

# COMMON BROKERAGE EVENT

15 – 16 October 2009

Brussels

Wireless Communications

Gilles Casanova

# Agenda

- Methodology
- Grand Challenges
- Eols: Tentative list
- Next steps

# The Working Group

- G.Casanova ST
- I.Karls IFX Heterogeneous integration
- B.Vertenten NXP wired connectivity
- G.Forlanini Numonyx Storage
- P.Blouet STE Agile architecture, NoC
- C.Papadas ISD Green wireless
- B.Candaele Thales security
- B.Delepine STE Wireless connectivity
- B. Thedrez Paris-Tech. Emerging applications

# Methodology

- To create a joint comprehensive analysis of the issues related to the wireless communications landscape.
- To agree on the corresponding challenges
- To select a set of “Grand Collaborative Challenges”
- To arrange focussed enlarged sessions

# The Wireless Communications Landscape

- Four main means used for wireless communications:  
**Radio-Satellite-Microwave-free space optics  
Infrared.**
- The WG focussed on Radio
  - ➡ Cellular mobile radio WWAN
  - ➡ Radio based fixed wireless technologies  
WLAN-WPAN- WMAN-WNFSN



Working Group  
**WIRELESS COMMUNICATIONS**  
July 2009

**G.Casanova (ST) - P.Blouet (STE) - I. Karls (IFX) - B.Vertenten (NXP)-  
G.Forlanini (Numonyx )- F.Perruchot (Leti) - JP Tual (Gemalto) -  
C.Papadas (ISD) - B.Candaele (Thales) - B.Delepine (STE)-  
B.Thedrez (Telecom-ParisTech.)**

# Grand collaborative challenges

- Based on the outcomes of the document and in line with the recommendations expressed by the Public Authorities, **the Core Group proposes three Grand collaborative Challenges** requesting a long range planning effort and close cooperation along the whole value chain. The objective is to spur development of innovative and cost effective technologies enabling designing and manufacturing silicon systems solutions for the wireless communication market. **The three Grand Challenges are namely:**

# Grand collaborative challenges

- Front End & Back End heterogeneous 3D integration Platform
- Technologies for “Green” Wireless Communication.
- Adaptative radio including wireless nodes and security issues

# Grand collaborative challenges

- **FE/BE heterogeneous 3D integration Platform**  
*Objective:* To enable the development of Materials, design tools and design methodology, manufacturing equipments and manufacturing process for Heterogeneous integrations.
- **“Green” Wireless Communication**  
*Objective:* From the system level to the design implementation to deploy in a holistic approach green wireless solutions.
- **Agile radio**  
*Objective:* To develop innovative integrated design solutions for both the RF front-end and the digital baseband. Security issues will be addressed in parallel.

# October 1st & 2<sup>nd</sup> - Meeting Aeneas office Paris

- To clearly define the scope and the objectives of the agreed cooperation (Grand Challenges) .
- To confirm the mutual interest of relevant key players to collaborate on the identified topics.

# Wireless Communication

Session Leader: Gilles  
Casanova, *STMicroelectronics*

39 Participants:

ANCEY Pascal	ST	GANDLARZ Jose	Apache	NGUYEN van Tam	Paris-Tech
BLOUET Patrick	STE	GELDREICH Bruno	Atrenta	PAPADAS Constantin	ISD
BOUFFIOUX Alain	NXP	HAASE Joachim	FhG	PERRUCHOT Francois	Leti
BRICAUD Pierre	Synopsys	HUEBER Gernot	IFX	ROSELLI Luca	Uni.Perugia
BRUCH Daniel	FHG	KWAKMAN Laurens	FEI	SCANNELL Mark	Leti
CABRURA Enrico	CNM	LANTING Cees	Csem	SCHREMS Martin	AMS
CANDAELE Bernard	Thales	LAUNAY Nicolas	Tegal	SIGL Alfred	EVG Group
DANGER Jean-Luc	Paris-Tech	LEFEBURE Laurent	Cadence	SWINNEN Bart	IMEC
DELEPINE Bruno	STE	MACII Alberto	PoliTo	TUOT Francois	Gemalto
DELMAS Serge	EADS	MIKA Thomas	Tegal	VÄHÄ-HEIKKILÄ Tauno	VTT
DUBOIS Thierry	IMEC	MOHR Werner	Catrene	VAN DER ZON Ben	TNO
DULONGPONT	Catrene	MONOT Jean-Jacques	Thales	VIALLE Nicolas	Apache
FORLANINI Giancarlo	Numonyx	NEGRA Renato	UMIC	WLOKA Markus	Synopsys

# General outcomes

- 3D European roadmap
- “Holistic collaborations”
- H/S-Silicon systems solutions
- Manufacturing

# 3D integration: Outcomes

- European roadmap
- Design kit
- Heterogeneous integration
- Manufacturing

# European Roadmap

- In collaborations *equipment vendors* often focus on short term modifications!
- Need for standardization---> "3D European roadmap" driven by applications
- The goal is not to compete with the ITRS but to express as much as possible an European voice to contribute to the ITRS.

