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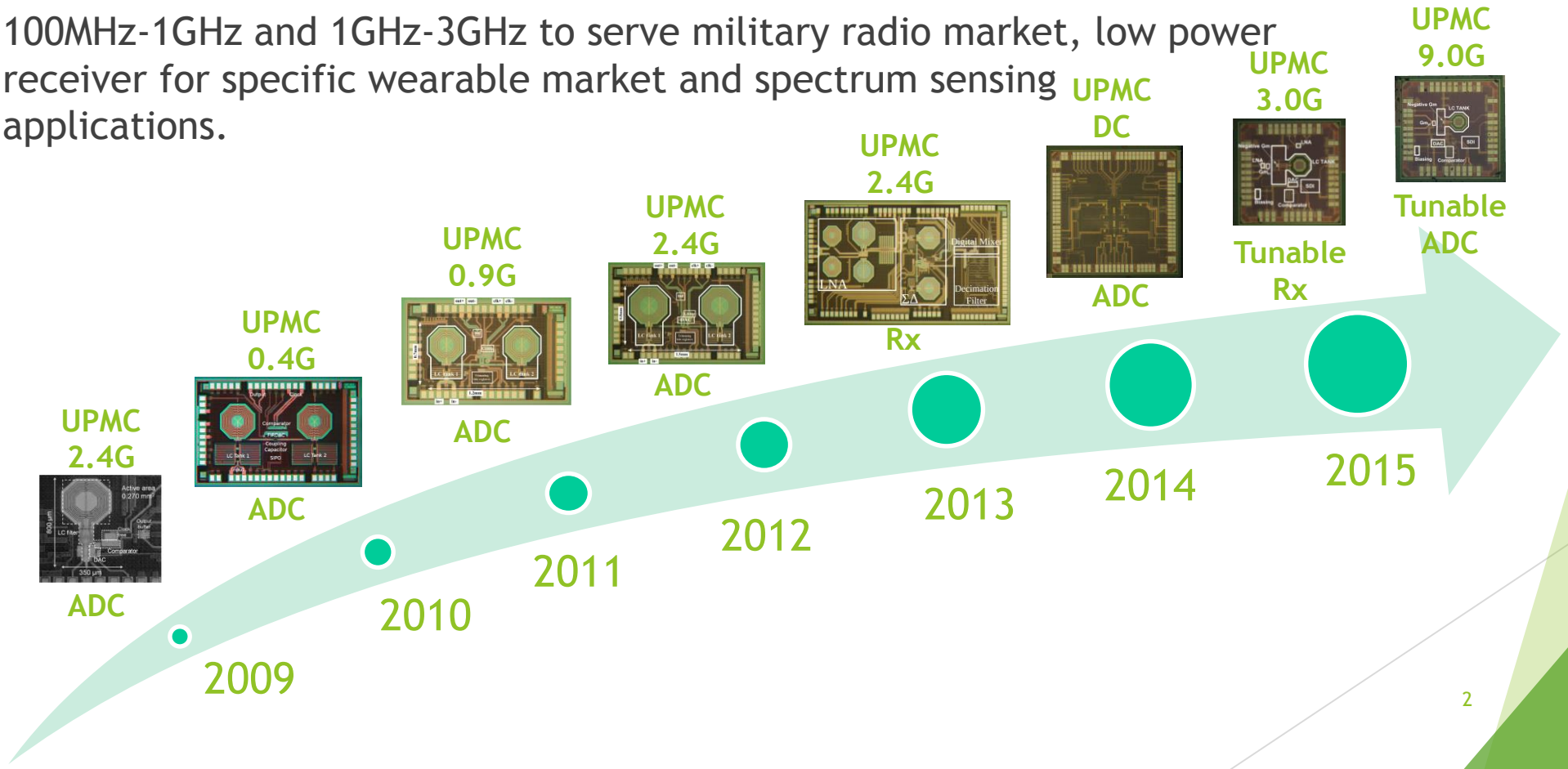
Semiconductors

COSEDA Technologies User Group Meeting 2016

Modeling of an ADC for a RF Transceiver with COSIDE®

Who we are

- Seamless Waves provides effective solutions for agile reconfigurable RF Front End using new design techniques enabling ultra low power communication and an efficient bandwidth adaptation.
- 100MHz-1GHz and 1GHz-3GHz to serve military radio market, low power receiver for specific wearable market and spectrum sensing applications.



