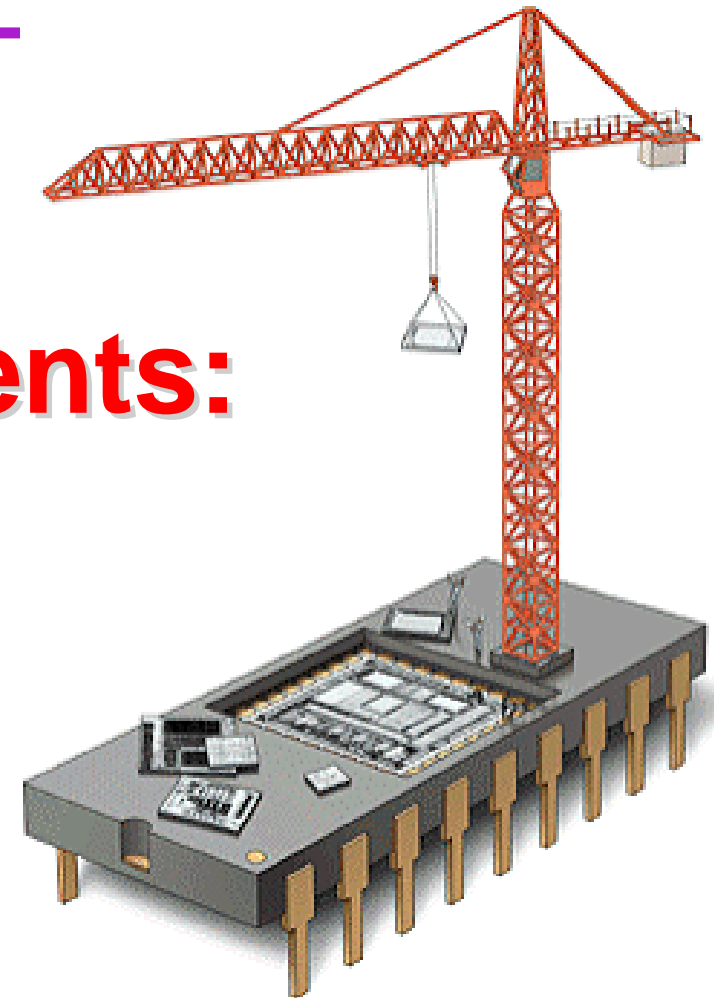




# Mixed signal Virtual Components: the challenges

Jean-François POLLET  
COO

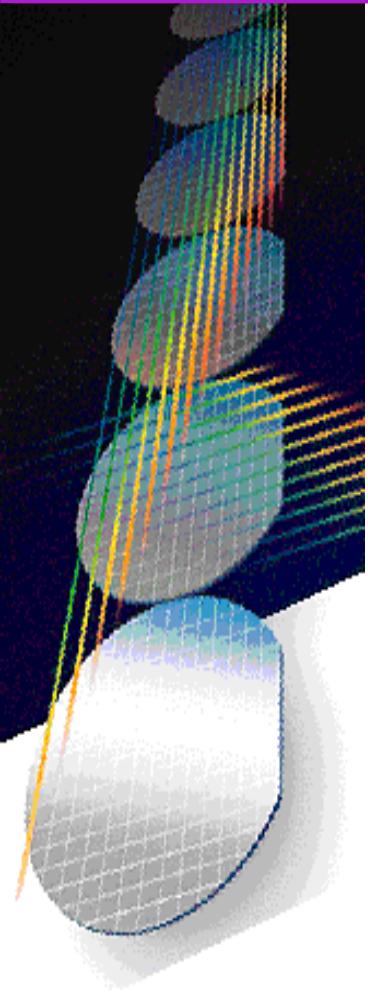
DOLPHIN INTEGRATION





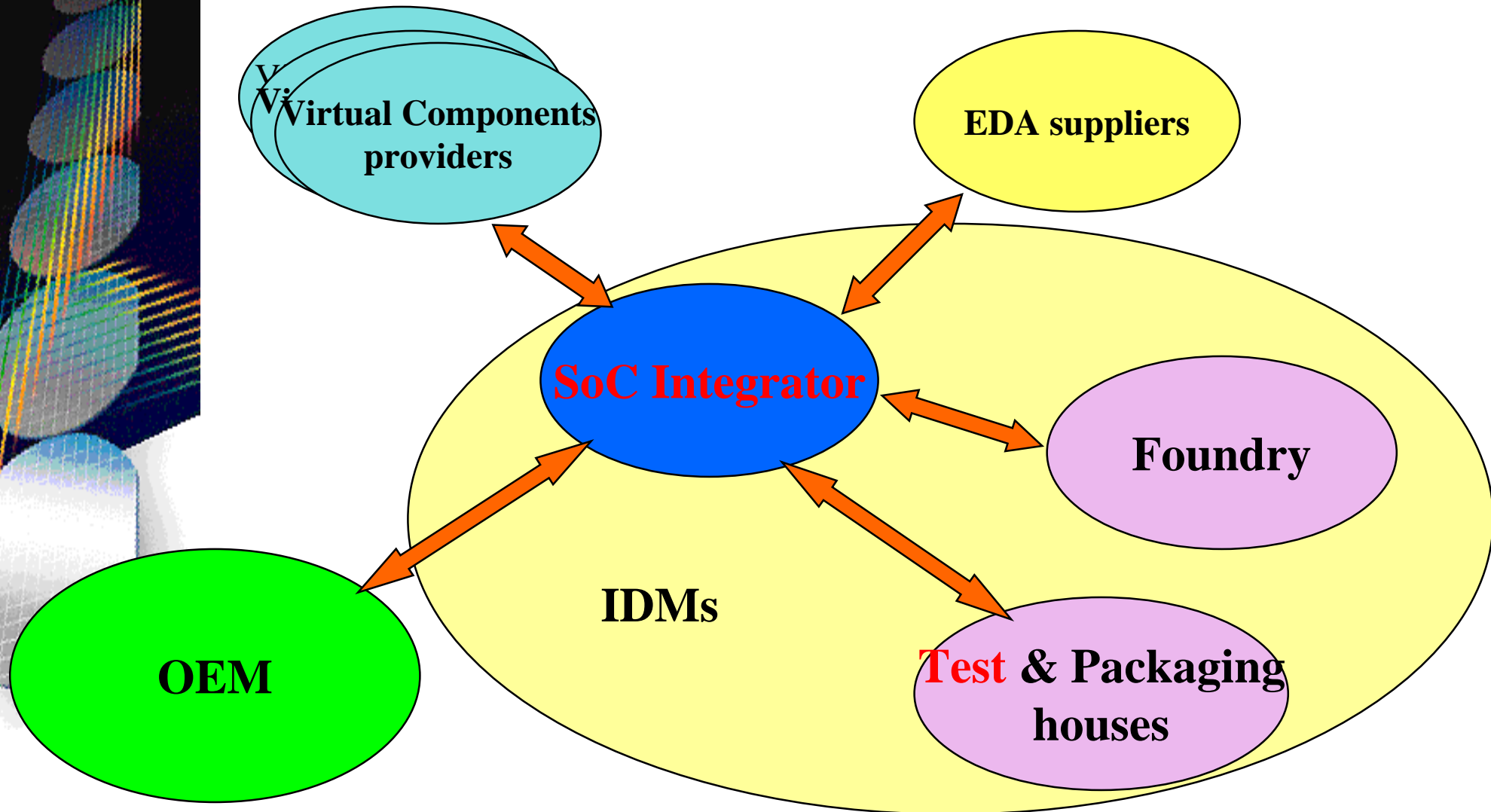
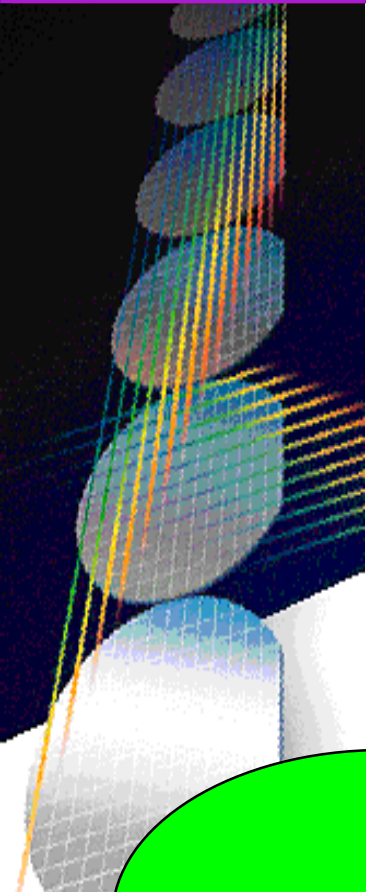