Equipment vendors can tune their R&D programs with the product development.

CAD tools priorities could be expressed more clearly.

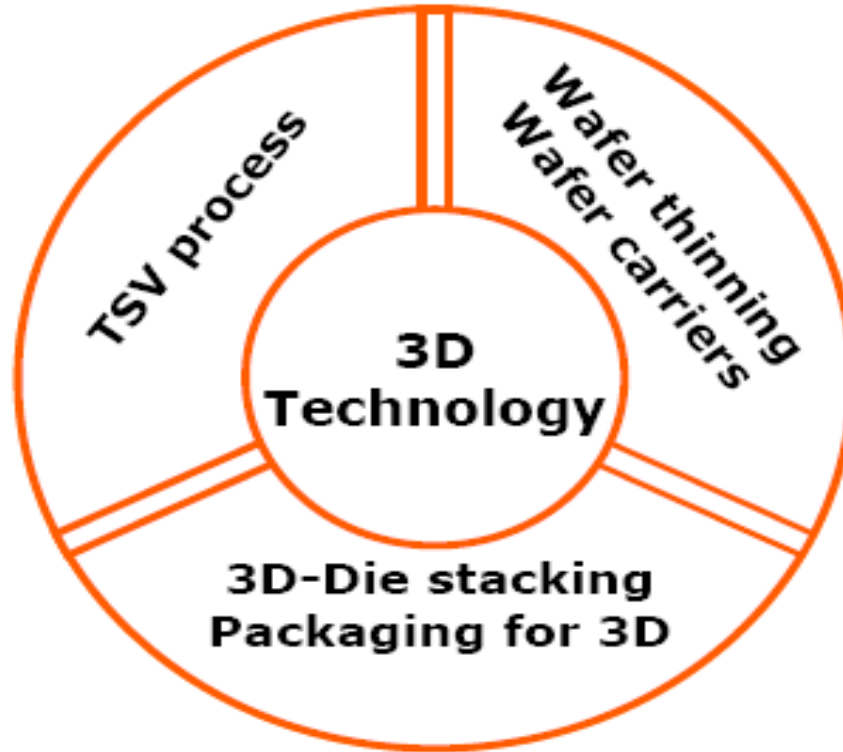
# European Roadmap

- Core Group: ST-STE-LETI-IMEC-CSEM-NXP-TNO-VTT-DICE-AMS----- Other?  
Q4
- Focus on Handset - Hearing aids - sensors networks

# Requirements for the success of 3D Integration

## 3D Definitions, Roadmaps

**3D-Design tools**  
**&**  
**Design methodology for 3D**



**Yield 3D**  
**KGD for 3D**  
**3D-Test strategies**

## Supply Chain & Standardization

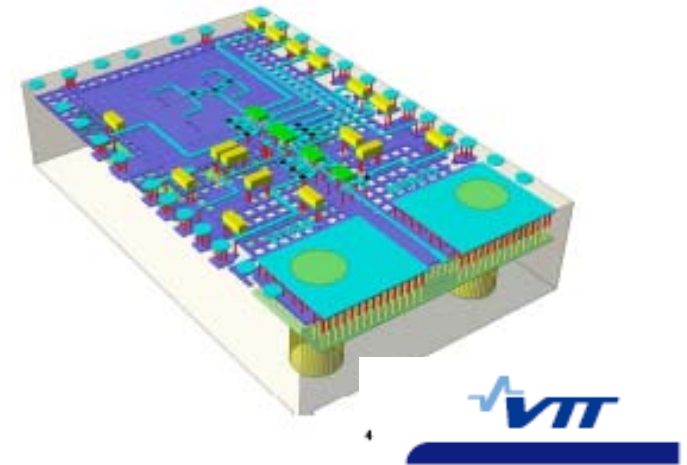
# Design kit for 3D integration

The lack of 3D EDA tools is a major roadblock to the adoption of the 3D technology

