systems at reduced cost (time and money) by a new approach combining most advanced model-based testing with static analysis techniques. MBAT will employ and re-use test and analysis models as basis for model-based V&V.

The IOS (Interoperability Specification) will assure interaction of tools taken from the RTP and assembled in a domain/application-specific subset-RTP instance.

MBAT is committed to the concept of an ARTEMIS RTP as initiated by the ARTEMIS project CESAR. The MBAT RTP will be connected to other ARTEMIS RTPs to extend these platforms pursuing the ARTEMIS goal to provide an European RTP for the development of (safety critical) embedded systems.
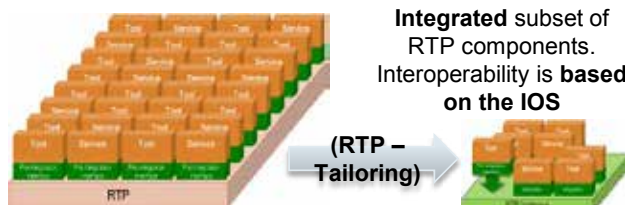
Integrated subset of RTP components. Interoperability is **based on the IOS**

(RTP – Tailoring)

Derive an instance based on a use case or user requirements.

Austrian contribution

The contributions of the Austrian partners, which are co-operating closely in research and use cases, are:

- AIT Austrian Institute of Technology GmbH: leads the "Technology and Innovation" subproject and the "Dissemination & Training" work package and the task on Standardization. To "Combined Model-based Analysis & Test Methodology" AIT contributes to development of test case generation techniques, particularly model-based mutation testing.
- AVL List GmbH has a leading role in the work package on automotive use cases and provides the use cases „Traction Battery" and „Hybrid power train control"; additionally, AVL is very involved in RTP tayloring and MBAT processes.
- Infineon Technologies Austria AG provides a particular use case, a virtual airbag prototype, applying different methods and tools for test model design, test case generation, coverage analysis of test results and Timing Analysis.
- TU Graz contributes to the meta model definition of abstract test cases and provides its expertise in model-based mutation testing.
- Virtual Vehicle Competence GmbH: leads the work package "RTP Adaption & Tailoring" to support the MBAT consortium and tool providers for the efficient integration of the different assets (e.g. data backbone, meta-models, modelling, analysis and test tools) in order to build integrated tool chains (MBAT RTP instances).

Impact for Austria

The MBAT reference technology platform will allow the integration of tools and their flexible combination to tool chains. This will result in less manual steps during product development and improved documentation and traceability of work products. This is of particular importance for Austrian industry covering all areas from HW, SW, manufacturing and services, accompanied by research, technology and innovation in embedded systems.

For AVL and Infineon the verification of safety requirements is of high interest. For this purpose, techniques as abstract interpretation and model checking will be investigated for their application in industry-sized use cases. Static verification in combination with dynamic testing is expected to increase product quality and reduce time to market. For the research organizations, it allows to further develop and exploit their tools and methodologies in industrial context.

Key Facts
Project Duration: Start: **November 2011**
End: **December 2014**
Project Coordinator: **Daimler (Germany)**
Project Costs: **34,5 Mio. €**

Partners: 41 industrial, SME, academic and research partners from 8 countries

Process Oriented Electronic Control Units for Electric Vehicles Developed on a multisystem real-time embedded platform

Project Description

With the next generation of electric vehicles will begin the convergence between computer and automotive architectures: future automobiles will be mechatronic systems comprising a multitude of plug-and-play and self configurable peripherals. Peripherals will be embedded systems containing hardware, algorithms and software. The architecture will be based on distributed energy while the propulsion systems will adopt radical new control concepts. Sensing, actuation, signal processing and computing devices will be embedded in the electronic equipment, electrical motors, batteries and the mechanical parts.

The objective of POLLUX was to develop a distributed real time embedded systems platform for next generation electric vehicles, by using a component and programming-based design methodology. Reference designs and embedded systems architectures for high efficiency innovative mechatronic systems were addressed with regard to requirements on composability, networking, security, robustness, diagnosis, maintenance, integrated resource management, evolvability and selforganization.

POLLUX addresses the embedded system needs for the next generation electric vehicles by exploiting the synergy with the ENIAC E3Car project which aims to develop nanoelectronic technologies, devices, circuits and modules for EVs in preparation for the launch of a massive European EV market by 2015-2020.

