INTERNATIONALIZATION ACTIVITIES AT

Smartare Elektroniksystem

ELECTRONIC COMPONENTS & SYSTEMS

Activities related to strengthen Swedish participation in Int'l (EU funded) consortium projects

THORBJÖRN "TOBY" EBEFORS, PHD

DEPUTY PROGRAM MANAGER

www.smartareelektroniksystem.se

Outline

- What is a strategic innovation programme
- How we work in Sweden for the growing electronics sector
- Support from idea to product in emerging technologies

  – focus 7 HUBs like organic and printed electronics
- Project and Company examples from Nat’l portfolio
  - Under development
  - New ideas for Int’l (EU / SWE-ITA) collaboration

Strategic Innovation Programmes

Strategic innovation areas

- Cooperation Industry – public sector – Academia (PPP)
- Strategic research and innovation agendas
- Strategic innovation programme

SVENSK ELEKTRONIK

SWEDISH ICT ACREO

swerea swedish research

PhotonicSweden

CHALMERS

LULEÅ TEKNISKA UNIVERSITET

KTH

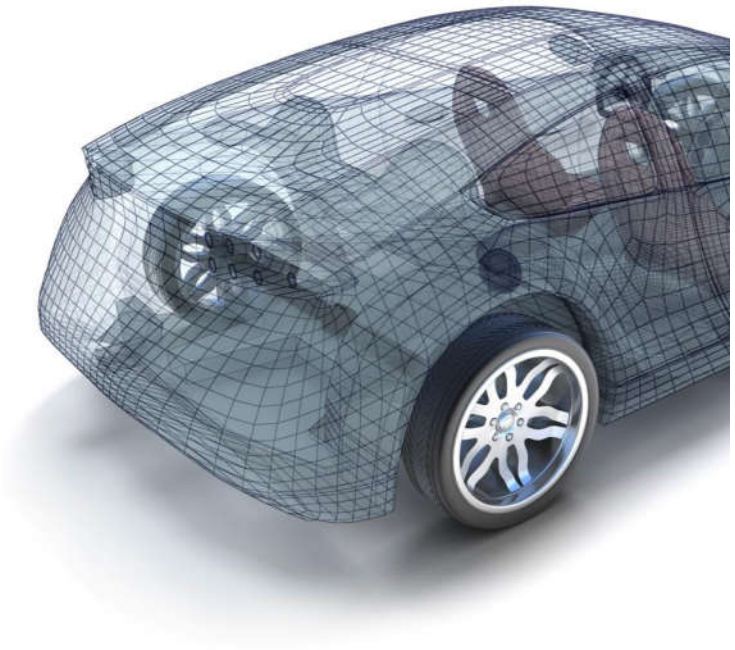
Funding in 2014:
+ ~70 companies,
total 107 organisations

+ adding 250 new organisations (Large Corps and SME and ROTs) 2014-2019


ABB
ABSORBEST
ADDIVA
Adiris
AecorLink
AGELLIS group
AKADEMISKA HUS
AKADEMISKA SJUKHUSET
Alelion
aifloo
Alleato
ALSTOM
ALSTOM | Power
ALTEN SVERIGE
AMPARO SOLUTIONS
ANGLAND SOLUTIONS
ANIMA
APPTEK
AQUA-Q
aquaductus
Arcticus Systems
arm
Aros electronics AB
ascilion
divi
ASTAZERO
AstraZeneca
Atlas Copco
Autoliv
AZELIO
Beneli
Biocrine
BLUETEST.se
BMP INNOVATION
BOARD ARCHITECT
BOLIDEN
BOMBARDIER
BOMBARDIER TRANSPORTATION
BrainCool
Brighter
BRÄNDÖ
bublar.
C2AMPS
CA Clase
CAPELON
CARGO BEACON
CATENA
CathPrint
CERVITROL
MC2
ChromoGenics
Cobolt
Cogra
combain
COMHEAT Microwave AB
compart
Connect2Mind
C*pac
dBm
DELTA
DENSO
DGC
DIGITAL METAL
DP Patterning
bradford ecaps
ecopilot
POWER SOLUTIONS
enics
epinova
epishine
Elektronik Partner
ERICSSON
excillum
ferroamp
fiberoptic valley
First Control Systems AB
FlexProp
FOI
FOLLOWIT
fortum
FOTONIC
g-logic
gammadata
GAPWAVES
GASPOROX
GE POWER
GEVEKO
Göteborg Energi
Göteborgs Stad
gotmic
graphensic
Greinon
GRÄNGES
EVAM
Hancap
HEAT CLICK
HEXATRONIC
HÖGSKOLAN I BORÅS
HÖGSKOLAN VÄXJÖ
HÖGSKOLAN I JÖNKÖPING
JÖNKÖPING UNIVERSITY
hta
HUGHES
Husqvarna
SWEDISH ICT ACREO
IGELOSA
IGGESUND
iGW
imagimob
Imagination
Imsys
inission
INMEC AB INDUSTRIELL TEKNIK
inmotion
Innoscentia
innotel
Inplastor
Insplorion
intel
SWEDISH ICT INTERACTIVE
InviSense
INWIDO
JP HOLDING AB
Johanneberg Science Park
KTH
KUNSKAP PARTNER
labtrino
LANTMÄTERIET
LEAX
Lemont
Limes Audio
Lindberg & Lindberg Engineering AB
LINKÖPINGS UNIVERSITET
Linnéuniversitetet
LKAB
LOW NOISE FACTORY
LTH
LUNDS TEKNISKA HÖGSKOLA
LUNDS TEKNISKA HÖGSKOLA
lumenradio
LUNDS KOMMUN
LUNDS UNIVERSITET
LYYTI
MÄLARDALENS HÖGSKOLA EKSKILTUNA VÄSTERÅS
MALMÖ UNIVERSITET
Mandalon
MASKINTEKNIK I Oskarshamn AB
MAVEN WIRELESS
MAVENOID
Medfield
Megger
meloq
MERCENE LABS
MEROX
METASUM
MiddDC
MINUT
MIST BASE
Mittuniversitetet
MittSverige Vatten&Avfall
MOBIVEN
Motion Control
MOUM DESIGN
MYCRONIC
MYVOX ULTRASONICS
NATIONAL INSTRUMENTS
NCI
neo
nilar
nip control
NOCILIS SENSORS
NoleTec
NORRKÖPING
NOTE
NYFORS
obducat
OMNISYS INSTRUMENTS
orbit one
OREXPLORE
Oskarshamns kommun
PERATECH
PERIMED
poc
Polisen
PROVIDE U
PROXIMION
psensor
qamcom
QRTECH
QUALISYS
rdot
Recab
Region Östergötland
requtech
RISE
RJK SE
Together ahead. RUAG
RUBICO
SAAB
SAAB
SafeLine
SAFERADAR RESEARCH
SANDVIK
SCANIA
scanreco
SCIBASE
scypho
SENSATIVE
Sensair
Sensix
sentient
SEPS
SERSTECH
SETEK
Shore Safety
ShortLink IMAGINE TOMORROW
SHT sinterna
SHT
SWEDISH ICT SICS
SP Devices
silex MICROSYSTEMS
simplex motion
SIVERSIMA
SKF
SKYSENSE
SLU
smart eye
smartoptics
Snackis
QSOFTWERK
SolarBora
SOLIBRO
SOLIBRO Research
Solutions for tomorrow
SONY
SoundView
SPARV Embedded
SPECTRACURE
SSAB
Synective Labs
SKB
STABLESURE
STAGA
Stardots
Statkraft
Stoneridge
Strål säkerhets myndigheten
SUNDSVALLS KOMMUN
SWECO
SAAB
SweGaN
swerea swedish research
swerea IVF
swerea KIMAB
swerea SICOMP
swerea SWECAST
TARJA'S CONSULTING AB
TCO DEVELOPMENT
Telia
tss
TERACOM
thinfilm
ThingWave
tibber
TIERPS JÄRNBRUK
TOLLCO
TOP NOTCH DESIGN & ENGINEERING
TOYOTA MATERIAL HANDLING
TRAFIKVERKET
TR:TECH
UNIBAP
UNICARRIERS
uniper
UPPSALA UNIVERSITET
VASAKRONAN
VATTENFALL
VB ENERGI
VERTICAL PLANTS SYSTEM
VIDEQUUS
VOITH HYDRO POWER GENERATION
VOLVO Construction Equipment
vti
Wasa Millimeter Wave
WideFind
winteria
WP2P
xenergic
xylem
yanzi
ZURAGON
AAC Microtec
ÅKERSTRÖMS
ÖSLING
3M

VISION and challenges

”by 2025 Swedish electronic systems enable a world-class Swedish industry ”.

