

**Smartare
Elektroniksystem**

ELECTRONIC COMPONENTS & SYSTEMS

Smarter Electronic Systems

-a strategic innovation programme to strengthen competitiveness of Swedish electronics sector

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Med stöd från

VINNOVA
Sveriges innovationsmyndighet

 **Energimyndigheten**

FORMAS 

Strategiska
innovations-
program

Outline

- What is a strategic innovation programme
- How we work in Sweden for the growing electronics sector
- Swedish ECS landscap
- Support from idea to product in emerging technologies
 - focus 7 HUBs exemplified by
 - Advanced manufacturing - Cross connect - Electronic packaging
- Project and Swedish ECS Company examples from Nat'l portfolio

Strategiska program



FORMAS

- Yellow dot
- Red dot
- Blue dot
- Green dot
- Orange dot

STRATEGISKA INNOVATIONS-PROGRAM

Strategic innovation areas

With support from



Strategic
innovation
programmes

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

SES Founded in 2014 and running to 2026:
+ ~70 companies, total 107 organisations

+ adding >350 new organisations (Large Corps and SME and ROTs) through-out 2014-2022 calls



Smarter Electronic Systems (SES) – a Swedish ECS partnership program

- Cooperation Industry - Public sector - Academia

Vision

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

3 challenges

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

Excellence

- Areas of Excellence

- micro-nano electronics
- printed electronics
- power electronics
- photonics
- antenna, microwave and terahertz system
- Sensors and embedded technology

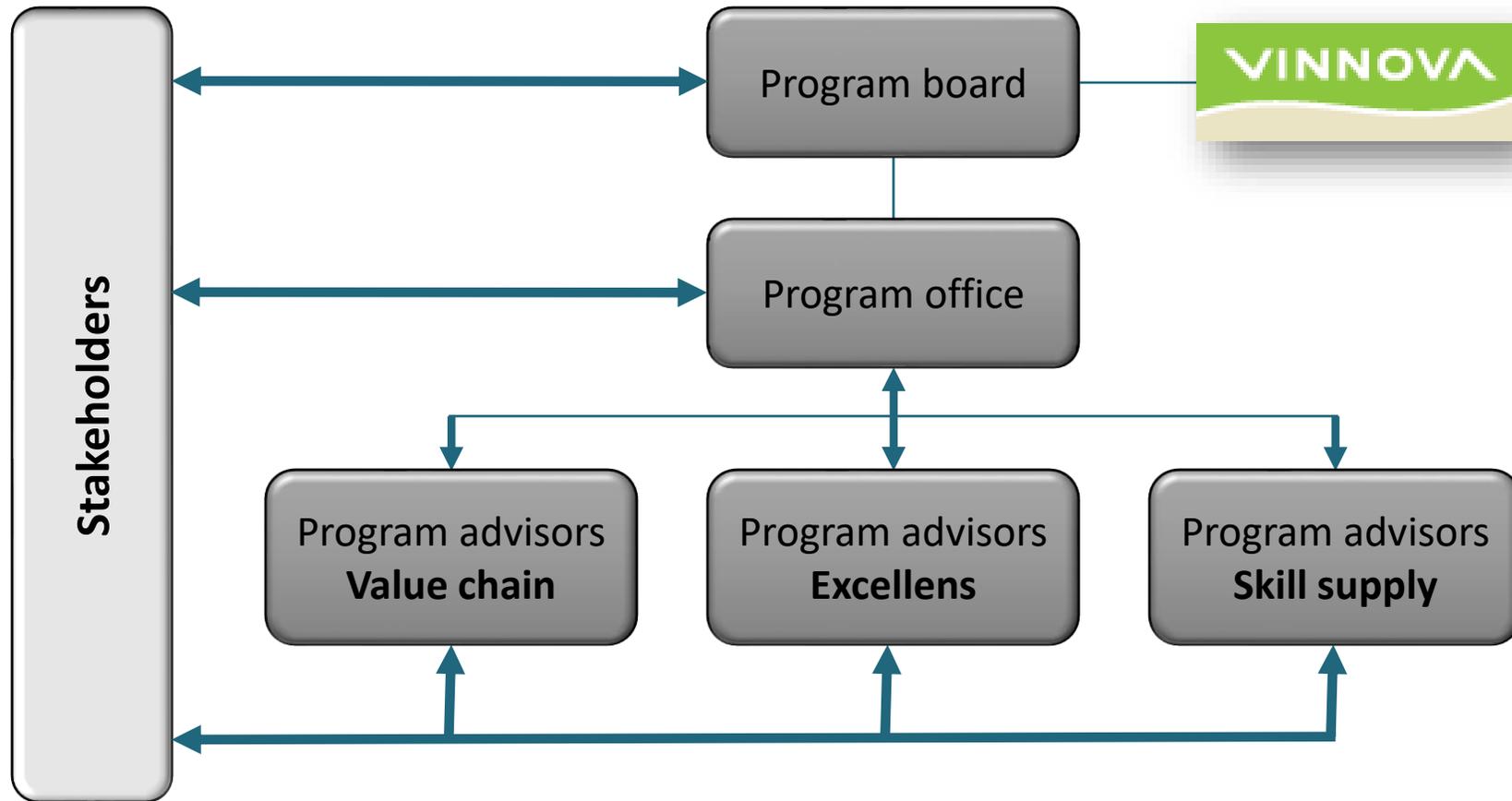
Focus areas

- **Electronics packaging**
- reliability
- advanced manufacturing technology



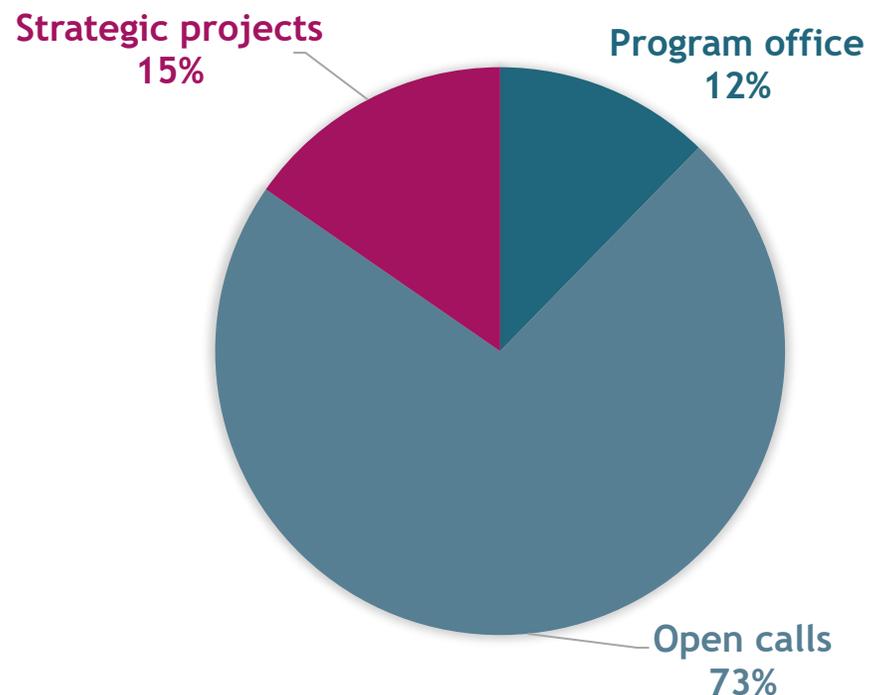
Forming ~600 SWE ECS project proposals 2014-22