We have to exchange the executable specifications with customers

- As their systems are becoming bigger and complex we need to provide models early in the global architecture process
- Systemc AMS is a perfect candidate
  - Delivery can be compiled or provided with source code
  - Mix simulation and software driven application
- Simulator license issue for the end customers

The choice of COSIDE® is meeting our requirements

- To accelerate our modeling flow (flat systemc ams or systemc files with multiples configurations)
  - But reuse our legacy from in Matlab Simulink
  - Software Driven Radio introduces many configuration issues
- To exchange with customers with meaningful representation
- To move to smart component and integrate digital
  - We need processor and software to drive the configuration of our ADCs and Radio Receiver
  - Simulink was not an option here
- To enable virtual tests/instruments usage for system companies early in the design process

Seamless Waves Background in Modeling

- For our new project the team is composed with 1 SystemC AMS expert involved since 2008 with ESL standards and 4 analog/RF designers
  - Expertise is coming from
    - Wasabi European project
    - BDREAMS European project
  - Last 3 ASICs were used with Systemc Ams modeling
    - Experiment : Validation
    - Experiment : Characterization (back annotation)
    - Post-Silicon Chip validation (to be done with the new coseda bridges to Keysight)

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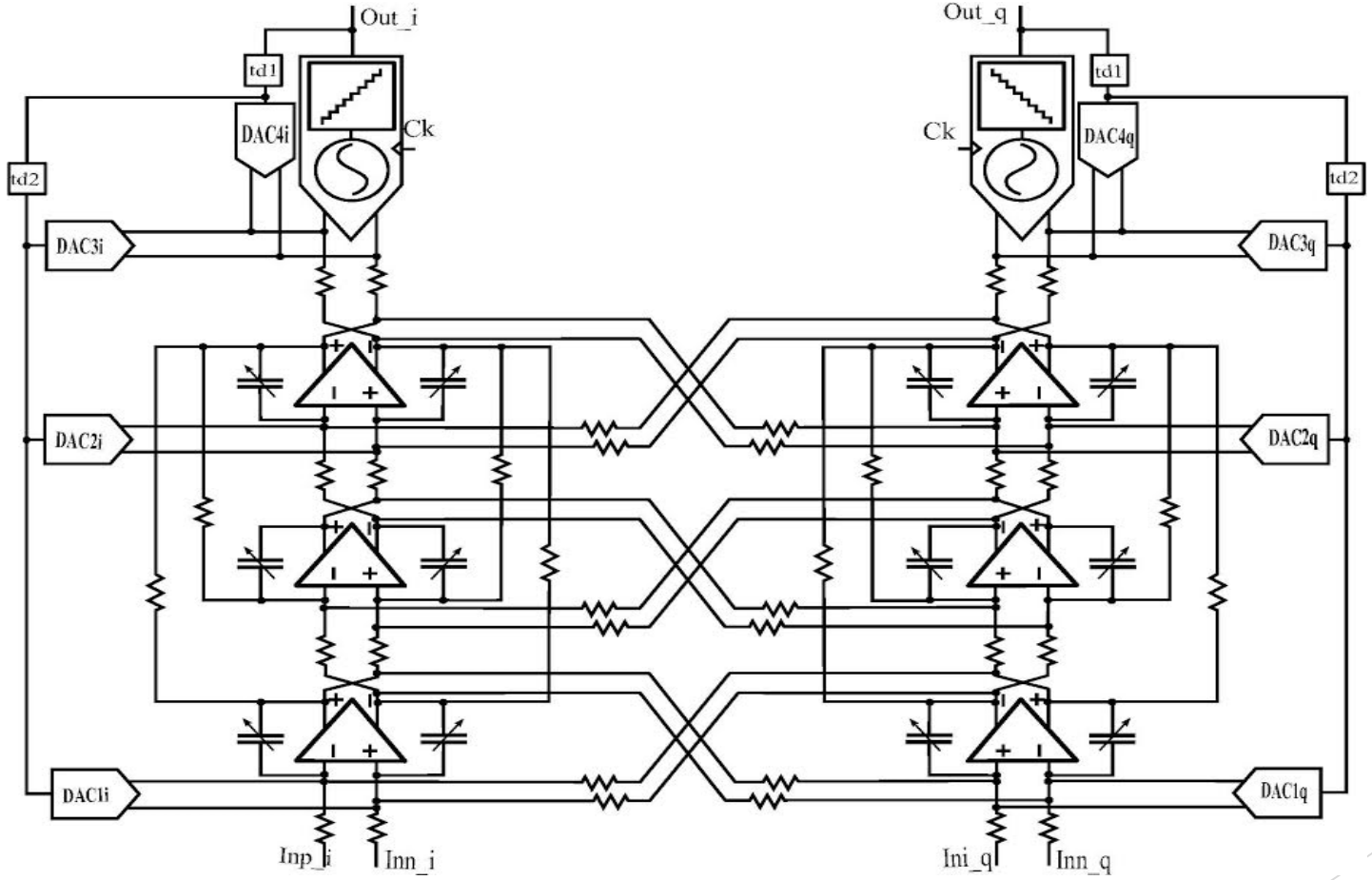
Use Case: Modeling a Quadrature Sigma-Delta Modulator



