The EUROPRACTICE MPW Service as an Enabler for Low Cost ASIC Prototyping for European academia

Romano Hoofman
Strategic Development Director
Imec, Belgium
What is EUROPRACTICE?

- A service offering access to **EDA tools and training** for IC/MEMS/photonics/FPGA design at affordable cost for education and research at European academia.

- Professional and state-of-the-art **technologies for prototyping** at affordable cost for education and research at European academia.

- Exists since 1989 and support to European academia is funded by the EC.

- **Companies** can use the MPW prototyping and volume production at cost.

- **Partners**: IMEC (B), STFC (UK) & Fraunhofer (D)
Current contract with the EC until to mid 2018

Universities and R/D
- CAD tools for European univ only
- Libraries
- Technical support
- MPW Prototyping
- Packaging

> 650 European Universities
+ research labs
European Academia using EUROPRACTICE

- More than 670 academic institutions
  - ~ 500 universities
  - ~ 170 research institutes

- In 44 countries close to Europe

- Train master and PhD students with industry-standard CAD tools and technologies, ready to go to industry (SMEs)

- Common design infrastructure installed over Europe
  - Ideal basis for collaborative research projects
  - Allow universities and research institutes to participate in national and EU funded projects
  - Universities contribute to innovation
Europractice CAD portfolio for European academia
Europractice Design Tool Portfolio

3D-IC
Photonics layout & verification
PCB design
Package analysis
Thermal analysis
DFM and yield optimisation
Interconnect analysis
SiP
SoC
Sensors - image, pressure, fluidic, ...
MEMS / microfluidic design
RF design
Design for testability
High level synthesis
Design verification
“App” development on Virtual prototypes
Application specific processors
Hardware software co-design
Embedded processors
Design reuse – IP blocks
Mixed-signal design
Digital synthesis from HDL
Transistors
Layout
Process and device modelling

- European Universities and Research Institutes have diverse training and research needs
- This needs to be reflected in the breadth of the design tool portfolio
- Tools are not restricted to EUROPRATICE processes or geometries
- Non-commercial use only
EUROPRACTICE Foundry Partners for European academia and companies
Selection criteria

- Well-known foundry
- Partnership
- Flexible prototyping
- Small + medium volume

GlobalFoundries (Germany + Singapore)
- 55nm CMOS Low Power
- 40nm CMOS Low Power
- 28nm Super Low Power/High Performance Power

ON Semi (Belgium + USA)
- 0.7µ CMOS A/D 2M
- 0.5µ CMOS A/D 3M
- 0.35µ CMOS A/D 5M
- 0.7µ CMOS A/D I2T100
- 0.7µ CMOS A/D I2T30
- 0.35µ CMOS A/D I3T80/50/25
- 0.5µ CMOS C5 EEPROM

IHP (Germany)
- IHP SGB25V 0.25µ SiGe:C
- IHP SGB25VGD 0.25µ SiGe:C
- IHP SG25H1 0.25µ SiGe:C
- IHP SG25H3P 0.25µ complementary SiGe:C
- IHP SG25H3 0.25µ SiGe:C
- IHP SG25H4 0.25µ SiGe:C
- IHP SG13G2 SiGe:C Bipolar/Analog
- IHP SG13S SiGe:C Bipolar/Analog/CMOS
- IHP SG13C SiGe:C CMOS 7M/MIM

ams (Austria)
- 0.35µ CMOS A/D 4M
- 0.35µ SiGe BiCMOS 4M
- 0.35µ CMOS 50V
- 0.35µ CMOS OPTO
- 0.18µ CMOS + HV

UMC (Taiwan)
- 0.18µ CMOS L/MMC/RF
- 0.13µ CMOS L/MMC/RF
- 90nm CMOS L/MMC/RF
- 65nm CMOS L/MMC/RF
- CIS : 0.18µ
- CIS : 0.11µ

Faraday (Taiwan)
- Cell libraries and design kits for UMC 0.18, 0.13µ, 0.11µ, 90nm & 65nm CMOS

TSMC (Taiwan)
- 0.18µ CMOS L/MS/RF + HV
- 0.13µ CMOS L/MS/RF
- 90nm CMOS L/MS/RF
- 65nm CMOS L/MS/RF
- 40nm CMOS L/MS/RF
- 28nm CMOS LP (SiON)
- 28nm CMOS HPL (HKMG)

XFAB (Germany)
- 0.18µ CMOS XH018 eFlash HV
- 0.18µ CMOS XT018 SOI HV

EURO PRACTICE IC SERVICE
PHOTONIC DEVICES FOR HEALTHCARE APPLICATIONS
PIX4life = Building pilot line capacity for SiN visible Photonic IC's

Complete eco-system with dual foundry access

4 pre-defined use cases driven by end users

PIX4life – H2020-ICT-2015 – contract 688519
our ambition: open access MPW SERVICE

Join us for fabrication-only or fabrication & test:
We offer open access multi-project wafer (MPW) runs: first OA run by end 2017.