SMARTER ELECTRONIC SYSTEM -organisation



Our tools

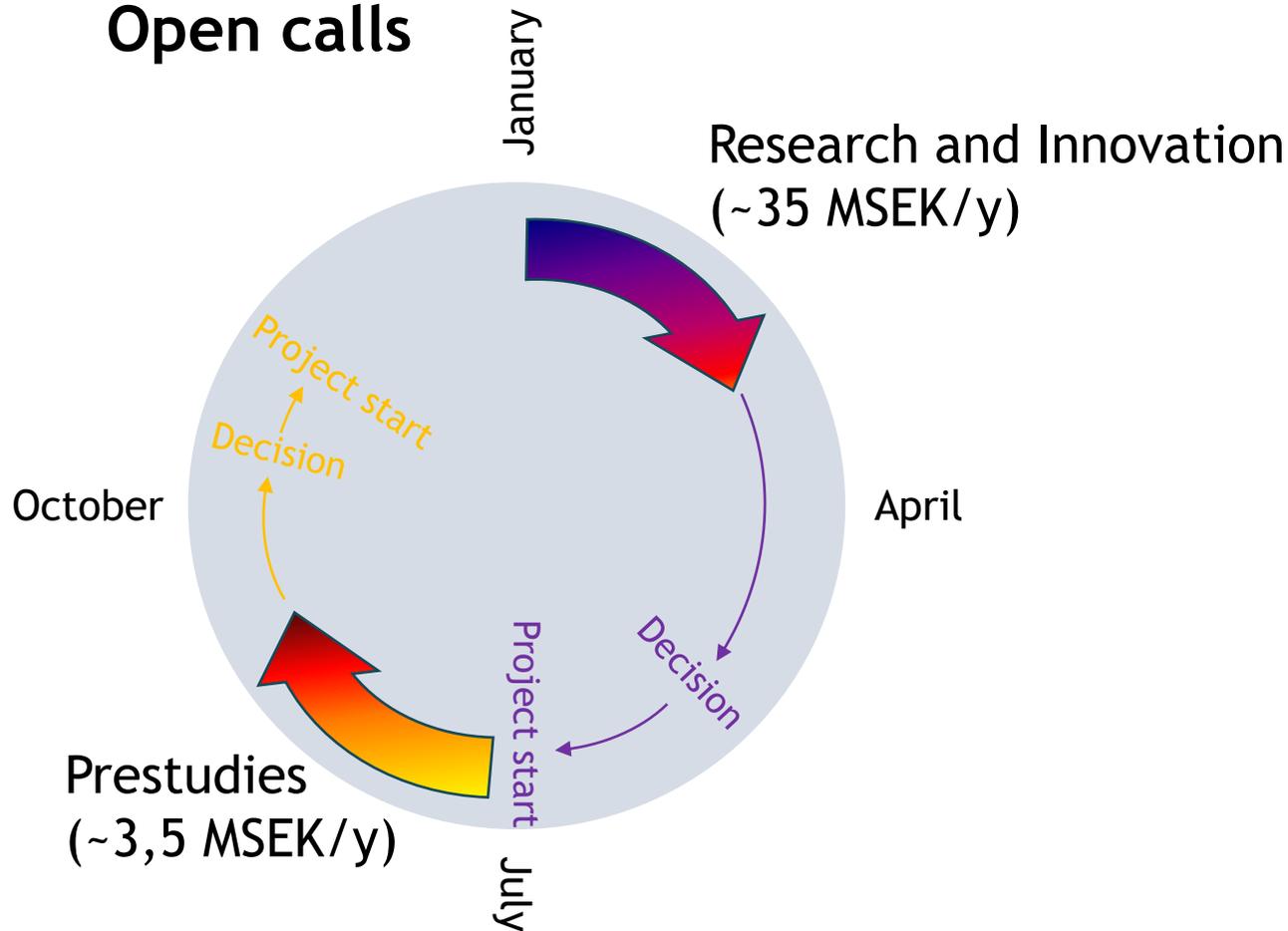
- Yearly budget ~4,5 M€



- Program office
 - ~3-4 persons
 - Conferences, seminars, fairs, delegations, matchmaking
 - Internationalization
 - Reports and lobbying
 - Managing strategic projects
- Strategic projects
 - Activities of interest for many
 - E.g. Testbed for printed electronics, Smartare Elektronikhandboken, PCB reliability testing project
- Biannual open calls through Vinnova
 - Feasibility studies
 - Innovation projects

SES Public funding opportunities for development projects

Open calls



Next opportunities

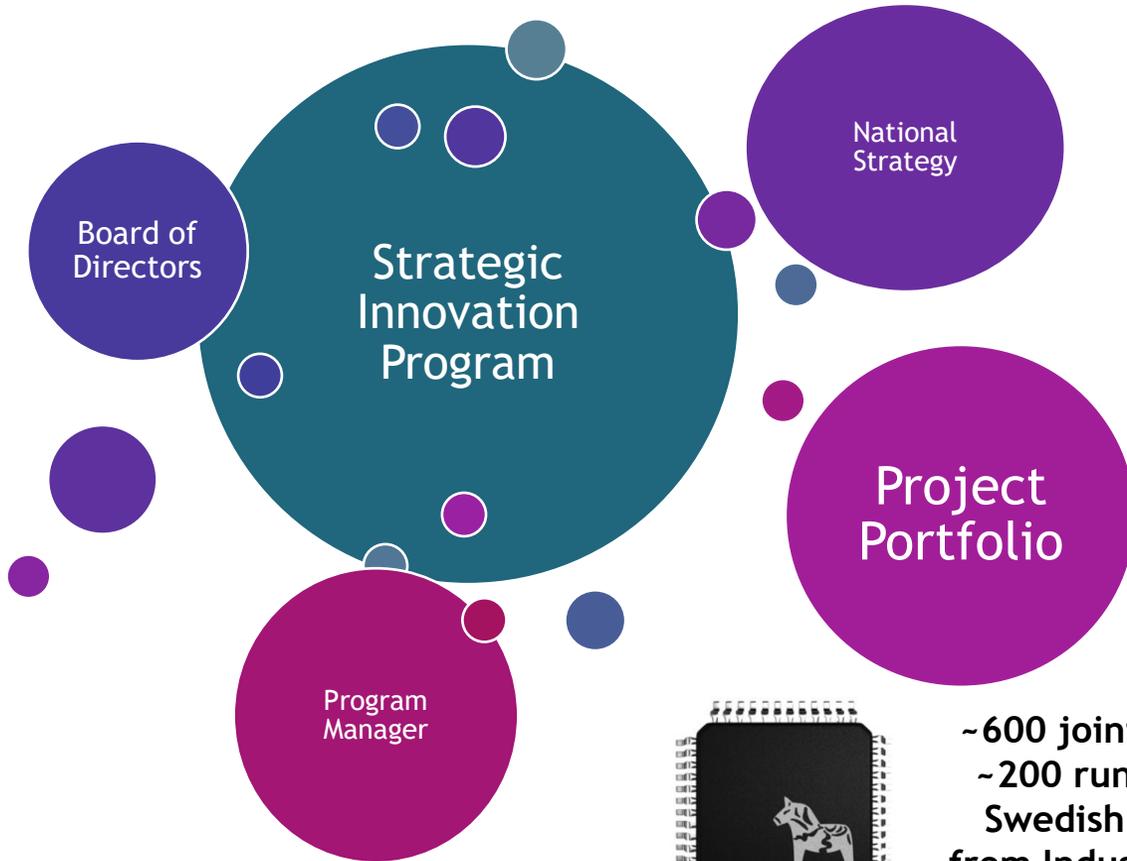
- Feasibility studies
- Open 7th June
- 16th Aug - call presentation and
- Deadline for proposal 7th Sep.

