European Cooperation in Science and Technology

An overview of European cooperation on antenna research

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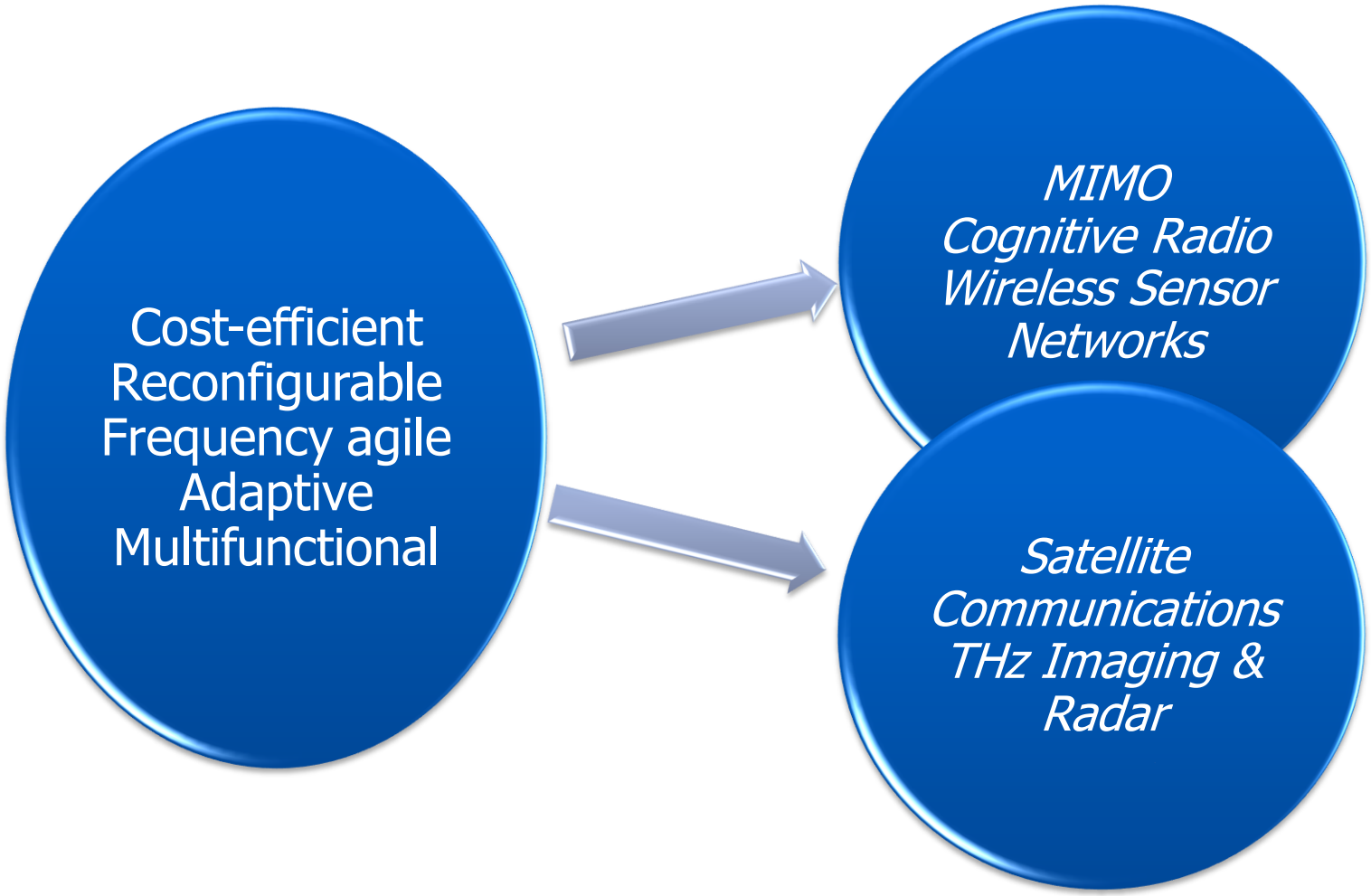
31-8-2012

August 31, 2012

Wireless systems of tomorrow



Antennas: an «interfacing» activity in COST

***Antennas*:**

The tyres !!

Channel propagation,
Navigation systems,
Global Integrated Networks ,
Atmosphere; Meteorology

***RF-Electronics*:**

The engine

The track

Why so important?

Present day (information) technology

The wireless interface

TOP ANTENNAS

The winning team

Effect (the application)

Antennas are the « tyres » of ICT Actions

We should never ignore them!

Translated to antennas:

European Antenna Research

Targets:

- Research, but also
- Networking
- Educational and Societal aspects
- EU strategic aspects

Instruments:

- Networks of Excellence, Coordinating Actions, Marie Curie initiatives, Training Networks, European Schools, "COST" projects…

What is COST?

COST is supported by the EU RTD Framework Programme

ESF provides the COST Office through an EC contract

Founded in 1971, COST is an intergovernmental framework for European Cooperation in the field of Scientific and Technical Research. COST Actions cover basic and pre-competitive research as well as activities of public utility.

COST has been successfully used to maximise European synergy and it is a useful tool to further enhance European integration.

COST main characteristics

- “Bottom-up” – no fixed programmes / priorities
- Flexible participation – join in if you are interested
- Focus on multidisciplinary cooperation
- Enabling agent – Promotion of Early Stage careers in Research
- Open to global cooperation in the mutual interest
- “Non-competitive” – pre-normative; public utility
- Networks based on national funding of researchers and projects – national responsibility

Timeline: Antenna COST Actions

1973-1977 - COST 25-1: Aerial network with phase control

1980-1984 - COST 204: Phased array antennas and their novel applications
8 countries

1984-1988 - COST 213: Electronically steered antennas for future satellite and terrestrial communications in the 90s
12 countries

1993-1997 - COST 245 Active arrays and array fed reflector antennas
17 countries

1997-2001 - COST 260: Smart Antennas: Computer Aided Design & Technology
18 countries

2002-2006 -COST 284: Innovative Antennas for Emerging Terrestrial and Space-based Applications
20 countries

2007-2011 - COST IC0603 ASSIST: Antenna Systems & Sensors for Information Society Technologies
27+2 countries

ACE 2003-2007

The ACE Network (2003-2007)

The final answer to existing problems

- No real European antenna community
- Week cooperation industry – university
- Research not always relevant
- Little cooperation in PhD education
- Little reuse of software and test facilities
- Too much duplication
- Weak dissemination

ACE outcomes

- European Association on Antennas & Propagation (EURAAP)
- EUCAP Conference (5th edition next year)
- European School of Antennas
- Benchmarking and standardisation activities (software/measurement)
- Follow-up FP7 coordinating actions: Antenna Research & Technology for the Intelligent Car (ARTIC), Coordinating Antenna Research in Europe (CARE)

European school of Antennas (ESoA)

- Geographically distributed post graduate school
- Founded in 2004 by ACE
- Objective: reinforce European training and research in antennas and relevant applications.
- Presently financed by a Marie Curie Action (MCA) project.
- Courses are distributed in the most accredited European research centres on antennas and wireless systems.

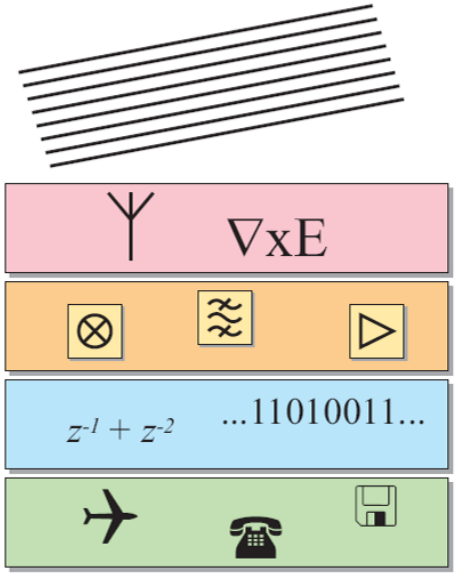
COST IC1102 „VISTA“

- Versatile, Integratd and Signal-aware Technologies for Antenna
- COST domain: Information and Communication Technologies
- Duration: 2011-2015
- Website: www.cost-ic1102.eu, www.cost-vista.eu

Trends…

Theory: Antennas as *physical layer:*

physics (electromagnetics) &technology (materials science).



Practice: Antenna systems spread into many layers!!!