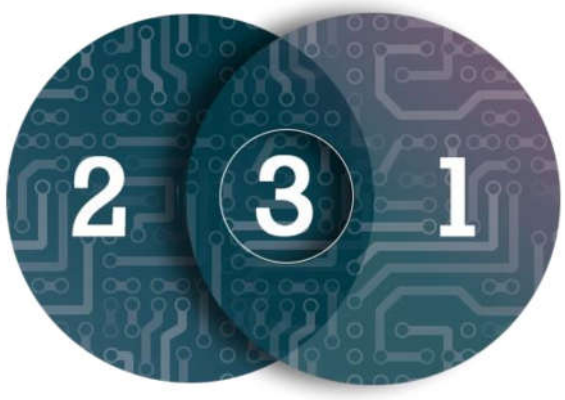


3 challenges

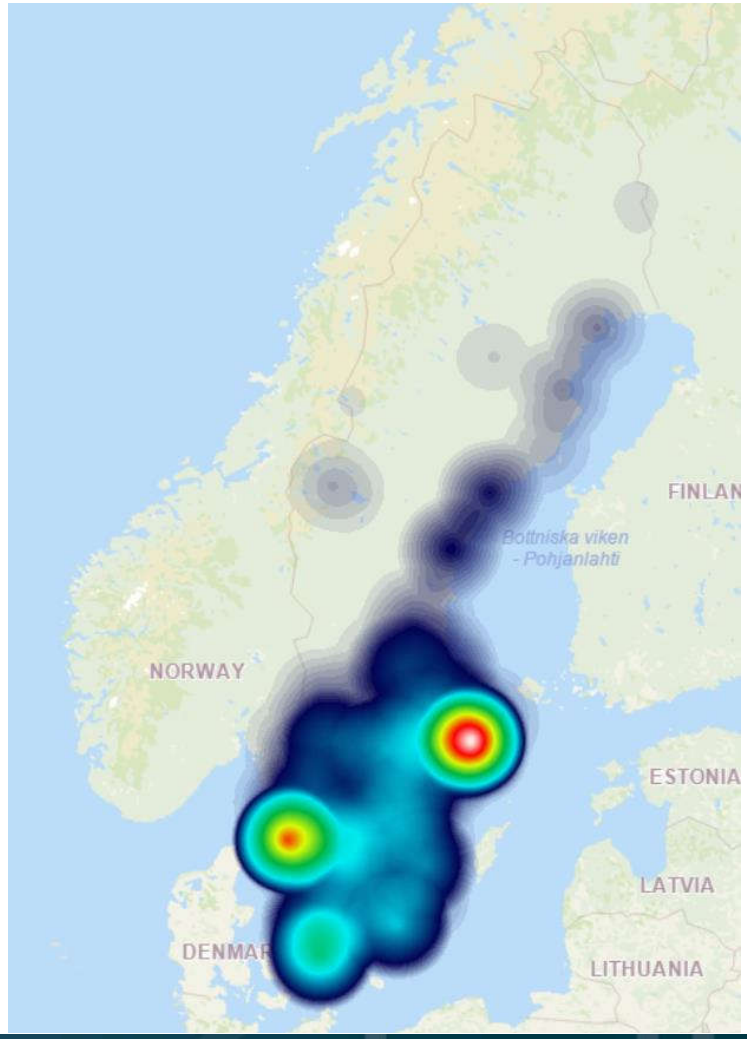
- Increased cooperation and efficiency in the value chains
- Maintained and further developed Swedish excellence
- Secure the provision of skills

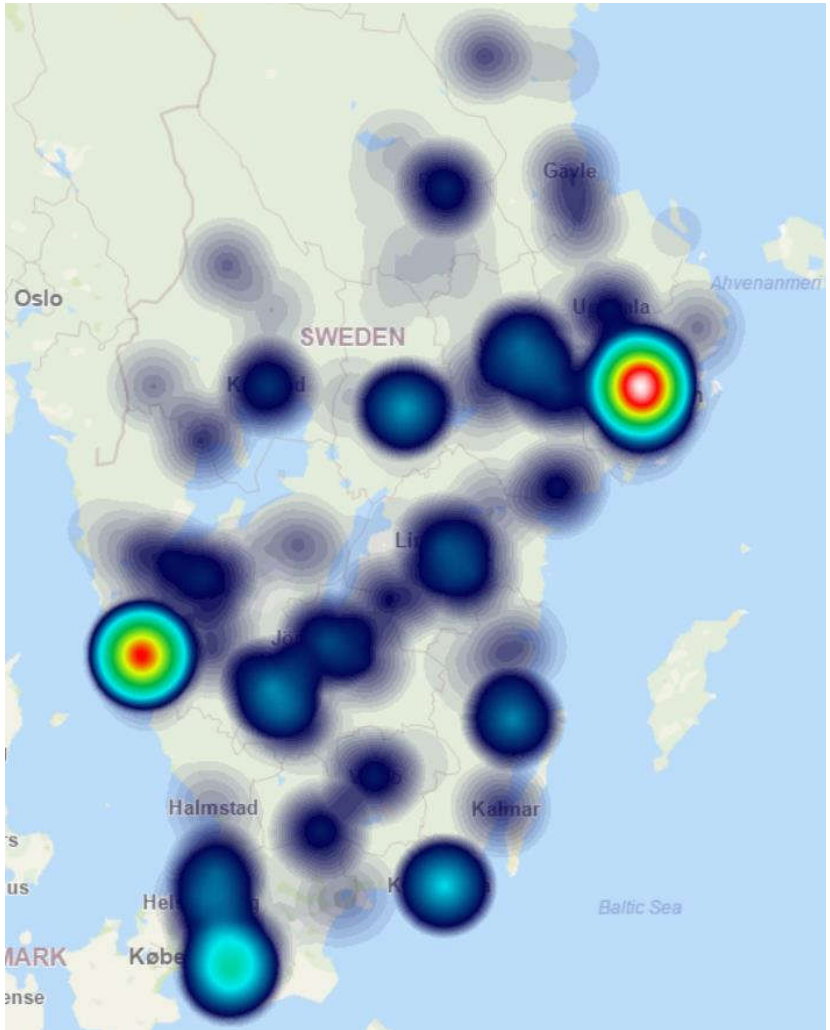
Three groups form electronic related industry in Sweden (figures from 2017)

- **Group 1** – 3 650 companies making electronics
  - Manufacturers, consultants, material/component suppliers and distributors
  - ENICS, Semcon Caran and Arrow
- **Group 2** – 7 850 companies with electronics in products
  - Elekta, ABB and Scania
- **Group 3** – 15 300 companies with electronics in production/operations
  - E.g. process industry, mining
  - AstraZeneca, Vattenfall and LKAB



