4. Teaching new skills and teaching skills in a new way (Part 2)

The afternoon session continued with specific presentations featuring good practice examples with regard to teaching new skills and teaching skills in a new way. The session consisted of six presentations followed by a detailed discussion and feedback of participants.

4.1. The CNFM education action and its connection with the ACSIEL, French industrial union of semiconductor: increasing the quality and relevance of existing curricula, Olivier Bonnaud, CNFM (France)

Prof. Olivier Bonnaud presented the education-related activities of the National Microelectronics Network (CNFM) and its connection with the ACSIEL, French industrial union of semiconductor companies.

CNMF was founded in 1981 with an objective to boost the Microelectronics industry facing a severe shortage in qualified people by:

- Increasing significantly the number of graduate students (Masters, engineers, PhD);
- Focussing on practical training using industrial tools;
- Establishing a network of common education centres: sharing cost & avoiding duplication;
- Setting up a National Steering Committee consisting of the representatives from universities, government and companies.

CNFM Network covers technical skills in **"Integrated Circuit (IC) Design, Fabrication, and Test"**:

- IC Fabrication in Clean Rooms: Toulouse, Grenoble Paris, Rennes, Orsay, Lille, Bordeaux;
- Embedded Systems, Smart sensors, HF electronics, optoelectronics;
- Design and Test of Integrated Circuits and Systems;
- State of-the-art CAD tools provider service in Montpellier.

CNFM provides a permanent link between the academic world and the industrial world. CNFM allows the pooling of technological platforms (process and CAD) accessible to all students, which allows them to acquire essential know-how. Because Electronics and Microelectronics are at the heart of the innovative objects (IoT), the training strategy aims to provide competence and know-how in microelectronics but also in all application fields.

The existence of **multidisciplinary platforms open to initial and Lifelong Learning training** allows meeting the needs of industry. The close link within the network between academia and industry makes it possible to jointly define learners' needs, build curricula adapted to the objectives with academic institutions, allow an opening to European and international cooperation, ensure learning that includes both the knowledge and know-how required for a successful 21st century industry.

The CNFM network's approach provides students with skills through practical training. This becomes essential as many knowledge acquisitions will be ensured by online tools and therefore without any practical experience. Thus, CNFM network provides this know-how.

On-the-job training is not easy to organise in a high-tech factory. Trainees must acquire a minimum technical background before entering such a plant. In the CNFM network centres, since conditions are close to the industrial environment, trainees are able to fulfil the job requirements. The acquisition of know-how on industrial tools and apprenticeship can be reinforced by end-of-study internships or dual supervision projects.

The CNFM approach fosters multidisciplinarity and the training platforms are open for a large spectrum of applications (e.g. Industry 4.0, Health, Environment, Transportation, Communications).

The applied curriculum framework implies the following:

- **Student-centric approach**: this approach is ensured by involving students in practical activities on the platforms. They must have initiatives that are validated by the practical work supervisors;
- **Problem-driven learning** is insured by the organisation of projects and internships on the platforms;
- **Collaborative learning and team working**: in practice, projects on platforms are organised by groups of students. They are required to share tasks and therefore coordinate their actions.
- **Self-assessment**: after each session on platforms, each student fills a questionnaire. This is mandatory for life-long learning sessions.

The CNFM network's strategy, which makes it possible to pool resources and maintain an adequacy with the needs of the socio-economic world, **can only be achieved by keeping platform equipment and study topics at the highest level**. The field of Microelectronics has been evolving rapidly for decades and training must also keep the pace.

Thus, this policy requires financial support to update the hardware and software that academic bodies currently have difficulty in acquiring, despite the pooling organised by the network, which makes it possible to limit the cost. It is necessary to consider at national and European levels that the needs of companies in training are specifically supported within the framework of industrial sectors with dedicated funding from both public bodies and private companies. **This network can be an example for wider organisation at the European level**.

4.2. *People-centred development as a novel interdisciplinary and co-creative approach towards teaching and learning – examples of good practices from Erasmus+ and H2020 projects,* Gregor Cerinšek, Institute for Innovation and Development of University of Ljubljana (IRI UL) (Slovenia)

Mr. Gregor Cerinšek addressed a topic of people-centred development as a novel interdisciplinary and co-creative approach towards teaching and learning.

The people-centred development approach in design and development aims **to make a move from the mind-set of engineers, designers and researchers to the specific needs and experiences of people**. In this approach, people play an important part in the innovation, design, co-creation, and testing of solutions.

The approach has been **tried by numerous international companies**. In the 1970s, Xerox relied on a people-centred approach to improve the usability of their first photocopying machine; in the 1990s, Boeing employed ethnography to design the 787 Dreamliner aircraft, and Microsoft used it to improve their operating system. In the new millennium, several other companies, including Intel, Google, General Motors, Motorola, Nissan, and Volvo, started to hire social scientists and use people-centred approaches for the design and development of their products and services. The approach has been further developed, implemented and tested in the frame of Erasmus+ Knowledge Alliance project PEOPLE (www.people-project.net), where experiments