New challenges call for new paradigms

Demand for **more and better ICT services** explodes

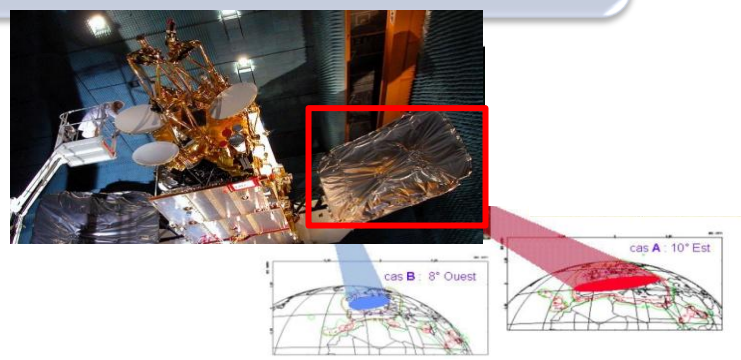
Increased use of **energy and spectrum** limited resources!

Solution: signal-antenna joint techniques for **lower energy and spectrum usage**

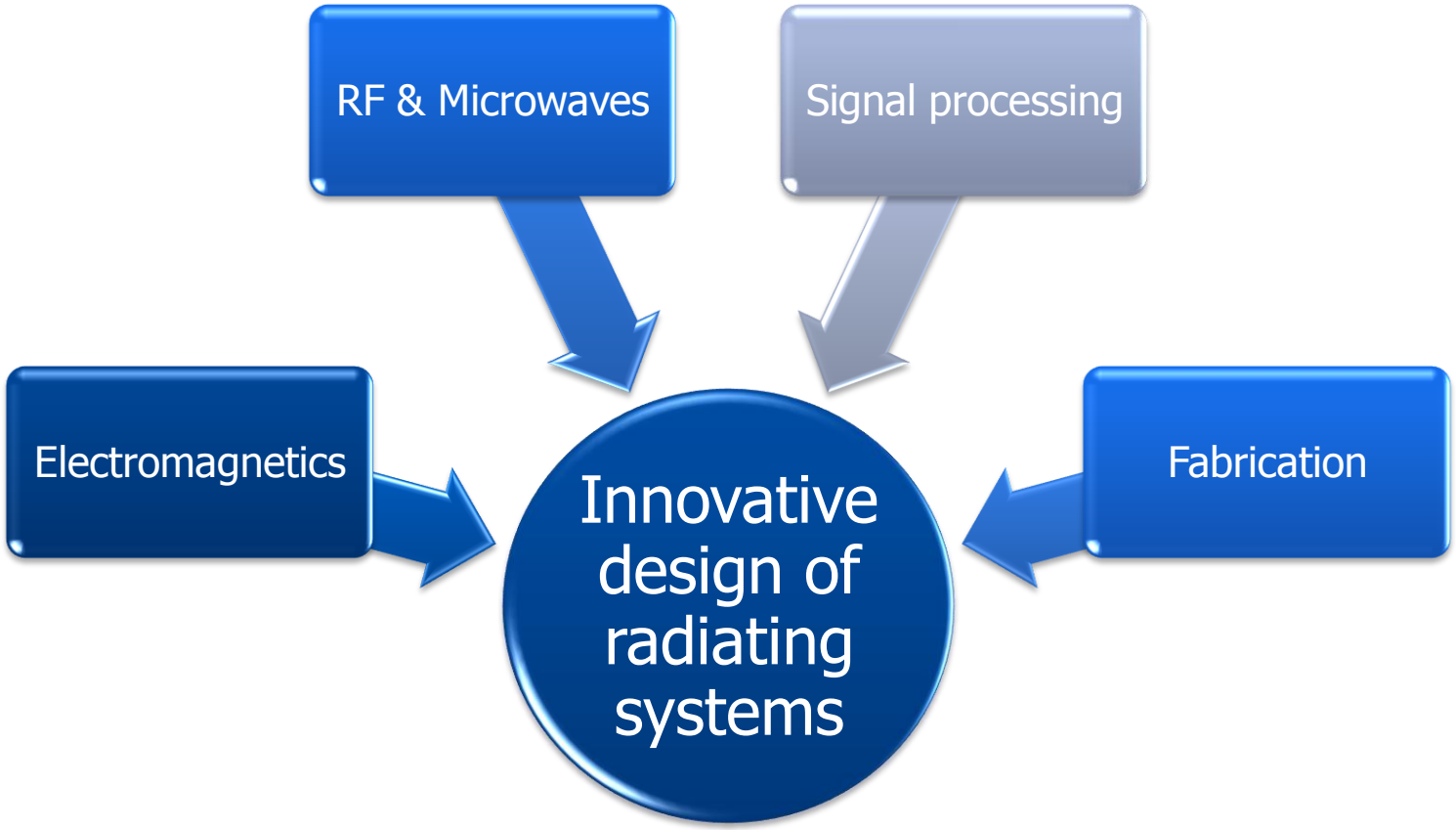
MIMO: multi-radio in small devices	**Cognitive radio:** *opportunistic* frequency/coding	**WSN**: distributed *cooperative* communication

Old and new challenges, new solutions

Satellite communications	• Higher frequency (Ka-band) for higher data rates • Reconfigurability: adapt the coverage/extend lifespan • Receivers: improved tracking possibilities
THz imaging and radar	• Reducing the system complexity • Real-time images.
Intra/on/off body communication	• imaging and diagnosis • radio-controlled, "intelligent" medical devices
New fabrication technologies	



Cross-disciplinary research



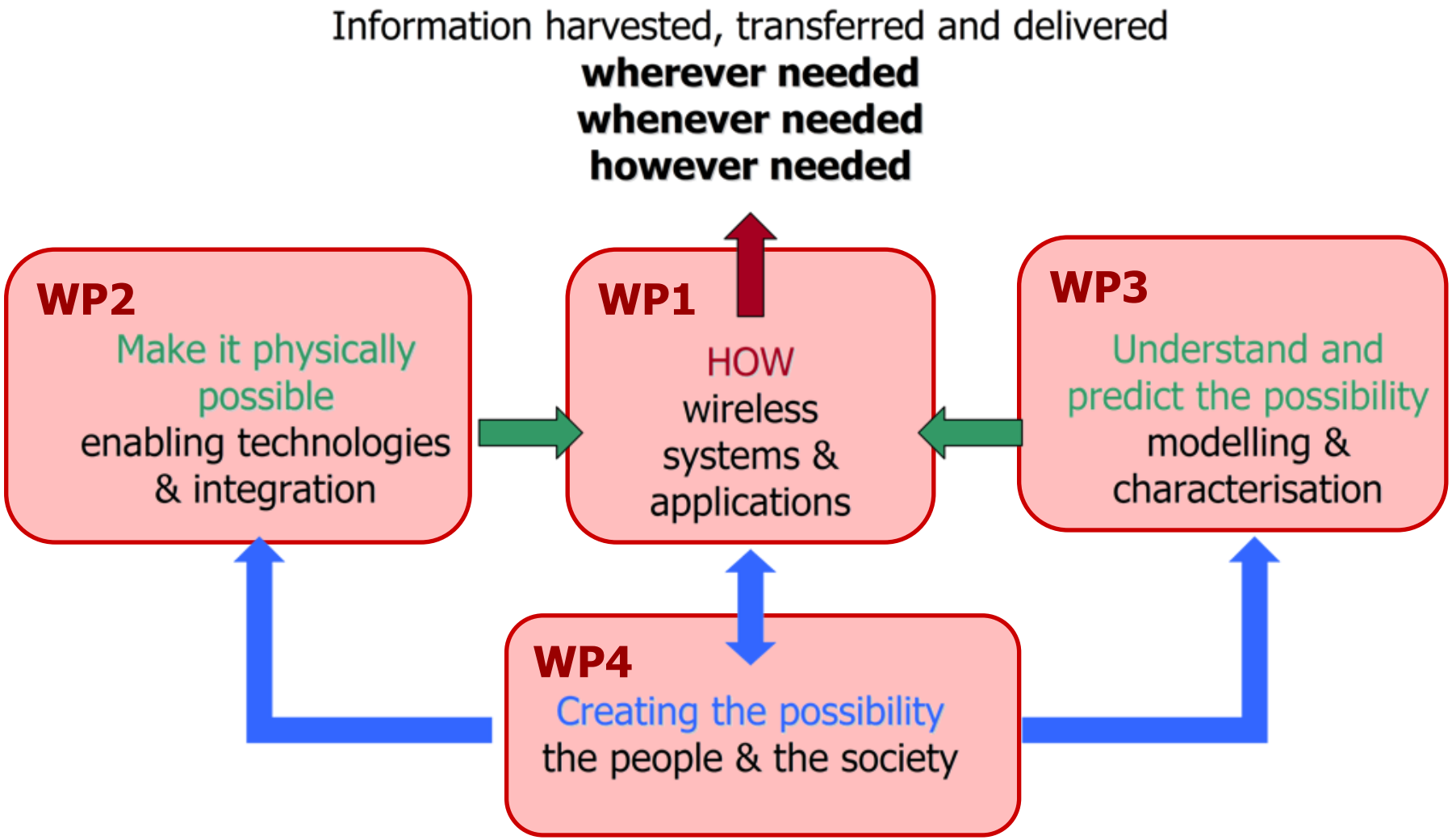
Benefits of VISTA

COST VISTA: Objectives

Coordinate cross-disciplinary research
on integrated and versatile antennas for wireless applications,