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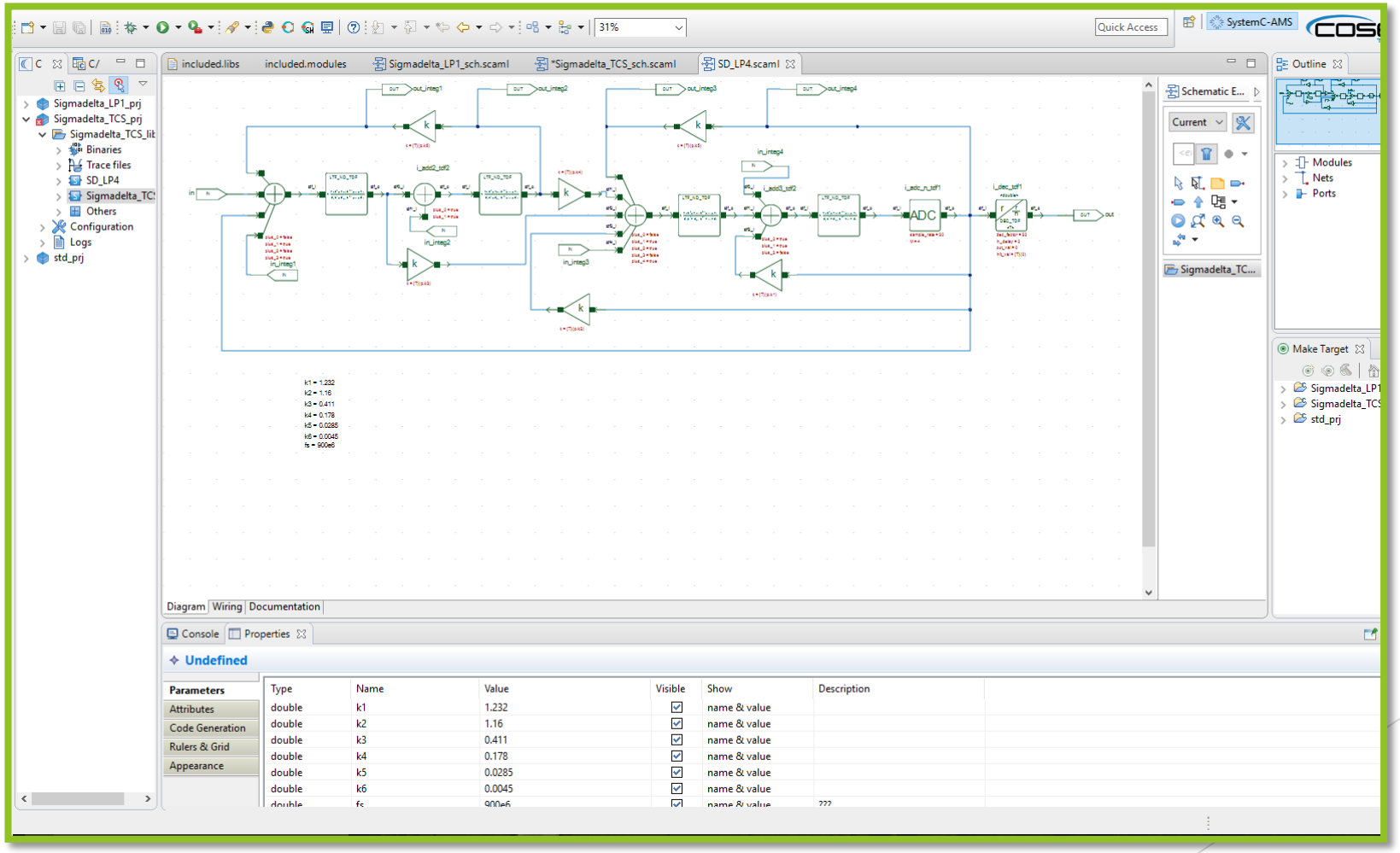

