



# ***Why the interest in the position of Vice-Rector (Research) ?***

**Rui Martins, *Professor***

## ***After 1.5 decade in leading academic/administrative positions :***

***Apr.1, 1993 - Oct.11, 1994***

***Director, CSTR***

***Jan.1, 1994 - Jun.30, 1994***

***Associate Dean, FST***

***Jul.1, 1994 - Aug.31, 1997***

***Dean, FST***

***Sep.1, 1997 - Aug.31, 2006***

***Vice-Rector (Academic/Research)***

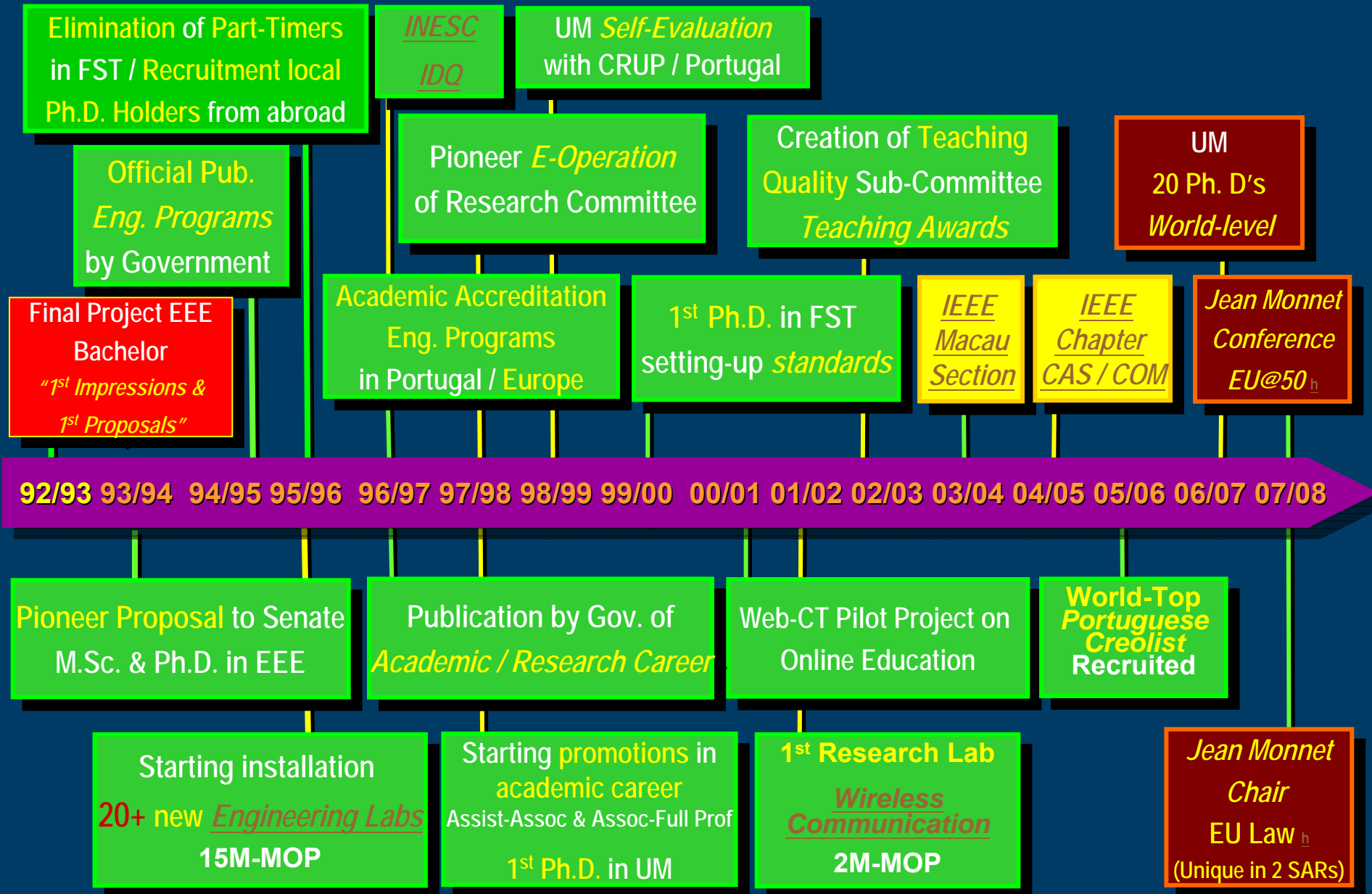
***Sep.1, 2006 - Aug.31, 2008***

***Vice-Rector (Research)***

***(also assisting Rector as VR/Academic)***

***Always accumulating with **Teaching & Research**  
in EEE Bachelor, Master and Ph.D.***

# Instrumental Activity in University – Milestones last 1.5 decade



***UM should still be considered  
a Teaching University***

***UM 10-Year Development Plan Strategy  
- Mission -***

***“To conduct Research for the advancement  
of knowledge and in support of Teaching”***

***This constitutes a significant challenge !***

*But, in **1993** it was even a bigger challenge !*

*There was no **Research** !*

*No **Culture***

*everybody teaching,*

*No **Motivation***

*non-existent academic career,*

*No **Money***

*budget to support other things,*

*No **Publications***

*there were no records*

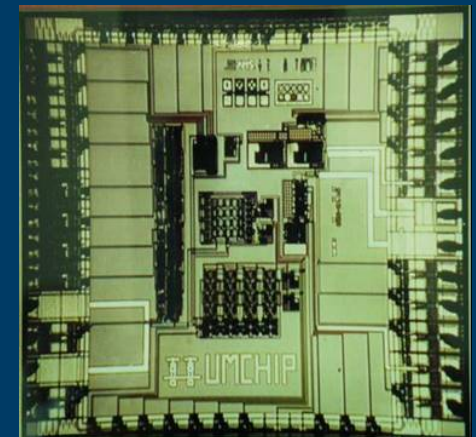
*- **Pioneer** -*

*1st UM research project to RC / 1993*

*40 kMOP*

*UMCHIP*

*1.2 $\mu$ m*



*Result of the 1st M.Sc. Course – **Chip worked & Paper published**  
in an international conference [10 students]*

...since then...

## Research Directory

1993-1995 CSTR



1995-1996 FST



1999-2004 UM



2005-2007 UM



**For the Record (only in academic year 2006/07):**

**36 books** (10 by reputable international editing companies),

**79 book chapters,**

**248 articles in academic journals** (132 in prestigious refereed journals),

**211 papers in international conference proceedings.**

## Budget for Research

1997 to 2007

**10-fold** increase from 0.64% to 6.6% (with S&T Fund)

**2008 to 2017**

(internally) apx. **3-fold** increase necessary to reach **10%**

# [Experience in Raising External Funding]

Local situation **quite different** from developed regions