# Dolphin Integration

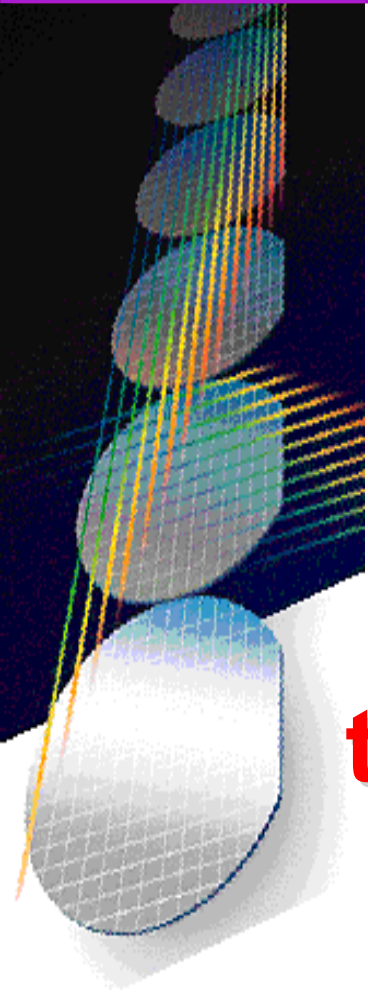
- Provider of
  - Virtual Components: **A&MS**, embedded memories, microcontrollers
  - Enabling technologies: **A&MS simulator SMASH**, cosimulator Success™...
  - Fabless Provider of custom SoCs
  - Empowering design services





