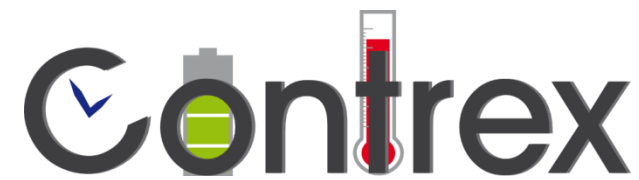


Welcome to CONTREX

<http://contrex.offis.de>

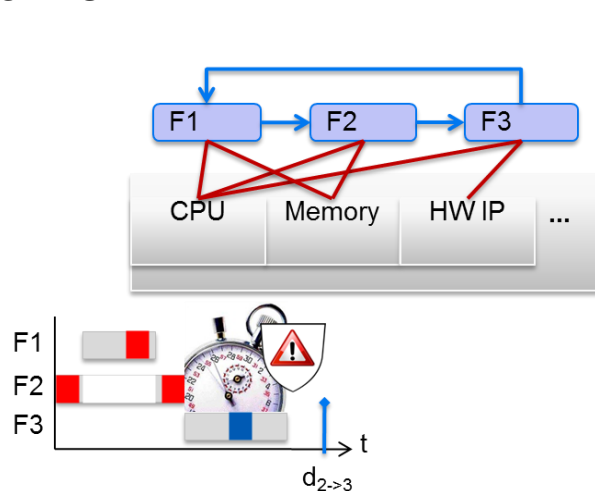


Kim Grüttner (OFFIS)



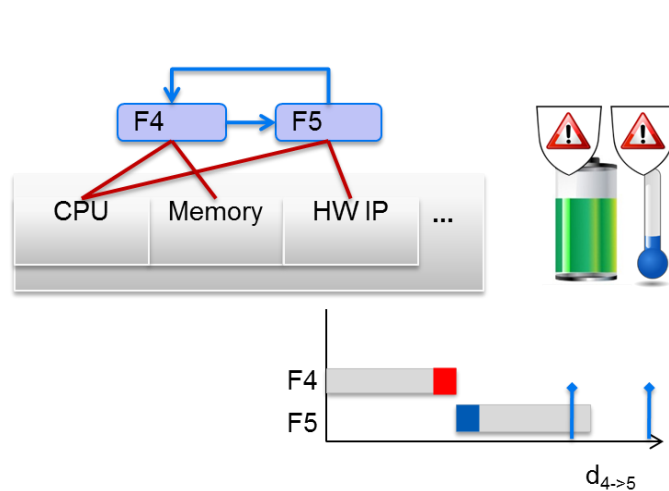
Funded by the EC under
Grant Agreement 611146

- **Definition:** A mixed-criticality system is a system containing computer hardware and software that can execute several applications while guaranteeing their differing requirements for real-time operations including their security and safety.
- **State-of-the-art:** Two control applications with different criticalities implemented on two physical separated (custom designed) hardware/software platforms