- Assessment and survey
- Technological development
- Supporting technologies
- Cooperation & Networking
- Training and education

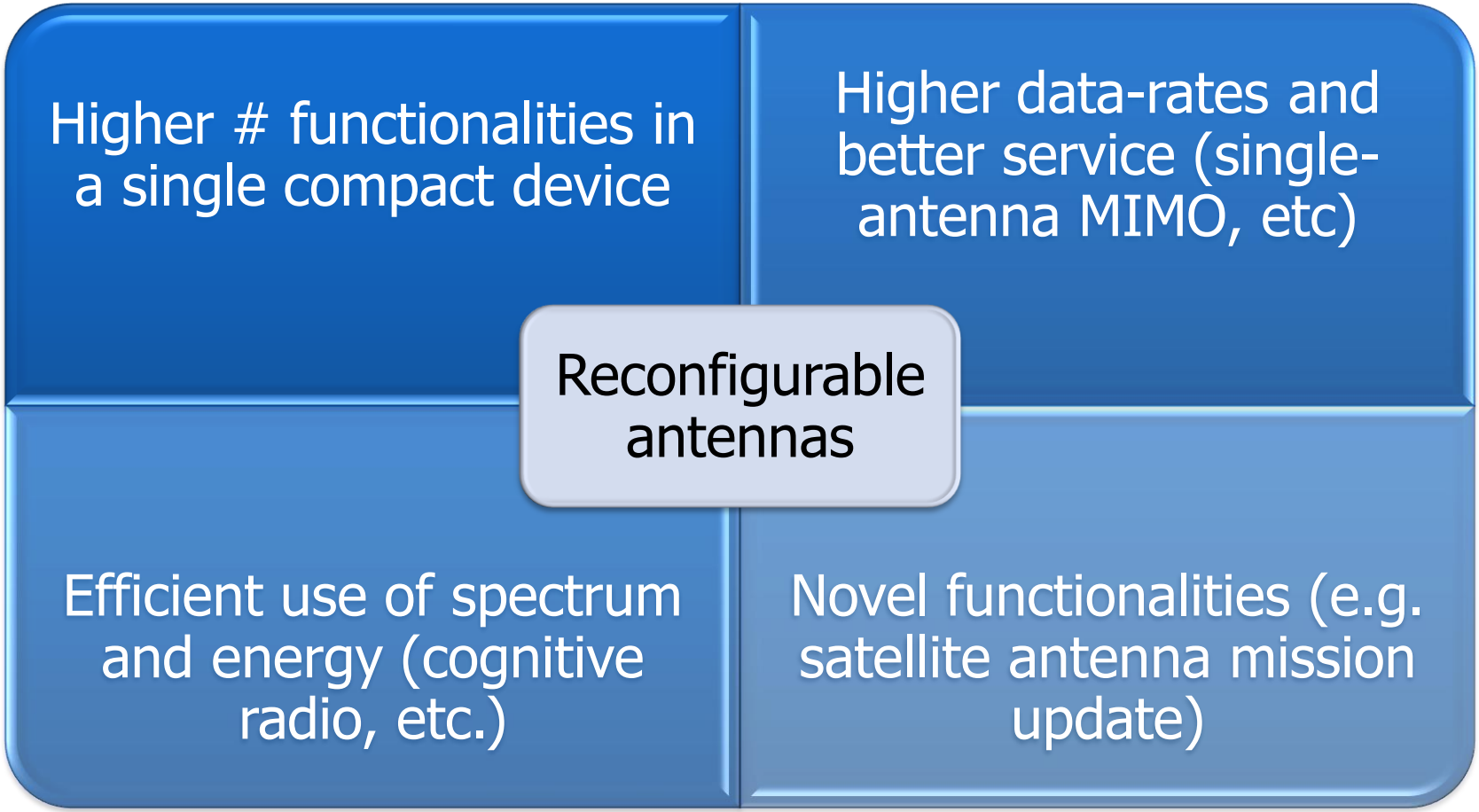
Scientific focus



WP1: What? Applications and requirements

Wireless home & office	Mobility	Enhanced quality of life
• enhanced systems for indoor data exchange • Fast data synchronistaion • Cognitive & SW defined radio	• Radar sensors • Vehicle communications • On-board infotainment • Positioning systems	• health & medical applications • business & industry automation • Safety critical communications • Remote sensing • Non-invasive diagnostics • Environmental monitoring

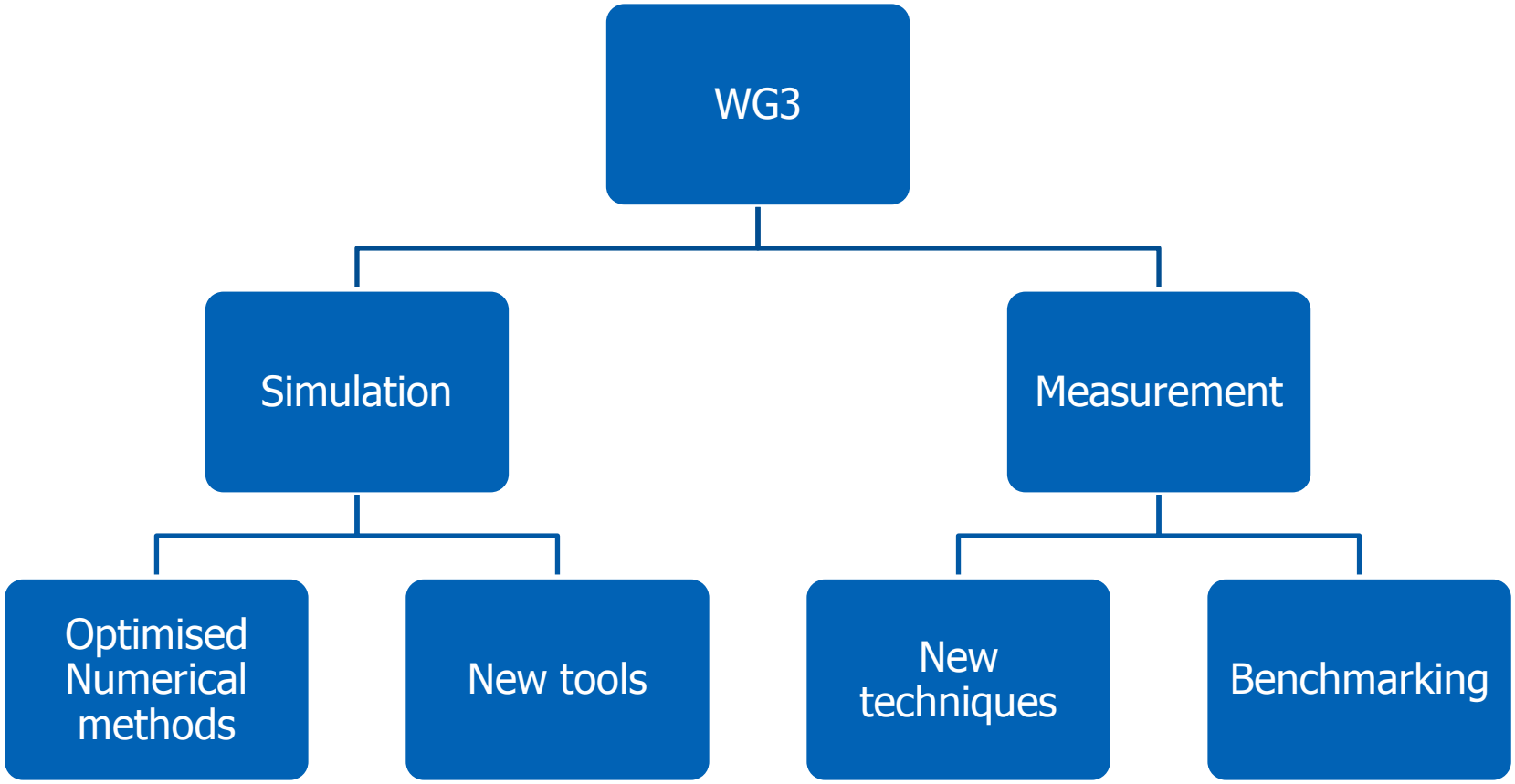
WP2: Enabling technologies and integration



Topic-wise…

- Remember that **“VISTA = Versatile, Integrated, and Signal-aware Technologies for Antennas”** !
- Focus on:
  - Multidisciplinary topics:
    - Link with novel fabrication technology
    - Evaluation of system-level performance, cross-layer design, in particular in radio coding (MIMO, cognitive, etc.)...
  - Higher frequencies up to THz (real time images, etc.)
  - Integration notably for mm-wave (60 GHz, 77GHz…) and reconfiguration
  - ‘Classical’ antennas requiring special evolution for ‘novel’ applications in WSN, medical, IR-UWB…

