

Industry/Academia System-Level Design Collaboration: Burden or Benefit?

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Let's not talk about...

- **Basic cooperation on advanced research:**
 - ❖ *Not* a source of problems or a burden - there is a clear interest in Academia towards increasing such type of collaboration;
 - ❖ Industrial “reality” stimulates but does not constrain academic research in such cases.



...rather about...

- More “applicative” aspects, touching on training as well:
 - ❖ Development of overall *design approaches* characterized by specific application areas and/or figures of merit;
 - ❖ Design tools and methodologies *used as means* in research on specific systems;
 - ❖ Adoption and extension of design tools and methodologies in training-for-research activities.



The Hosting environment...

- **ALaRI: an Institute based on Industry-Academia synergy**
 - ❖ Master course teaching plan designed by a joint Academia - Industry Steering Committee;
 - ❖ Teaching body involves industrial experts as well as academics;
 - ❖ Students' Master projects mostly proposed by Industrial partners (advising + monitoring granted jointly by Academia and Industry).



... somehow an answer to the opening question!

- Obviously, ALaRI is a very peculiar environment, where Industry/Academia System-Level Design Collaboration is at the core of the whole adventure...
- Could experience developed here constitute a “general” answer?



ALaRI: The teaching environment

- **Trans-disciplinary education**
⇒ a challenge of embedded systems design!
- **International Faculty**
⇒ greater flexibility towards updating and improving courses and curriculum;
- **Participants:**
⇒ both graduates just out of school and persons with a previous professional experience.



ALaRI: a hotbed for system-level design experiences?

- **From the academic perspective:**
 - ❖ “System” concepts and design philosophy a great educational solution ⇒ designer achieves a flexible, retargetable approach to design problems, has greatest re-training capacity...
- **... the best possible approach!**



ALaRI: a hotbed for system-level design experiences?

- **No problems, then? Just for starters...**
 - ❖ Students are exposed to system-level design concepts in a number of courses \Rightarrow identification of a common entry language far from immediate (at least at present...);
 - ❖ Modeling approaches and tools derived from widely different scientific environments and requirements \Rightarrow no easy way to interfacing...



...system-level design experiences?

- But after all, these are typical problems for an engineer, aren't they?
⇒ may be rather disconcerting for a student...



So, what about interfacing?

- At system level, problem may be (as yet) too “hazy” from the industrial point of view - anyway
- ...it often means “company interfacing” rather than “language translation”!
- Could Academia provide the answer to this problem? Be some sort of “neutral common ground”?



A meeting point?

- **Should Academia be a “special” user of system-level design tools?**
 - ❖ Didn't seem necessary with “traditional” CAD tools...
 - ❖ Quite a different case at system level: one wishes to experiment with different “plug-ins”, mix commercial and public-domain modules, use internal IP rather than (or together with) “commercial” IP...



A meeting point?

- **Summing up: Academics may wish to create their own customized environments...**
 - ❖ **Providers always supported it for big customers...**
 - ❖ **Are they willing to do it with academics? At system level, academic suggestions are prone to be farther removed from “industrial reality” than for gate-level synthesis or test pattern generation!**



Industry-Academia relations: a three-cornered affair?

- A well-assessed experience in the case of system-level design: “user” companies see University research as an “exploration” opportunity where new technologies or methodologies are concerned;
- Technology/methodology providers find in University-based research a possibility to test and validate new proposals on challenging cases - not too far removed from “real” world!



Industry-Academia relations: a three-cornered affair?

- **What about the “in-between” position of Academia?**
 - ❖ **Potentially exciting and fruitful;**
 - ❖ **Fraught with dangers (being the third party where “three is a crowd” ...)**
 - ❖ **A great experience for students involved in this kind of operation!**



A multi-cornered affair - a (small) successful example

- **The case: A Master Research project for two (subsequent) groups of ALaRI students;**
- **The industrial partners involved: a silicon company, a systems company, an end-user of the product;**
- **Role of academia: adopt comprehensive system-level approach to case design.**



A successful example

- **More specifically: design of a general-purpose utility meter characterized by:**
 - ❖ **Wireless connection to utility (through a hierarchy of networks);**
 - ❖ **Low power consumption (battery-operated, with long-battery life requirements);**
 - ❖ **Very low cost.**



A successful example

- **The design flow:**
 - ❖ From high-level requirements formalization to
 - ❖ Hardware-software partitioning
- **Technology-independent (as far as possible!);**
- **UML adopted as highest-abstraction specification language.**



A successful example

- Experience quite positive from the participants' point of view...
- Some basic characteristics - as far as industrial partners were concerned:
 - ❖ Project NOT on a company's critical path, yet
 - ❖ Project of actual interest to all participants, as
 - ❖ The same holds for experience gained on approach and tool.



A successful example

- **What (who) was lacking?**
- **No design tool company in this (informal) cooperation; such absence *was* a source of some problems ⇒ end of the design flow has not yet been reached;**
- **Experience gained instrumental for devising further future collaborations.**



Summing up

- **Collaboration: a benefit - provided collaboration is clearly defined and implemented!**
- **System-level might be the best possible meeting ground for a number of different players;**
- **Academia might find a pivotal role in such a scene.**