Application 1

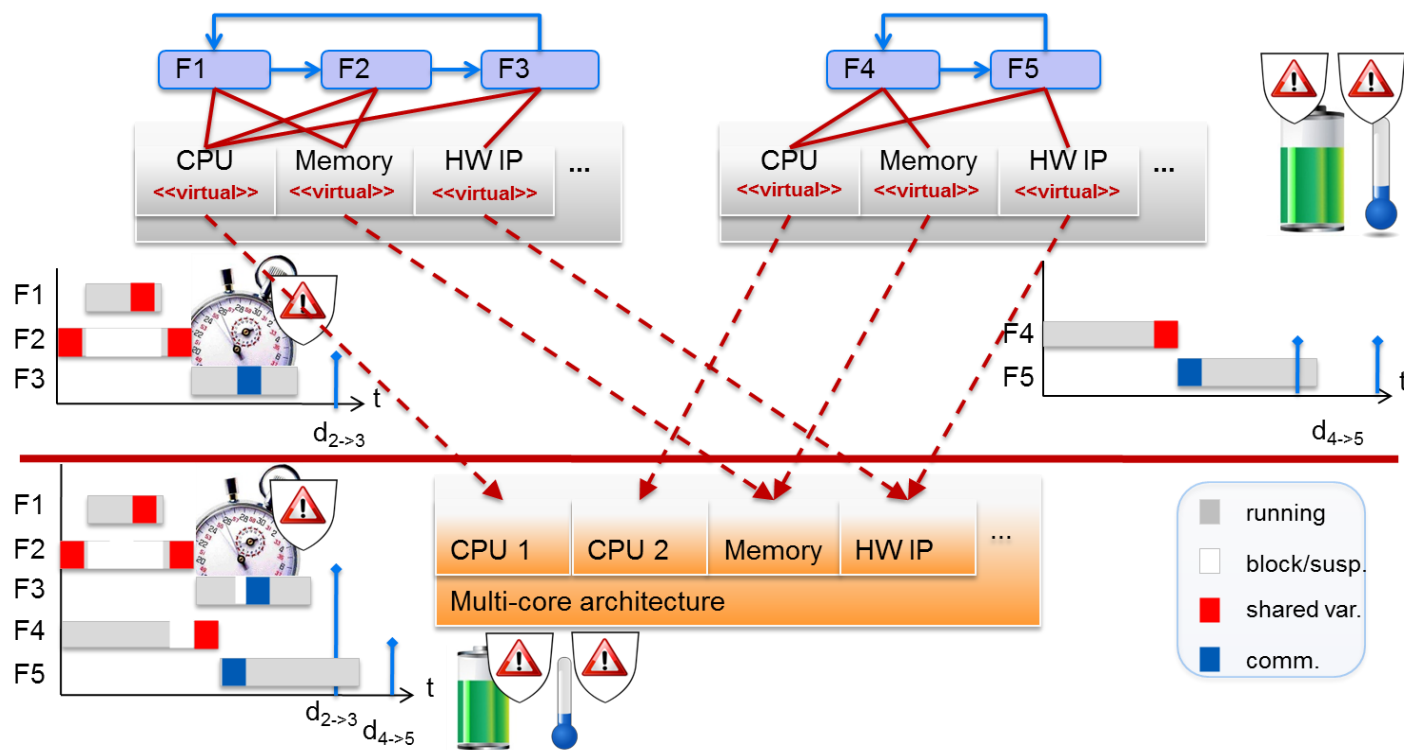
- Hard deadline $d_{2 \rightarrow 3}$
- No power constraint
- No temperature constraint