WP3: With what? Supporting technologies



WP3: With what? Modelling and Characterisation

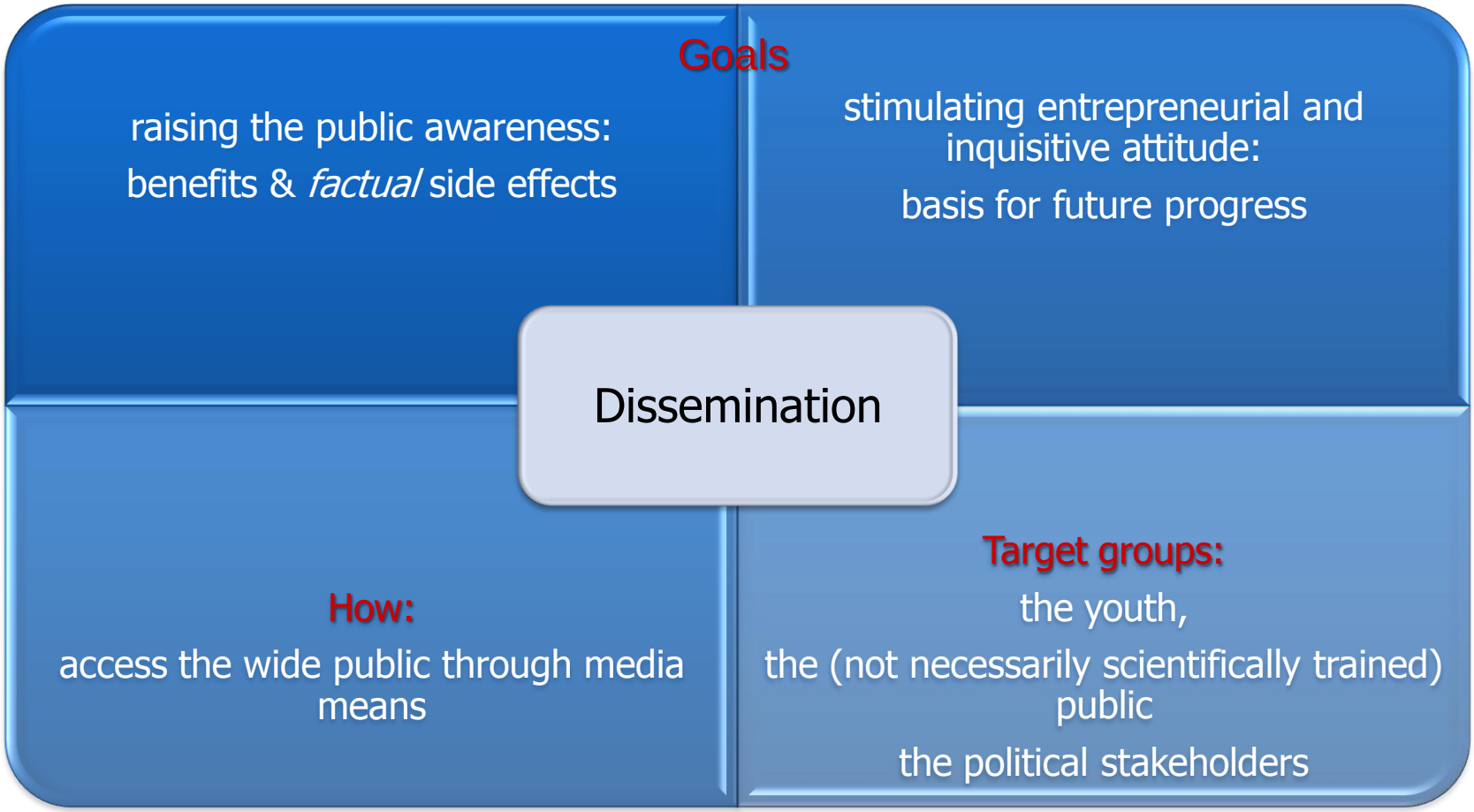
Antenna modelling including environment

- Faster solvers
- Algorithms requiring less memory.
- Hybrid methods,
- Link with fast approximations
- Multi-physics calculation
- Software tools for optimising matching circuits.
- Parallelization of algorithms
- New analytic approaches for complex media