The project considered both vertical integration and horizontal cooperation between OEMs and hardware/software/silicon providers to build a solid, embedded-systems European industry while establishing standard designs and distributed real-time embedded-systems platforms for EVs.
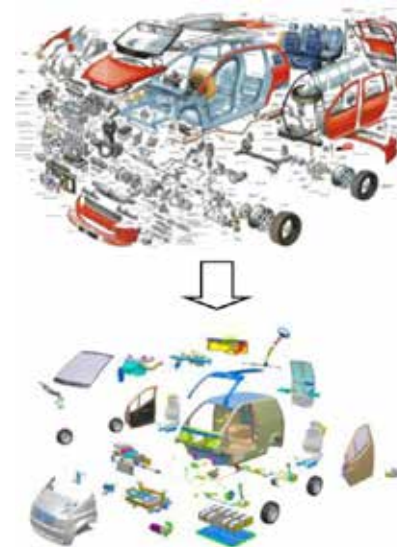
Austrian Contribution

A total of eight Austrian partners contribute to the Pollux project from large, medium and small industry companies to public research institutions. AMS, AVL, Infineon, TTTech Computertechnik, CISC, AIT, FH Joanneum and Virtual Vehicles have distributed their contributions over all technical work packages. The areas of interest lie amongst others in wireless and wired communication (FlexRay), battery management but also standardization, dissemination and exploitation.

Long-term Benefit

Infineon mainly involved in the project's activities of the supply chain for power and signal distribution and more specifically in wireless links. Through this funded project Infineon was able to extend its knowledge on wireless sensor networks, their application and system-wide sensor integration using wireless sensor networking technologies.

The fact that Infineon was one of the main drivers for the use case of a wireless communication link in an e-car, provides the company with the opportunity to directly exploit project results for the business unit. The project enables the company to explore new concepts for a new wireless communication link with improved EMI resistance capabilities. Moreover experience from modelling was gained and the concrete concept was consequently evaluated by project partners for its applicability and reusability in real-life applications.

The two main exploitable results of POLLUX for Infineon are:
• A solid basis for a new line of wireless control products for automotive applications
• Starting point to develop products for industrial applications such as Automatic Meter Reading

Key Facts

Project Duration:	Start: March 2010
	End: September 2013
Project Coordinator:	STIFTELSEN SINTEF
Project Costs:	33 Mio. €

Austrian Partners: 8 industrial, SME, academic and research partners

R3-COP
Resilient reasoning robotic co-operating systems

ECSEL Austria

Project Description

R3-COP aims at providing European industry with new leading-edge innovation that will enable the production of advanced robust and safe cognitive, reasoning autonomous and co-operative robotic systems (mobile and immobile) at reduced cost.

The major objective is to achieve cross-sector reusability of building blocks, collected in a knowledge base, by developing and implementing a generic framework and platform with domain-specific instantiation, and use of a multi-purpose computing platform. R3-COP covers the domains of *ground-based, air-borne* and *underwater robotic autonomous systems*, industries include transport, manufacturing, domestic, maintenance and surveillance services.

The main focus of R3-COP lies in particular on

- design & development by providing components as building blocks for robotic autonomous systems (compositional design), and on
- verification, validation and test by solving critical problems in assessing correctness, safety and robustness of autonomous robotic systems with complex sensors and perception modules.

Partners: AIT, Germany (TU Braunschweig (coord.), Infineon, Siemens, Univ. Erlangen-Nuremberg, FhG IDMT and IPA), Czech Republic (TU Brno, CAMEA), Hungary (Budapest Univ. of Techn. & Economics), Greece (Hellenic Aerospace, TU Athens, TSI), Italy (Thales, Innova, Elettric80), Denmark (DTI), Spain (Tecnalia, Acciona), Univ. of Latvia, Finland (VTT, TEKNOSAVO, Probot, Profin), The Netherlands (Philips, TU Eindhoven, Demcon).

Austrian contribution

AIT Austrian Institute of Technology GmbH developed the proposal idea, lead the full proposal and the negotiations. In the final project established after the negotiation phase, AIT (Safety & Security Department) took over the lead in the subproject on validation, verification and certification support, focussing on new and innovative testing solutions for complex robotic (stereo) vision and perception (by means of test data generation with known coverage of application-specific typical and critical situations), and in standardization and dissemination. The Austrian contribution is key to achieve trust and reliance on the solutions facilitated by the R3-COP methodology, tools and components.

Impact for Austria

R3-COP supports accelerated uptake of next generations of autonomous systems and robotics, particularly for robust, safe and reliable robotic applications, even in niche application sectors. The project will bring appropriate and efficient solutions for the fast deployment of innovations in robotics, industrial production, and manufacturing processes. Moreover, R3-COP will contribute to widespread comparative assessment of robot performance for different tasks and technologies. This will enable new market opportunities for EU industries. R3-COP is expected to reduce cost and development cycles of resilient robotic systems by 15% while managing 25% of complexity increase at 10% less effort.