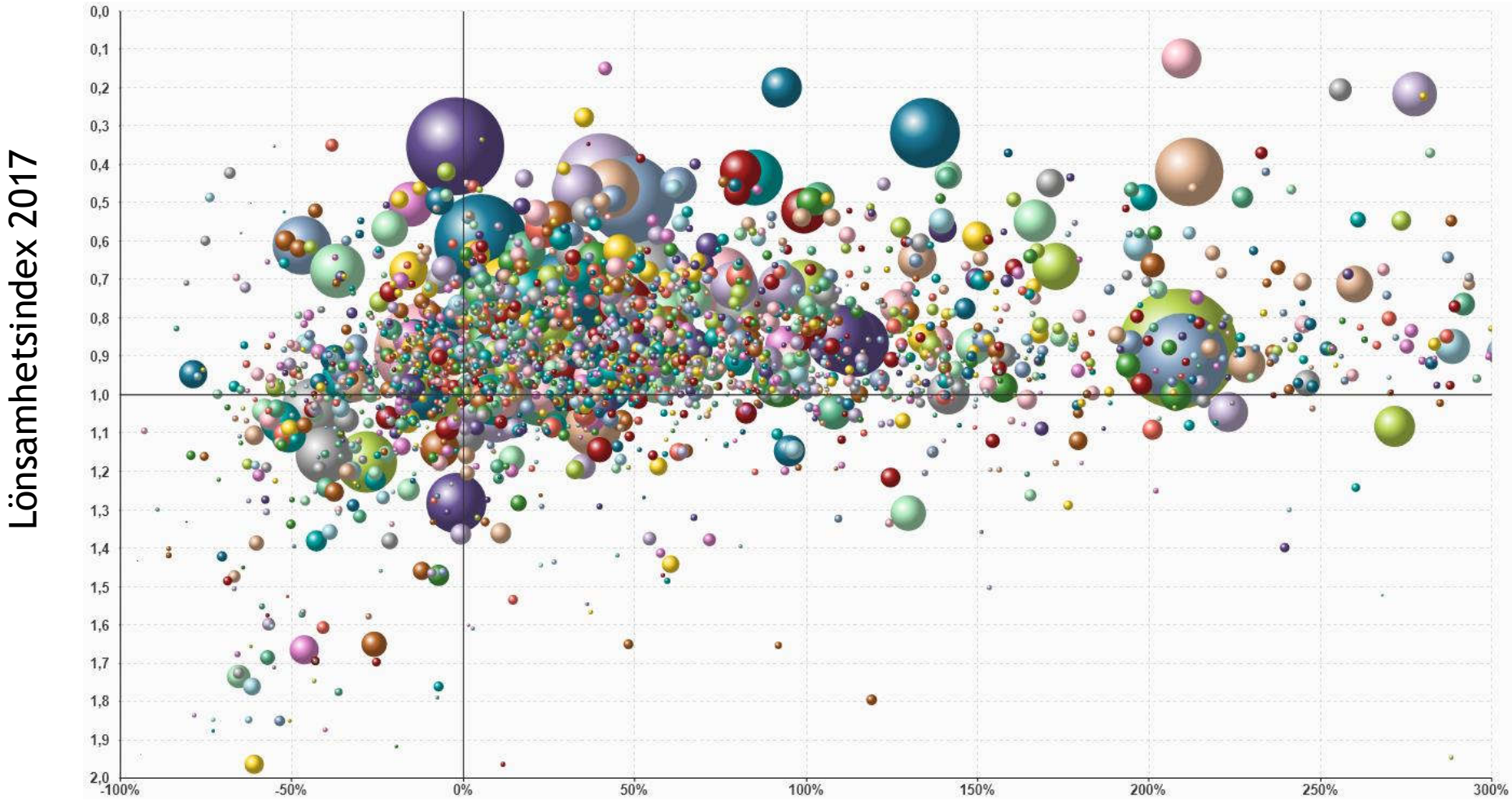
Group 1 companies in Sweden



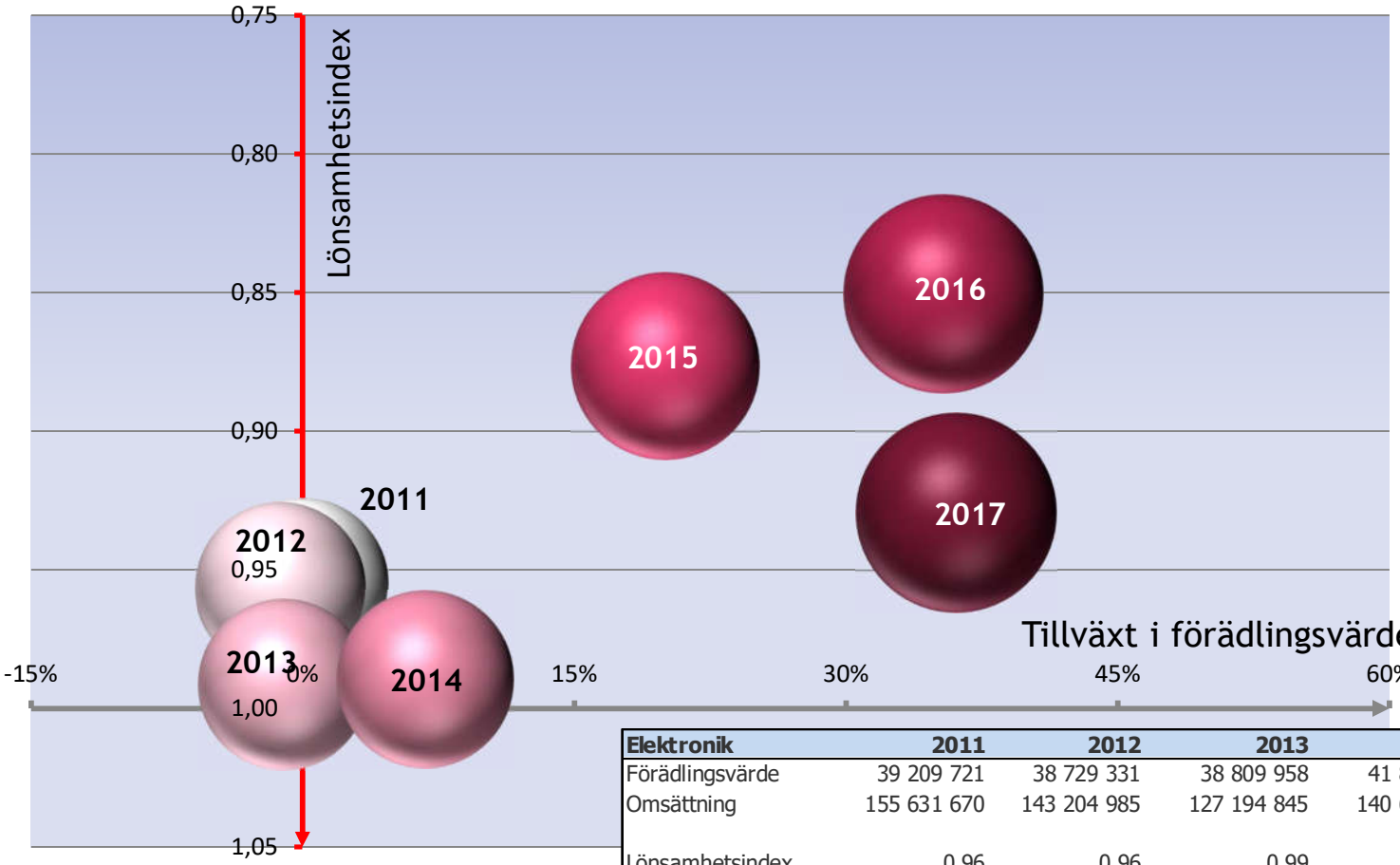


Group 1 Electronic industry- location of employees in sweden

All companies in Group 1Electronic industry – Growth *(Swe. Tillväxt)* and profitability *(Swe. Lönsamhet)*



Group 1 Status Swedish Electronic industry 2011-2017



Grupp 1 Elektronikindustrin har en medelgod till god lönsamhet under perioden. 2016 påverkas mycket positivt av Fingerprint Cards och NEVS.

Tillväxt i förädlingsvärde: +36%
Tillväxt i antal anställda: +14%
Tillväxt i antal företag: +1%
(+42 företag netto)

<u>Sveriges näringsliv</u>
Tillväxt i förädlingsvärde: +37%
Tillväxt i antal anställda: +11%
Tillväxt i antal företag: +10%

Elektronik	2011	2012	2013	2014	2015	2016	2017
Förädlingsvärde	39 209 721	38 729 331	38 809 958	41 869 869	47 065 552	53 085 336	53 374 043
Omsättning	155 631 670	143 204 985	127 194 845	140 617 247	153 767 165	163 518 021	172 678 166
Lönsamhetsindex	0,96	0,96	0,99	0,99	0,88	0,85	0,93
Antal anställda	50 806	50 887	51 394	52 768	52 897	55 032	57 818
Antal företag	3 543	3 518	3 593	3 655	3 686	3 659	3 585

SWE-EU BRIDGING ECS ACTIVITIES

- ✓ To work in close contact with small, medium and large Swedish companies to pilot them into consortia and Open Innovation collaborations for international (EU) collaborations
- ✓ Work is focused on 200 + SWE companies that participated in applications within the ECS SIP calls. This by analyzing EU Strategic Research Agendas (SRA) and EU calls, eg ECSEL, ARTEMIS, AENEAS, H2020, Europides-2/PENTA, Celtic Plus, and EU consortiums through Euripides/Eurostars, …) to match project descriptions within SWE-ECS against these
- ✓ Search for ECS project with Swedish partners and “convince" the opportunities and benefits with participation in EU research programs from good reference examples
- ✓ As a founding partner of Digital Sweden (ECSEL mirror group-SWE) – Collaboration with “sister” organizations similar to Smarter Electronics Systems in other countries, e.g. ECSEL Austria, ECSEL Italy, UK High Value Manufacturing Catapult, Photonics Finland, Digital Sweden Ambassadors, …
- ✓ Use these networks to find international partners for Swedish project participants in the field of Smarter Electronics Systems (ECS)
- ✓ Encourage and support ECS project partners to use EEN and EIC/EASME acceleration services to apply for international collaborations to further develop project results