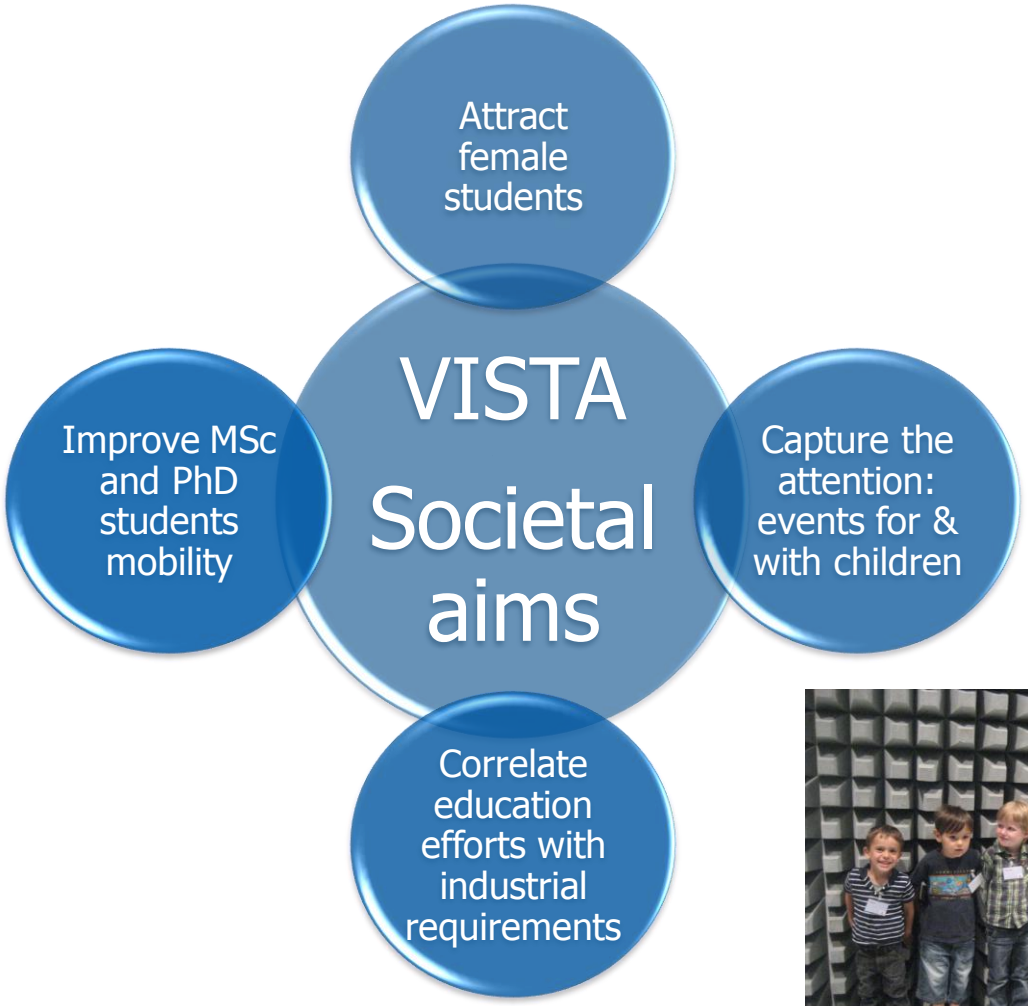
Advanced measurements

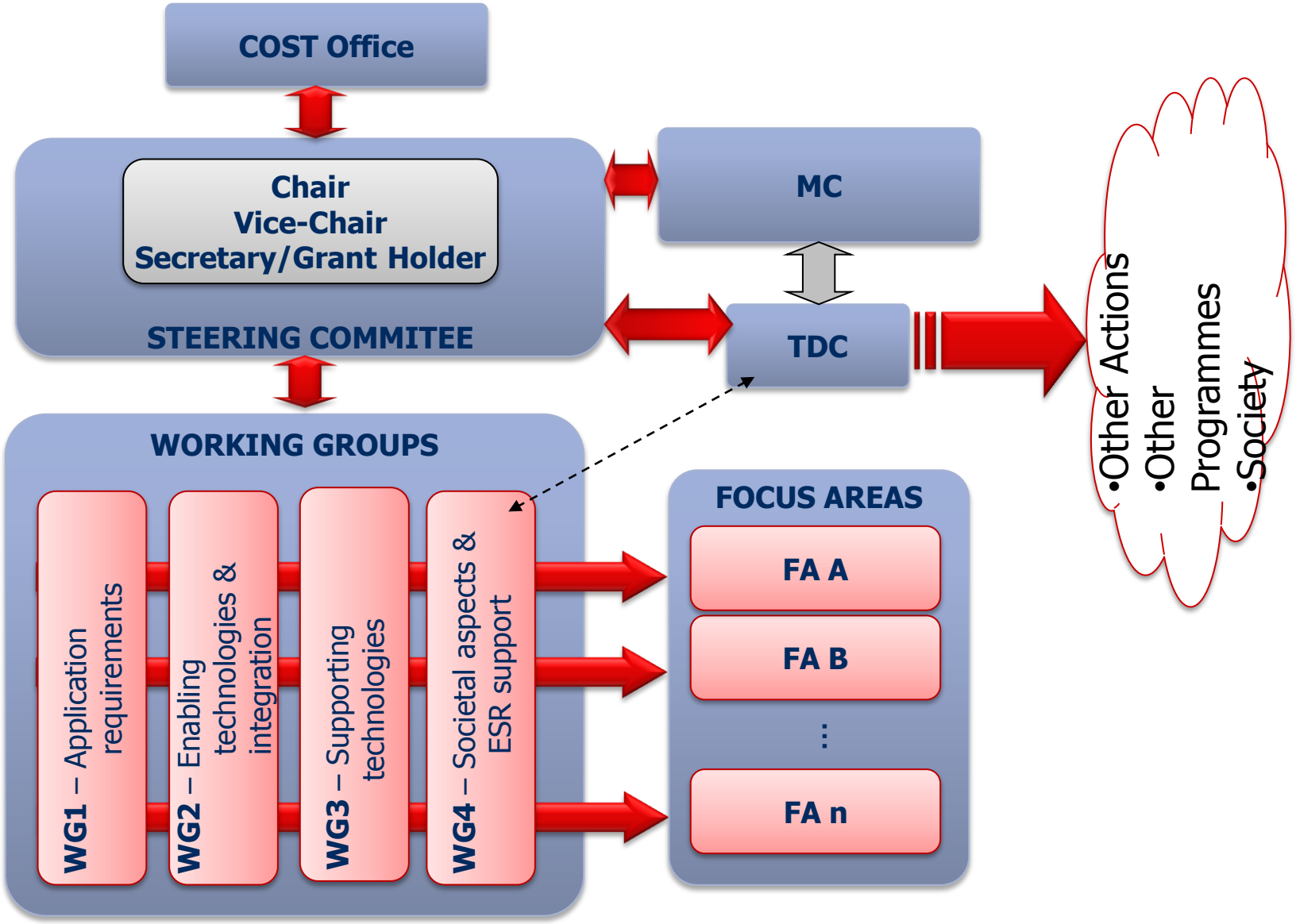
- Experimental validation of modeling techniques
- Near-field methods for new applications
- Advanced methods for OTA test procedures
- Millimetre-wave and TeraHertz measurement techniques
- Measurement of ultra-small radiators and time-varying media.
- Imaging and inversion techniques (e.g. antenna diagnosis)
- Characterization of structured materials (e.g. metamaterials)

WP 4: Who? Message to the broad public

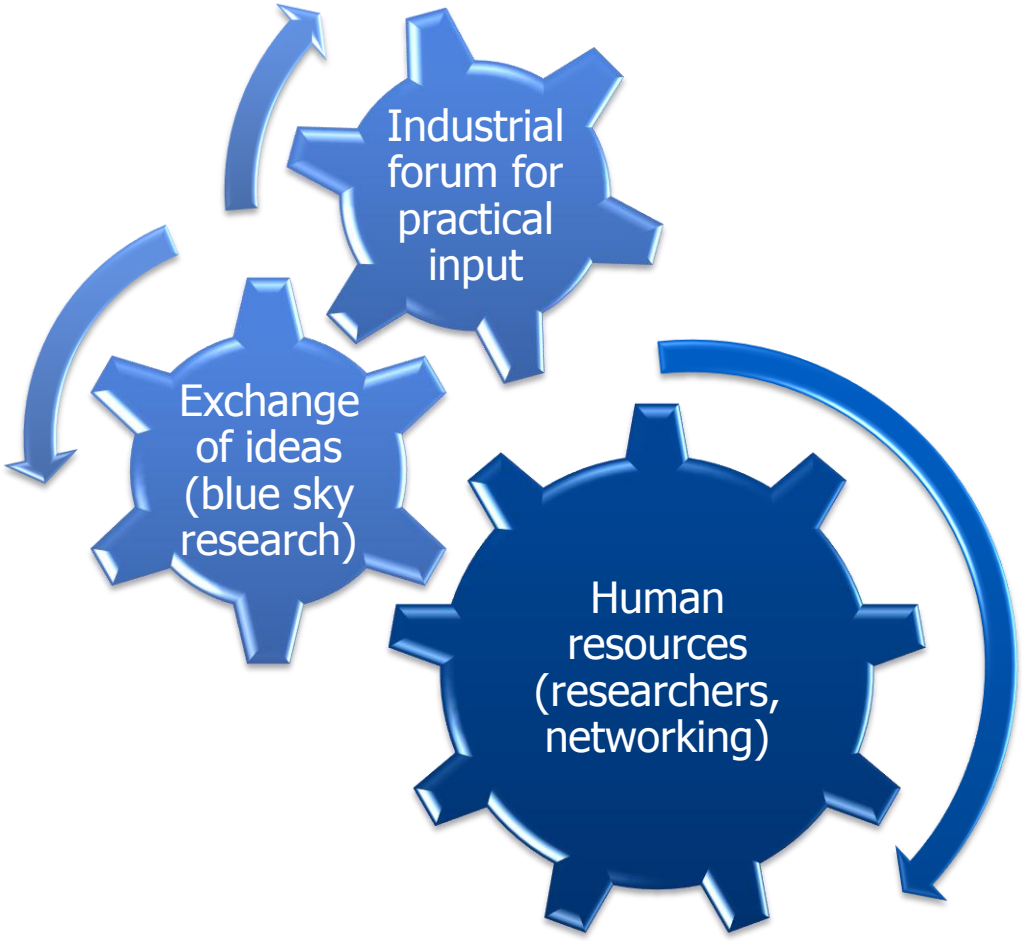


WP 4: Who? Training and Education




COST Office
Chair
Vice-Chair
Secretary/Grant Holder
STEERING COMMITEE
MC
TDC
•Other Actions
•Other Programmes
•Society
WORKING GROUPS
WG1 – Application requirements
WG2 – Enabling technologies & integration
WG3 – Supporting technologies
WG4 – Societal aspects & ESR support
FOCUS AREAS
FA A
FA B
...
FA n