Benefits

- We were able to use directly RF basic modules from of a large library.
  - No need to reinvent the wheel or to redefine Systemc AMS basic blocks
  - Library understandable by analog/rf designers

  - Clear understanding between architect and designers
    - Same schematic, same concepts
    - SystemC code is accessible and editable

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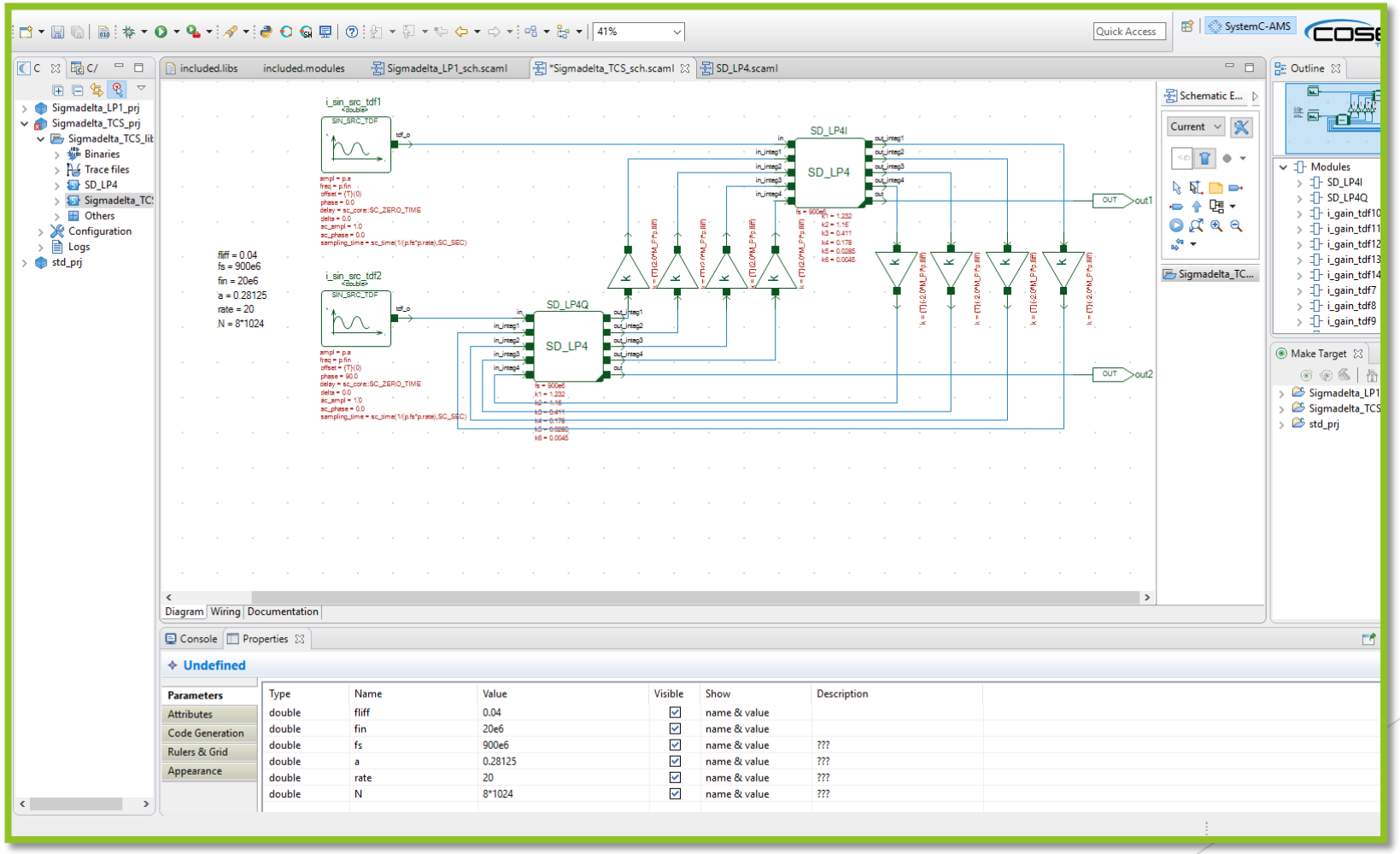