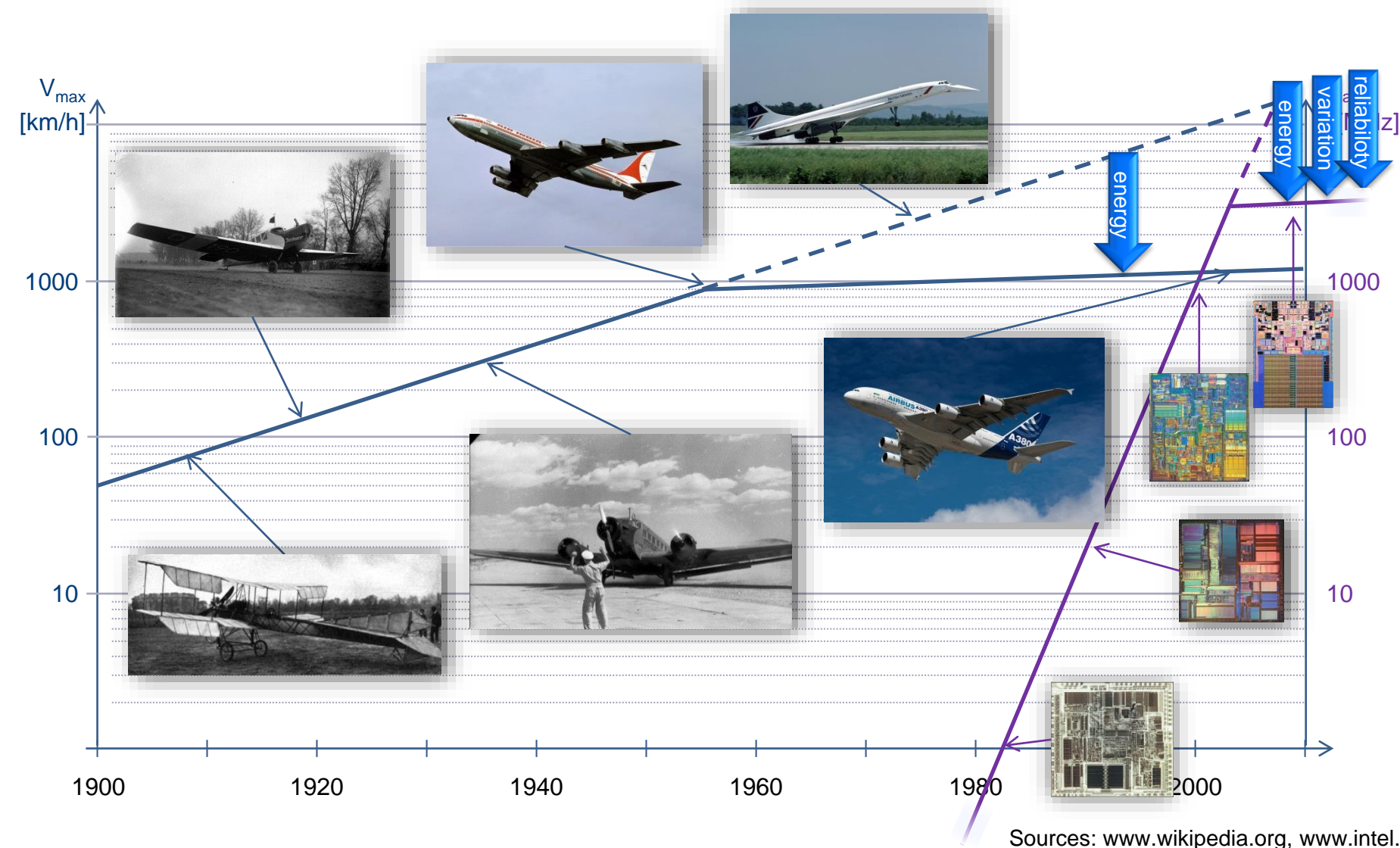
Application 2

- Soft deadline $d_{4 \rightarrow 5}$
- Hard power constraint
- Hard temperature constraint

- **Future mixed-criticality systems:** Two independent applications with different criticalities implemented on a (general purpose, COTS) multi-core hardware/software platform that enables temporal and spatial segregation.
- **CONTREX** challenges to **guarantee timing, power, temperature, and reliability requirements** by controlling (shared) resource usage and access on the execution platform.

