



**Workshop on
“Access to design and fabrication of electronic components and
systems”**

24th October 2013, Brussels

Draft Report

Objectives and Rationale

The Workshop was organised in the context of the implementation of the strategy to reinforce Europe's industrial competitiveness in micro and nano-electronic components and systems. This strategy was adopted by the Commission on 23rd May 2013. The main objective of the strategy is to reverse the decline of EU's share of world's supply of electronic components and systems¹.

One of the proposed actions of the strategy is to make shared facilities for testing and early experimentation available to start-ups, SME's, universities and users, possibly in the frame of the HORIZON 2020 Programme. The specific objective of this workshop was to bring together existing 'European Service Providers' in the area of micro- and nanoelectronics, in order to:

- document the 'offering' in terms of available technology/services;
- explore cooperation arrangements between service providers;
- discuss a 'reach-out' strategy, especially towards SME's; and
- examine 'facilitation' conditions.

The agenda of the Workshop as well as the participants list are given in the Annex.

This report describes the main points addressed in the presentations and in the context of the above stated objectives. The presentations are available on <https://ec.europa.eu/digital-agenda/en/electronics>. A brief summary of the discussion on “offerings”, “cooperation”, “reach-out strategy” and “facilitation” follows before the report ends with some main conclusions.

¹ <http://ec.europa.eu/digital-agenda/en/news/communication-european-strategy-micro-and-nanoelectronic-components-and-systems>

Presentations

• *EUROPRACTICE Fabrication Service* (Carl Das)

The EUROPRACTICE Fabrication Service offers access to prototype fabrication to European universities and research institutes using Multi-Process-Wafer (MPW) services. It covers the whole chain, design tools – design kits – fabrication. Photonics technologies are included in the portfolio. "Specialty foundries" are becoming part of the offer, including MEMS on CMOS, Si-Photonics, 3D-DSP, and in future possibly flexible electronics. In addition training courses are offered, e.g. via IDESA or STIMESI projects for MEMS.

The EUROPRACTICE Fabrication Service is targeting European universities and institutes as well as companies, with the latter fully self-funded. Approximately 550 designs a year are processed, 85% of the turnover is coming from end users.

In addition to the MPW services, IMEC has established the mini@sic program for the most advanced (and therefore most expensive) technologies. With the mini@sic program the minimum chargeable area of a set of selected MPW runs is divided in 3 or 4 parts (depending on the technology) and each university or research institute can use one of these reduced areas. Parts of the mini@sics runs are subsidised by the EC project (those areas that are not filled).

The presentation outlined the need of users for technology support. It was noted that MEMS foundries want to keep the link to industrial customers. For this reason EUROPRACTICE is not offering foundry services to industry.

• *EUROPRACTICE Design Tool Service* (John McLean)

Europractice offers access to IC design tools at affordable prices to European universities and research institutes. This activity is managed by STFC-RAL who is in charge to negotiate terms and conditions with the EDA vendors in order to purchase the design tools. STFC-RAL is also in charge to make the non-disclosure agreements with every users of the tools. Complementing the preceding presentation it was reported that a raise in research institute participation is seen, however at the expense of university users.

The presentation advanced the idea for an offer based on renting centrally purchased licenses to clients. This is, however, subject to the EDA vendor's approval. Also the possibility of implementing a "First MPW use" scheme for SMEs was raised.

• *Circuits Multi-Projects – CMP* (Jean-Christophe Crebier, Bernard Courtois)

Similar to Europractice, CMP offers services for prototyping and low volume production of ICs and MEMS. Circuits are fabricated for universities, research institutes and industries. For the access to the design tools, CMP makes use of Europractice design services. CMP has links to the foundries STMicroelectronics and austrianmicrosystems. The service is offering 28nm FDSOI and 14 nm FDSOI for selected industries. CMP runs approximately 250 projects a year, with 20 % of clients are industry.

CMP is in discussion with EUROPRACTICE on diverse forms of cooperation beyond the use of the EUROPRACTICE design services.

Furthermore CMP is participating in the ENIAC project Things2Do.

The CIM Alpes initiative was described, a shared design platform which is supported at regional level (CIMEnanotech and Minalogic).