# WHO are the PLAYERS ?





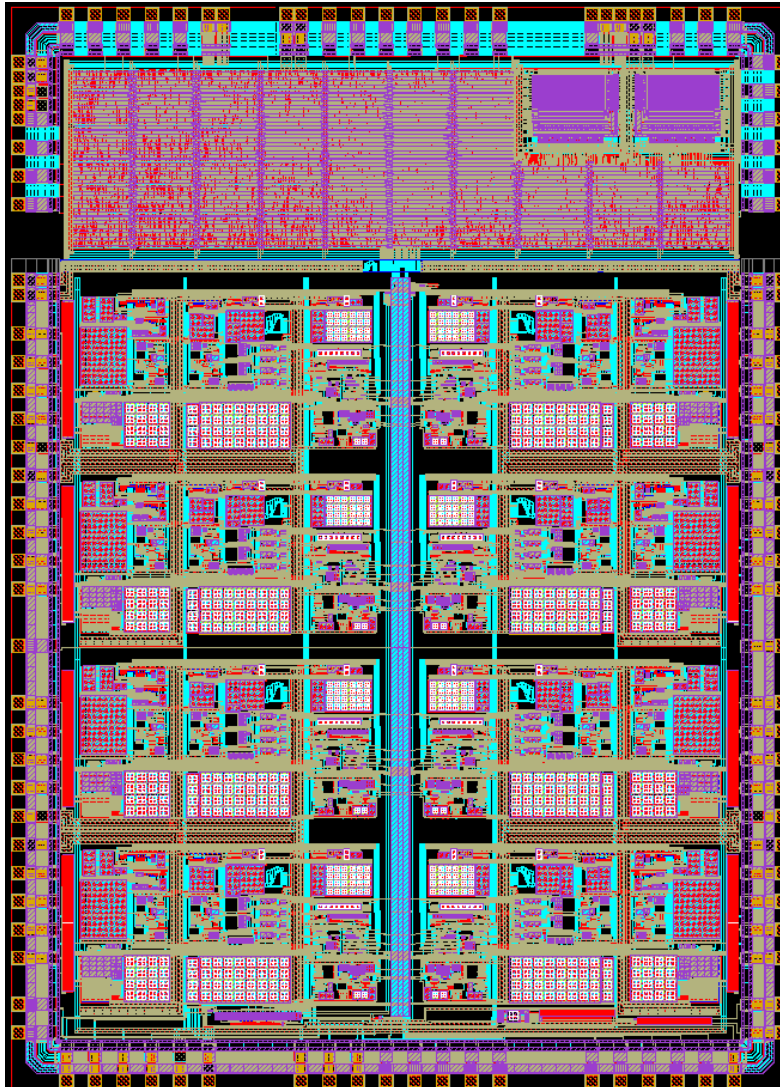
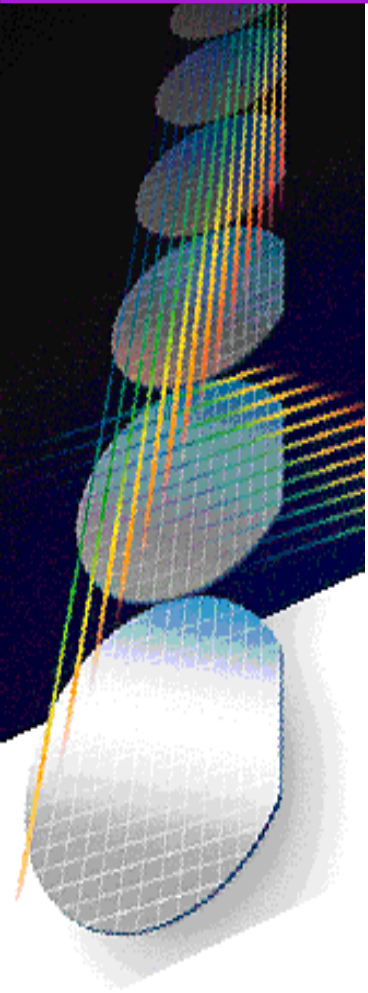
**Mixed signal SoC  
integrators  
and ViC providers:**

