Research in Microelectronic: fun or innovation boost?

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This talk is about something that is not technical!

WE MOVE FROM SOME QUESTIONS

Is the role of research changing?
Why is the role of research changing?
But, … are we aware of this changes?
What are the limits and what are the risks?
How to properly face the new scenario?

And, … am I giving a good answer? Not sure …
Introduction and Motivation

Many years ago, I started with some interests on the social and economical impact of research activity:

In 1993 I proposed to a good friend (J. L. Huertas, General Chair) a plenary at ESSCIRC with title
RESEARCH-BY OBJECTIVES, TECHNOLOGY TRANSFER, AND MARKET EVOLUTION: A VIRTUOUS TRIANGLE

In 1996 I proposed to a good friend (T. Sturaitis, General Chair) a plenary at ICECS with title
RESEARCH AND INNOVATION: A NEW ROUTE TO DEVELOPMENT

In 1997 I was asked to evaluate the electronic research in Finland …
Old way

PIPELINE FOR TRANSFORMING CONCEPTS INTO PRODUCTS

IDEA \rightarrow POSSIBLE APPLICATION \rightarrow PRODUCT

TIME

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5 a 9 de Maio de 2008
Old way: Intellect and very cheap

- Reflection of A. Graham Bell that says: “Leave the beaten track occasionally and dive into the woods. You will be certain to find something that you have never seen before”.

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10ª Escola de Microeletrônica

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Old way: Efficiency and labor

- Four key principles of the Taylor’s scientific management:
  - Replace rule-of-thumb work methods with methods based on a scientific study of the tasks.
  - Scientifically select, train, and develop each employee rather than passively leaving them to train themselves.
  - Cooperate with the workers to ensure that the scientifically developed methods are being followed.
  - Divide work nearly equally between managers and workers, so that the managers apply scientific management principles to planning the work and the workers actually perform the tasks.
Old way: fun and childhood
Old way: I will become famous
Old way: Effectiveness?
Old way: Others? What does it matter …
New deal: Knowledge society

Industrial Revolution (USE OF HANDS)

Knowledge Society (USE OF BRAIN)
The emergence of the Knowledge Society, building on the pervasive influence of modern information and communication technologies, is bringing about a fundamental reshaping of the global economy.

The application of knowledge to economic activity, to the extent that has become the predominant factor in the creation of wealth. As much as 70 to 80 percent of economic growth is now said to be due to new and better knowledge.
Knowledge Society: risks

Diagram showing the percentage of population in different social classes over the years.
Knowledge society and Research

- The recent use of knowledge for generating economical and social advantages is changing the paradigm of research activity, especially in the microelectronic field.

- Since the results of research have a direct impact on high-tech products it is necessary to change the approach and the researchers attitude.
Research in the Knowledge Society

- Short distance between generation and use of knowledge.

The relationship between University and industry is more and more important.

A proper amalgam of the different and at times conflicting objectives can bring long range benefits.
Research in the Knowledge Society

WRONG

◆ University staying in the ivory tower
◆ Monad Industry
◆ Slave University
◆ Vassal Industry

RIGHT

◆ Motivate people
◆ Find the right balance
◆ Proper use of money
◆ Look for effective social results
Motivation

- Set a major goal, **but follow a path**.
- Finish what you start.
- **Socialize** with others of similar interest.
- **Learn how to learn**.
- **Harmonize** natural talent with interest that motivates.
- **Increase knowledge** of subjects that inspires.
- **Take risk**.
The key point is that scientific research and high education are essential for electronic development but they are not (and can not be) the direct instruments for achieving market competitiveness; instead, they are the cultivation soil of innovation.
Research in the Knowledge Society

Find the Right Balance

✧ Global view and international dimension.
✧ Unfettered information flows.
✧ Balanced research-industry relationship.

The link between research, invention, innovation and competitiveness is quite complex. The best approach is the following: researchers receive hints, stimulus for ideas from the industry; these hints are able to trigger the technical curiosity that generates that brain processing which can transform problems into solutions, theories, methodologies.
Proper Use of Money

- No frozen fish
- No just personal fun
- No open loop

- Yes teach how to fish
- Yes social fun
- Yes feedback
Research in the Knowledge Society

Look for Effective Social Results

- Personal grown.
- Long term perspective and short term objectives.
- Co-ordination between scientific organizations
- Favor use and development of state-of-the-art technologies.
- Seek for proper government legislation.
- Stimulate customer feedback.
Conclusions

Sorry, No Conclusions!

◆ Just a Reflection:

“Try to find the right track that enables you to have fun and, at the same time, to favor innovation and social happiness”.

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5 a 9 de Maio de 2008
Thank you!

The care for the man and his destiny must be the top concern of your scientific and technical efforts. Never forget this, … you, flooded by your diagrams and your equations.

Albert Einstein