- ***Heterogeneous Technology Alliance – HTA*** (Joachim Pelka, Georges Kotriotsos)

HTA is a novel approach that combines the capabilities of four research organisations (CEA-LETI, CSEM, Fraunhofer and VTT) to create and develop microtechnologies, nanoelectronics, and smart systems for next-generation products and solutions.

HTA operates as a one-stop shop for complete system solutions, and guarantees simple access to an enlarged portfolio of technologies. It is structured to facilitate technology transfer to European and non-European companies.

HTA presentation showed their way of doing complex projects and small scale production with SMEs. They advocate to put emphasis also on higher TRL levels and to work on reliability and packaging issues. HTA observed the trend that clients are changing to system integrators, which is increasing the risk for RTOs. It was underlined that users look for products and not for technologies, hence require "manufacturing capabilities".

HTA faces the issue that it is difficult to align members' investment strategies due to different support models in the respective countries.

- ***Silicon photonics platform – ePiXfab*** (Amit Khanna)

ePiXfab is a silicon photonics platform with MPW services done through Europractice and with the intention to become a self-sustained service beyond the funded EU project. The main objective is to set up a Fabless Si Photonic service.

ePiXfab reported on free feasibility studies for SMEs. 30 feasibility studies were already carried out, but none of them affected the market.

ePiXfab recommended built-in technology support centers, the realisation of "generic tested technology modules" easily adaptable to specific applications, giving access to packaging technologies as well as to work towards more predictable R&D cost scales.

- ***Joint European Platform for InP-based Photonic Integrated Components and Circuits – JePPIX*** (Luc Augustin)

JePPIX is an InP photonics platform with the objective to assist organizations around the globe to get access to advanced fabrication facilities for Photonic Integrated Circuits (PIC). It relies on three foundries and had 180 users, with 100 from industry.

JePPIX proposes work towards ASPIC – Application Specific Photonic Integrated Circuit (the "ASIC for PIC").

- ***Flexible electronic platforms*** (Isabelle Chartier)

In flexible electronics new value chains are appearing. The current situation is judged to be similar to that of MEMS 20 years ago.

The PictiC platform and the Euro-Flex preindustrial pilot platform were presented.

The recommendation to increase the TRL level was put forward. There is a need seen to integrate new flexible electronics devices with Si electronics.

It was argued that the service should be on a regional level, but problem how to move technology/manufacturing is to be tackled on European level.

- ***SME`s need for smart system innovations*** (Arndt Steinke)

CIS presented its modular platform designed to serve SME`s needs. The core of this "Product Driven Platform" are microsensors. The main idea in order to lower the cost is to reuse core technologies for a whole set of applications. Successful examples were given, including particles detection in oil, levelling sensor, fluorescent sensor, all using the similar core technologies in filtering/detection/transducers and signal processing.

- ***EXPRESS – Mobilising Expert Resources in the European Smart Systems Integration Ecosystem*** (Thomas Köhler)

EXPRESS is a FP7 - coordination action with the aim to accelerate the adoption of Smart Systems Integration. The project will start its activities in January 2014. A classification of users was presented with four different types which need different ways of access. Such a flexible access for users also depends on the level of technology needed for a specific case. Also training is needed in order to support users.

In general EXPRESS will provide the link to the "right" ecosystem, i.e. people concerned with the topics under discussion.

Discussion

The ultimate question “Why invest public money?” was answered by a multitude of arguments at different levels.

First of all it was argued that public funding is needed to create a right environment. Effort is needed in order to activate the spectrum of opportunities available in Europe, which are scattered in several places.

Also RTOs need capacity (not paid by clients) in order to achieve an aggregated service. This is closely linked to the ideas on platforms.

Furthermore public money is necessary to covers risks, e.g. risk of not filling the wafer in MPW services (e.g. mini@sics project for prototyping small ASIC designs).

In order to provide optimal processes for users, effort is needed to evaluate if for example a different layer from another supplier does fit into a certain process.

ePiXfab told about feasibility studies done for potential clients and reported that SMEs were still not able to use Si Photonics. A “first user”-type of action line could help in this respect.

Last but not least there was the argument that Europe is in competition with other regions outside Europe who are heavily supported by public funding/support.