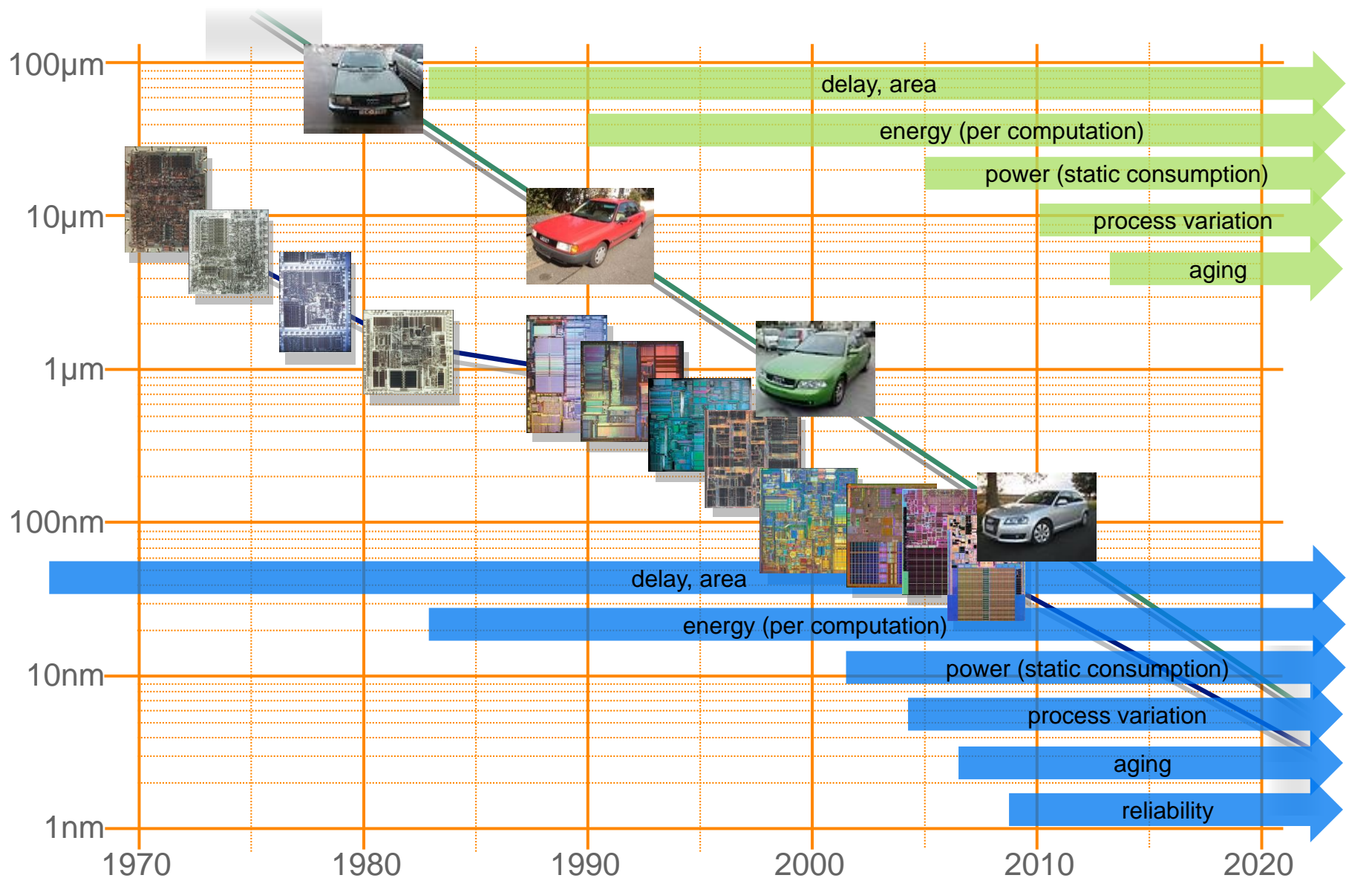


4 Extra-functional properties and their influence on system design



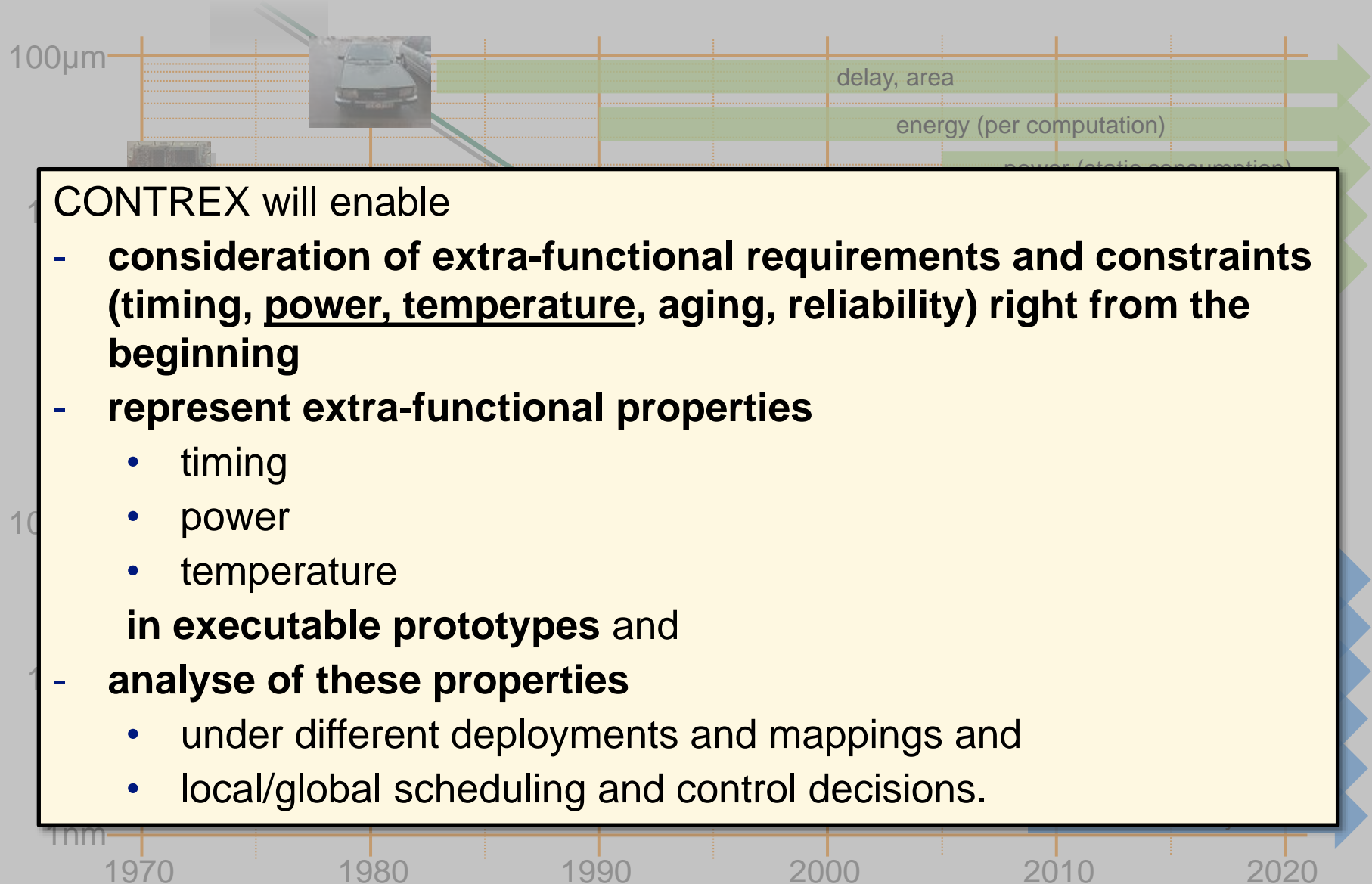
Sources: www.wikipedia.org, www.intel.com