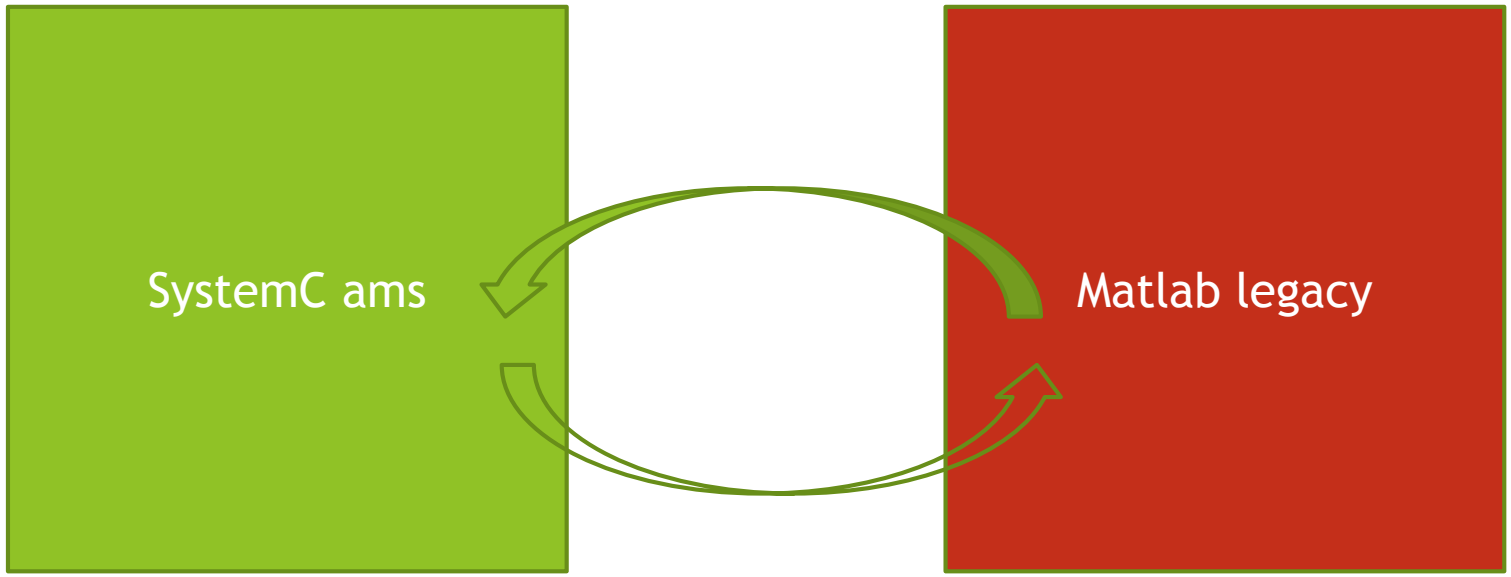
Use Case: Modeling a Quadrature Sigma-Delta Modulator – introducing environment and stimuli



Testbench with Matlab legacy

- Reuse of legacy analysis in matlab (dump of plots using .dat file)
- Import of waveforms coming from RF specific modules made with matlab at a certain time.
- SystemC AMS used as scheduler for our testbench