- No tradition of supporting scientific research in the 90's
- Situation changed with creation of **S&T Council (00/01)** and **S&T Fund (03/04)**

**Instrumental Activity in setting-up conditions for PG training of UM engineering graduates abroad and the launching of local institutions to support financially R&D in S&T:**

1. Initiated a **PG internship** program for FST graduates (since 1<sup>st</sup> batch of EEE in 1993 until 1997) in Portugal - **40 PG students** were supported in top R&D institutions in Portugal  
**[Amount 2.5M-MOP]** – from *Macao Foundation, European Union, Portuguese R&D Institutes*
2. Coordinated launching of **10 Eureka Projects** (label obtained from EU / Partners from Europe, China and Macao) **Proposed the creation of S&T and Innovation Committee** of Macao set-up by Portuguese Administration in **1997**, predecessor of **S&T Council** **[Amount 08 – 23M-MOP]**
3. Coordinated the team of local and Portuguese institutions that created **INESC-Macau** / Institute of Systems Engineering and Computers in **1996**. Chaired the Institute between 96 and 03  
**[Amount 10M-MOP]** – from *Macao Foundation, Foundation for Cooperation and Development, Government Hospital, Blood Bank, UM, CEM, CTM, CTT, INESC, MPI, ADA*
4. Coordinated the team of local and Portuguese institutions that created **IDQ-Macau** / Institute of Development and Quality in **1996**. Integrated and Chaired GA of IDQ between 96 and 99  
**[Amount 13M-MOP]** – from *Macao Foundation, Foundation for Cooperation and Development, UM, ISQ (Portugal), IACM, LECM, CPTTM, MPI* **[key in building construction]**  
*[generated income 2001 / 0.9M-MOP, 2007 / 7.5M-MOP]*
5. Local high-tech company – **Chipidea-Macau**, world-leader in Analog IP Solutions (microelectronics)  
**[Amount invested 50M-MOP / 6 years]** – employs 30+ EEE graduates from UM
6. **First US Patent from UM** / Microelectronics (06/07) **[Amount 160k-MOP]** – supported by **S&T Fund**
7. **2 Research Projects** / Microelectronics (07/08) **[Amount 3M-MOP]** – supported by **S&T Fund**
8. **Jean Monnet Chair & Conference** (07/08) **[Amount 1M-MOP]** – supported by **European Union Commission**

