



Cyber-Physical Systems in EU Programmes

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*Werner Steinhoegl
Complex Systems & Advanced Computing
European Commission - DG CONNECT – A3*

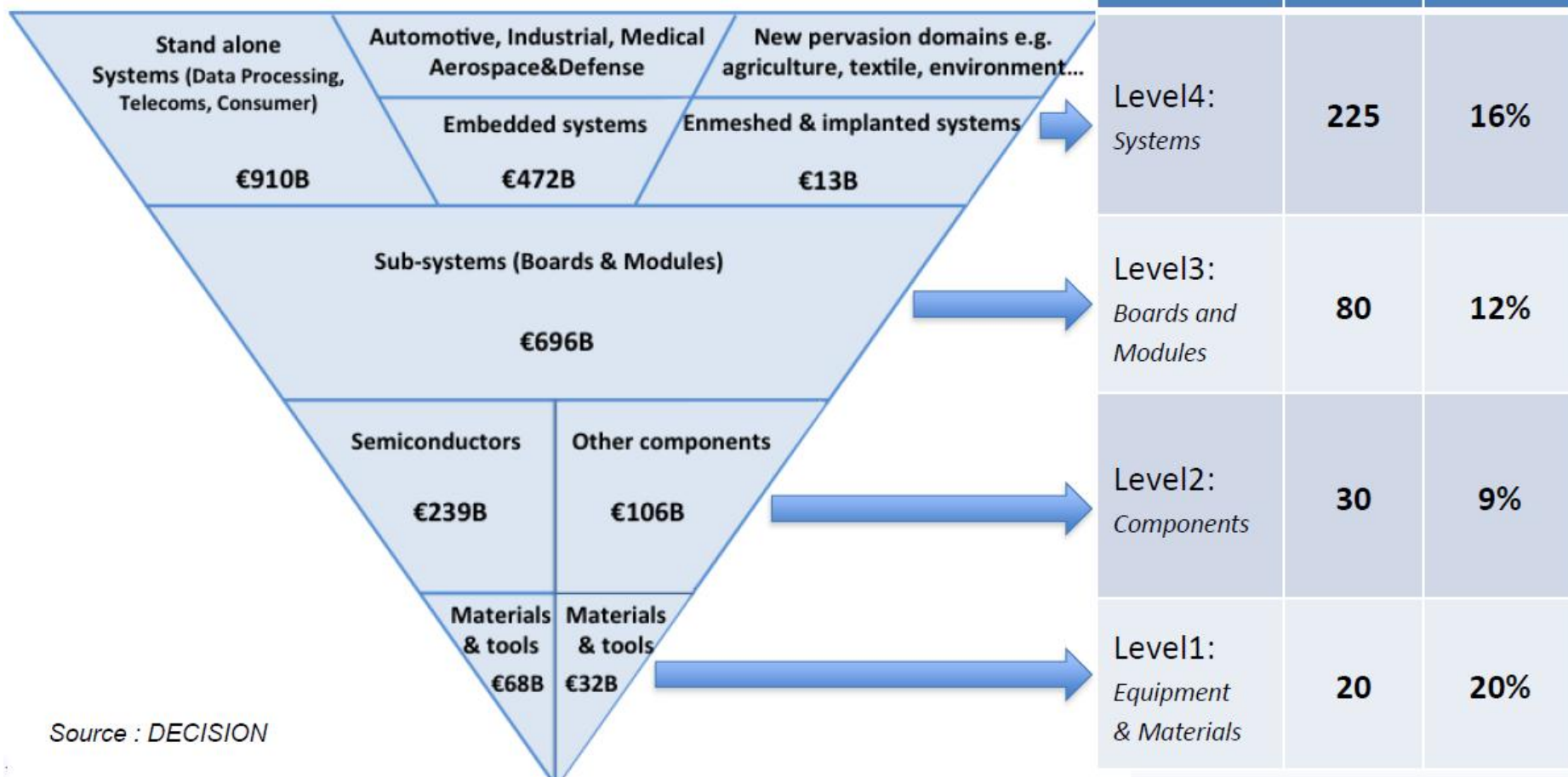
1. Introduction
2. Achievements
3. The Future – What is planned?
4. ECSEL calls: Observations/Hints