**two sides of the same challenge**





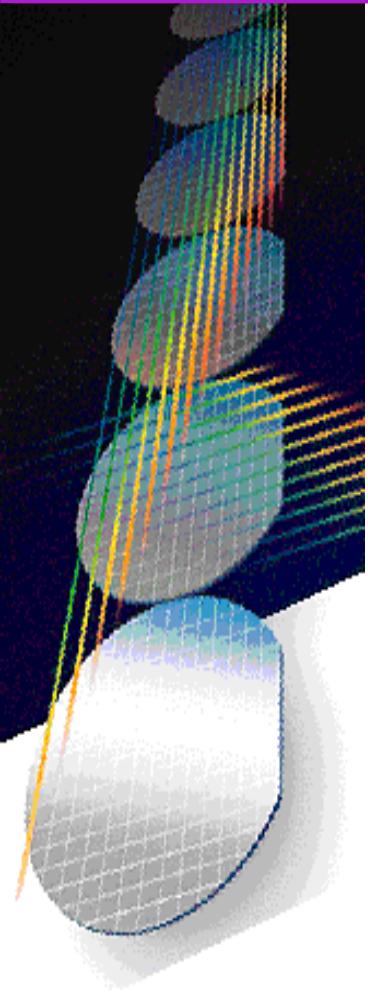
# E.g. a mixed signal SoC with 8 Channels high resolution ADC





# SoC Integrators

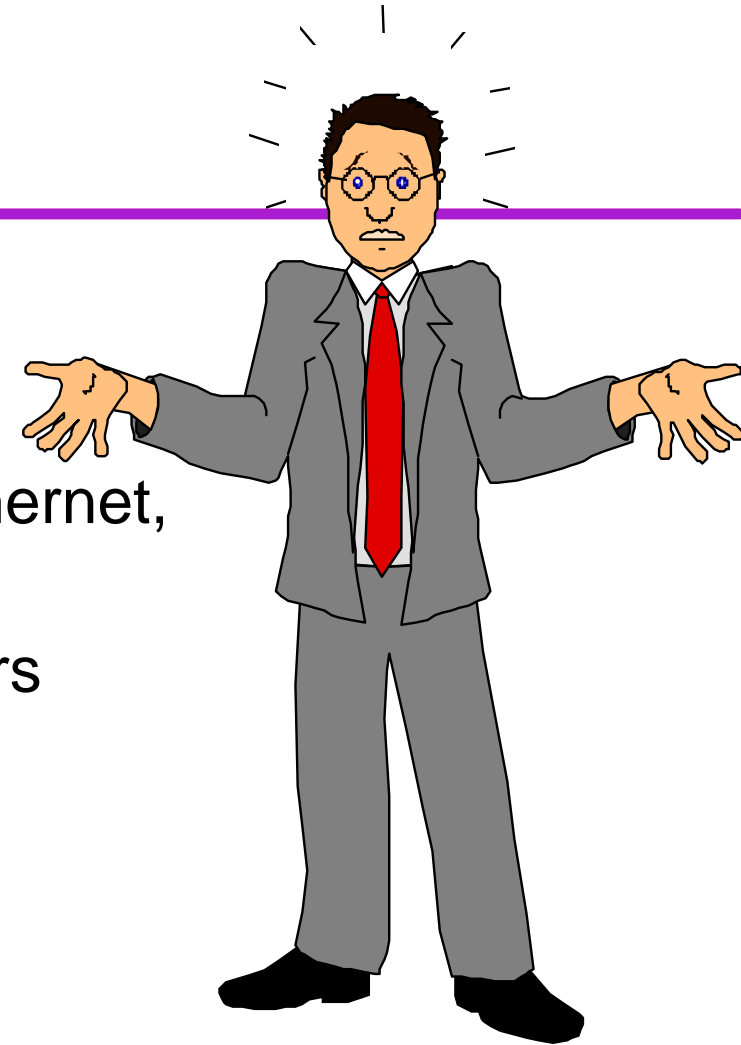
- **Who are they?**
  - Mainly **specialists in logic design**
  - Some analog specialists, but each of them in one specific domain
- **What do they have to face?**





# You say A&MS?

- Various specific fields
  - High speed I/Os (LVDS)
  - Bus interfaces (USB, Ethernet,
  - High speed converters
  - High resolution converters
  - RF
  - PLL
  - ...



- SNR, THD, ENOB, SINAD, offset, noise, INL, DNL, bandwidth, AC, DC, PSRR, crosstalk, spurious, FFT, gain, AGC....

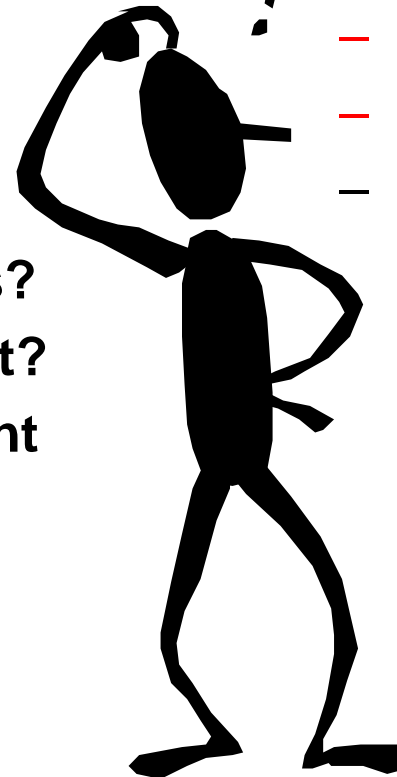


# Embed or not embed A&MS ViCs?

- Sometimes the choice is evident:
  - Low Power / Low voltage
  - PLL
  - Physical size
  - Lower cost
  - ...
- Higher performances?
- Return on Investment?
- How to select the right solution: technical, provider...?