Research and Innovation projects

- Open January 2023
- Deadline March 2023

Internationalization @ Smarter Electronic System (SES)

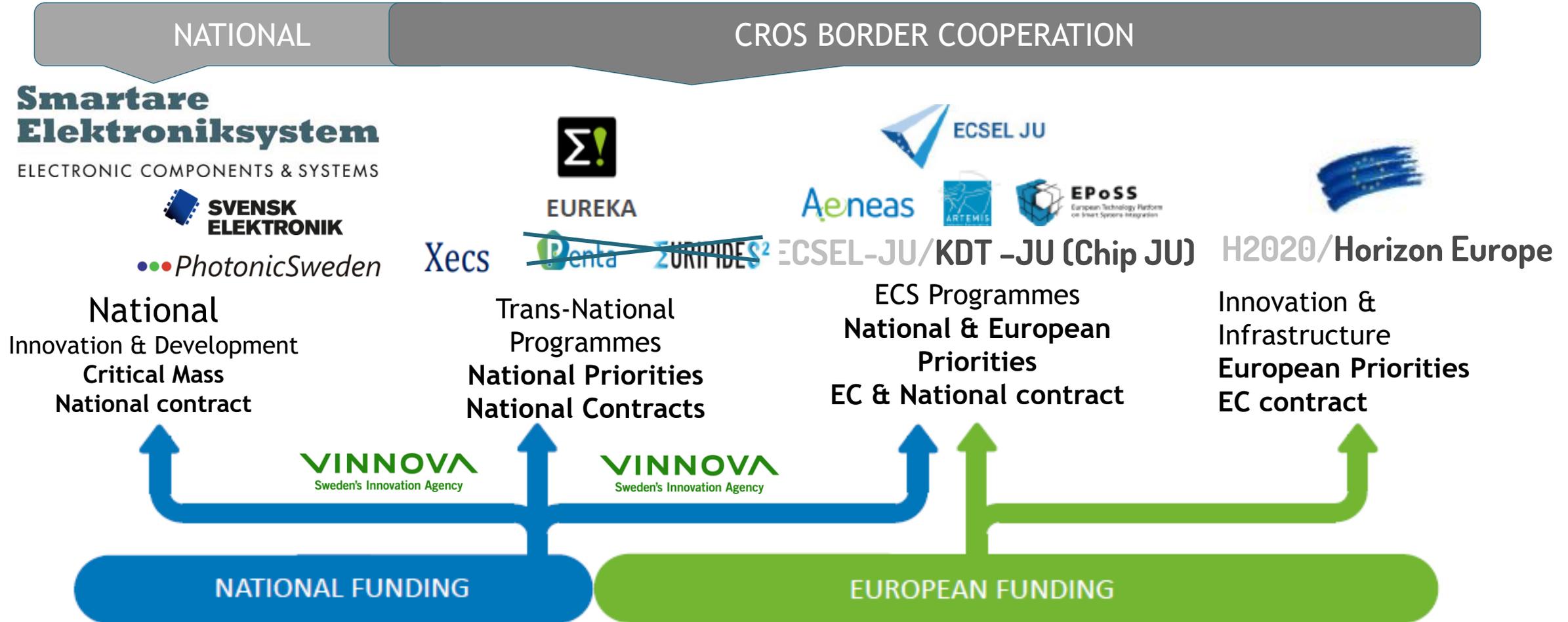
National Ecosystem

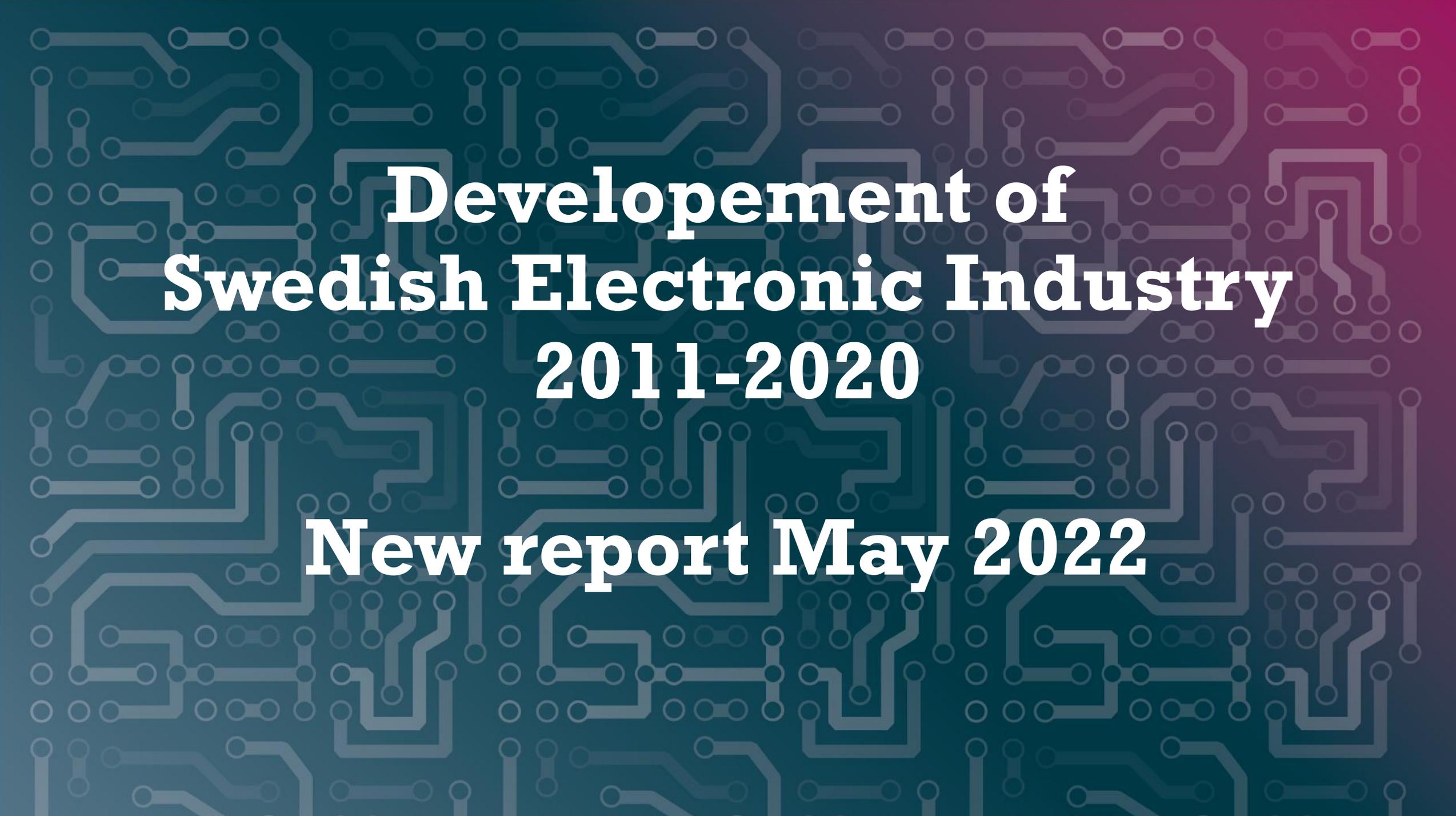


~600 joint proposals and
~200 running or ended
Swedish ECS projects
from Industry & Academia

The ECS Funding instrument landscape

Positioning Smarter Electronic Systems (SES) vs Xecs and KDT in the European Funding Landscape



The background of the slide is a repeating pattern of a circuit board, rendered in a light blue-grey color against a dark teal background. The pattern consists of interconnected lines and circular nodes, resembling a printed circuit board (PCB) layout. The overall aesthetic is technical and modern.