Join us as an end user with a new life sciences / health use case!
We can offer a spec-to-tested device service. Do not wait until end 2017!

More information: www.pix4life.eu - info@pix4life.eu
MPW for prototyping

- Mask cost is shared between customers
- Wafer fabrication cost is shared between customers
- You pay as you use
- Many MPW runs scheduled in each technology

Packaged samples

Design A

Design B

Design n

YOUR Design
<table>
<thead>
<tr>
<th>Technology node</th>
<th>mask + prototype cost (euro)</th>
<th>MPW cost</th>
<th>mini@sic cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>area mm²</td>
<td>cost (euro)</td>
<td>area (mm²)</td>
</tr>
<tr>
<td>0.7 micron</td>
<td>10</td>
<td>3,500</td>
<td></td>
</tr>
<tr>
<td>0.35 micron</td>
<td>10</td>
<td>6,000</td>
<td></td>
</tr>
<tr>
<td>0.18 micron</td>
<td>25</td>
<td>15,000</td>
<td>2.5</td>
</tr>
<tr>
<td>90nm</td>
<td>16</td>
<td>50,000</td>
<td>3.75</td>
</tr>
<tr>
<td>65nm</td>
<td>12</td>
<td>50,000</td>
<td>3.75</td>
</tr>
<tr>
<td>40nm</td>
<td>9</td>
<td>65,000</td>
<td>3.5</td>
</tr>
</tbody>
</table>
After the success of the first stimulation actions in the EUROPRÁCTICE2013 project, two new Stimulation Actions for FIRST USER European EUROPRÁCTICE university members have been defined as a part of the EUROPRÁCTICE2016 project funded by the European Commission.

1. For very-first users
   → free-of-charge miniasic in 0.18micron technology

2. For first advanced users
   → reduced cost (€5000) miniasic in 90, 65 or 55nm technology
EUROPRÁCTICE STIMULATION PROGRAM for FIRST USERS of chip design

1. **Stimulation Action for VERY FIRST USERS**
   FREE prototype fabrication (excluding packaging) of a minimum block size design on any mini@sic run in 0.18 μ CMOS from ams, UMC or TSMC.

   **Conditions:**
   - Current EUROPRÁCTICE university member
   - Multiple applications can be submitted, but a maximum of 1 design per university can be approved
   - The design has to be taped out on a mini@sic run before 30 September 2017

2. **Stimulation Action for FIRST ADVANCED USERS**
   prototype fabrication at 5000 € (excluding packaging) of a minimum block size design on any mini@sic run in 90/65nm from TSMC, 65nm from UMC or 55nm from GLOBALFOUNDRIES.

   **Conditions:**
   - Current EUROPRÁCTICE member and having prototyped at least one design through EUROPRÁCTICE in a technology larger than 90nm.
   - Multiple applications can be submitted, but a maximum of 1 design per university can be approved
   - The design has to be taped out on a mini@sic run before 30 September 2017
How to apply

- A proposal of 1 page maximum must be submitted on the template via email to Romano.Hoofman@imec.be
- Deadline for proposal submissions is 10 November 2016
- Proposals will be evaluated by an Independent Committee and the selected first users will be informed before 16 December 2016

Evaluation criteria:

- How you intend to evolve your teaching to address the challenges of smaller geometry processes
- How this will lead to further research using IC design and IC fabrication by your institute
- Clarity of application and credibility of case
- Proposed ASIC design and proposed design methodology to be used
EUROPRACTICE offers EDA tools, technology training and MPW prototyping to more than 650 European academia.

EUROPRACTICE continuously expands its service with new technologies (also in the MtM area).

- In some cases a new technology offering is set-up in a separate project (e.g. PIX4life → SiN photonics for healthcare applications).

EUROPRACTICE stimulates ‘first’ users to produce a prototype in different ‘more advanced’ technologies.

---

dr. Romano Hoofman
Strategic Development Director
imec IC-link

romano.hoofman@imec.be