- Need a real 3D floor-planner with multi-CMOS technologies in one framework, able to interface with 2D tool for IC physical implementation
- DFM rules, 3D library, system partitioning, Electrical characteristic, ESD strategies

# 3D heterogeneous integration

- Integrated passive-RF-sensors-opto-Systems memories
- Accurate thermal models
- Design knowledge from materials and processes to module level
- “Package less” issues



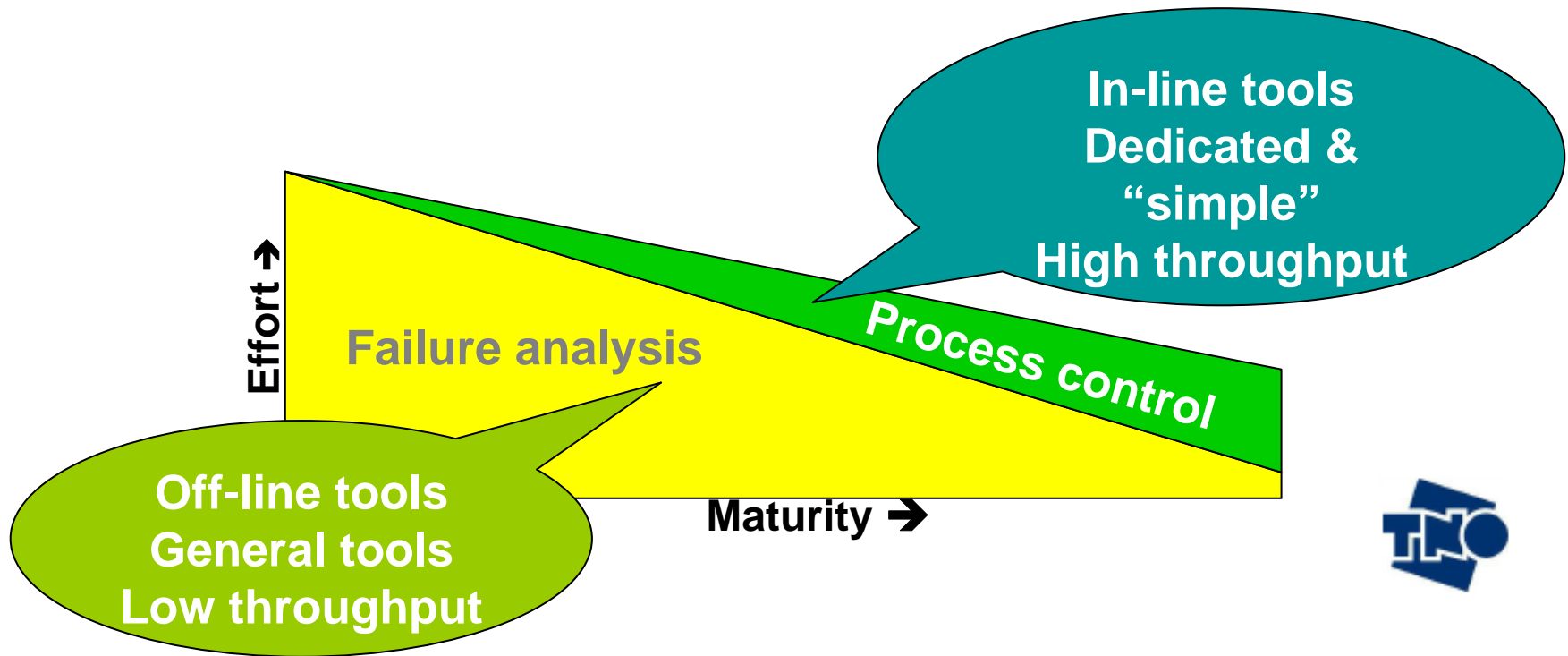
# Manufacturing

We need to articulate public R&D funding and Manufacturing challenges

- **Yield enhancement and Failure Analysis**
  - Fault isolation methods: measurable signals, spatial resolution (x,y)
  - chip access (stacked dies, finished products)
- **Design for Failure Analysis**
  - Design verification & debug
  - Circuit Edit: not possible for stacked dies, new strategies?