Development of Swedish Electronic Industry 2011-2020

New report May 2022

Three groups form electronic related industry figures from 2020 (2017)

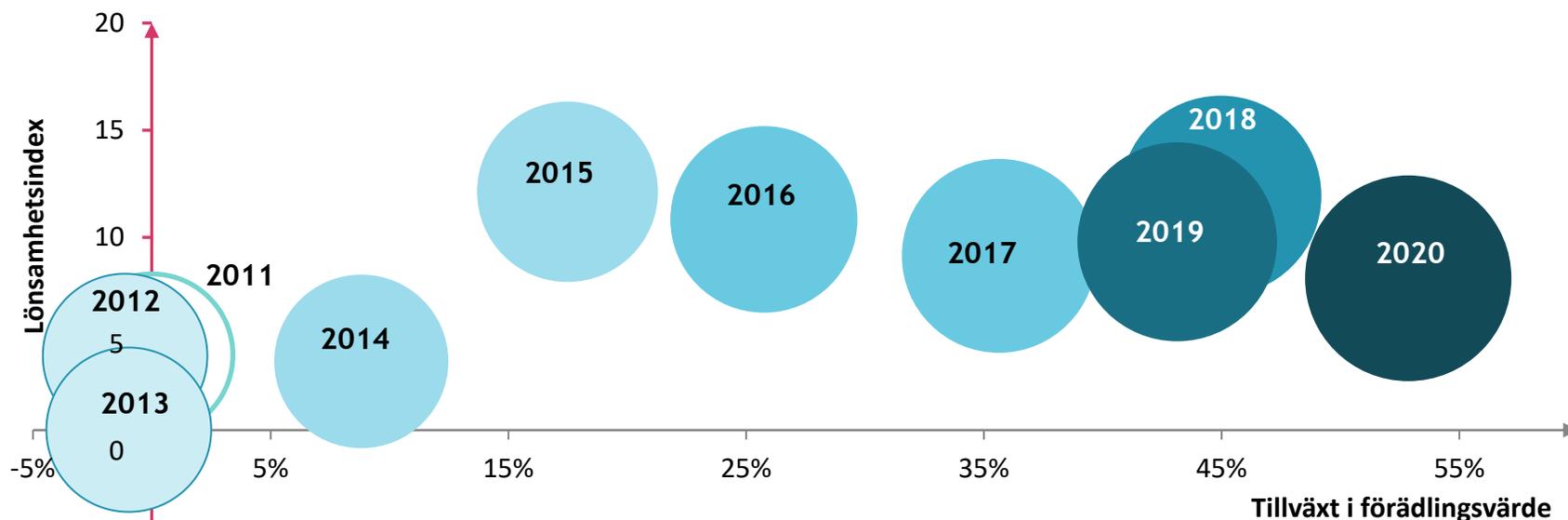
- **Group 3** - 16 429 (14 158) companies with electronics in production/operations
 - E.g. process industry, mining
 - AstraZeneca, Vattenfall and LKAB
- **Group 2** - 8 030 (7 537) companies with electronics in products
 - Ericsson, Elekta, ABB and Scania, ...
- **Group 1** - 3 667 (3 543) companies making electronics
 - Manufacturers, consultants, material/component suppliers and distributors
 - ENICS, Semcon Caran, Arrow, Silex, Mycronic, FPC, ...



Our stakeholders

Group 1 Elektronik industry, development 2011-2020

Excl. NEVS, Fingerprint cards, Veoneer, Polestar and Northvolt **



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Om vi exkluderar företag med stora satsningar ser vi en stabil och god utveckling för branschen. Satsningarna ger hopp om fortsatt god utveckling.

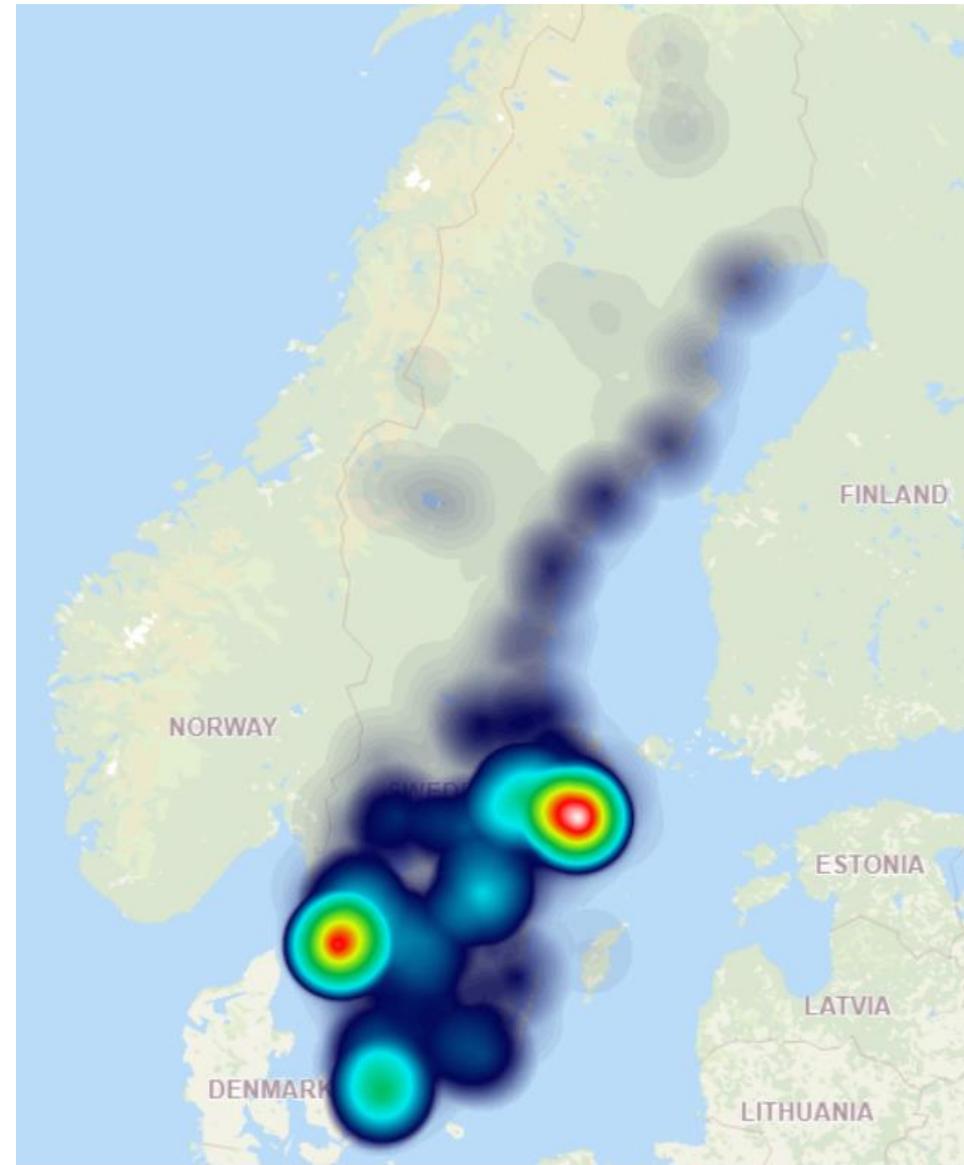
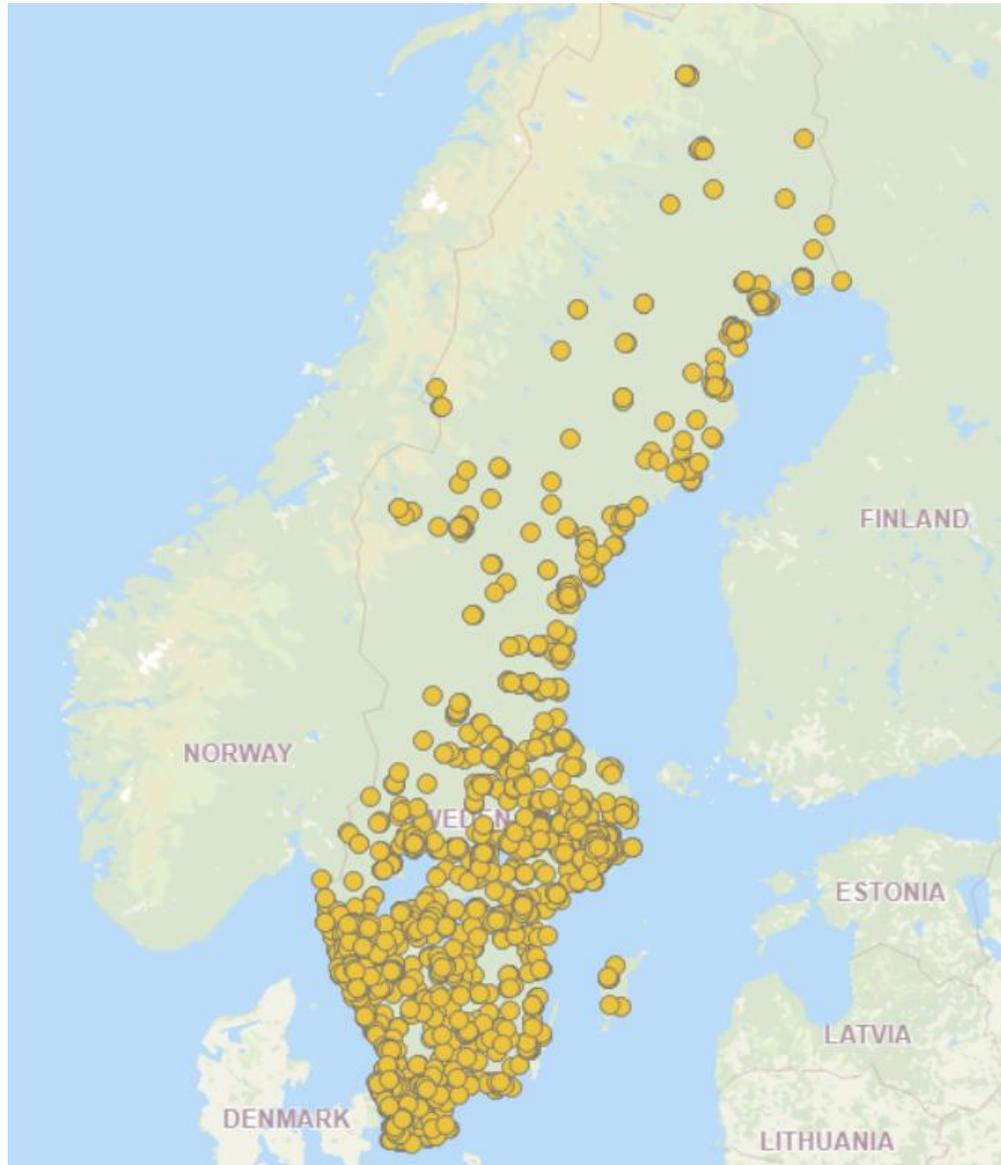
Growth added value: +53%
 Growth # employees: +24%
 Growth #companies: +3%
 (+124 net new companies)