5 Evolution and challenges in consumer electronics vs. electronic control units in cars



Sources: www.mobile.de, www.intel.com

6 Evolution and challenges in consumer electronics vs. electronic control units in cars



CONTREX will enable

- **consideration of extra-functional requirements and constraints (timing, power, temperature, aging, reliability) right from the beginning**
- **represent extra-functional properties**
 - timing
 - power
 - temperature
- **in executable prototypes and**
- **analyse of these properties**
 - under different deployments and mappings and
 - local/global scheduling and control decisions.

Sources: www.mobile.de, www.intel.com

PARTICIPANT NO.	PARTICIPANT ORGANISATION NAME	PART. SHORT NAME	COUNTRY
1 (Coordinator)	OFFIS e.V.	OFFIS	Germany
2	STMicroelectronics srl	STM	Italy
3	GMV Aerospace and Defence SA	GMV	Spain
4	Cobra Telematics SA	Cobra	Switzerland
5	EuroTech S.p.A.	EUTH	Italy
6	Intecs S.p.A.	INTECS	Italy
7	iXtronics GmbH	iX	Germany
8	EDALab srl	EDALab	Italy
9	Docea Power	Docea	France
10	Politecnico di Milano	PoliMi	Italy
11	Politecnico di Torino	PoliTo	Italy
12	Universidad de Cantabria	UC	Spain
13	Kungliga Tekniska Högskolan	KTH	Sweden
14	Electronic Chips & Systems design Initiative	ECSI	France
15	ST-POLITO Societa' consortile a r.l.	ST-PoliTo	Italy