Swedish ECS Roadmap

Smartare
Elektroniksystem
för Sverige

RAPPORT

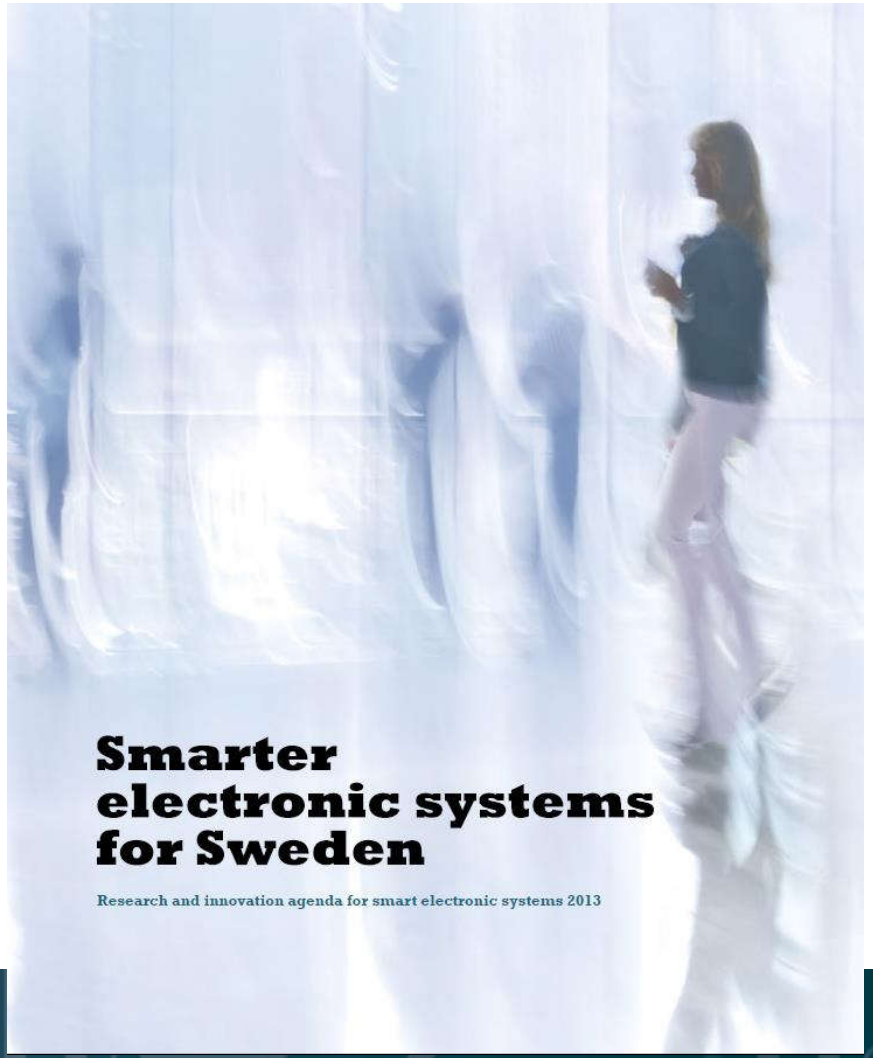
Roadmap for Smarter Electronics Systems

September 2016

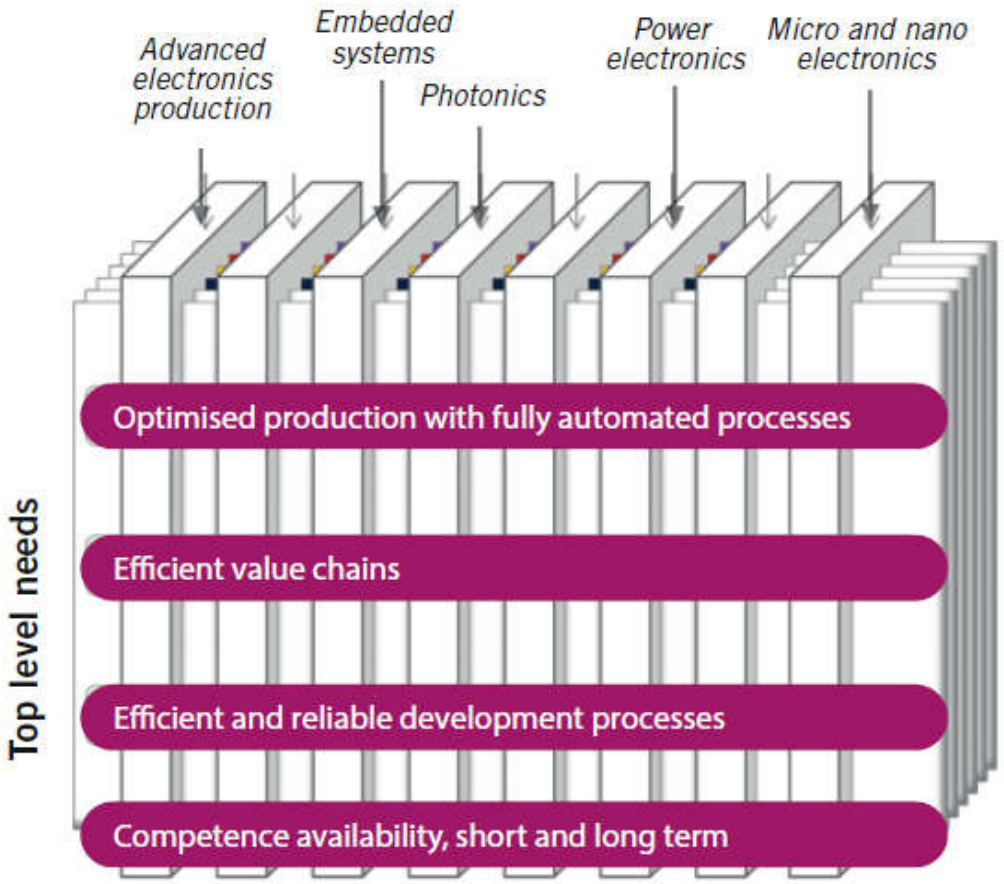
Rapporten är sammanställd av:

Jerker Delsing, Luleå Tekniska Universitet
Jonas Gustafsson, Luleå Tekniska Universitet
Magnus Svensson, Acreo Swedish ICT AB
Leif Lungqvist, Acreo Swedish ICT AB
Maria Månsson, Svensk Elektronik
Pierre-Yves Fonjallaz, PhotonicSweden
Hans Grönqvist, Swerea IVF AB

SRA -Research and Innovation Agenda for ECS Sweden (English version)



Strategic Research and Development ECS areas in Sweden



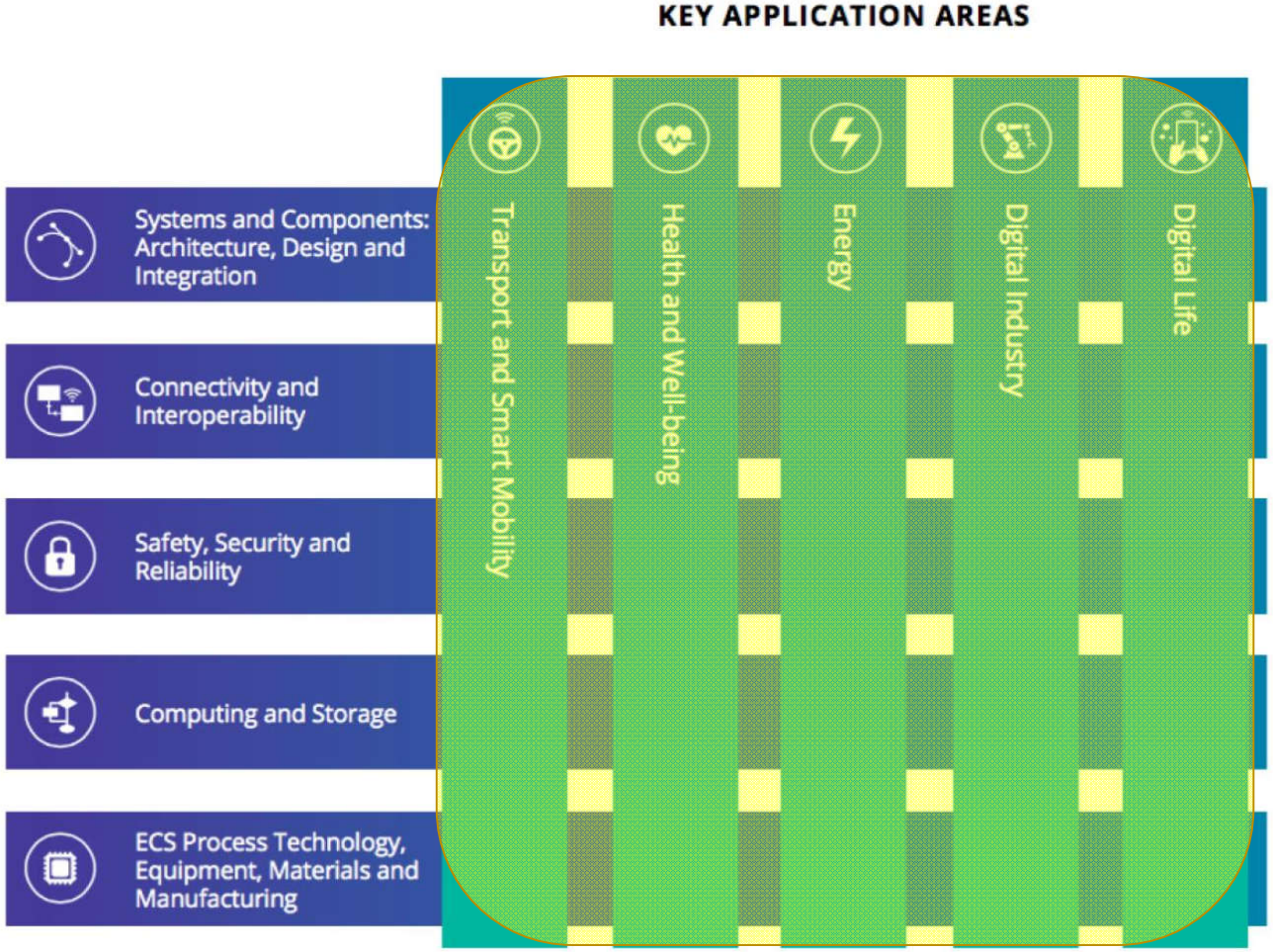
Industrially interesting/emerging technologies

- *Assembly technology and reliability*
- *Sensors*
- *Printed electronics*
- *Antenna, microwave and therahertz systems*

Application priorities

- Telecom
- Automation/production
- Automotive
- Energy
- Life Science
- Military and security

The 130 Swedish ECS projects granted under SES 2014-19
- all over the ECSEL theme map



SES competence HUBs:

- ✓ Antenna, microwave and THz systems
- ✓ Printed Electronics
- ✓ Photonics
- ✓ Micro- and nano- electronics
- ✓ Embedded systems
- ✓ Advanced electronics production
- ✓ Power electronics
- ✓ Reliability in electronic hardware

extra HUBs:

- ✓ Embedded sensor systems for health
- ✓ Integrated Circuits and systems

EU Investments in Sweden

Invest. (Sept 30 2017)	H2020	ICT	ICT-Target	Increase
Total	26 549 M€	3 110 M€		
Sweden	931 M€	90 M€	*109 M€*	*19 M€*
Share	3,5%	2,9%	*3,5%*	*21%*

- **Sweden is 8th largest receiver of H2020 funds in EU corresponding to 3,5% of the H2020 budget (public data upto Sept 30 2017)**
- **In the ICT Area Sweden's share is 2,9% which is considerably less than average H2020 level**
- **A reasonable goal is to increase ICT to the average Swedish H2020 level of 3,5%**

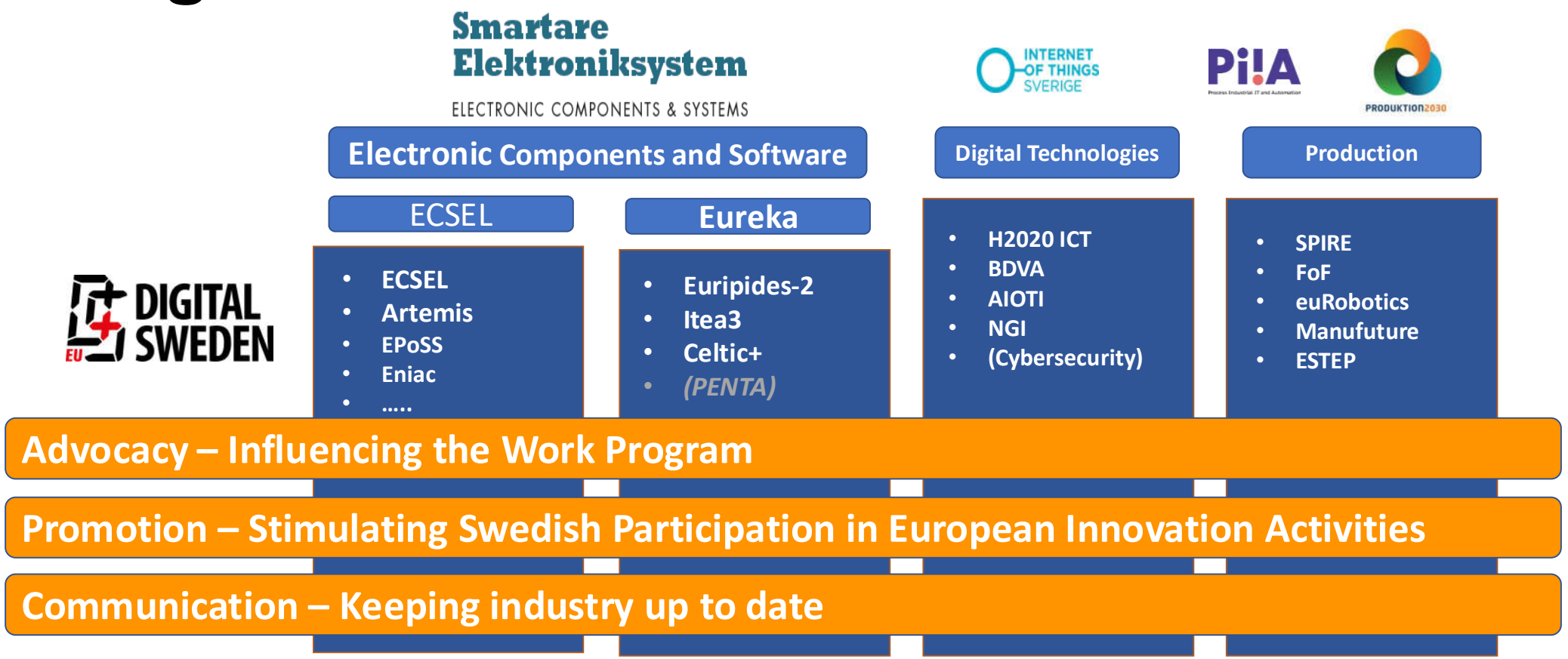
CONTACT:
WWW.SMARTAREELEKTRONIKSYSTEM.SE

Deputy program manager
responsibilities for Int'l activities:
Dr. Thorbjörn "TOBY" Ebefors
Thorbjorn.Ebefors@smartareelektroniksystems.se

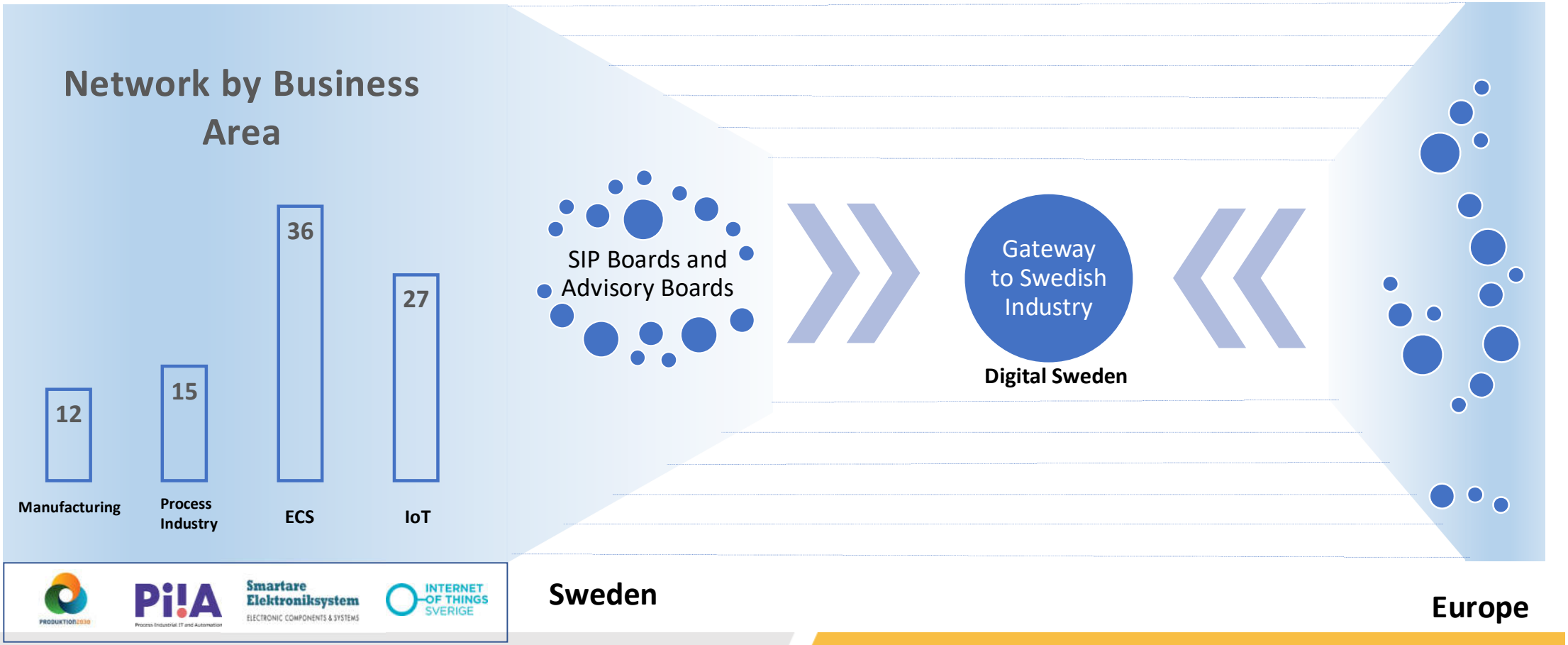
Program manager:
Magnus Svensson
Magnus.Svensson@smartareelektroniksystem.se

Gateway to
Swedish ICT
in EU

Digital Sweden in EU



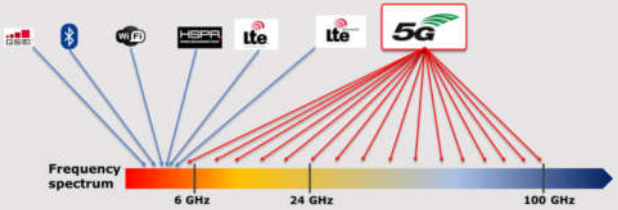
A Gateway to Swedish Industry



Swedish ECS project portfolio examples and ideas for Int’l collaborations

BeammWave AB

Disruptive antenna and RF front-end chip for mmWave devices



Mobile data **2X** Every 18 months

Higher complexity and new frequencies in 5G

mmWave, beamforming and massive MIMO

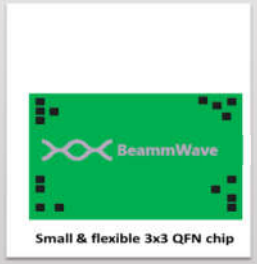
New and exceptional challenges in small form factor devices

Analog reference
Expensive, large area, lossy paths to antenna

Analog

Large, bulky standing modules

Digital



Small & flexible 3x3 QFN chip

Optimized performance, shorter TTM, smaller, less loss and cost efficient

BeammWave

Mission:

Absorb complexity whilst optimizing performance, cost and allowing the smallest possible mmWave 5G device, enabled by digital beamforming