# Metrology & detection tools

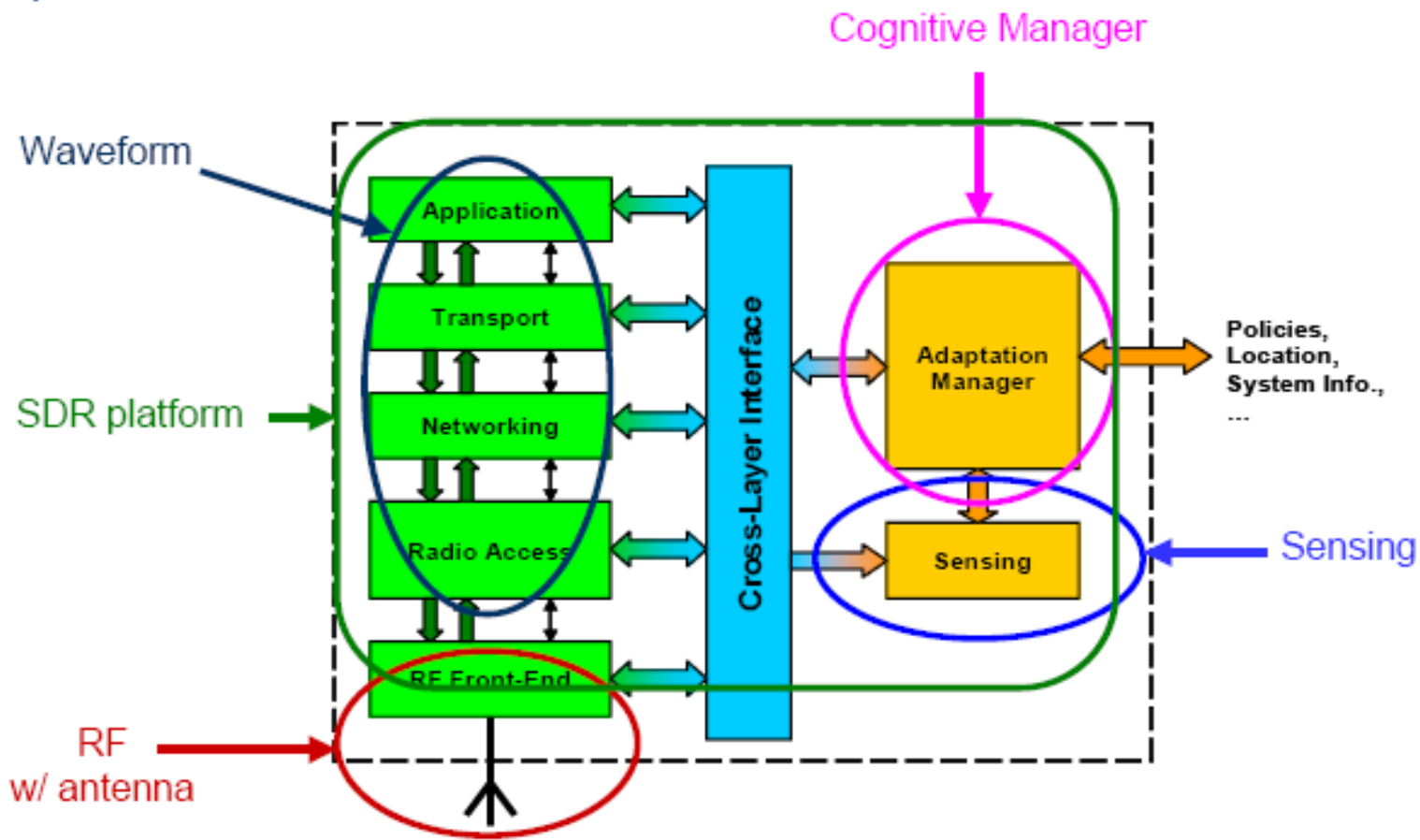
Metrology changes focus from  
**Failure analysis to process control**



# Agile radio

- Smart SDR/Sensing
- Agile RF transceivers
- Wireless sensors
- Green wireless
- Open trusted platform

# Cognitive Radio Functional Architecture



Thales ENAC-CATRENE pre-brokerage October 2nd 2009

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THALES

# Focus on:

- **Smart SDR system/Sensing** - analyzing stimuli - user profile – spectrum occupancy network-spectrum sensing algorithm.
- **Spectrum analyzer** to be integrated in a terminal
- **Collaborative architecture framework**
  - Dynamic reconfigurable architecture
  - Holistic 3D approach link to many core architectures