Starting date: 01/10/2013

Duration in month: 36

Call identifier: FP7-ICT-2013-10

Website: <http://contrex.offis.de>

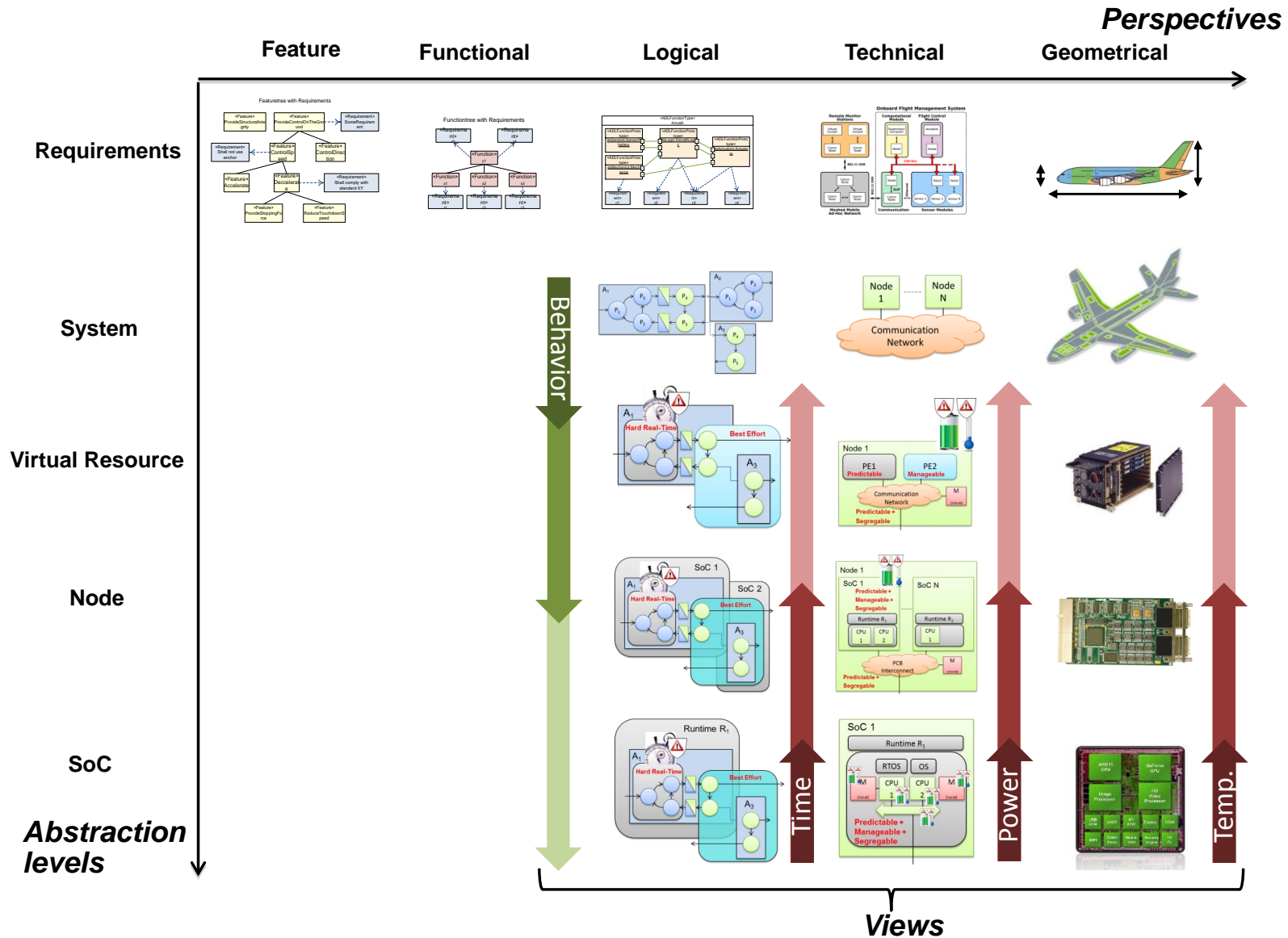
Universities and Research Institutes

Industry

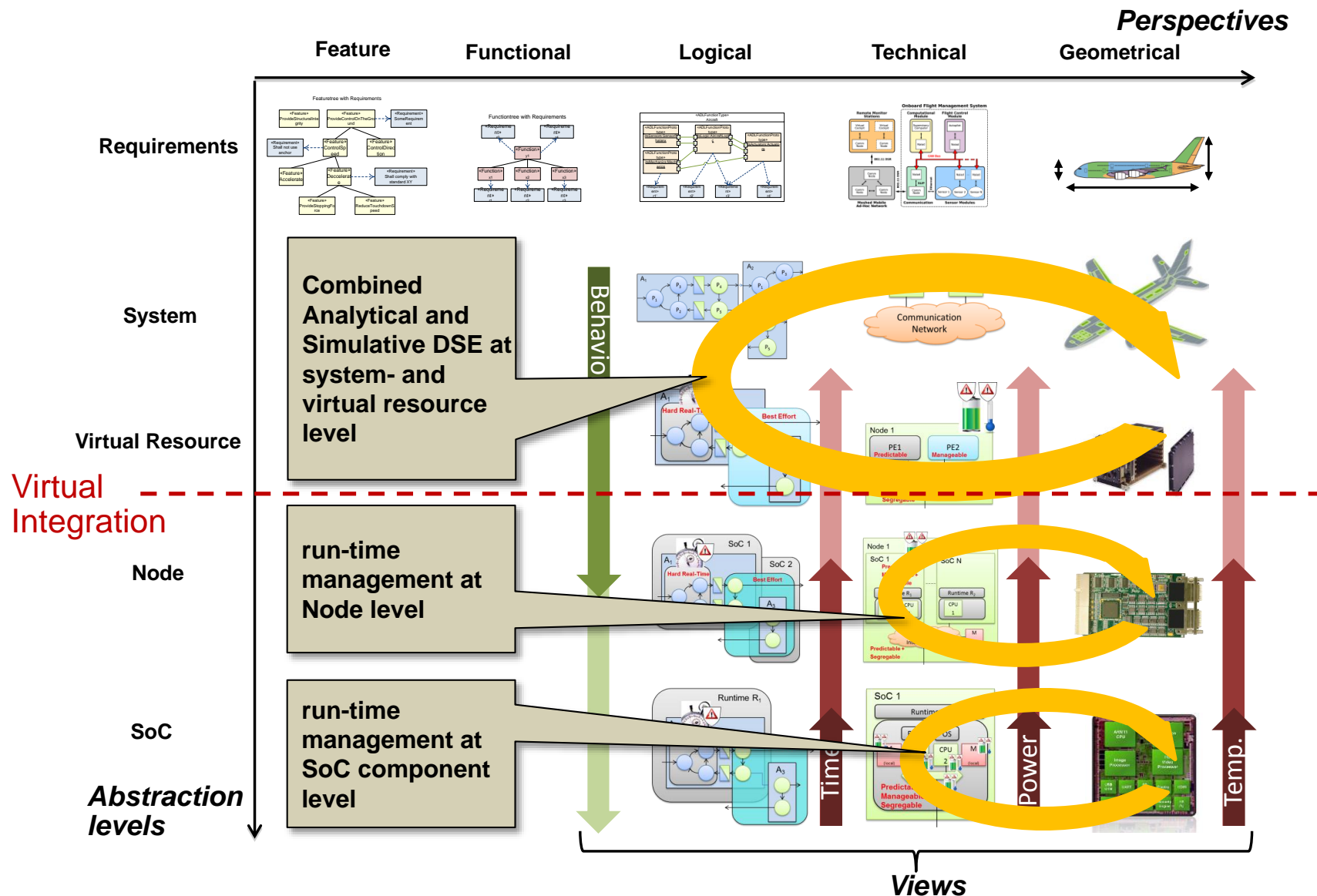
Small and Medium Size Enterprises

Other

1. **A meta-model for the design and analysis of mixed-critical systems**, covering the feature, functional, logical, technical, and geometrical perspectives; system, virtual resource, runtime, and platform abstraction levels; and behaviour, time, power, and temperature viewpoints
2. **Deployment and mapping of control applications** to a network of virtualized hardware/software platforms and network infrastructure **abiding extra-functional properties**



1. A meta-model for the design and analysis of mixed-critical systems, covering the feature, functional, logical, technical, and geometrical perspectives; system, virtual resource, runtime, and platform abstraction levels; and behaviour, time, power, and temperature viewpoints
2. **Deployment and mapping of control applications** to a network of virtualized hardware/software platforms and network infrastructure **abiding extra-functional properties**
3. Development of a service-based, **executable and analysable power and temperature model for multi-core execution platforms**
4. Implementation of **local and distributed power and temperature monitoring and control techniques**



1. **A meta-model for the design and analysis of mixed-critical systems**, covering the feature, functional, logical, technical, and geometrical perspectives; system, virtual resource, runtime, and platform abstraction levels; and behaviour, time, power, and temperature viewpoints
2. **Deployment and mapping of control applications** to a network of virtualized hardware/software platforms and network infrastructure **abiding extra-functional properties**
3. Development of a service-based, **executable and analysable power and temperature model for multi-core execution platforms**
4. Implementation of **local and distributed power and temperature monitoring and control techniques**
5. **Demonstration of a seamless integration of mixed criticalities under consideration of extra-functional power and temperature properties** (combining 1, 2 and 3) in three different domains: avionics, automotive telematics, and telecommunications
6. **Proposals and feedback to standard and certification bodies** in the area of model-based mixed-critical system design, MPSoC power and temperature simulation & analysis, and power and temperature management architectures