- Requires to master all the costs

- License & royalties
- **Test**
- **Production yield**
- A&MS or logic process?



- Requires to master the design-in





# Main challenges for a provider of A&MS Virtual Components

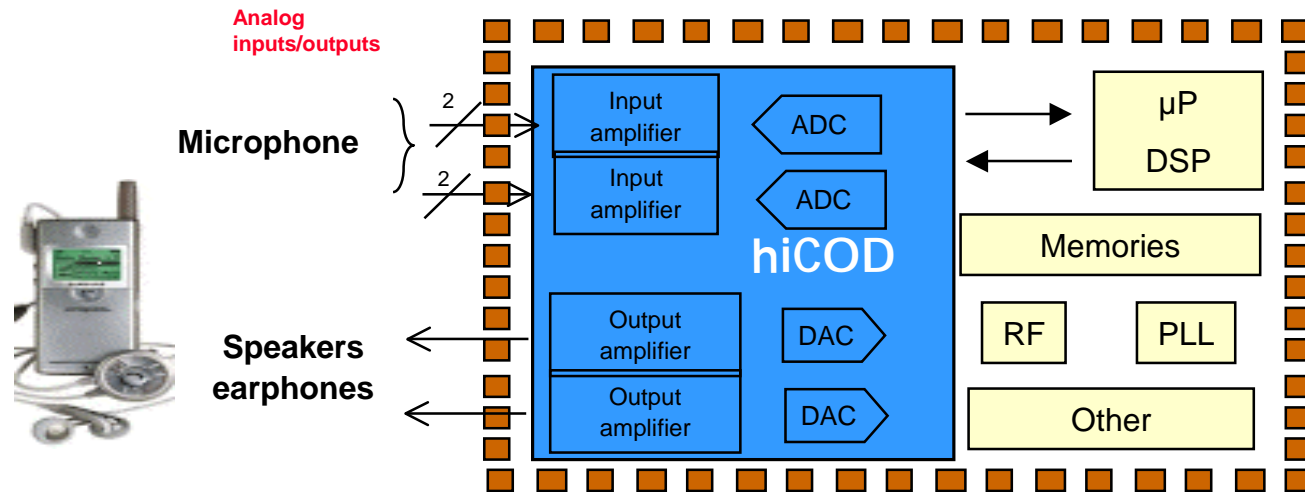
- Multi-foundry portability
- A&MS or logic technological process?
- How coping with the request for customization?
- Noise: substrate, supply voltage
- **Testability: debug and industrial**
- **Test program coverage?**
- Production yield
- Return on Investment





# hiCOD High Quality Audio Stereo Codec (ADC + DAC)

***It is time to integrate the CODEC in your SoC!***



***What are the main applications for hiCOD?***



- MP3 players
- Digital video camera
- DVD player
- Car audio devices
- Set Top Box