VISTA & Industry



Output

Training and education

- Mobility through STSM (>10/year)
- Courses
- Teaching material

Durable cooperation

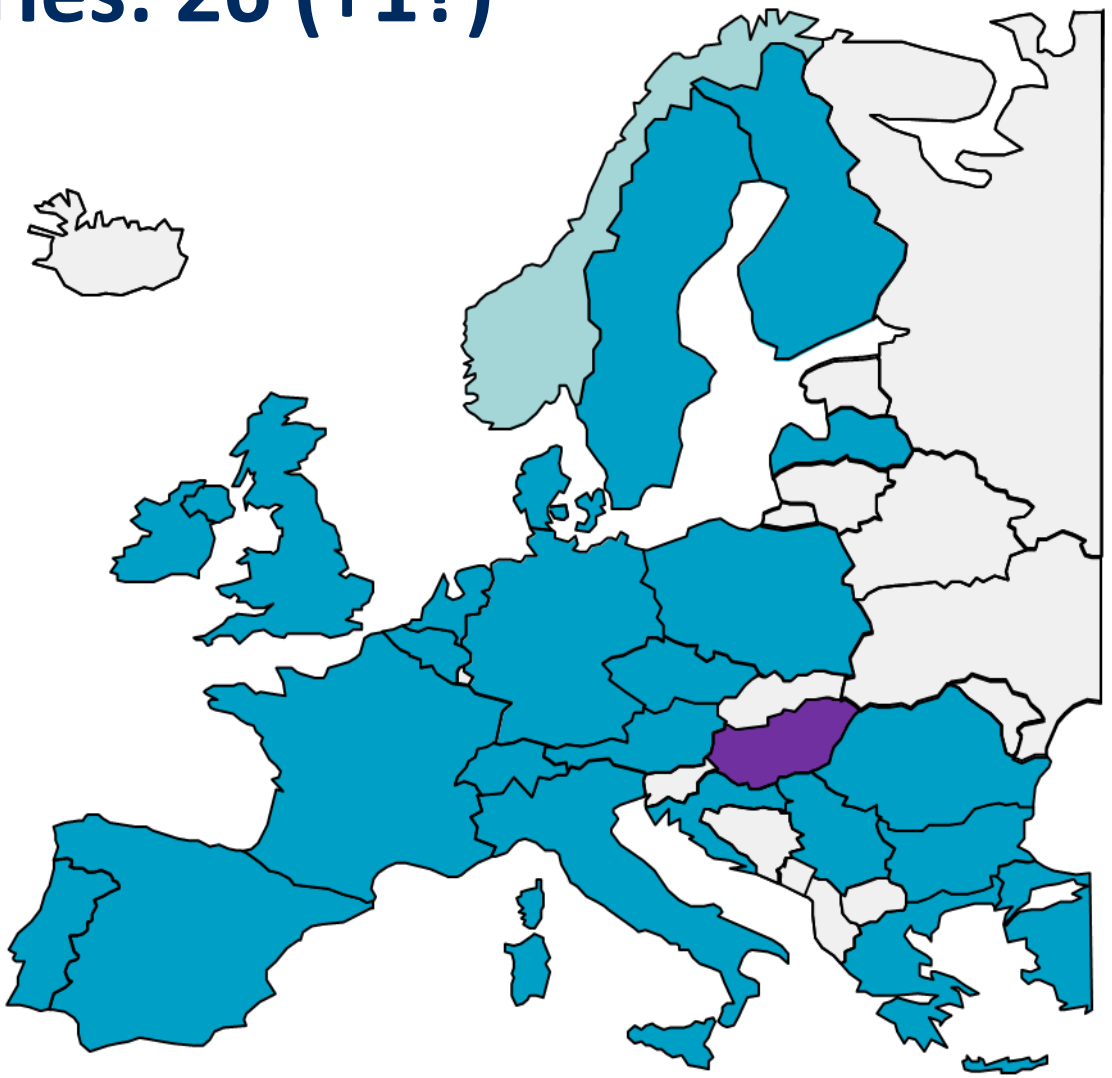
- Industry-University
- Spin-off projects

Technical outputs

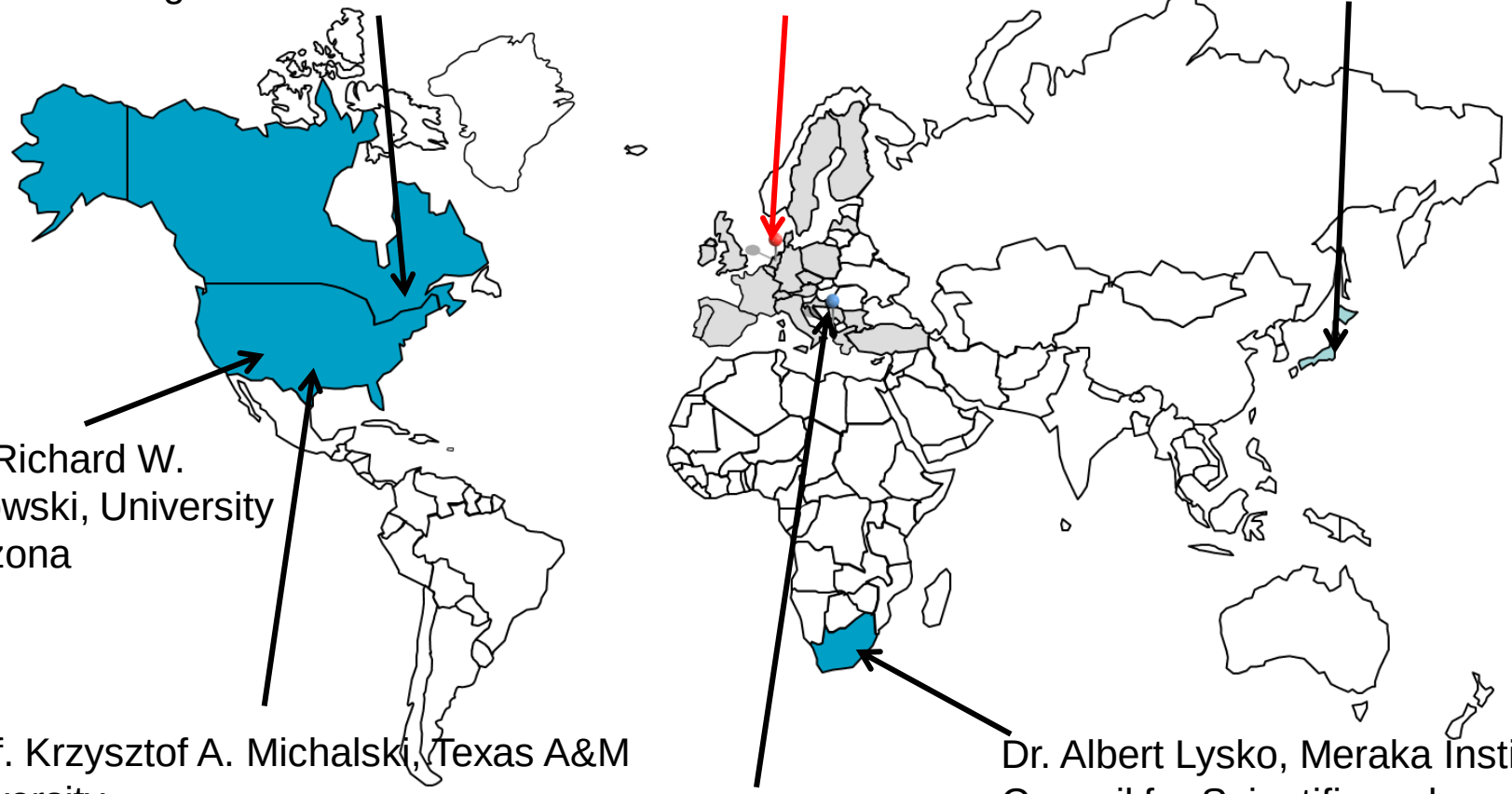
- Recommendations for future applications
- Technical documents
- Algorithms & measurements
- Benchmarking activities

Signatory countries: 26 (+1?)

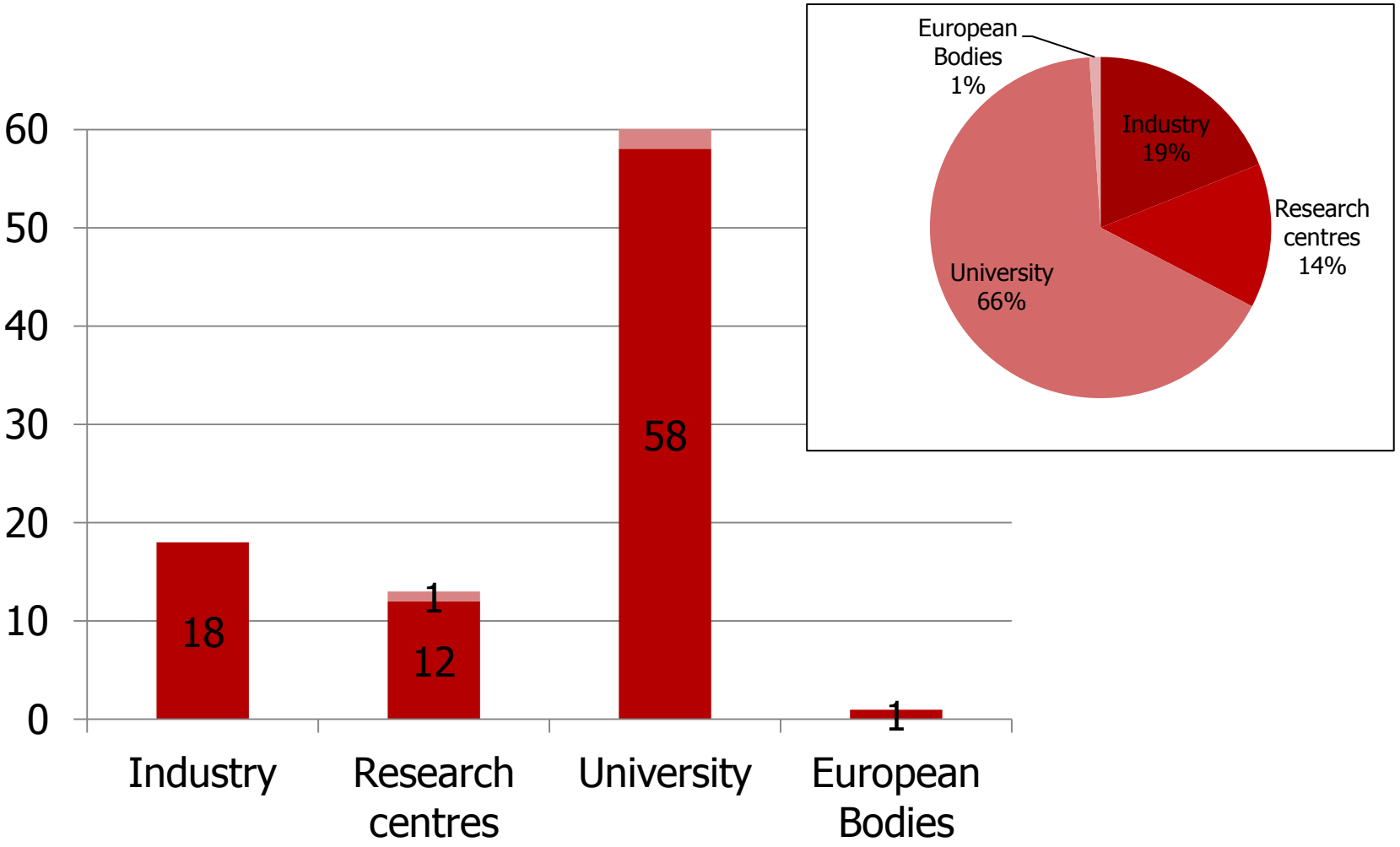
Country	Date
Austria	23/01/2012
Belgium	12/07/2011
Bulgaria	19/08/2011
Croatia	06/12/2011
Cyprus	03/10/2011
Czech Republic	15/06/2011
Denmark	01/11/2011
Finland	21/06/2011
France	12/08/2011
Germany	27/06/2011
Greece	21/11/2011
Hungary	**20/04/2012**
Ireland	11/08/2011
Israel	06/06/2011
Italy	10/08/2011
Latvia	18/07/2011
Netherlands	14/06/2011
Poland	01/07/2011
Portugal	16/06/2011
Romania	21/06/2011
Serbia	18/10/2011
Spain	07/07/2011
Sweden	15/09/2011
Switzerland	07/07/2011
Turkey	29/09/2011
United Kingdom	18/07/2011