1. “Offering” in terms of available technologies/services

It was stated that in principle a lot of infrastructure is available in Europe but the offering is fragmented. A potential user is lost with the manifold of different technologies and therefore needs help (idea of support centers for local industry clusters). In addition barriers especially for SMEs must be lowered.

A missing layer providing translation between technology and application is needed but not available.

There are deficiencies with regard to the production of small quantities especially needed by SMEs. Few of the big players are interested to do this. And even if so there are severe risks associated when a SME relies on getting its devices manufactured by a big player. “RTO pilot lines” could help here (this is a topic not yet covered).

Concerning manufacturing, the questions “Use of manufacturing pilot lines?” and how efficiently “Step to bigger numbers?” were discussed.

It was signified that “First use” actions are needed as a means to get to manufacturing.

Benchmarking was considered as very useful. However, it was also stressed that Europe should not imitate overseas strategies.

2. Cooperation between service providers

It was stated that in general and as soon as there is a bi-lateral interest, service providers will cooperate. In such cases no much help from the EC is needed.

However, a better linking RTO networks would be for the benefit of Europe and a prerequisite to further maximise European leadership for instance in SOI technologies. Also compatibility between different technologies should be studied further.

Next to the already mentioned yet unavailable catalogue of hand-on technologies it was considered that flagship projects by service providers are useful to convince clients, especially SMEs. Furthermore it was stated that SMEs need local partners as they will not contact a European platform.

In Europe more technology is available than is offered to industry. It was believed that this can be overcome by a (virtual) European institute for smart systems. However, care is needed in order that funding dedicated to access does not go to the development of the technology. It was seen as important that a major part of the available funding dedicated to access measures will reach entities which are in need of the services.

The impression that there is a missing layer between SMEs and Suppliers could at least partially be countered by service providers putting more efforts to become solution oriented rather than technology oriented.

3. Reach out, especially to SMEs

It was argued that it is most important that needs of SMEs have to be understood by service providers. Also awareness creation is an important prerequisite for further exploiting available technologies.

A Smart Systems FUSE action is seen as an effective trigger for SMEs. In addition the use of platforms would be enhanced by feeding them with such FUSE actions.

However, FUSE type actions for smart systems will be more complex and expensive. In taking this into account a “two step” FUSE could be established to help SMEs to use the platform (first step) and then technology (second step).

4. “Facilitation” conditions

The question if “access to design tools or access to design service?” should be provided was discussed. It was concluded that existing design tools are not sufficiently integrated and therefore co-design concepts should be further stimulated.

A European Smart Systems institute as a main facilitator and broker was advocated.

The question “How to overcome fragmentation of users?” was discussed, however with no easy solution at hand.

In order to further facilitate access, a compendium of service providers is needed, condensing available services throughout Europe.

Conclusions

This workshop brought together existing 'European Service Providers' in the area of micro- and nanoelectronic components and systems. This was considered very useful by the participants.

From presentations and discussions it can be concluded that the services provided in distinct areas show communalities, also from a technological point of view. However, there are also main differences, again in terms of technologies but also in maturity and significance on the global market². As an example and with regard to technology, there is a main difference between electronics and smart systems. For the first very few different process chains are dominant worldwide whereas for the latter there is a manifold of technologies to be integrated. Accordingly, for manufacturing the first domain needs big investment in a few places (pilot lines), whereas the latter needs more modest investment but in a quite large variety. In essence this means that different areas need different specific measures to facilitate access for (new) users. However, as was also discussed, there is room for enhanced cooperation, enabling mutual benefits and unlocking synergies. This is also outlined in documents describing the envisaged ECSEL private public partnership³.

With regard to the objective to make facilities for testing and early experimentation available to start-ups, SME's, universities and users⁴ it has to be noted that activities are already on-going. Access activities were called for in FP7 ICT Call 10 and are planned to be called in H2020 ICT 2 - 2014.

In this context the participants agreed that a follow-up meeting would be useful and best organised after the results of the mentioned first call for proposals in H2020 are known.