# hiCOD High Quality Audio Stereo Codec (ADC + DAC)

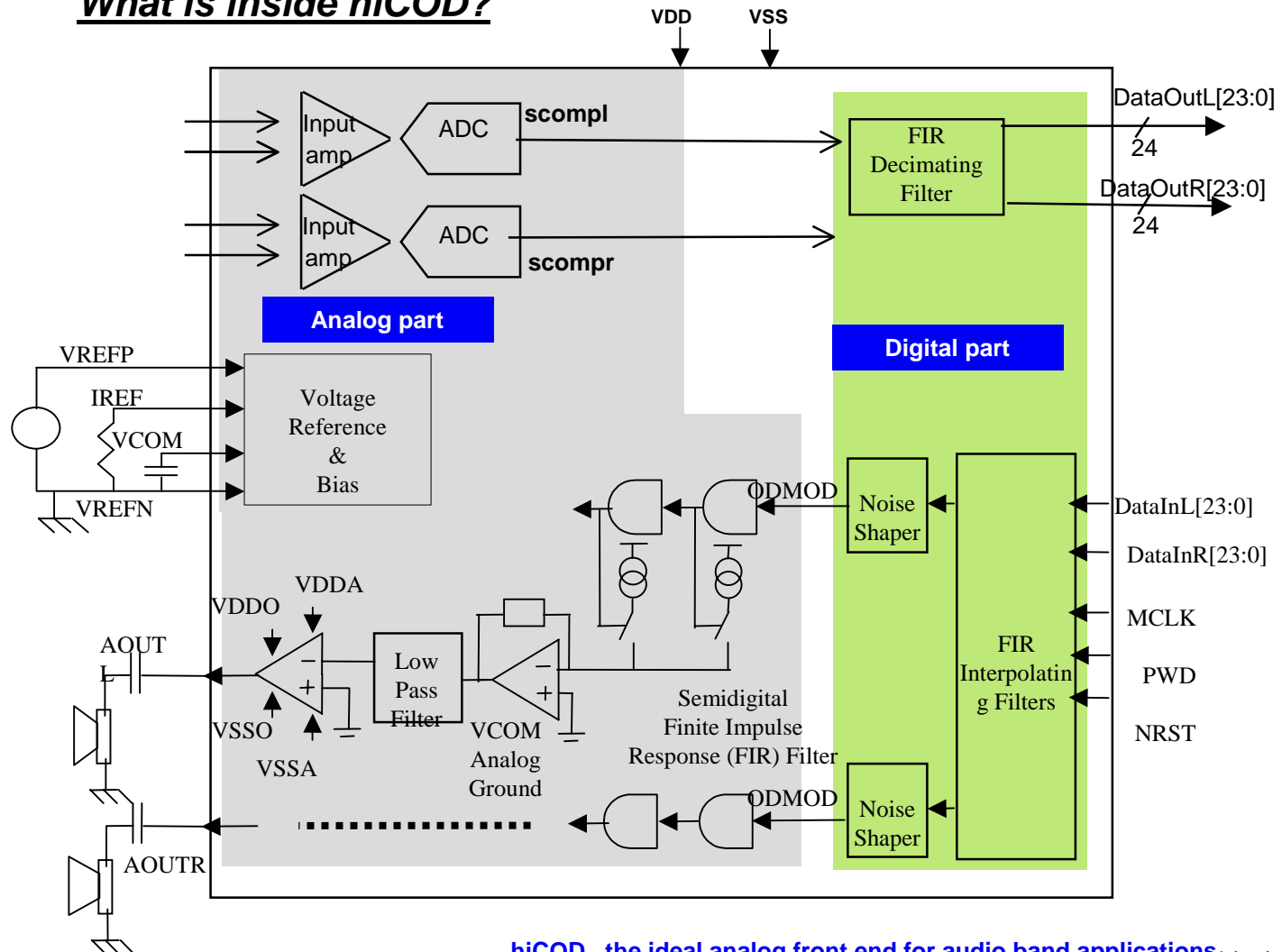
## Main features

- » **TSMC compatible 0.18  $\mu\text{m}$  process:**
- » Single **+3.3 V** power supply (2.7 V to 3.6 V) for analog; 1.8 V for logical part
- » Typical SNR and THD in the 50 - 20 kHz band: **over 90 dB**
- » programmable gain amplifiers and attenuators
- » Output sampling  $F_s$  between 8 and 48 kHz
- » Low impedance output driver: 8 or 16  $\Omega$
- » 24-bit Data-In and Data-out
- » Differential analog inputs, single ended analog outputs
- » Temperature range from -40  $^{\circ}\text{C}$  to 85  $^{\circ}\text{C}$
- » Input offset calibration mode
- » Separate **power-down mode** for ADC and DAC