BeammWave

Ambition & Business model(s):

IP licensing and partner projects based on verified chip

BeammWave

BeammWave

Looking for partners complementing our RF solution

Contact information:

Web:	https://www.beammwave.com/
Technical:	CTO, Per-Olof Brandt <per-olof@beammwave.com>, +46 738 151983
Commercial:	CEO, Stefan Svedberg <stefan@beammwave.com>, +46 705 106080

xenergic

xenergic

Memories for a connected world

Low-voltage SRAM for **I**ntegrated **C**ircuits

- 28/ 22/ 16 nm, Bulk and SOI
- 90% less power
- High access rates
- Cost (area) efficient

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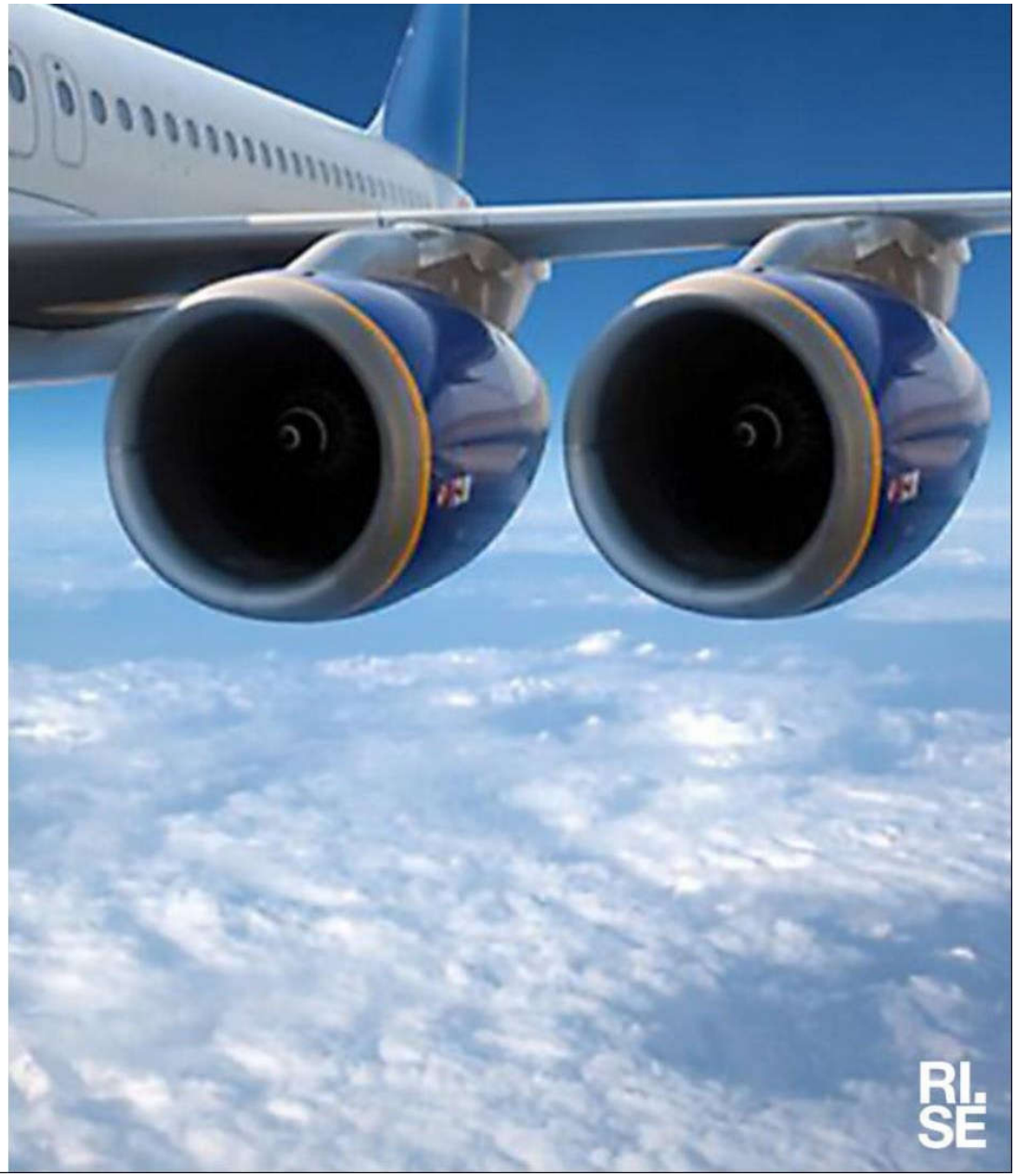
SENSORS FOR DIGITAL ELECTRONICS AND PHOTONICS APPLICATIONS

QIN WANG AND MICHAEL SALTER

SMART HARDWARE DEPARTMENT
RISE/ICT
164 25 KISTA
STOCKHOLM
SWEDEN

QIN.WANG@RI.SE AND MICHAEL.SALTER@RI.SE

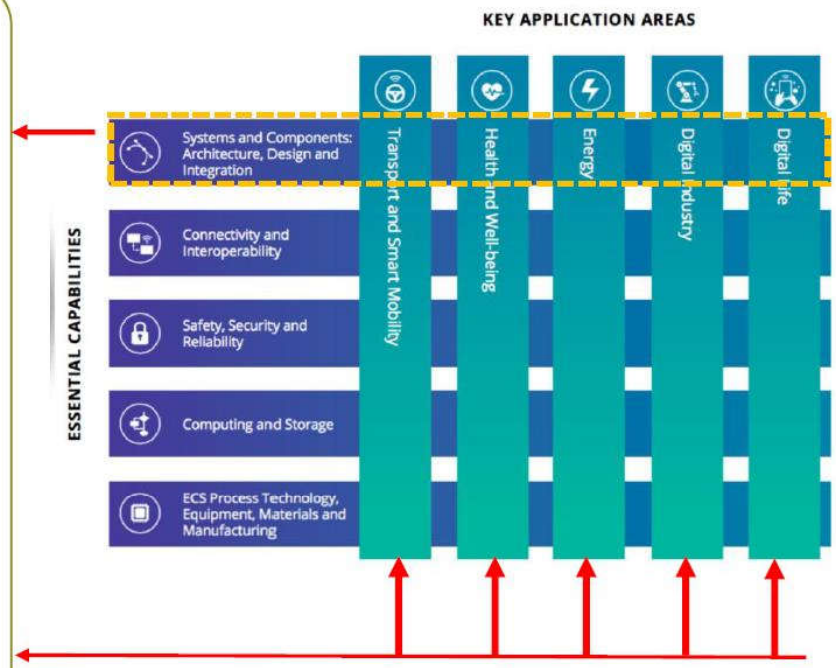


Our offers/competence:

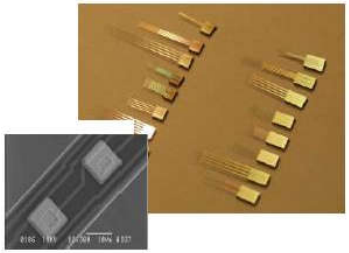
- We develop new materials, electronic and photonic devices and systems that create new functionalities and allow for further integration and miniaturization giving higher performance at reduced cost.
- We specialize in the areas of nano/micro fabrications, MEMS/NEMS nanoelectronics/photonics for applications for imaging, bio/life science, sensors and actuators, power electronics and high-speed communications.

Call partnership on:

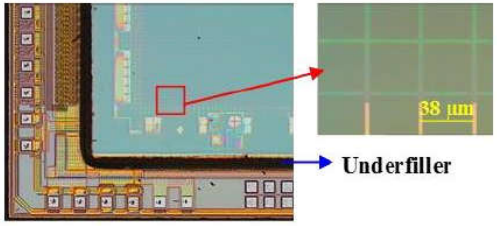
- Artificial Intelligent (AI) Empowered Sensor System for Neurodegenerative Disease Detection
- R&D of Wide Band Semiconductor for RF and Power Electronics
- Multiple Quantum Wells (QWs) based Large Format 2D Spatial Light Modulators (SLMs) for Optical Information Processing such as AI applications
- Development and Optimization of SiC based High Temperature and High Pressure Sensors for Industrial and Harsh Environment Applications



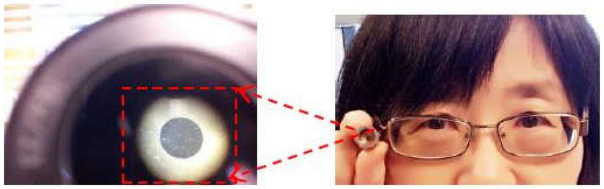
Wafer scale components/sensors design and fabrication at Electrum clean room facilities