Finally, the most dominant suggestions discussed during the workshop are summarised below:

- support actions dedicated to create awareness about technological possibilities and to disseminate success stories;
- facilitate ideas for technology support centers, addressing specific needs of SMEs on a regional level, i.e. via local industry clusters;
- encourage ideas for a (virtual) European institute for smart systems, making existing technology available to industry;
- foster actions which aim to better link RTO networks (a lot of infrastructure is available in Europe but the offering is fragmented);

² While RTD efforts in Europe are of the same order of magnitude in microelectronics and smart systems, there are also promising emerging areas such as flexible electronics. Regarding the global market position, for instance in microelectronics Europe has to put efforts in order maintain a 10% level of worldwide production. In contrast world market leaders in manufacturing of MEMS are located in Europe (<http://www.isuppli.com/mems-and-sensors/marketwatch/pages/it%E2%80%99s-a-tie-bosch-and-stm-hold-joint-honors-as-no1-mems-suppliers-for-2012.aspx>), a position which also needs to be defended.

³ See http://ec.europa.eu/research/press/2013/pdf/jti/ecsel_factsheet.pdf or http://europa.eu/rapid/press-release_MEMO-13-673_en.htm

⁴ For more information: <https://ec.europa.eu/digital-agenda/en/electronics-strategy-europe>

- stimulate actions which can provide the “missing layer” which gives a translation between technology and application;
- establish “first user”-type action lines in order to help SMEs;
- assist in creating manufacturing capabilities in order to enable small scale production for SMEs, for instance via RTO pilot lines;
- sustain work on a compendium of European service providers;
- support further work also on higher TRL levels, on reliability and packaging issues;
- further stimulate co-design concepts;
- patronize a possible offer based on renting to clients centrally purchased software licenses for simulation and design (also for commercial purposes).

25/11/2013

Isabel Vergara, Henri Rajbenbach (CNECT, Components), Rainer Günzler (HSG-IMIT, Rapporteur)

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Agenda

10:00	Welcome & Introduction – Willy Van Puymbroeck, Head of Unit “Components”
10:15	Presentations of the different services invited (15 min presentations) <ul style="list-style-type: none"> • EURO PRACTICE – fabrication services. Carl Das (IMEC) • EURO PRACTICE – design services. John McLean (STFC) • Circuits Multi-Projects - CMP. Bernard Courtois / Jean-Christophe Crebier (CMP)
11:00	<ul style="list-style-type: none"> • Heterogeneous Technology Alliance. Joachim Pelka (Fraunhofer) / George Kotrotsios (CSEM) / Jussi Touvinen – tbc (VTT) / Laurent Malier – tbc (CEA-LETI) • ePiXfab - Silicon photonics platform. Amit Khana (U. Gent) • JePPIX - Joint European Platform for InP-based Photonic Integrated Components and Circuits. Luc Augustin (U. Twente) • Flexible electronic platforms. Isabelle Chartier (CEA)
12:00	<ul style="list-style-type: none"> • SME`s need for smart system innovations. Arndt Steinke (CiS Forschungsinstitut für Mikrosensorik und Photovoltaik GmbH) • EXPRESS - Mobilising Expert Resources in the European Smart Systems Integration Ecosystem. Thomas Köhler (VDI/VDE)
12:30	Sandwich Lunch
14:00	Discussion covering the topics <ul style="list-style-type: none"> • explore cooperation arrangements between service providers; • 'reach-out' strategy, especially towards SME's; and • examine 'facilitation' conditions.
15:30	Summary and wrap up (Willy Van Puymbroeck)
16:00	End of the Workshop

Participants List

NAME	ORGANISATION	COUNTRY
Augustin, Luc	TUE	Netherlands
Courtois, Bernard	CMP	France
Crebier, Jean-Christophe	CMP	France
Das, Carl	IMEC	Belgium
Günzler, Rainer	HSG-IMIT (Rapporteur)	Germany
Hohenbichler, Michael	DG CNECT, A1	
Khanna, Amit	Univ. Gent	Belgium
Köhler, Thomas	VDIVDE-IT	Germany
Kotriotsos, Georges	CSEM	Switzerland
McLean, John	STFC - RAL	United Kingdom
Pelka, Joachim	FhG	Germany
Radu, Oana	DG CNECT, A4	
Rajbenbach, Henri	DG CNECT, A4	
Steinke, Arndt	CIS	Germany
Van Puymbroeck, Willy	DG CNECT, HoU A4	
Vergara, Isabel	DG CNECT, A4	