# hiCOD High Quality Audio Stereo Codec (ADC + DAC)

## What is inside hiCOD?



hiCOD, the ideal analog front end for audio band applications

www.dolphin-integration.com

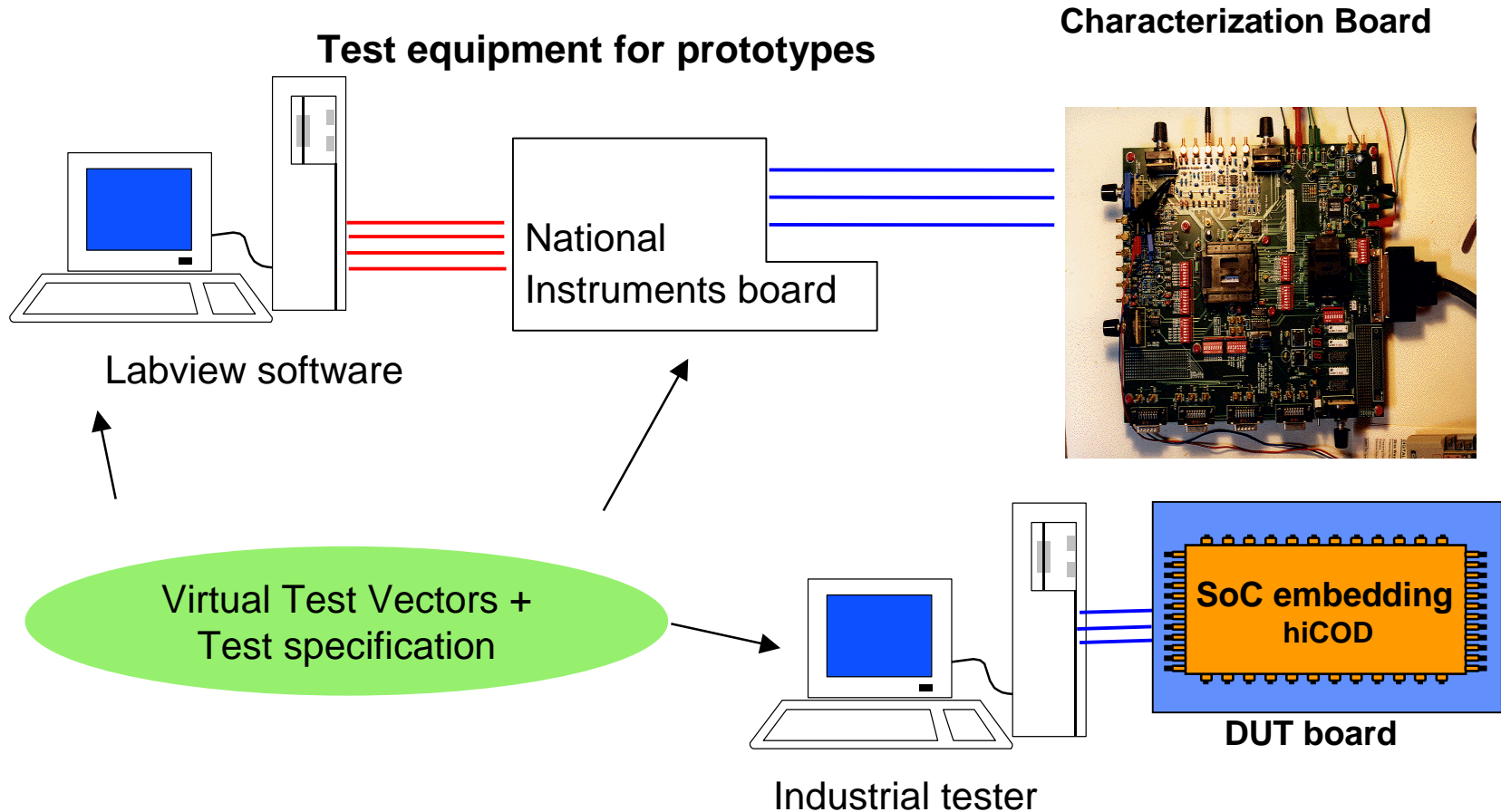
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# hiCOD

High Quality Audio Stereo Codec (ADC + DAC)