Electronic Components and Systems: Innovation boosters for Products and Services



Frigidaire online refrigerator

World electronics industry value chain, 2012



Source : DECISION

1. Products with "ICT inside"

- Smart anything everywhere in our products and services
- Infinite opportunities for product innovation

2. Digital transformation of processes

- Next generation of production systems are digital:
 - From logistics and product design to shop floor automations and CRM
- Build on CPS/IoT, digital design, robotics, big data
- Increased resource efficiency and productivity – need for re-skilling
- Re-shoring: move production close to customer

3. Radical/disruptive changes in business models

- Blurring the boundaries between products and services
- Reshuffling value chains

What needs to be done?

1. Wide-spread adoption and best use of digital technologies across industrial sectors
2. Leadership in digital platforms for industry
3. Filling the skills gap and preparing the workforce for change
4. Providing the best framework conditions for attracting private investment in industry in Europe

Benefits of Partnerships - ICT

Joint Technology Initiatives

- **ECSEL** (Electronic Components and Systems for European Leadership)
 - ✓ **1,215 b€ from EU** (250m€ in 2014-15)
 - ✓ **3,6 b€** (out of which 1,2 b€ from Member States) **from industry partners and other sources**

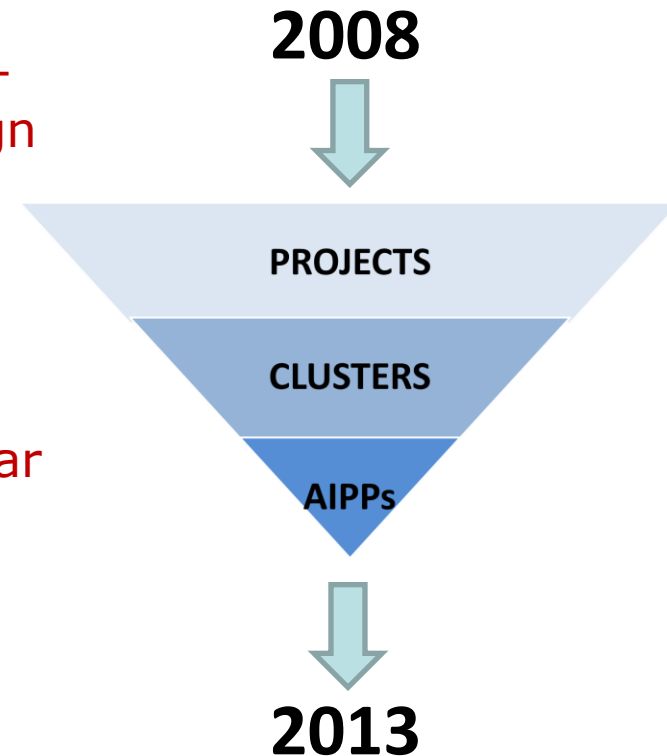
Contractual PPPs

- **5G** → **700m€** indicatively earmarked in H2020 (125m€ in WP2014-15)
- **Photonics** → **700m€** (156m€ in WP2014-15)
- **Robotics** → **700m€** (157m€ in WP2014-15)
- **High Performance Computing** → **700m€** (157m€ in WP2014-15)
- **Factories of the Future** (ICT part) → **450m€** (102m€ in WP2014-15)
- **Green Vehicles** (ICT part) → **80m€** (20m€ in WP2014-15)
- **NEW!!! Big Data** → 500m€ (not in WP2014-15)