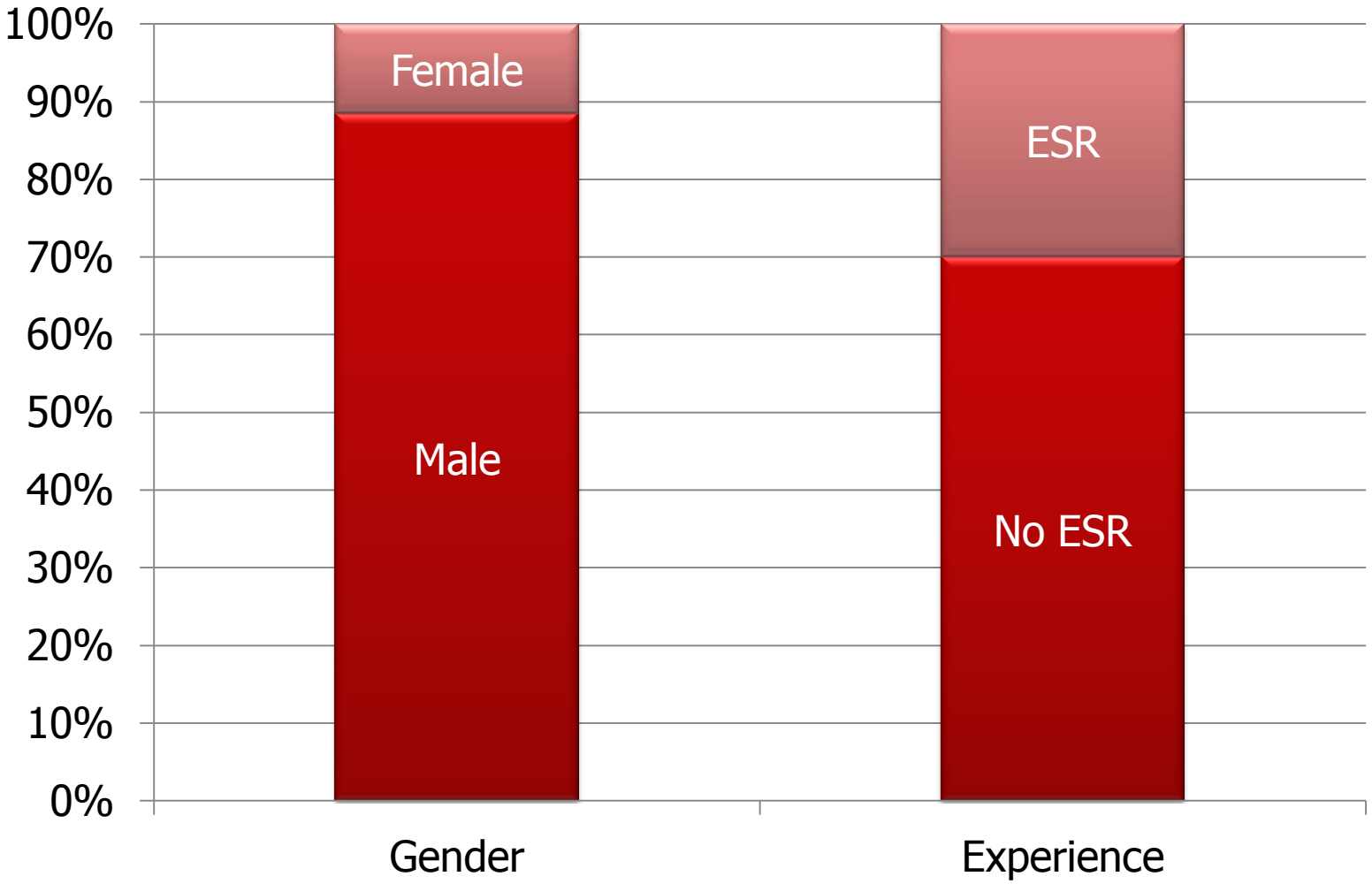
Non-COST& others



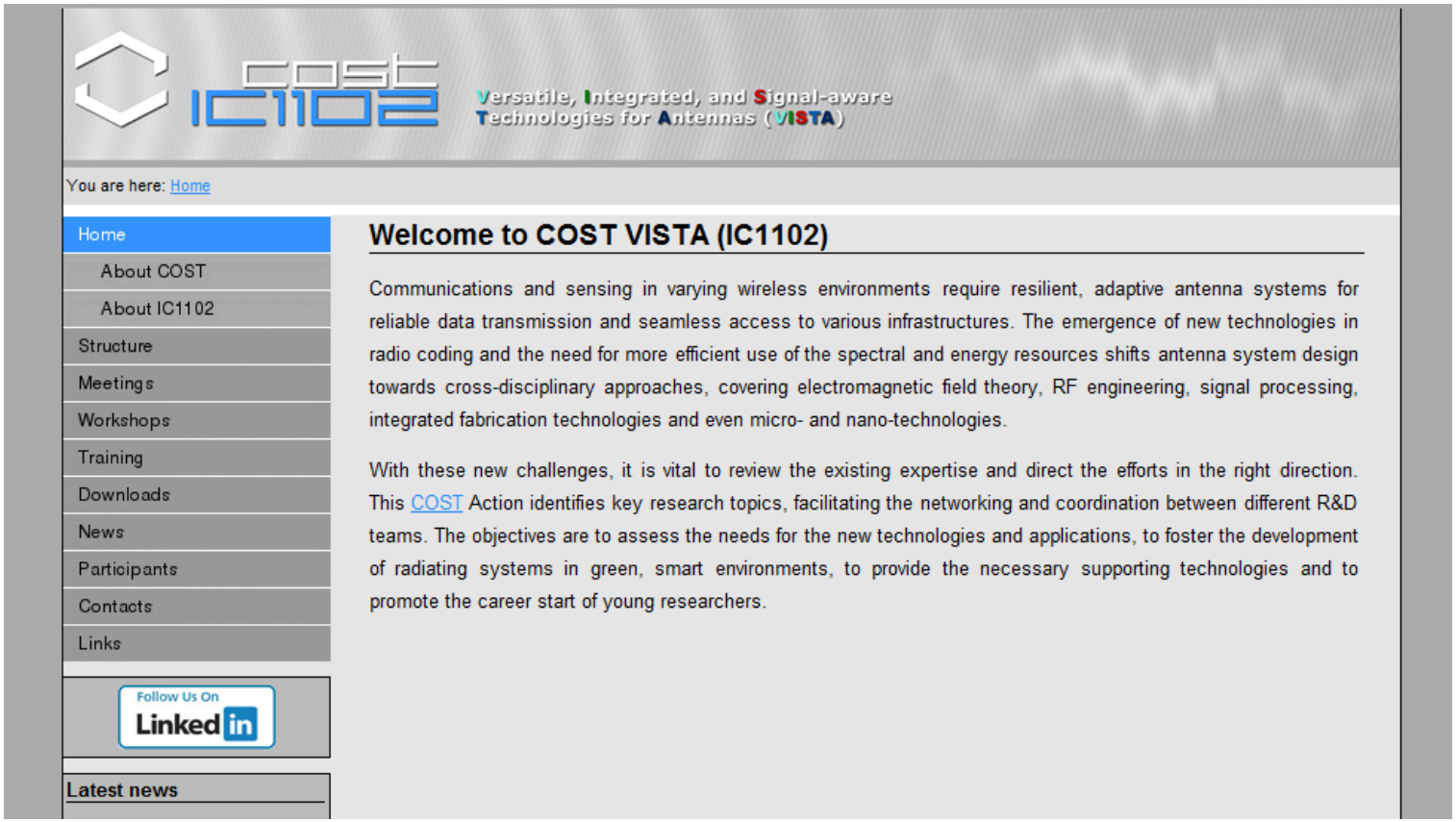
Facts and Figures: 94 Institutions



Facts and Figures: 130 Researchers

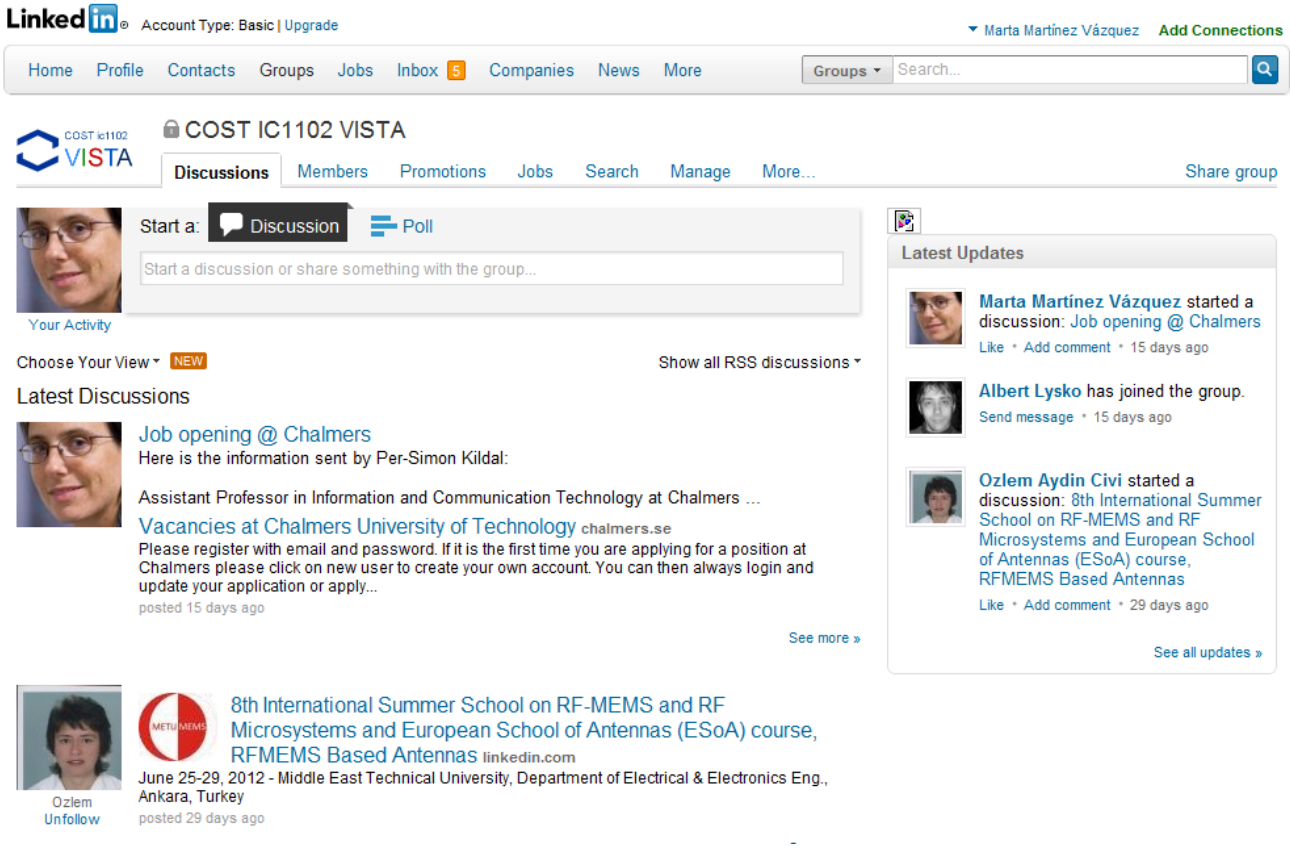


COST VISTA website

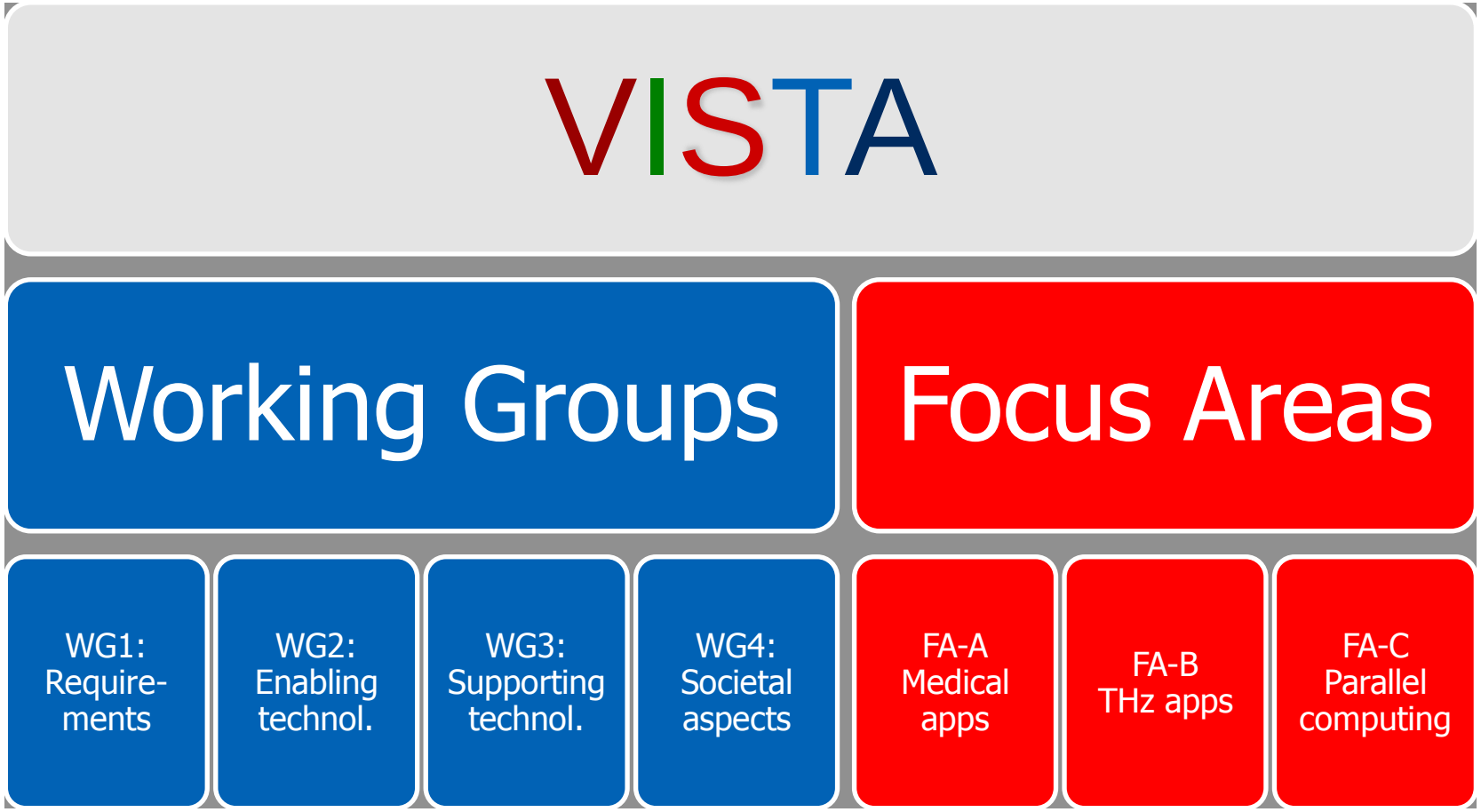


www.cost-ic1102.eu or www.cost-vista.eu

COST VISTA LinkedIn group



- 66 members
- Quick information exchange


VISTA
Working Groups
Focus Areas
WG1: Require-ments
WG2: Enabling technol.
WG3: Supporting technol.
WG4: Societal aspects
FA-A Medical apps
FA-B THz apps
FA-C Parallel computing

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Thank you for your attention…

31-8-2012