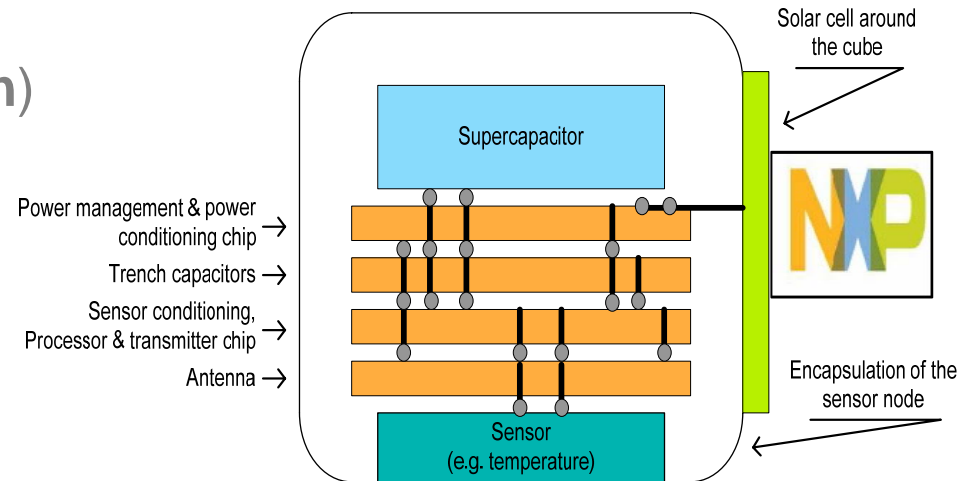
**Real need to have transversal project able to cover several domains**

# Agile RF transceiver

- Reconfigurable antennas with MEMS switches. – Multipath MIMO solutions (from multiple BS /relay /terminal ) and improvement of existing standards
- Highest integration of PA
- Digital enhanced RF



- **Low-power electronics & energy management**  
(for improved autonomy, smaller batteries, enabling use of energy scavenging, smaller cost, environment...)
- **Low-power wireless communication**  
Main standards defined with audio/video streaming in mind  
Current standard not suited for low-duty cycle operations
- **3-D integration for miniaturization**, for handling heterogeneous technologies and for dealing with the broad multidimensional design space of sensor applications (common **modular** platform).
- **Reconfigurable electronics** for applicability (**common design**) to many applications (SDR, configurable SAR-DAC) with eventual sensing functionality for adaptation to the wireless environment (**cognitive radios**)



# Green wireless

- **Holistic approach** Energy management at different level
  - Chip / terminal / network
  - Measurements, estimation
- **Power driven design**
  - H/S power profiling issues
  - Ultra low power technologies
- **Energy harvesting techniques**

# New Memory System for Wireless Communications

- The project targets new Hardware and Firmware technologies for mobile systems and communication of large and multi-form data assistant (mobile phones, PDA, laptops etc.) allowing them also to bridge to the wired network in the house.
- The project based on a new communication platform, is targeting mobile and wired applications, withj on high speed interfaces, including new memory systems both for Storage and Code execution.
- Packaging activities, will also be needed due to the high frequencies of the high speed Interfaces.
- The Application for demonstration will be innovative to the mobile market, using the new features and possibilities brought by the new platform

# List of possible Eols - Contact point

- 3D Design kit: [gilles.casanova@st.com](mailto:gilles.casanova@st.com)
- Manufacturing-Yield/test:  
[Martin.Schrems@austriamicrosystems.com](mailto:Martin.Schrems@austriamicrosystems.com)
- 3D Heterogeneous integration:  
[patrick.blouet@stericsson.com](mailto:patrick.blouet@stericsson.com)
- Cognitive radio: [Jean-Jacques.Monot@fr.thalesgroup.com](mailto:Jean-Jacques.Monot@fr.thalesgroup.com)
- [gwenael.guilmin@thalesgroup.com](mailto:gwenael.guilmin@thalesgroup.com)
- Agile RF transceiver: [Gernot.Hueber@infineon.com](mailto:Gernot.Hueber@infineon.com)
- Wireless sensor node: [alain.bouffioux@nxp.com](mailto:alain.bouffioux@nxp.com)
- Green wireless: [papadas@isd.gr](mailto:papadas@isd.gr)
- New memories systems: [giancarlo.forlanini@numonyx.com](mailto:giancarlo.forlanini@numonyx.com)
- Open trusted platform:

# Next steps

- Individual contribution has to be sent to the respective contact point, explaining the proposed scientific contribution (max 100 words) and the corresponding requested resources--→ W 43.
- Consolidation W 44-45
- Eols W 47