A Survey about FPGA Users in Spanish SMEs

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Abstract- A study about training requirements in SMEs that work in the area of electronic design is presented. The experiment was developed during 2001, by the Spanish Pole of Euroform, with the sponsorship of the local representative of Avnet Silica. A very narrow target was selected: companies whose products incorporate Xilinx FPGA devices. More than 88 designers were inquired during four technical seminars. The main goal of this paper is to guide the universities in the planning of training action for local industries.

1 Introduction

EUROFORM is an UETP (University Enterprise Training Partnership) composed of 14 active partners and more than 60 associated organizations (universities, research institutes and companies) in the field of microelectronics and related technologies. Using this structure, Euroform provides regional experts to assist the industry in a wide range of topics [1].

The main activities of the Spanish Pole [2] are focused in training and design service in the field of FPGA-based system. Even though several activities have been developed with local industries and academic organizations, a habitual problem has been to broad the base of customers. The identification of SMEs (small and medium enterprises) that use FPGA technology is difficult. No association of such a companies exists, and the FPGA market is fragmented and opaque. Thus, the ways to contact managers and engineers of these companies have been limited to the scope of personal connections (ex-students, colleagues, people met in conferences, etc.).

In early 2001, a new strategy to get in touch with the FPGA users in SMEs was developed. To make known our activities, the assistance of Silica [3], the local distributor of Xilinx FPGAs was obtained.

2 University and Component Distributor Collaboration

Advertising via component distributors guarantees the university the success of any action targeted toward an industrial auditory. It is an important improvement: they are the only player that knows all the companies involved in a particular technology (FPGAs, DSPs, etc.). The synergy between the partners is summarised in Table I.

For a distribution company, the returns are different. They can address industrial customers toward specialists at university labs that can solve specific technical problems. Punctual technical training or design consulting facilitates the selling of electronic devices. Current products like microprocessors, FPGAs, DSPs or PCI controllers are complex. If the buyers do not control the technology, to book a large number of pieces is not probable.

In addition, taking into account that an important mobility of sales and field engineers exists between distribution companies, to have a permanent partnership with a local university can be significant. The people of the campus usually stay at the same

place for years, their laboratories work in long-terms research programs, and they have infrastructure and skills for designing or technical training. On the contrary, the crescent day-to-day duties of field engineers (travelling, visiting of customers, meetings, etc.) limit the time available for the organization of activities that are not directly close to the product.

Finally, in the Internet era, models like B2B and B2C can produce in the future an important process of desintermediatization. To offer the customers new services with added value like advising, design capability, or tailored training will be a must for component distributors.

Table I: Synergy between Universities and Component distributors.

	University	Distribution Company
Main activity	Training and Design (FPGAs in this case)	Marketing and distribution of electronic components (FPGAs)
Staff	People stay at the same job for years.	The mobility of field-application engineers is high.
Market Knowledge	Low. Limited to personal contacts.	High. They are permanently monitoring SMEs requirements.
Training capability	High. Source of long-term research in FPGAs technology. Training material is continuously produced and upgraded.	Low. Day-to-day activities and heavy portfolios of diverse products limit the time available for learning.

3 Results of a questionnaire about FPGA users

Between June and November 2001, we ran with Silica a series of specialized technical seminars. Four FPGA hot-topics were selected: Low-Power Design, Computer Arithmetic, VHDL, and High-Speed Digital Design. The goal was double: to promote our activities, and to know the training requirements of FPGA users. A questionnaire based on previous activities of Euroform [4] in the area of Graz (Austria) was distributed among the participants. In the following paragraphs, some results are summarized.

- Profile of Spanish FPGA designers: The background of FPGA designers is varied, even than the 50% of the participants studied in universities of Madrid area. Main disciplines are: Telecommunication Eng. 43%, Industrial Eng. 34%, and Electrical Eng. 14%. The last 9% came from areas, like Physics that are not close to electronics. Over a 46% of the engineers have a 3-year degree (named in Spain, *Ingeniero Técnico*). Thus, this diversity is an important fact to consider in any training strategy. Finally, the 40% of the spanish FPGA designer are young: they obtained their degree two year ago.
- Application fields of FPGAs: Spanish companies that use FPGAs are working in diverse areas: space electronics, communication systems, TV broadcasting, instrumentation (great variety), machinery for food packaging, military applications, audio, GPS based systems, mobile communications, control systems,

and medicine. Signal processing and glue logic with microprocessors are the most mentioned application of FPGAs.