## Configuration for real test: prototypes and production



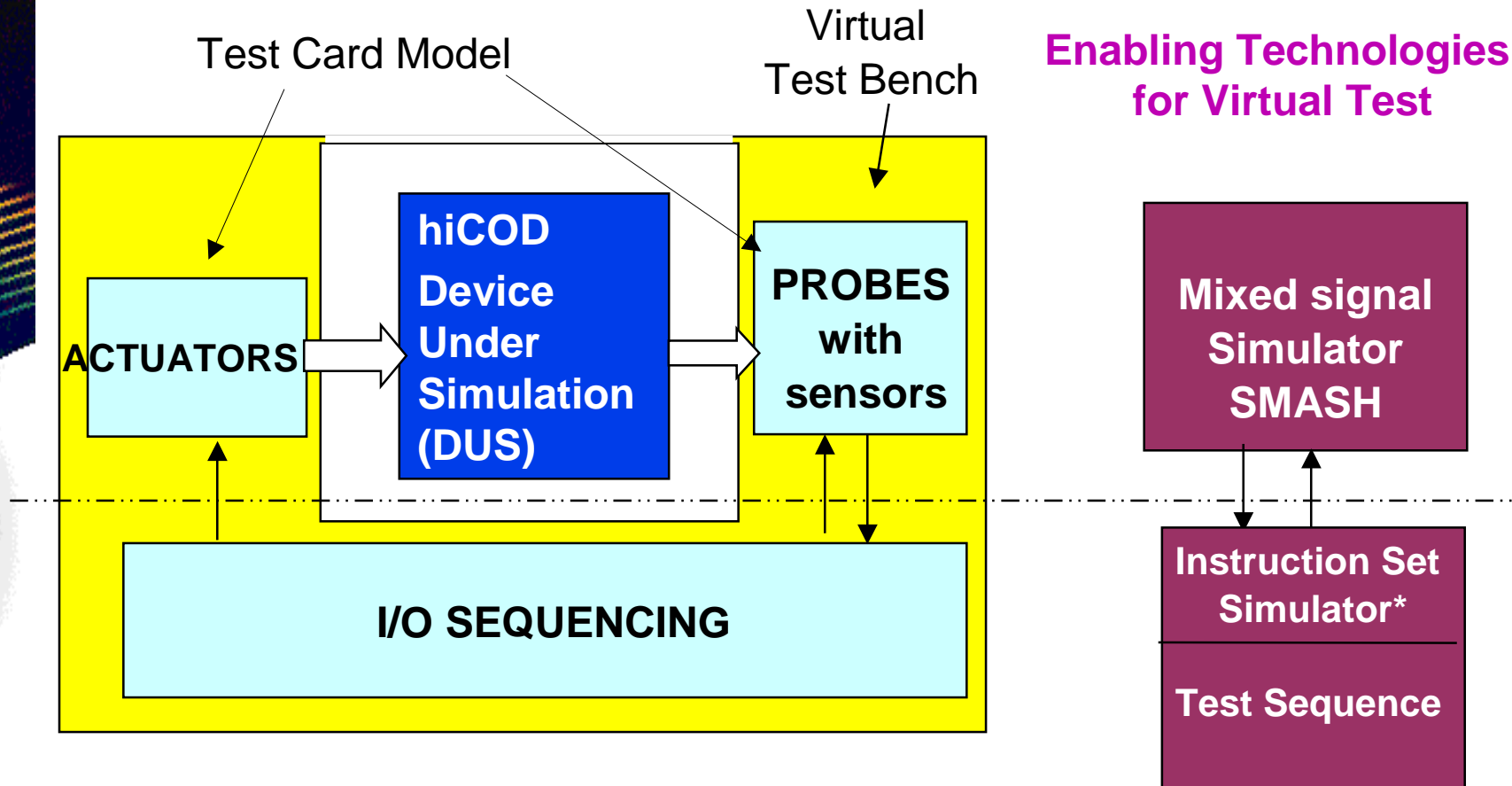




# hiCOD

High Quality Audio Stereo Codec (ADC + DAC)

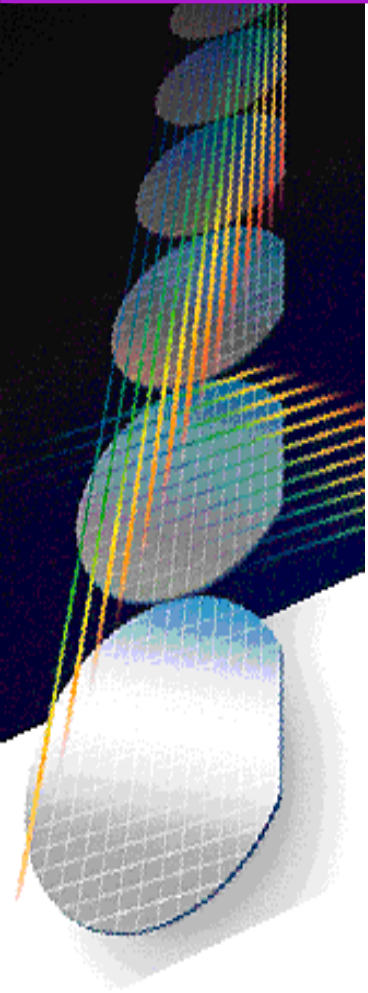
## Configuration for virtual test



\* e.g. Labview



# Testability issues for high resolutions converters

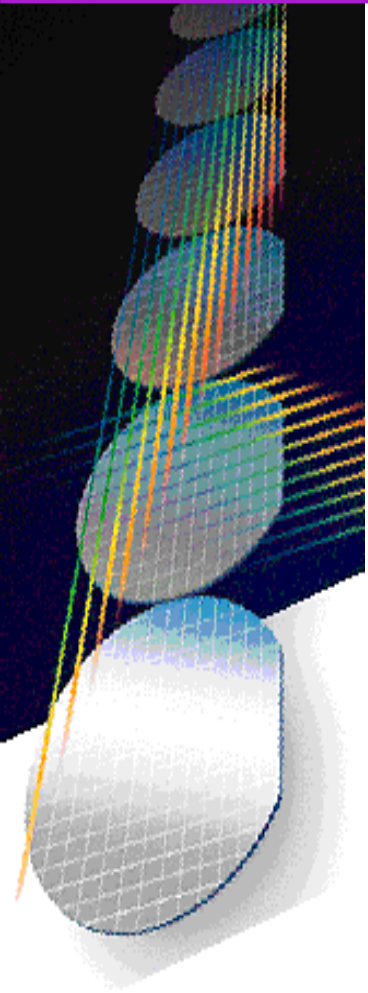


- Full spec has to be guaranteed under all operating conditions
- 10s industrial test time with FFT > 0.65 \$ not compatible with consumer products using millions SoCs!
  - DfT required based on the architecture and circuit implementation
- Mixed signal industrial tester
- Test solutions for debugging SoCs and **accelerating Time-to-Fab**



# Some main needs

- A&MS Virtual Components need to be delivered as **black boxes** to be used by non-specialists
- ViC providers and SoC integrators must follow and adopt **standards** (VSIA, IEEE...)
- Virtual test solutions required for reducing
  - **Time-to-Fab**
  - **Time-to-Market** of industrial products
- Standardization of test sequences format for virtual and real test





# A promising future

- By 2006, 70% of all SoCs will be mixed-signal! (20% in 2002)
- It requires drastic changes
  - In EDA: design flow incorporating A&MS
  - In A&MS Virtual Components offering
    - Diversity
    - Retargetability
    - Testability
    - Configurability
    - Reliability