Si based micro needles

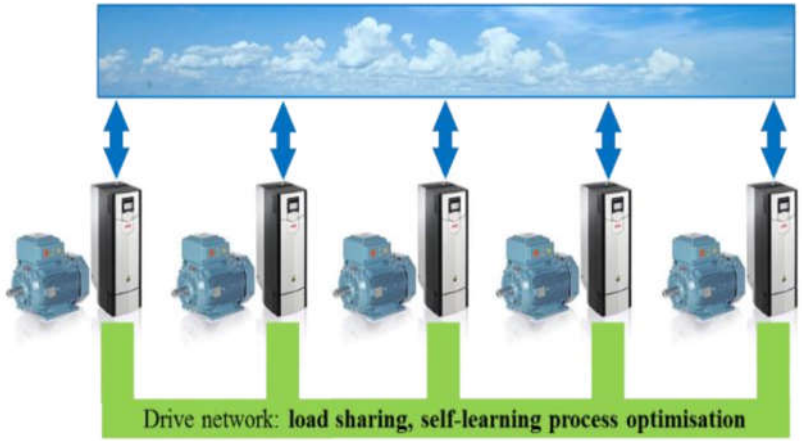


MQW SLM flip-chip mounted on its electronic driver



SiC based all optical high pressure and high temperature sensors for auto industry

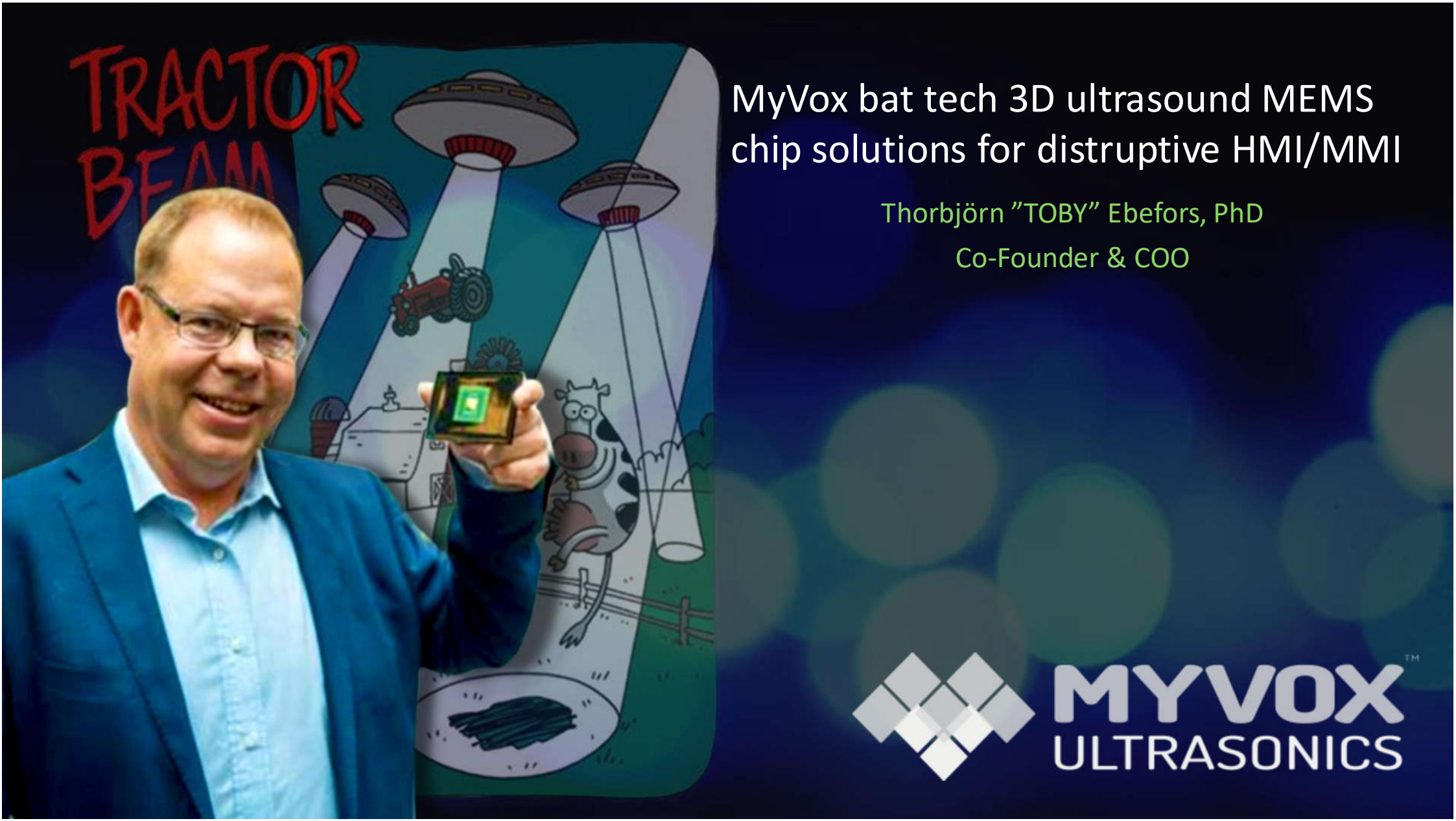
SpiceDrives: Self-predicting and inter-communicating electric drives for industrial process optimization (2018-2020)



- Proof of concept testbed of small set of drives, including oversampling based state monitoring, machine learning based diagnostics, and reliable drive to drive communication
- Participants: KTH Royal Institute of Technology, Ericsson, ABB, Imagimob, Lumen Radio

- Looking for collaborators for project continuation
  - Industry applications as use cases for inter-drive communication or drive health monitoring
  - System integrators
- Contact: Viktoria Fodor, KTH, vfodor@kth.se
- Project information: https://www.kth.se/profile/vjfodor/page/vinnova-self-predicting-electric-drives

With financing from: VINNOVA Sweden's Innovation Agency



MyVox bat tech 3D ultrasound MEMS chip solutions for distruptive HMI/MMI

Thorbjörn ”TOBY” Ebefors, PhD

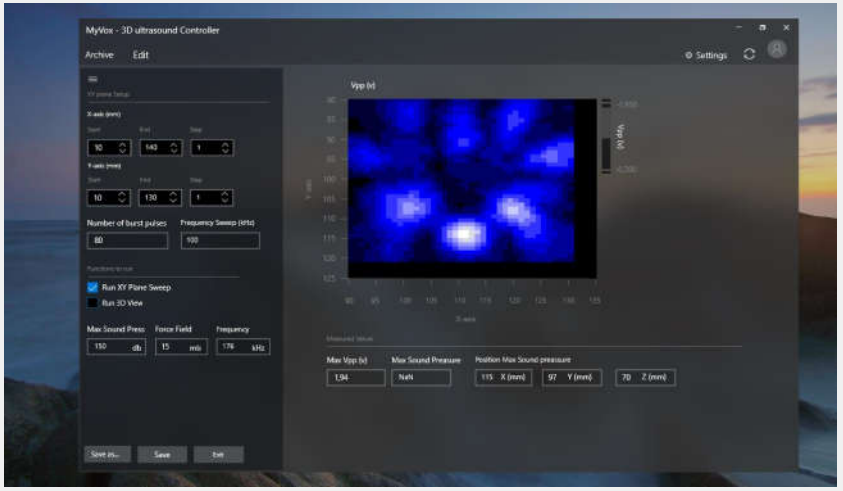
Co-Founder & COO

MYVOX™ ULTRASONICS

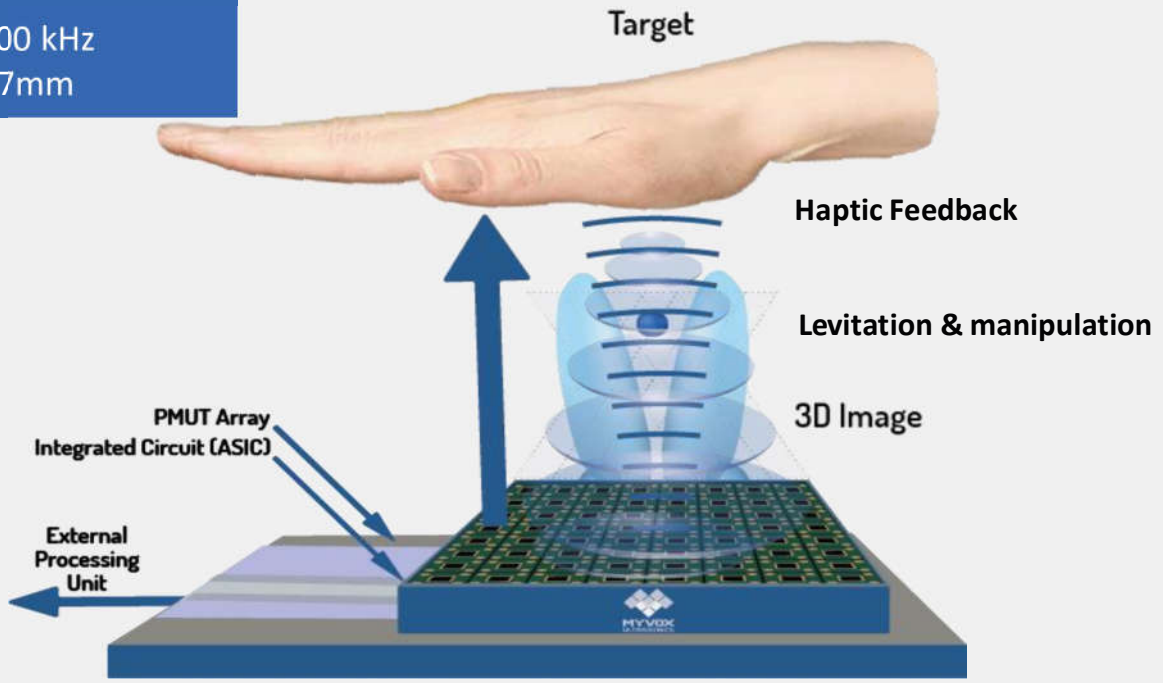
MYVOX TECHNOLOGY – PLATFORM ARCHITECTURE