Sveriges Näringsliv

Growth added value: +58%
 Growth #employees: +15%
 Growth #companies: +66%

Exkl Bolag	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Förädlingsvärde	39 183 461	38 743 822	38 805 122	42 639 177	46 036 941	49 272 711	53 149 188	56 806 299	56 085 881	59 895 206
Omsättning	155 563 049	143 194 709	127 099 440	140 310 405	150 047 462	154 940 645	168 803 162	188 409 701	196 227 075	213 031 780
Lönsamhetsindex	4,51	4,46	1,02	4,22	12,12	10,84	9,13	11,94	9,79	8,08
Antal anställda	50 787	50 868	51 368	52 190	52 430	54 266	56 976	59 399	60 165	63 026
Antal företag	3 542	3 517	3 592	3 653	3 684	3 657	3 583	3 658	3 643	3 662

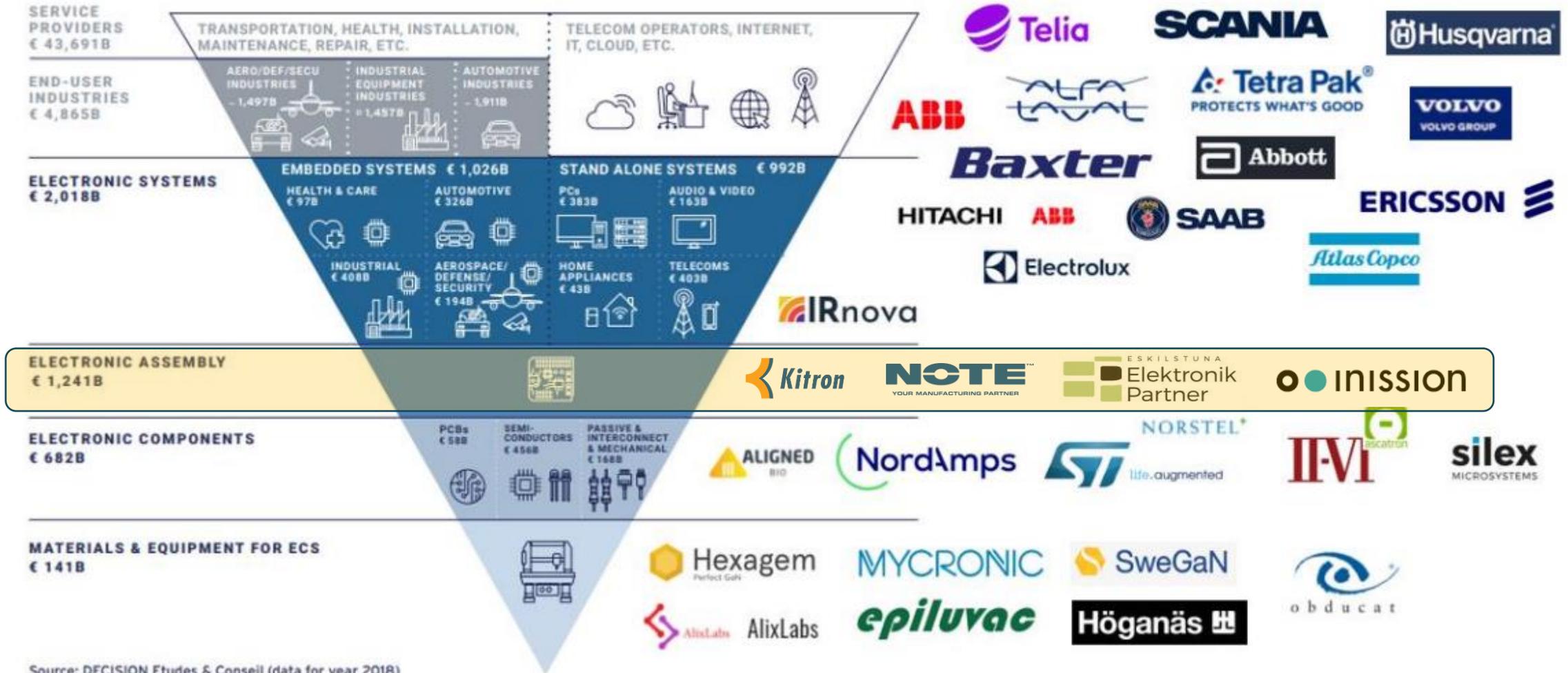
Group 1 Electronic Industry - all over Sweden