UC1: Avionics



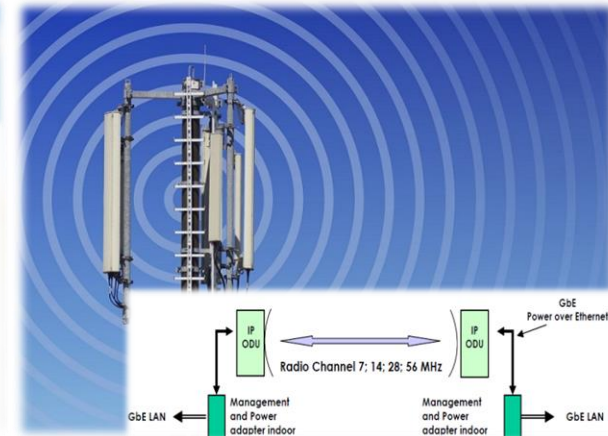
Goal: Flight control computer executes safety-, mission- and non-critical applications on the same multi-core execution platform.
 Criticalities: *safety- and mission-critical*
 Extra-functional properties: *hard real-time, power, temperature, reliability*

UC2: Automotive Telematics



Goal: Move processing from local (on-board) devices into the cloud.
 Criticalities: *mission- and non-critical.*
 Extra-functional properties: *performance, power, security, reliability*

UC3: Telecommunication

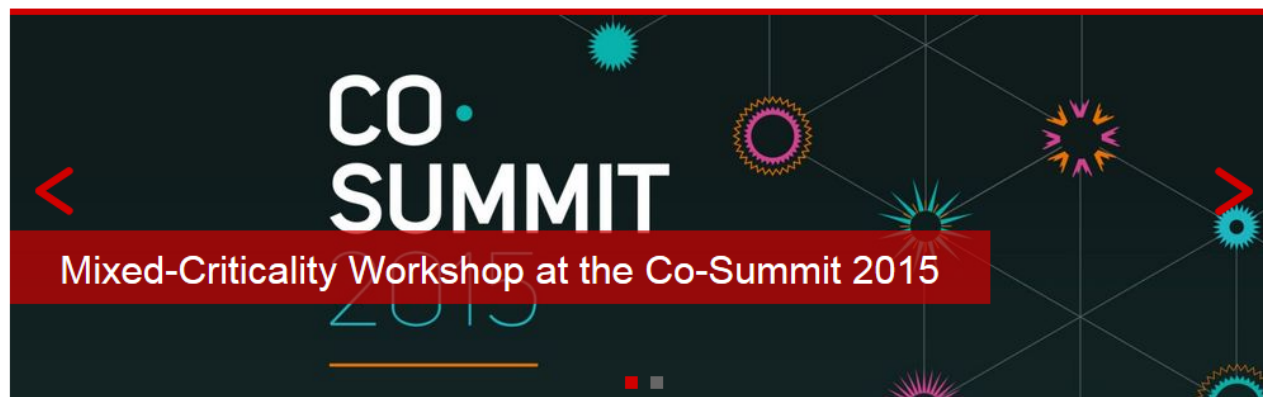


Goal: Optimization of performance/cost characteristics of a Gbit Ethernet over radio system.
 Criticalities: *safety-, mission-, non-critical.*
 Extra-functional properties: *real-time, power, temperature, reliability*

CONTREX will support scaling up of the number of mixed-critical applications per SoC by a factor >10 while reducing the power consumption by 20%.



[INNOVATION ROADMAP](#) [NEWS & EVENTS](#) [PROJECTS](#) [CATALOGUE](#) [ORGANISATIONS](#) [ABOUT US](#)



Workshop "Towards Mixed-Criticality Systems" at the Co-Summit, Berlin

[read more](#)

The Mixed-Criticality Cluster (PROXIMA, CONTREX and DREAMS) will host a Mixed-Criticality Systems workshop at the ARTEMIS Co-Summit on Tuesday, 10 March 2015, starting at 14:00 in the "YELLOW CORNER". See the progra

Supported by



MCS Workshop, 19 January 2015

[read more](#)

The workshop "MCS: Integration of mixed-criticality subsystems on multi-core and manycore processors" will take place on Monday, January 19th, 2015 at the HIPEAC conference (Amsterdam). In the workshop, a slot

HIPEAC conference 2015, 19-21 January

[read more](#)