# Research in Microelectronics – Milestones last 1.5 decade

**11 M.Sc. Theses & 9 Ph.D. Theses**  
 (including 1<sup>st</sup> in S&T and 2 Dual-Degrees with Technical U Lisbon)  
 [All local graduates, except 2 M.Sc.]

The 7<sup>th</sup> IEEJ / IEEE International  
*Analog VLSI Workshop* Hosted  
 (in cooperation with IEE Japan)

*IEEE*  
*APCCAS 2008*  
 (Dec08)  
 [Top in Asia-Pacific]

“Lagging behind  
 20 years”

1<sup>st</sup> Local Paper  
 In *IEEE Journal*

2<sup>nd</sup> & 3<sup>rd</sup> Books published by  
 Science Press/China & Springer

3 Ph.D's  
 (Jun08)  
 Expected

1<sup>st</sup> CMOS IC Courses  
 in MSc EEE of UM

1<sup>st</sup> Local Paper  
 in *IEE Journal*

*Analog & Mixed-Signal*  
*VLSI Lab* inauguration  
 3M-MOP

1<sup>st</sup> paper in *IEEE*  
*Symp. on VLSI*  
 2<sup>nd</sup> Ph.D. Grad.

1<sup>st</sup> IEEE Fellow  
 in Macau (Jan08)

1993 1994 1996 1997 2000 2002 2003 2004 2005 2006 2007 2008

“From the Desert into the Sea”

1<sup>st</sup> Chip –  
 UMCHIP Developed

1<sup>st</sup> M.Sc. in IC  
 area from UM

1<sup>st</sup> Ph.D. in Analog &  
 M-S IC from UM  
 1<sup>st</sup> Scientific Paper  
 in *IEEE ISSCC*  
 (in China // HKUST)

Winner of IEEE DAC / ISSCC Ph.D.  
 Student Design Contest (1<sup>st</sup> in Asia)

1<sup>st</sup> Local Paper in *IEEE CICC*

1<sup>st</sup> US Patent filed

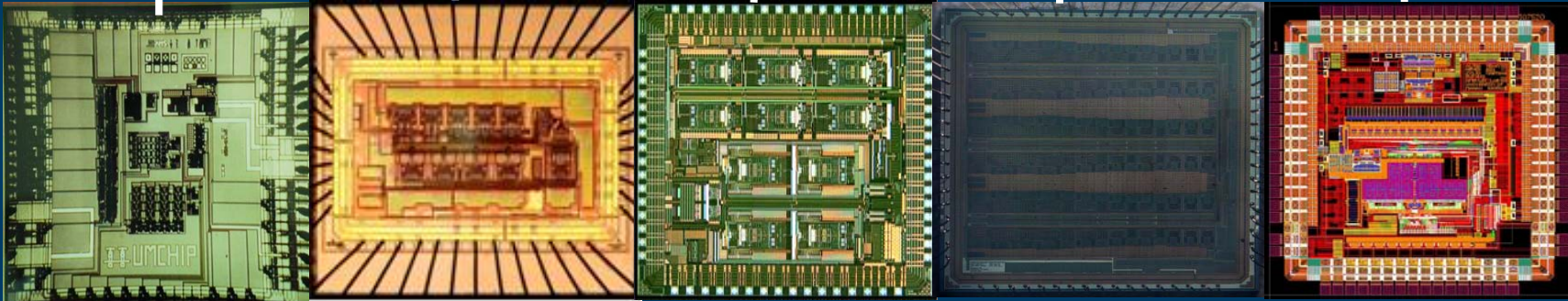
1<sup>st</sup> Industry Chipidea  $\mu$ -electronics  
 (Macau) Established