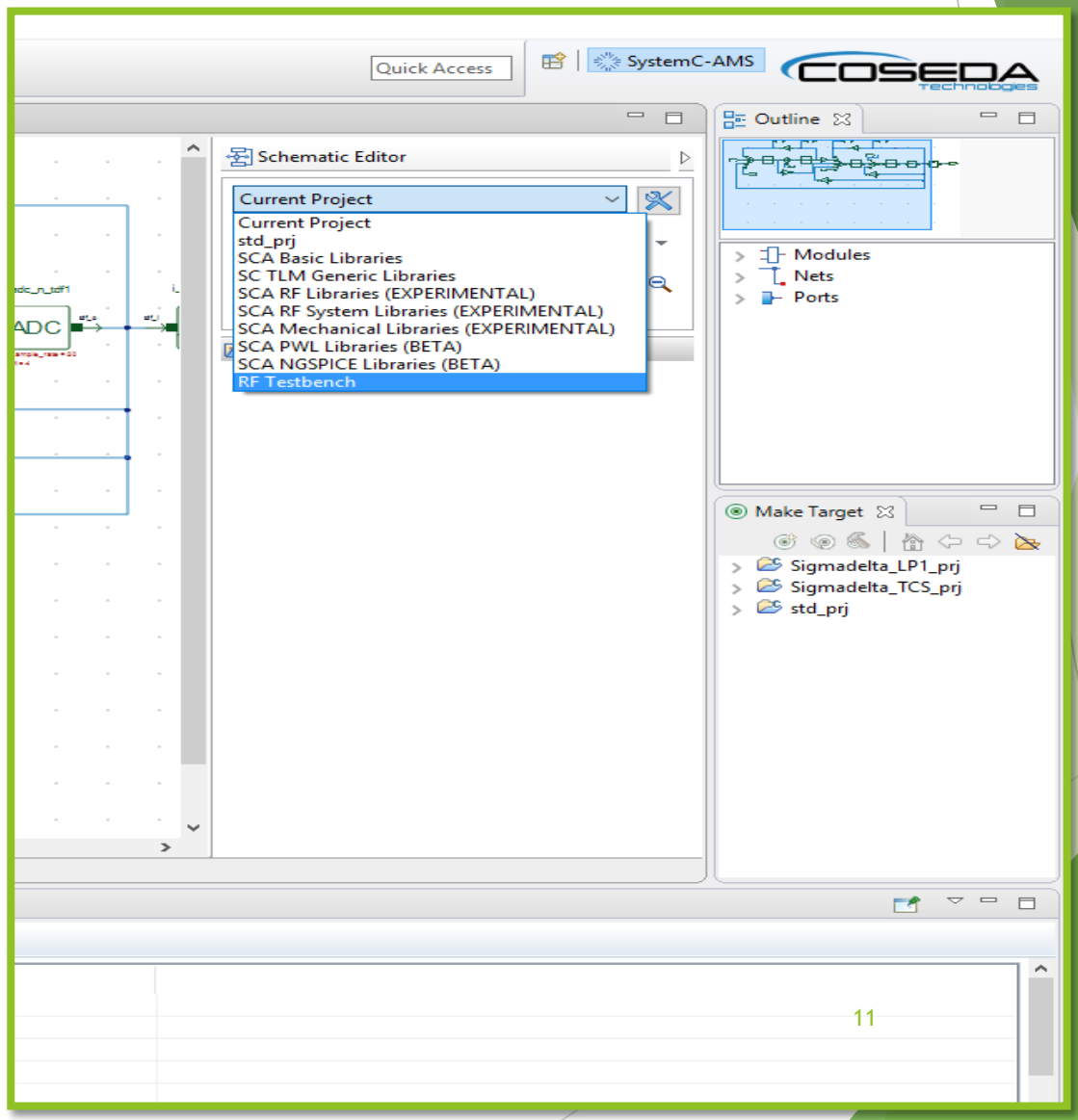


(Eclipse) Plugin inside COSIDE®

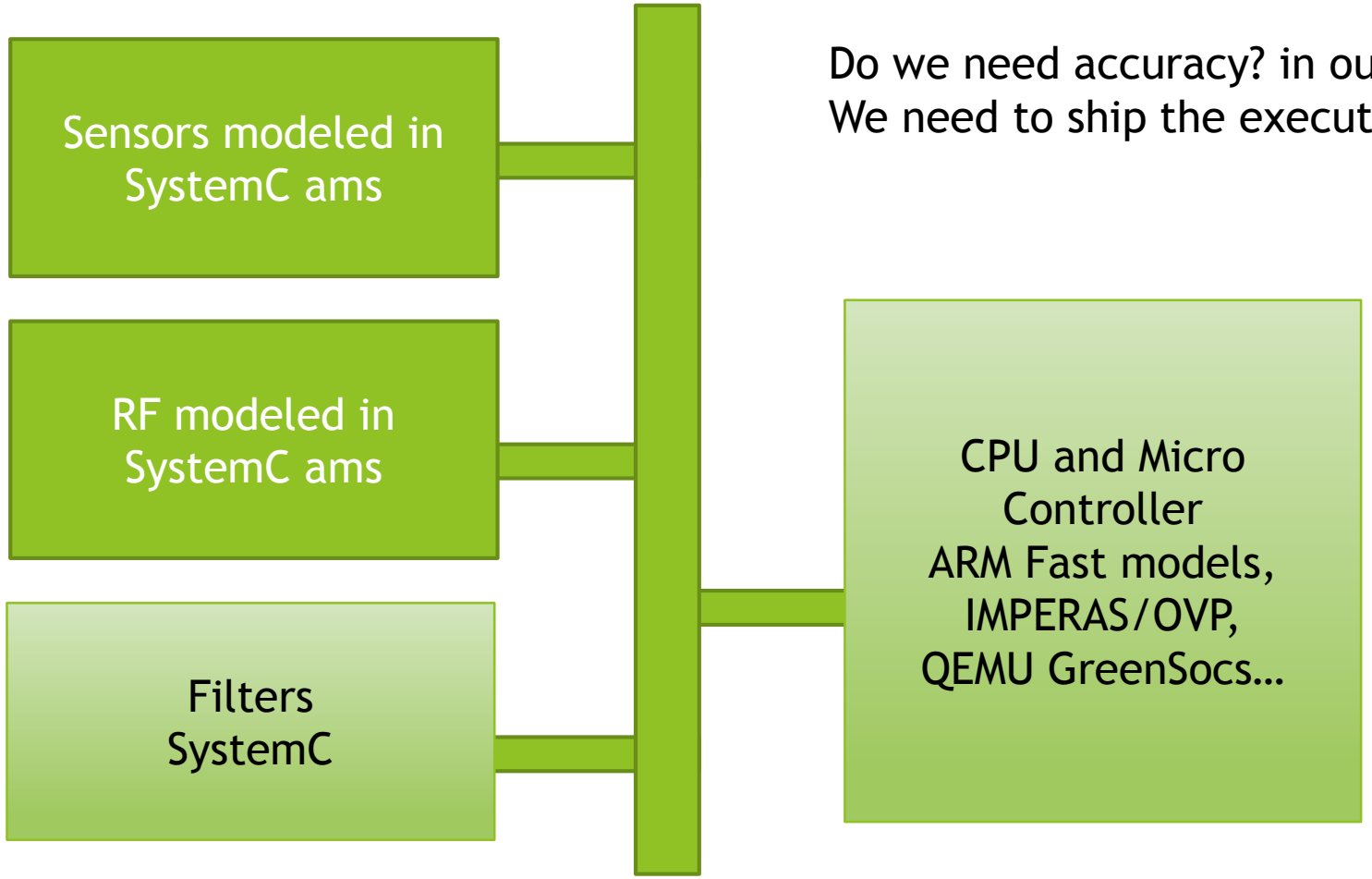
Eclipse plugin (extendable, expandable)
Portable java on both windows or linux

Classical RF Inputs :
-2 tone test
-Noisy channel (channel modeling)

Output Analysis
-RF eye diagram
-Bit error rate
-Specific Constellation (octave)
-Spectrum analysis (octave)



Mix digital and analog



Do we need accuracy? in our case no
We need to ship the executable specifications

Next steps

- COSIDE® to virtuoso bridges will be used
  - We will change our flow to introduce this feature
  - Elaboration of the configuration? Who is driving the coherency?
- Greensocs QEMU integration
  - To drive the configuration
  - Reuse of firmware (continuous integration)

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THANK YOU