Swedish ECS value chain

Swedish industry [source: ProNano/RISE]

GLOBAL ELECTRONIC COMPONENTS AND SYSTEMS (ECS) VALUE CHAIN

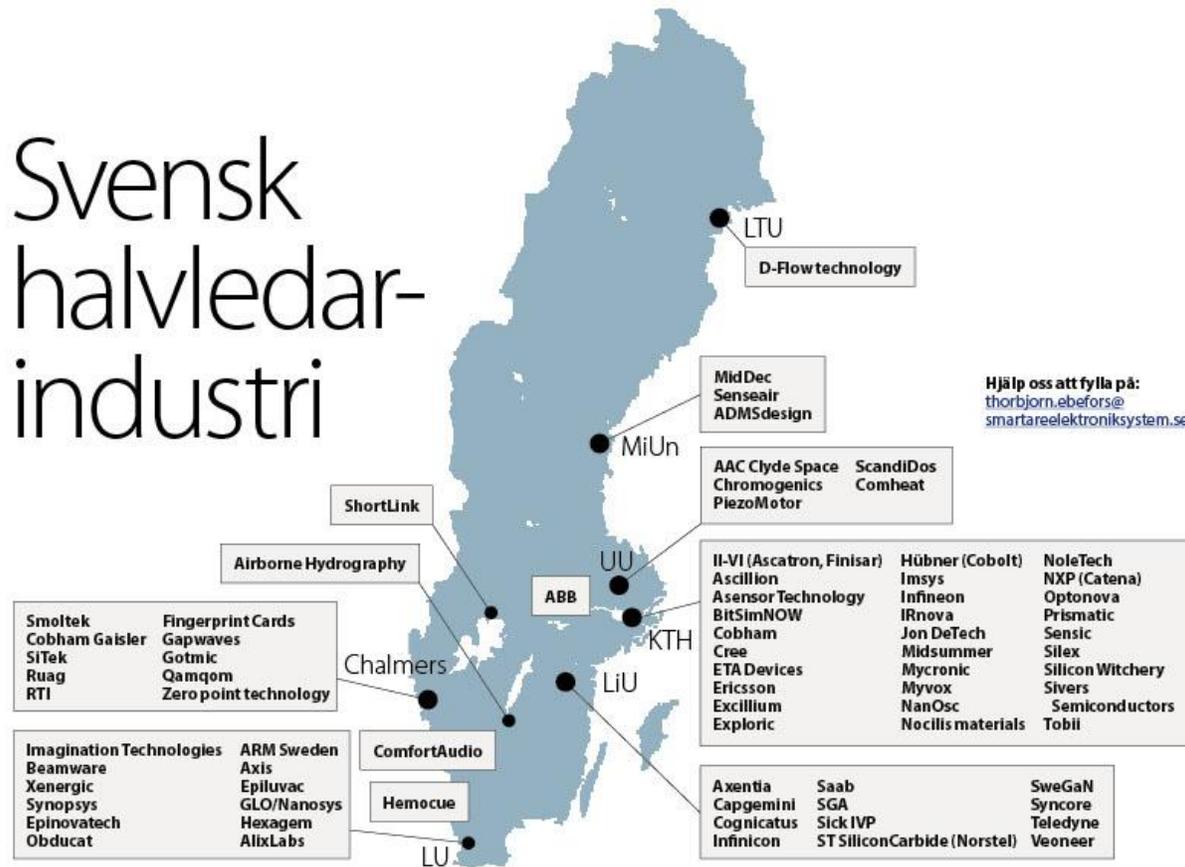


Source: DECISION Etudes & Conseil (data for year 2018)

Swedish Semiconductor Landscaping 2021

Semiconductors by Sweden

Svensk halvledar-industri



Key findings from SES landscaping activities

- There is a growing Semiconductor ecosystem within Sweden:
 - > 5 BSEK turn-over,
 - > 2300 employees
 - and > 70 identified Swedish semi companies
- This ecosystem is global and Int'l collaboration is essential (Key for Swedish players to join EU Semiconductor industry alliances)
- Smarter Electronics systems SIP has established a collaboration with Business Sweden to start the growth journey through Internationalization - **Semiconductors by Sweden Alliance**



Full presentation at:

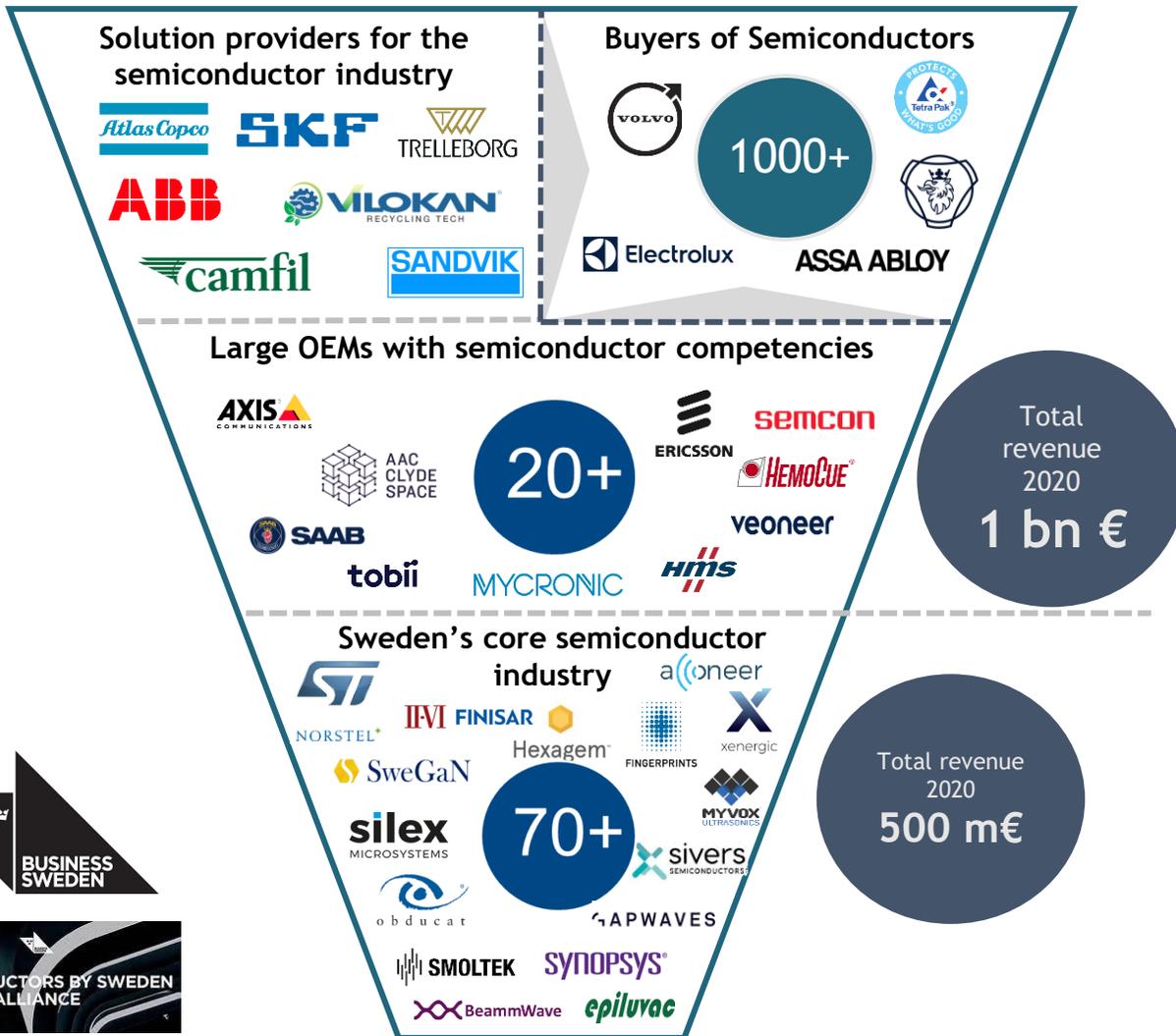
<https://www.smartareelektroniksystem.se/wp-content/uploads/sites/40/2021/09/Presentationer-paket-2.zip>