1<sup>st</sup> Scientific Book  
 published by Springer



# Microelectronics CHIPS - 1st MSc Course & 4 PhD Theses

1994 1.2 $\mu\text{m}$     2002 0.35 $\mu\text{m}$     2006 0.35 $\mu\text{m}$     2007 0.18 $\mu\text{m}$     2008 90nm

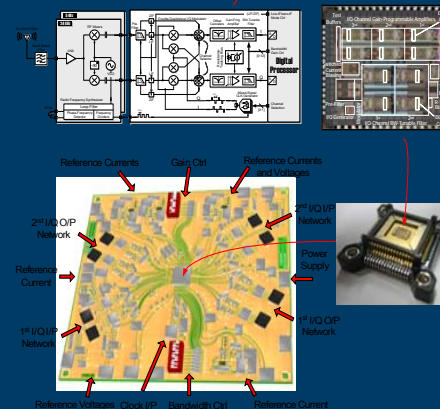
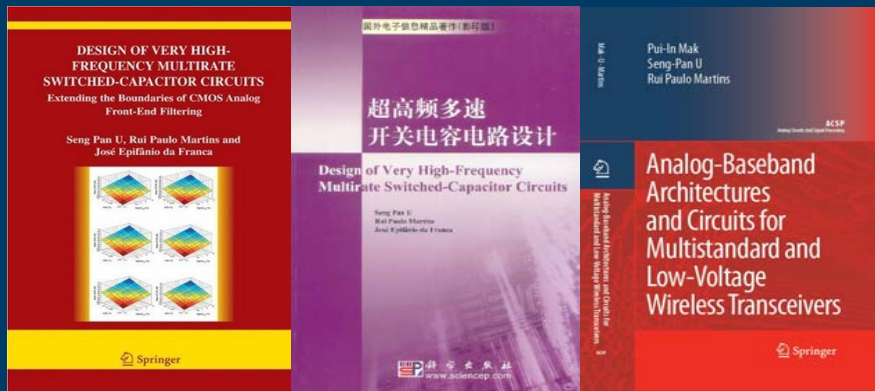


"State-of-the-art"

**3 Books from PhD Theses**

(Springer – 2005 & 2007 + Science Press / China - 2007)

**2 U.S. Patents**



**222 Publications**

- 3 Books (co-authored)
- 6 Books (co-edited)
- 3 Book Chapters
- 30 Ref. Journal Articles
- 118 Ref. Art. Conf. Procs.
- 62 Others

Plus, My Favourite Teacher in EEE Department October 2007

in line with 10-year strategy:

"To conduct Research for the advancement of knowledge and in support of Teaching"

Now, in **2008** there are already significant **Research** results for a **Teaching** University but there is a considerable **asymmetry** among Faculties

**Better internal conditions :**

1. **Embryo of Research Culture** **strong** in FST and ICMS and **rising** in other Faculties;
2. **Quantity & Quality of Publications** **increasing** every year university-wide;
3. **Staff Motivation** **strong** due to need of progression in academic career;
4. **Financial Support** is **adequate** internally & externally.

**To capitalize on the results achieved – Plan for 2008-2012 (and beyond):**

- **Creation** of **University-level** and **Faculty-level** research projects (January 08)
- **Definition** of **UM Key Research Areas** at University-level (January 08)
- **Revision** of the Research Committee Rules to allow **higher financial flexibility** and to **increase researchers' accountability** – More PG Studentships, Post-Docs, Definition of Conferences Academic-Levels, Better Conditions for Field-Trips and Visiting Scholars, etc...(January 2008)
- **Creation** of conditions to set-up **External Research Assessment** (after 2010)
- **Definition** of world-level **Areas of Excellence** (after 2012)

# UM Key Research Areas <sub>h</sub> (coordinated only by Full-Professors)

- FST** Computational Structural Mechanics  
Urban Environmental Management  
Computer Visualization Reality  
Machine Translation (*Portuguese-Chinese Automatic Translator – unique in the world / PhD*)  
Microelectronics (*possible future National Joint-key research lab with Tsinghua U*)  
Power Electronics  
Thermal Engineering  
Robotics  
Hyper-Complex Analysis  
Computational Numerical Analysis [ 8 out of these 10 areas already graduated 10+Ph.Ds ]
- ICMS** Chinese Medical Sciences (and the Chinese Medicine Journal by ISCM)
- FSH** Linguistics [ already 2 Ph.Ds ] (*emphasis on Portuguese Creolistics, focus on Patuá / Macau – world top*)  
Macau Macroeconomic Model (*coordinated by a Nobel Prize winner*)  
Chinese Foreign Relations
- FLL** Macau Legal Knowledge Collection (*with publication of new text manuals in Chinese & Portuguese*)
- FED** History of Macau Education
- FBA** Gaming Management (*coordinated by ISCG with external funding – unique in Asia*)