EU has become world leader in highly reliable safety-critical systems

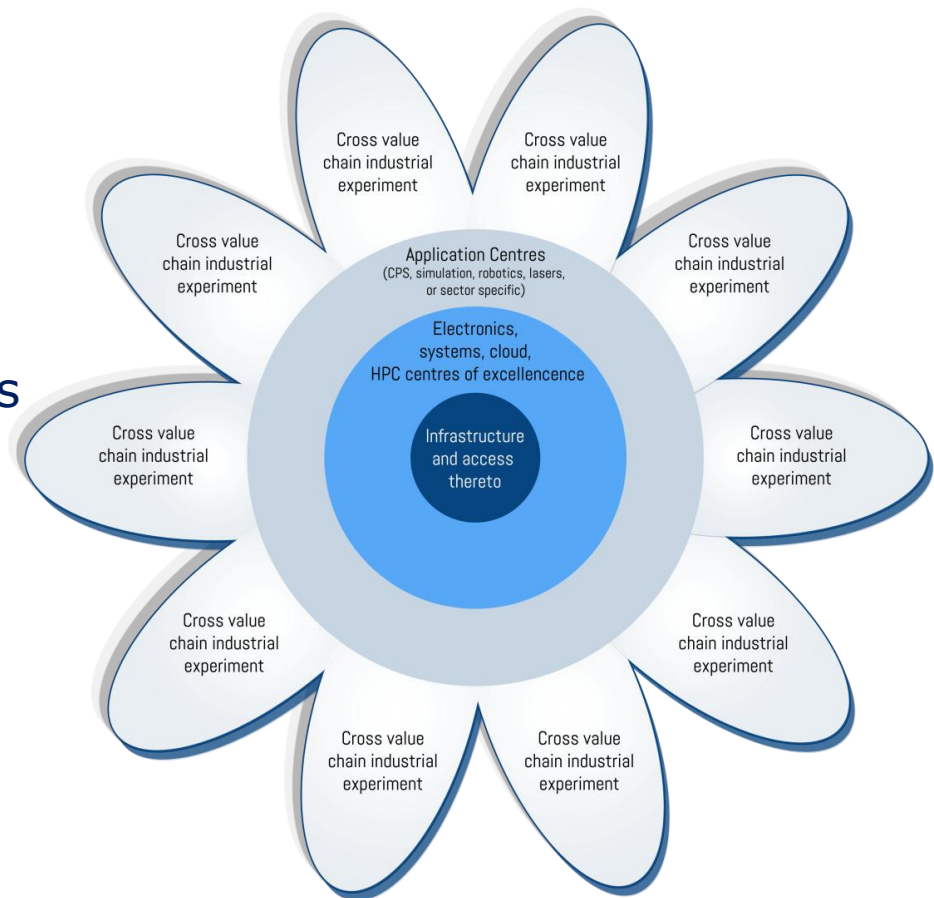


- Strategic programme effort of ARTEMIS and WP
 - business ecosystem created around CESAR-tool platform for professional systems design
 - Now in CRYSTAL: industrialisation, large scale take-up
- Some detailed successes:
 - AUTOSAR embedded ICT platform for the car used by all EU, most US, many other manufacturers
 - Three most successful SMEs (total 2003 – 2013):
 - ✓ Revenue growth: 13 M€/yr → 65M€/yr (average growth 18 %/yr)
 - ✓ Jobs: 200 → 530 employees
 - ✓ EU investment in FP7: ~13M€ in total



- ❑ Built around pan-EU networks of competence centres
 - Provide expertise and skills
 - Broker/facilitator
 - Technology Transfer
 - Dissemination / Multiplier
- ❑ Critical mass of experiments
 - Industrial – focus: SMEs/mid-caps
 - Cross value chain
 - Flexible partnerships (50-250M€)
 - Sharing lessons learnt – not IPRs
- ❑ Flexible implementation
 - Open Calls for new experiments
 - Cascading funds to third parties

Typical project structure (IP/large IA)



I4MS

under the PPP Factories of the Future

Competence Centres (40) in I4MS-
ICT innovation for Manufacturing SMEs



Smart Anything Everywhere under Components and Systems



- Competence centres: RTOs, university and innovation centres
- Similar initiatives also under PPPs Photonics 21 and SPARC¹⁰