- Topics for training: Figure 1 shows the average score for a list of proposed courses. Even considering that most of the participants were young people, the first claim was VHDL. Describing circuits by schematics is still a lively tradition. The effort to introduce VHDL or Verilog in the academia should be incremented. The second topic of interest was High Speed Digital Design, an aspect very close to these fields where FPGAs are better than DSPs or microprocessors. Courses about the FPGA tools itself had also an important demand.

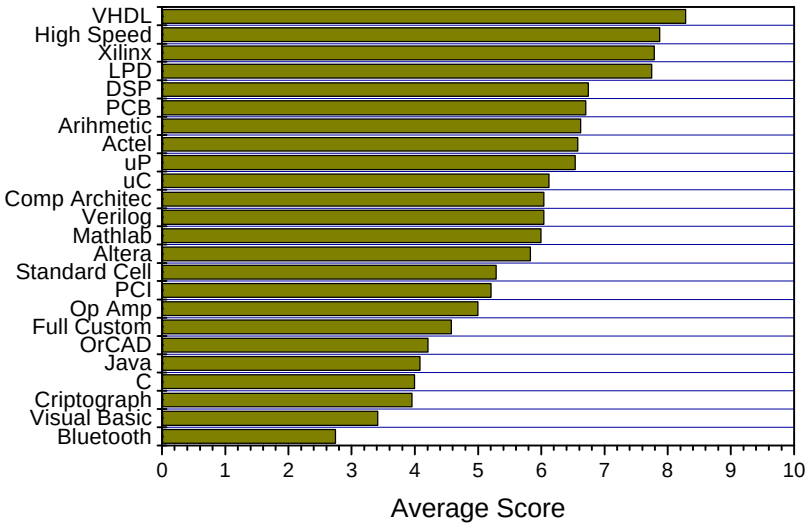

Figure 1. Training preferences of FPGA designers.

- FPGA predilection: A specific course on Xilinx FPGA was scored with 7.75; meanwhile Actel obtained 6.6, and Altera 5.8. This fact denotes that some designers (all of them are customers of Xilinx) also use a second FPGA supplier. For example, the 44% of the assistants expressed their interest in Altera technology. A course like “Xilinx FPGAs for Altera Designers” would be really successfull.
- EDA Tools: An additional problem for the planning of training activities is the variety of tools utilized by the designer: Accel, Cad Star, Fpga Express, Intergraph, Lattice, Mathlab, Maxplus II, Modelsim, Orca Foundry, Pspice, Protel, Quartus, Synario, Synopsys, Tango, Veribest, Verilog, Warp, and Xilinx Foundation.
- Size of the design team: The average size is 5 designers. In these small groups, there is no room for highly specialised people. FPGA designers also must be able to do lot of thing: analog electronics (62%), PCB (62%), microprocessors and microcontrollers (59%), and DSPs (38%). This fact demonstrates that a generalist education at the engineering school is still vital.
- Technical literature: The source of knowledge in the SMEs is other important phenomenon. People learn from databooks and application notes (97%). This

information is obtained from Internet (95%). The 87% uses also books, and the 55% consults the material of training courses. Finally, less than the 50% read technical papers (like those of the IEEE) or standards. Considering that the travel of new ideas from technical papers to textbooks requires several years, universities have an important opportunity to offer the industry updated technical training.

- Training plans in SMEs: People consider that the internal training policy is not completely satisfactory. More than the 60% of the assistant ranked better their companies than their training plans. The lack of training oportunities is recognized between the medium-level management.
- Other hints for course organization: Most of the participants prefer to concentrate the courses in just one day. The second option is to make use of three mornings. The option of Saturdays, where university laboratories are free, must be discarded. More than the 62% of the participants choose courses organized outside their own companies.

4 Conclusions

This study has been focused in some training requirements of the electronic design community in Spanish SMEs. An important number of companies were contacted with the collaboration of an electronic component distributor. A significant demand of training was observed, and several topics for future actions were identified.

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