**@Faculty-level:** PISA (OECD), Socio-Criminology, Finance, Business Ethics & Psychology, Gaming Law, Digital-Divide, World-Internet-Project (UCLA/USC), etc.

Current Project Statistics: FSH-54, FST-46, FBA-22, FLL-19, ICMS-16, FED-13

*...in line with the Values of UM 10-year Development Plan Strategy:  
To Excel in Research with Unique Cross-Cultural Characteristics*

# ***SWOT analysis of UM's Research area***

## ***Strengths***

- i) Leading Public University representing Macao SAR**  
*[With adequate financial support]*
- ii) Young and energetic Academic Staff Group (Assistant Profs.)**  
*[Mentoring in preparation for Social Sciences and Business areas]*
- iii) Excellent Infrastructure:**
  - a) Computer and Communications network (wireless & paperless)**
  - b) Well-equipped labs for Research in university key areas**
- iv) High-level international criteria for graduation at Ph.D. level**  
*[Unique in the local HE-sector]*
- v) Attraction of top PG students from Macao and China**
- vi) Singularity in terms of Culture Mix (East & West - including Africa)**
- vii) Strategic leadership in Asia on Gaming Management Studies**

# Weaknesses

- i) Lack of leading Senior Academics in several areas (ex. FBA)**  
*[Not even one Full-Professor in the whole Faculty]*
- ii) Lack of critical mass for Research due to small dimension**  
*[Difficulty for one academic to research alone in a specific area]*
- iii) Lack of Space on Campus for teaming-up Research groups**  
*[New labs are necessary to face the development of UM Key Research areas]*
- iv) Teaching-oriented staff in some Faculties (FBA, FSH & FED)**  
*[Reduction of teaching credits per major needed to release staff for research]*
- v) Excess of Part-time academic staff in FLL**  
*[Difficult problem to solve due to the bilingual characteristics of Macau legal system]*
- vi) Difficulty in recruiting as Post-Docs top graduates from China**  
*[Problems with working permit]*
- vii) Deficient university's image promotion in academic circles**  
*[Due to the lacking of well-known Scholars]*

# Opportunities

- i) Important Role to play in diversification of Macau's Economy**  
*[Local center of knowledge in several areas, like economy, business, computers, internet, social studies, law, gaming management, microelectronics, environmental studies, Chinese medical sciences]*
- ii) Key-University in the Regional Integration of Pearl-River Delta**  
*[In particular the West-side – With good links to top universities in HK]*
- iii) Window-to-Portuguese-speaking world, namely Africa & Brazil**
  - a) Expertise in Creole Studies *[Top of the world]*
  - b) Place of interface between European Law & Chinese Law
- iv) Important place for Historical research**  
*[Historical building structures preservation – World-Heritage site]*
- v) Unique site for research about cultural-interaction**

# Threats

**i) Local low-level awareness of HE-Research Environment**

*[Lack of knowledge about international standards in the area]*

**ii) Rumors about merging of local HE-Institutions**

*[Possible, but may hinder or slowdown the present pace of development]*

**iii) Development of 4-year majors in HK may imply staff turnover**

*[In particular among the young and energetic academic staff group – ex. Assistant Professors]*

**...in the present competitive and global world, universities can only be singled out according with international recognized standards by their research level**

**(...and 'quantum leaps' are not possible, 'consolidation' is the keyword for the future 10-years)**

**In conclusion, the answer to the initial question of:**

***“Why the interest in the position of Vice-Rector (Research) ?”***

**is:**

***“To continue working towards a challenging goal of raising UM's international status in the research field with significant repercussions in the overall university's image, with a personal open and tolerant research-oriented mind, enjoying to 'lead by example' and to participate in 'team-work', with deep knowledge and experience of the internal university operation and the local environment.”***