(Presentation: Halvledarkluster_Magnus S)

More info and registration at:

<https://marketing.business-sweden.se/acton/media/28818/semiconductors-by-sweden-alliance>

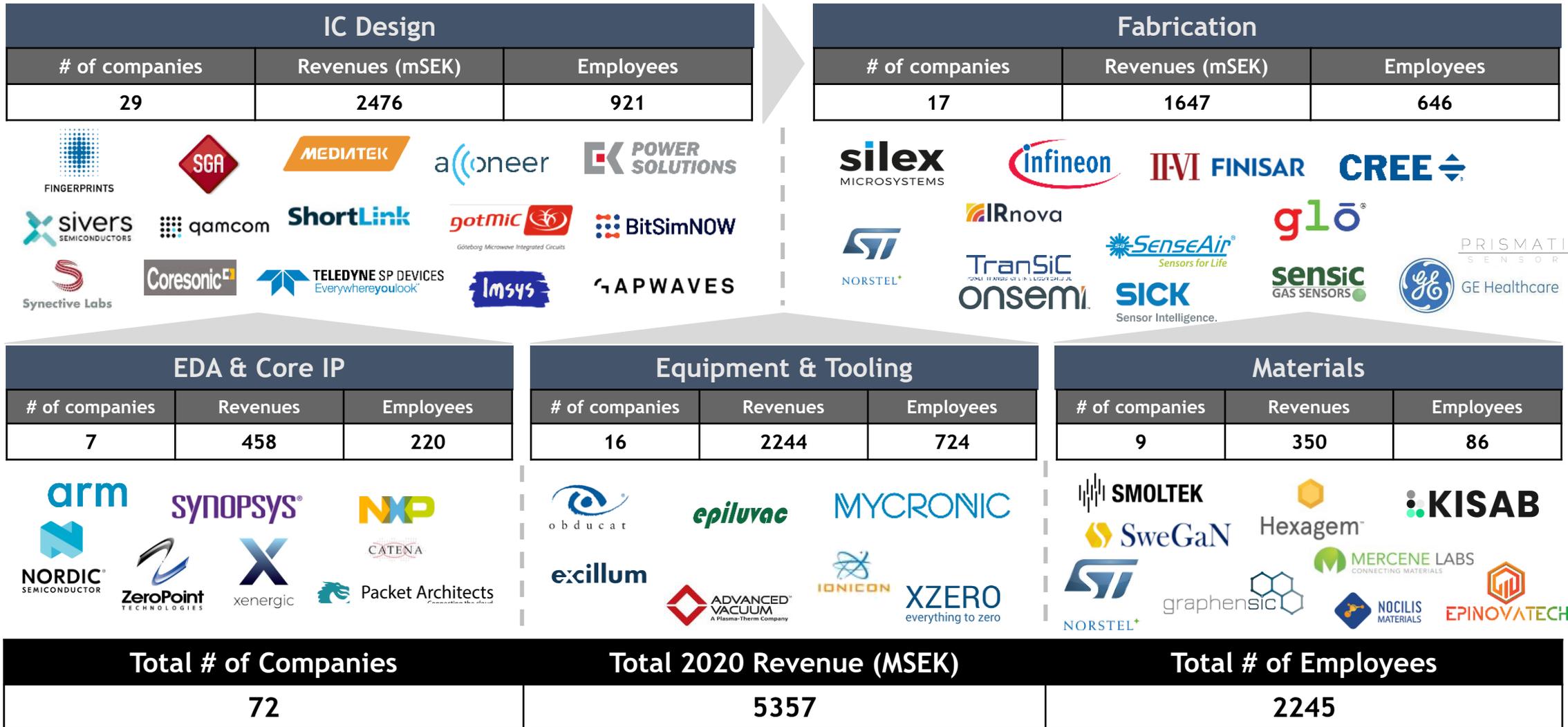
The Swedish Semiconductor ecosystem is highly innovative and has the potential to become a key part of the European value chain



Our proposition

- Strong industry core of high-tech companies focused on different parts of the value chain
- A healthy start-up/scaleup ecosystem in need of support for internationalization, strategic capital and partnerships
- Strong front-end manufacturing capabilities that can be further developed as Sweden has the right conditions for large scale manufacturing
- Competencies within and IC Design
- Strong end-user industries with leading companies in automotive, robotics and ICT
- A world-class R&D and testbed environment with regional clusters that conduct research at the highest level

Swedish Core SEMI Companies – Value chain mapping



Note: The mapping is based on publicly available sources, interviews with experts and is subject to change

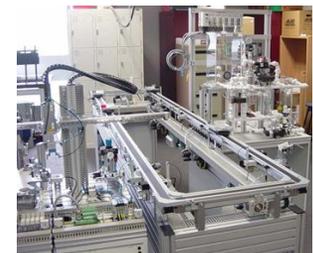
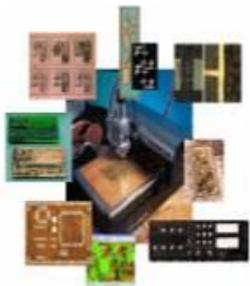
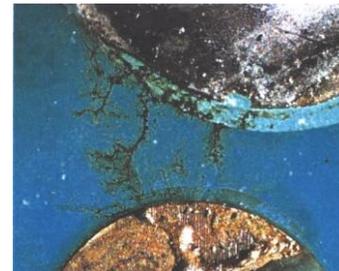
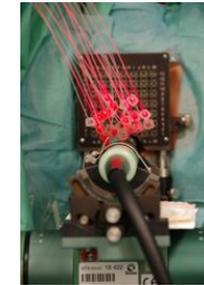
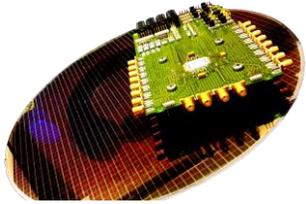


Competence HUBs

ECS Competence HUBs in Sweden with contact info

www.smartareelektroniksystem.se/en/efforts/competence/

- **MicroNano Electronics**, Mitt University, christer.frojd@miun.se
 - *Sub-HUB* Integrated Circuits and systems, Linköpings University Atila.Alvandpour@liu.se
- **Photonics**, Photonic Sweden, lennart@photonicsweden.org
- **Power Electronics**, SiC Power Centre at RISE, Mietek.bakowski@ri.se
- **Antennas- mm wave- and terahertz systems**, Chalmers
jan.grahn@chalmers.se
- **Printed Electronics**, Printed Electronics Arena, RISE,
bjorn.norberg@ri.se
- **Embedded systems**, Luleå University, ulf.bodin@ltu.se
 - *Sub-HUB* Embedded sensor systems for health, Mälardalens Högskola, maria.linden@mdh.se
- **Advanced electronics production / Cross connect**, KTH, johnnyob@kth.se
- **Reliable electronics hardware**, RISE / Swerea IVF, per-erik.tegehall@ri.se



More info the – Cross connect

För att konstruera framtidens allt mer komplexa elektroniska system inom utsatt tid och budget och samtidigt garantera korrekt funktion samt krav på säkerhet och strömförbrukning krävs avancerade konstruktionsmetoder och byggsätt. När en stor del av produktion sker av kontraktstillverkare utanför landet är det av stor vikt att dagens och framtidens ingenjörer behärskar och håller sig uppdaterade på de senaste bygg och konstruktionsmetoderna.