AIT expects in the medium term to strengthen its position in the field of safe and autonomous systems development, verification and validation in Europe, continuing with research building upon results and contacts gained through R3-COP. In the long term, AIT expects to contribute to a stronger Austrian economic and industrial position in the robotics and autonomous systems field, including SMEs, and to a possible knowledge and innovation cluster, by technology transfer and co-operation in future projects.

Key Facts

Project Duration:	Start: **May 2013**
	End: **October 2013**
Project Coordinator:	**TU Braunschweig**
Project Costs:	**18,3 Mio. €**

Partners: 26 industrial, SME, academic and research partners from 11 different countries

## Safety Certification of Software-Intensive Systems with Reusable Components (pSafeCer + nSafeCer)

Project Description

SafeCer is targeting increased efficiency and reduced time-to-market by composable safety certification of safety-relevant embedded systems. The industrial domains targeted are within automotive and construction equipment, avionics, and rail. SafeCer will also develop certification guidelines and a training example for other domains, thus considerably increasing its market impact.

A primary objective is to provide support for system safety arguments based on arguments and properties of system components as well as to provide support for generation of corresponding evidence in a similar compositional way. By providing support for efficient reuse of certification, component reuse will be facilitated and the amount of components available for reuse will increase.

Partners: Volvo, AVL, TRAIL, TTTech, AIT, VIF, Thales Alenia Space, GMV, TRAINTIC, ULMA, OSATU, Mondragon University, University Politec. Madrid, Thales Communications, Delphi, Magillem, AdaCore, CEA-LIST, AKHELA, INTECS, Vitrociset, ResilTech, FBK, LDZ, AlgoRego, Riga Technical University, Volvo Constr. Equipment, CrossControl, Quviq, MDH, SP
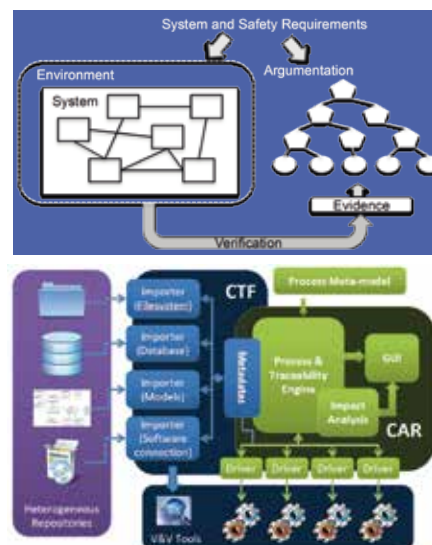
Austrian Contribution

The five Austrian partners participate in the project with a strong focus on the demonstration aspects. **AVL List GmbH (AVL)** and **Virtuelles Fahrzeug (VIF)** work on a use case in the automotive domain that demonstrate the applicability of improved process and tool support. **Thales Railway Signaling Systems** (TRAIL) focuses on a use case in the railway domain to demonstrate the potential for reuse in a software platform underlying critical rail signaling applications. **TTTech Computertechnik AG (TTTech)** is working on a use case that shall demonstrate the improved potential for cross-domain reuse in the aerospace, automotive and industrial domains. Finally the **Austrian Institute of Technology (AIT)** works on providing the generalization of the project results and the potential extensions that are required to transfer the results to even additional domains.

Long-term Benefit

SafeCer will enable innovations in multiple application domains by paving the way for cost-efficient and even cross-domain reuse, and by providing lighter, cheaper and faster certification. This will enable realisation of new innovative products that currently are economically or technically infeasible. SafeCer will bring application innovation in the development, verification, and certification tools markets, by providing methodology, reference architecture, and prototype tool environment that enable increased efficiency in development and certification. This will provide basis and competitiveness for tool vendors. SafeCer will pave the way for a (cross-domain) market for software components qualified for certification. This will provide business opportunities and competitiveness for European SMEs and technology providers by substantially broadening the market for niche components and increasing cost-effectiveness by allowing productlines/variants even across multiple domains.

TTTech
Ensuring Reliable Networks

Key Facts

Project Duration: 48 months (combined),
Project Start: April 2011
Project Coordinator: Volvo Group Trucks Technology
Project Costs: 17,2 Mio. €

Partners: 32 Partners from industry, SMEs, academia and research from 6 different countries (23 partners in pSafeCer and 30 in nSafeCer)

# Verification and Testing to Support Functional Safety Standards

Project Description

New safety standards, such as ISO 26262, present a challenge for companies producing safety-relevant embedded systems, as they demand an elaborate verification process. Safety verification today is however still discipline dependent (HW, SW, analogues, digital,…) and often done ad-hoc and manual.