The Future

**ITEA: Software
Intensive Systems**

Societal Challenges

Internet of Things

CPS in Manufacturing

**EFFRA
SRA**

**Low power
Computing**

**Cyber-Physical
Systems**

**Following
ARTEMIS-IA
Agenda**

**ECSEL - CPS
(Joint Technology
Initiative)
driven by ARTEMIS**

**EPoSS
IA SRA**

**AENEAS
SRA**

Photonics

Robotics...

5G

Big Data

Cloud

**Member
States
Initiatives**

ICT4 - Customised and low power computing

ICT 4

What we ask for (1)

Servers, micro-server and highly parallel embedded computing systems based on ultra-low power architectures

Integration of HW and SW into working prototypes

Low-power, low-cost, high-density, secure, reliable, scalable

Cross-layer programming approaches to exploit the full potential of heterogeneous parallel architectures

Multi-dimensional optimisation (performance, energy, response time...)

Programming approach per application class, easy for programmers

Scalable market approach

ICT4 - Customised and low power computing

ICT 4

What we ask for (2)

Reference architectures and platforms across several sectors and application domains



Use-case driven

Industrial consensus building, pre-normative activities, reference implementations, proof-of concept demonstrations and validation in key application domains

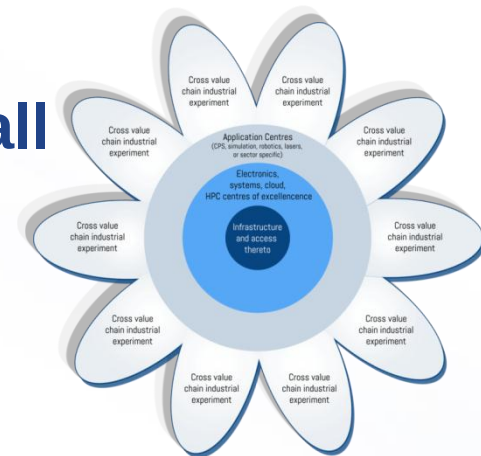
Small proposals

Application experiments bringing together all actors along the value chain

experiments clustered in large scale projects driven by networks of European centres of excellence

Open calls

Large proposals



Internet of Things/Connected Smart Objects – a cross-cutting activity in Horizon 2020

ICT 30 - Internet of Things and Platforms for Connected Smart Objects

- Cutting across several LEIT-ICT areas (smart systems integration, cyber-physical systems, smart networks, big data)
- Bringing together different generic ICT technologies and their stakeholder constituencies
- **51 M€**, call 2 of WP 2014-15 (closure: April 2015)
- Research and Innovation Actions (100% funding) & Coordination and Support Action
- Large Projects
- Mechanism of open competitive calls up to 30% of total budget

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1. Opportunity to cooperate
2. More competition – less protection
3. Important to understand the two sub-calls: RIA and IA
 1. Separate budgets (IA=innovation action is higher)
 2. Different maturity of technology
(**RIA**: TRL 2-5, whereas **IA**: TRL 4-8)
4. Think strategic when you set up your project:
 1. Eco-system, platforms, value chains
 2. Context of your planned work
 3. Consider new actors
 4. Use of results, impact

THANK YOU

Werner.Steinhoegl@ec.europa.eu

Digital Agenda for Europe – Components and Systems:

<https://ec.europa.eu/digital-agenda/en/science-and-technology/components-systems>

DG CONNECT (Communications Networks, Content and Technology):

http://ec.europa.eu/dgs/connect/index_en.htm

Horizon 2020 on the web:

http://ec.europa.eu/research/horizon2020/index_en.cfm

Info Day Work Programme 2015:

<https://ec.europa.eu/digital-agenda/en/news/horizon-2020-calls-info-day-low-power-computing-internet-things-and-platforms-smart-objects-ict>