MyVox patented technology is based on ultrasound Transmit/Receive beamforming

MyVox 3D Ultrasound Controller Software



Ultrasound Wave
f_0= 200 kHz
λ= 1,7mm



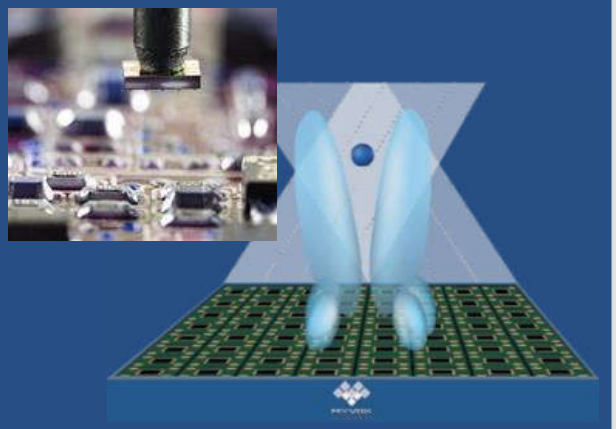
THE ABILITY OF 3D ULTRASOUND

Gesture Control

HMI Vision

The *Human hand* becomes a universal input for interaction with Machines.

Acustic Tweezers



MMI Vision

For small objects manipulation

Haptic applications

HMI Vision

Contact free personalized knobs with haptic feedback


We have helped entrepreneurs to:
✓ Reach the 33-list of Sweden's hottest tech companies... twice
✓ Find optimal technology and apply efficient processes
✓ Support the entire product life cycle
✓ Show real value of IoT – Splunk
✓ Scale resources on demand
✓ Secure patents and IPS protection
✓ Go from idea to market to IPO
strikersoft.com
Strikersoft

The Nordic region's leading design house for power electronics and PCB-layouts

www.ekpower.se

Not your average smart glass manufacturer

ChromoGenics offers smart glass with controllable heat- and light transmission. The company's unique technologies ConverLight® and I-Window provide sustainable solar control for increased indoor comfort and energy efficiency, and contributes to Green Building certifications.

ChromoGenics

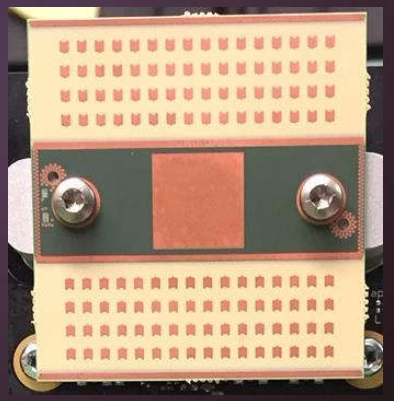
Sivers IMA
R&D collaboration –

SIVERSIMA

5G-NR and 802.11ay

- Sivers IMA is looking for partners in the domain of 5G-NR and IEEE 802.11ay systems
- Sivers IMA is planning chip development of the next generation mm-wave RFIC Transceiver
- Key technology aspects/collaboration areas
  - mm-wave design in advanced high frequency silicon technologies
  - Efficient and linear PA
  - High speed AD/DA converters
  - 5G and 802.11ay Modems

BFM06010/00 Primary Side



BFM06010/00 Primary Side

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Questions?

For more information @ www.siversima.com

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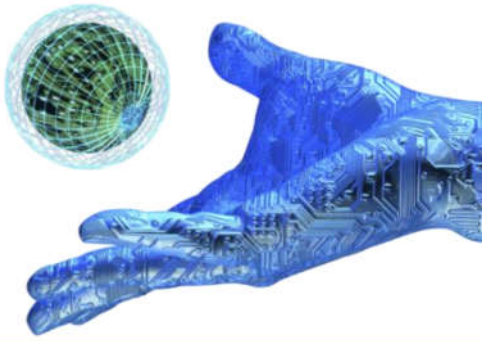

Aaxsus ABB ABSORBEST a(c)oneer ADDIVA Aditus Science AB AecorLink AGELLIS group Air Green Sweden AB Akademiska Hus Akademiska Sjukhuset Allelion aifloo ikit Communications Alleato ALSTOM ALSTOM Power

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Beneli Biocrine blink BLUETEST.se BMP INNOVATION BOARD ARCHITECT BOLIDEN BOMBARDIER BOMBARDIER TRANSPORTATION BrainCool Brighter BRÄNDÖ bublar.

C2AMPS CA Clase CAPELON CARGO BEACON CATENA CathPrint CERVITROL MC2 ChromoGenics Cobolt Cochlear Cogra combain COMHEAT Microwave AB compart Connect2Mind C*pac

dBm RF Research AB DELTA DENSO DGC DIGITAL METAL DP Patterning bradford ecaps ecopilot POWER SOLUTIONS enics epinova epishine Elektronik Partner ERICSSON excillum

ferroamp fiberoptic valley FOTONIC First Control Systems AB FlexProp FOI FOLLOWIT fortum frontside

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MYCRONIC MYVOX ULTRASONICS NATIONAL INSTRUMENTS NCI neo nilar nip control NOCILIS SENSORS NoleTec NORRKÖPING NOTE NYFORS obducat OMNISYS INSTRUMENTS orbitone OREXPLORE Oskarshamns kommun

PERATECH PERIMED POC Polisen PRODUCE U PROXIMION esensor qamcom QRTECH QUALISYS rdot Recab Region Östergötland requtech RISE RIK RUAG RUBICO

SAAB SAAB SafeLine SAFERADAR RESEARCH SANDVIK SCANIA scanreco SCIBASE scypho SENSATIVE Senseair Sensefix sentient SEPS SERSTECH SETEK Shore Safety ShortLink SHT Sinterna SHT

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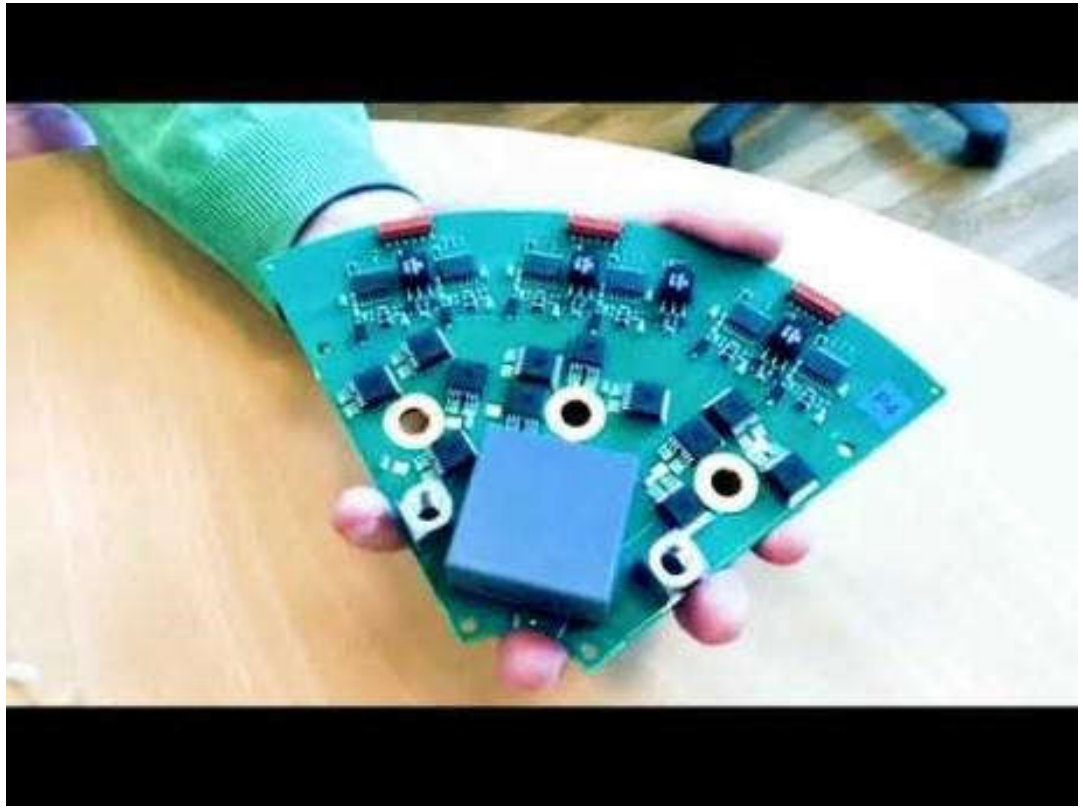

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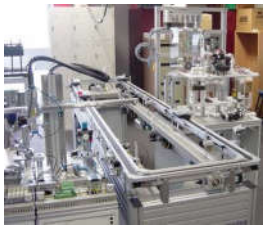

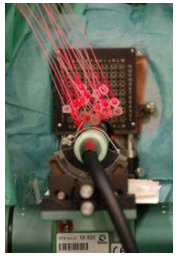

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