Therefore VeTeSS develops standardized tools and methods for verification of the robustness of safety-relevant systems, particularly against transient common-cause faults.

By bringing together partners from every part of the supply chain, it is possible to develop automated, quantitative processes usable at all stages of the development. The gained standardized data from verification can consequently be used for safety standard qualification. This not only results in reduced costs but also in reduced "Time-to-Market", even with the increasing complexity of embedded systems and software.

Especially the concept of "Safety Element out of Context" will be taken into consideration. This concept enables the development of a standardized component for the use within a variety of different applications. Only in a second step the specific needs of the customers are taken into consideration. See www.vetess.eu
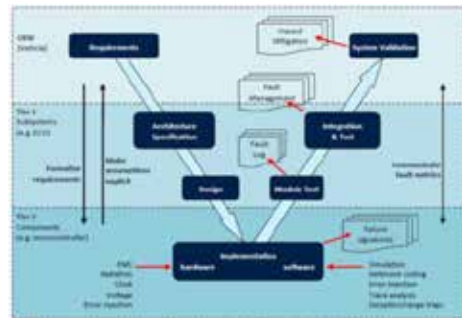
Austrian Contribution

Austria provides a strong team of partners for the VeTeSS project. With Infineon, AVL, TU Vienna and Virtual Vehicles we represent not only strong industrial partners, but also established research institutions that hold key roles within the project. Austria provides two use cases, which are application examples on which the developed methods and tools are tested. Furthermore Austrian partners strongly support the requirements definitions, as well as the collection of verification data for the ISO26262 qualification. Very diverse tasks from the integration of EMI into the safety process, to the technical lead of tool qualification, tooling and core tool chain development, the development of formal methods for verification and test case generation and the system and software integration of automotive embedded systems are performed. This list is not exhaustive as Austrian partners are contributing to all work packages.

Long-term Benefit

VeTeSS results will enable Infineon to deal with todays and tomorrows challenges in the field of safety relevant electronics for the automotive market. The goal is to handle increasing complexity while fulfilling all safety relevant aspects. Infineon will exploit the project results in the verification area for the automotive domain. In a first place Infineon will utilize the methods and tools developed in VeTeSS for an airbag chip set that makes extensive use of analogue mixed signal methodologies. In a later stage Infineon additionally plans to deploy the methods and tools developed in VeTeSS to all mixed signal related products, especially for safety critical products.

As Infineon is a use case provider in the VeTeSS project, an Infineon specific real-life problem will be considered while developing the tools and methods. Thus the results of the project can be directly applicable for the company, while also company specific needs will be taken into consideration in the development phase.

The exploitation of VeTeSS results will enable Infineon to detect all errors in the phase before the start of the chip manufacturing, beyond that the safety, quality and reliability of products will be improved overall. With this "First-Time-Right" approach we are enabling our customers to deliver high quality products with optimized „Time to Market" factors. Being early in the market with proven quality will help to maintain and grow the leading market position.

Key Facts
Project Duration: Start: May 2012
End: April 2015
Project Coordinator: Infineon Technologies UK Ltd
Project Costs: 19 Mio. €

Austrian Partners: 4 industrial, academic and research partners

About ECSEL-Austria

Austrian actors established two associations „ARTEMIS Austria" and „ENIAC Austria" to support the Joint Undertakings ARTEMIS and ENIAC during FP7.

Now the activities of ENIAC, ARTEMIS as well as EPoSS are combined within ECSEL-Austria, seeking to generate synergies and additional interconnection of value chains for the future. Another challenge is to build more projects as pilot lines with the integration of hardware, software and smart systems, also considering sensors or actuators. Many examples of such cooperations already proved to result in innovations, which is also an ambitious goal in Horizon 2020.

Our Mission is to

Secure supply of key technologies and critical knowhow in the field of electronic components and systems to support innovation in all major sectors of the economy and society in Europe.

Our Vision

- strengthen the international competitiveness of Austrian companies in this sector
- increase the international visibility of Austrian companies and R&D facilities
- encourage the cooperation, focus and performance of Austrian R&D institutions
- develop inputs for European research activities based on the strengths of Austrian actors
- accentuate the Austrian innovation landscape in Europe
- promote Austria as an attractive location for establishing a business and expanding high-technology production

Contact

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