Framtidens elektroniska system kännetecknas av hög integrationsgrad och användande av innovativa tillverkningsmetoder och byggsätt såsom 3D interconnect, System-on-Chip, Network-on-Chip och tryckt elektronik.

Olika komponenter, t.ex. processorer, sensorer, radio och kommunikationskretsar ställer olika krav på montering, avkoppling, kylning, elektromagnetisk koppling och anslutning för korrekt funktion. Samtidigt har systemen högt ställda krav gällande effektförbrukning och fysisk storlek. System för krävande miljöer såsom rymdapplikationer, eller där höga krav ställs på säkerhet, kräver även de särskilda byggsätt för att garantera korrekt funktion och undvika manipulering.

I en tid där en stor del av produktion sker av kontraktstillverkare utanför landet är det av stor vikt att dagens och framtidens ingenjörer behärskar och håller sig uppdaterade på de senaste bygg och konstruktionsmetoderna.

Målet med kompetensnavet Byggsätt är att ge en överblick av forskning och resurser inom moderna byggsätt och konstruktionsverktyg.

Specifika mål för navet

Målet med kompetensnavet är att systematiskt kartlägga och redovisa svenska och internationella

- Kompetenser
- Labbresurser
- Konkreta resultat (komponenter, verktyg, hårdvaruplattformar) som används för byggsätt av elektroniska system

Aktörer

Se kontaktinfo nedan för mer information

Kontaktinformation

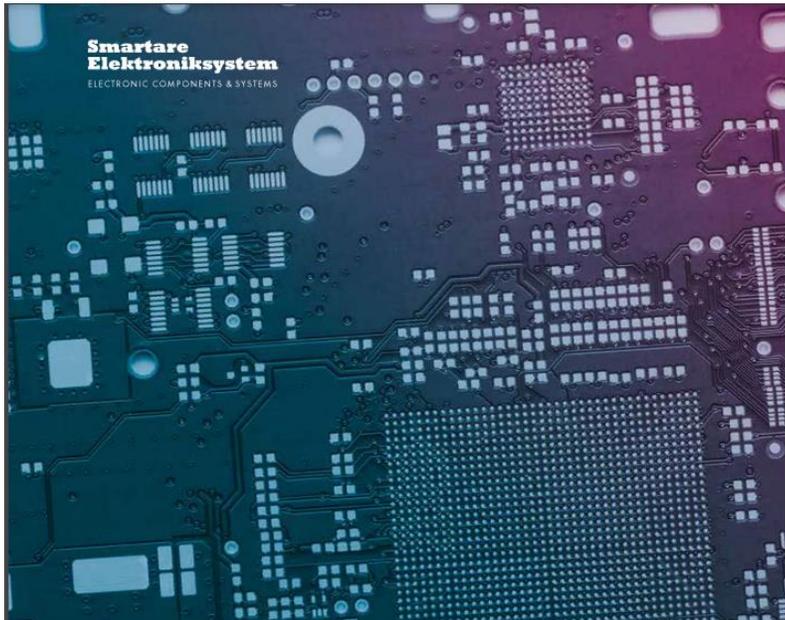
Johnny Öberg

ICT-KTH, Electrum 229, 164 40 Kista

E-post: johnnyob@kth.se

Telefon: 08-790 4127

<https://www.smartareelektroniksystem.se/wp-content/uploads/sites/40/2020/06/Bilaga-kompetensnav.pdf>



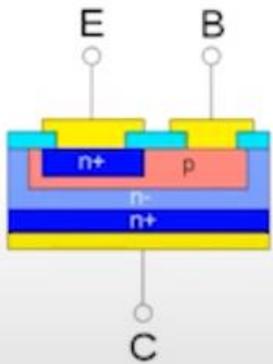
Bilaga 1

Smartare Elektroniksystems Kompetensnav

Ett strategiskt innovationsprogram för att öka konkurrenskraft och tillväxt i svensk industri

Cross connect

– Design methods for electronic systems



Enabling
technology



Hardware
integration



Software
integration



Services

The big challenge ...

- **Dealing with Complexity - Function, Constraints, Cost (Area, Power, Delay, Latency), Cooling, Safety, Security, ...**
 - "Intelligence" in everyday objects
 - Brain-Scale Integration, Neural Nets, Machine learning, Smart homes, Self-driving cars, computers, gaming platforms, cell-phones, cameras, etc, ...
 - New tools and methods needed to handle complexity
- ***Example, self driving car. Performance, power consumption and manufacturing cost determined by choice of build method.***
 - *CPU – Easy to program, but low throughput when it comes to image processing*
 - *GPU – Power hungry, but very good at image processing*
 - *FPGA – Low power, high throughput, but needs specially trained hardware designers, fast turn-around time*
 - *ASIC – Lowest power, highest throughput, but needs specially trained hardware designer, long turn-around-time*

Safe (and secure) Architectures & Systems for Any Environment

Applications in Automotive, Avionics, Space, Automation, Health/Bio-Medical, ...



- Formal System Design Methods for Mixed-Critical Systems
- Fault-Tolerant Systems
- Run-Time Reconfigurable Systems
- High-Temperature Electronics
- Radiation-Hardened Electronics
- "Wet"/Biological Electronics
- Wearable Electronics

More info on Competence HUBs – Cross connect



Kompetensnav Byggsätt - Cross Connect

Smartare Elektroniksystem
ELECTRONIC COMPONENTS & SYSTEMS

www.smartareelektroniksystem.se

Kompetensnav
Byggsätt
22/4 2020, Online

Fredrik Jonsson, Johnny Öberg
Kontakt: Johnny Öberg, KTH
johnnyob@kth.se

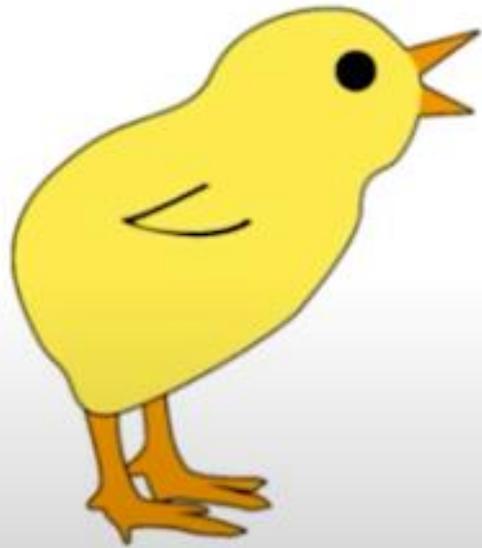
VINNOVA
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FORMAS
Strategiska innovationsprogram

Competence hub **Construction method** - Cross Connect
Electronic components and systems are a prerequisite for many products and services in Swedish industry.

Trends in recent years have been increased integration and the use of innovative manufacturing methods such as construction methods in 3D, System-on-Chip, Network-on-Chip and printed and flexible electronics.

<https://youtu.be/XXSZFAHVvgY>

Summary



- Future designer will face new challenges in terms of complexity and cost and time-to-market constraints
- Many activities at universities in the area of design and construction methods to address these problems
- Several projects already useful for a broader audience
- CrossConnect competence hub aim to make projects visible

**Smartare
Elektroniksystem**

ELECTRONIC COMPONENTS & SYSTEMS

CONTACT:

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Thank you !